

Historical Monetary Statistics for Norway 1819-2003

Øyvind Eitrheim, Jan T. Klovland and Jan F. Qvigstad (eds.)

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Preface

*This project on Historical Monetary Statistics in Norway was initiated in the Statistics Department of Norges Bank in the mid-1990s by its former director Jon P. Holter. Drawing on more than 30 years of service in Norges Bank, he started out with the aim of improving the quality of a relatively crude historical consumer price index which had previously been constructed in 1978, and which was based on only a few benchmark years between 1835 and 1865. Holter collected annual market prices for eight groups of commodities and this formed the basis for an improved price index for this period. Holter's first article on consumer prices was followed by a series of articles (in Norwegian) on the main monetary variables which would shed some light on the development in consumer prices, such as historical exchange rates, monetary aggregates, the production and circulation of coins and interest rates. These articles were published during the years 1996–2000. The article about “Inflation over 300 years”, which was published in the Bank of England's *Quarterly Bulletin* in 1994, certainly was a great inspiration for this work.*

In 2001 the responsibility for the project was transferred to the Research Department. After some discussion about the reliability of the collected raw material and the methods used to construct long runs of price indices, it was decided to fill in missing lacunae and make some improvements in the weak spots detected. The scope of the project was also widened to cover not only the variables relevant to price stability, but also the other main area of responsibility for central banks – financial stability. The focus of the project has been to construct long time series of a reasonably high quality for a limited number of macroeconomic variables. The selected variables are considered to be of central importance in the areas of price stability and financial stability. Within the limitations of the available time and resources, the aim is to provide increased quantitative knowledge about historical developments in Norway back to 1819 (Norges Bank was established in 1816 but it was not until 1819 that it became fully operational). The aim of the project is to collect and systematize the historical background material – making the material available for economic research and analysis. We have also made the historical data available at Norges Bank's web-site to stimulate further work in this area.

In 2001 it was also decided to provide the project with more resources. Professor Jan T. Klovland, Norwegian School of Economics and Business Administration, has been engaged in the project since 2002 through a part-time position at the Research Department. In addition

to acting as a consultant for the project, Klovland has focused on improving the historical data on interest rates and monetary aggregates. In the fall of 2002 it was also decided to increase the ambitions of the project following some preliminary investigations into the Historical Archive on Prices and Wages at the Norwegian School of Economics and Business Administration, which was assembled in the 1930s by the School's first rector Professor Ingvar Wedervang. This Archive had not previously been utilized in a systematic way in the context of a price historical project for the period prior to 1850. In the fall of 2002 two students were hired to help collect historical price information from these archives under the supervision of Professor Ola H. Grytten at the Norwegian School of Economics. Professor Grytten has been associated with the project since 2003 in a part-time position at the Research Department. It was also decided to publish documentation of the project in Norges Bank's series of Occasional Papers. In 2003 the project expanded into the area of collecting historical house prices and a series of studentships were organized in four Norwegian cities which enabled us to construct a large database for historical market prices for housing capital. This database forms the basis for the construction of repeat sales indices for house prices reported in Chapter nine in this volume.

This book provides detailed documentation of the historical database as of June 2004. The data are available in spreadsheet format on Norges Bank's web-site. The web-site will be updated with information about revisions and corrections of errors in the database. It is therefore advisable to check the current status of the historical database at <http://www.norges-bank.no>. During the work with this publication we have benefited greatly from comments from many colleagues. Solveig Erlandsen has provided editorial assistance throughout the project and she has also served as project coordinator for the collection of data for historical house prices. Anne Sandsbraaten and Rønnaug Teige have provided technical assistance with the web-publication of this project and Øystein Bieltvedt Skeie has read the final manuscript and helped eliminate errors in the reported data. We are also grateful for comments from Forrest Capie, Peter Englund, Andrew Filardo, Olle Krantz, Lasse Sandberg, Pierre Siklos and other participants at a seminar in Norges Bank on June 11th 2004.

September 2004,

Øyvind Eitrheim, Jan T. Klovland and Jan F. Øvigstad

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Chapter 1 – Introduction

Øyvind Eitrheim, Jan T. Klovland and Jan F. Qvigstad ¹

1. Introduction

This book presents historical data on a (small) number of macroeconomic variables relevant to monetary policy analysis for the period 1819-2003. The motivation of the project is to enhance our understanding of the long lines of developments in two areas of utmost importance to central banks - those of fostering price stability and financial stability. Norges Bank aims at stabilizing consumer price inflation at 2.5 per cent within a flexible inflation targeting regime. The promotion of financial stability aims at analyzing and identifying factors that foster sound financial developments through the monitoring of economic developments in the household sector and the corporate sector as well as for banks and other financial intermediaries.

The aim of this study has been to include sufficient macroeconomic variables to sustain the analysis of both price stability and financial stability. Constructing a dataset which covers a long time span enables us to ask questions about the formation of prices in different time epochs and across different economic policy regimes and the evolution of policy institutions, cf. Bordo and Jonung (1987) for a detailed analysis.

The first major prerequisite for a successful empirical research project using historical data is that economic data for the subject matter are available and that the data are of sufficiently high quality. This places some requirements on the accuracy, reliability, coverage and suitability of historical data for the particular application. This fact is often overlooked in practice, maybe because the perceived return on the construction of high-quality data appears to be low. True or not, in this project we hope that the indirect payoff in the form of enthusiastic users of the historical material we present and also the improved quality of the research which is promoted by the availability of these data will greatly outweigh the costs of making the data available to a wider audience. A high quality dataset which covers the period from 1819 to 2003 will provide enhanced understanding of the economic developments across epochs of important changes in Norwegian society.

¹Øyvind Eitrheim is Director in the Research Department, Norges Bank, Jan T. Klovland is Professor at the Norwegian School of Economics and Business Administration and a Special advisor to the Research Department, Norges Bank, and Jan F. Qvigstad is Executive Director and Chief Economist in Norges Bank. Thanks to Aanund Hylland for valuable comments.

2. Why 1819?

This book contains historical monetary statistics widely defined to also include consumer prices, output and asset prices. For many of the macroeconomic variables the time series go back to 1819. The reason that 1819 has been chosen as the main starting year has to do with the fact that a number of main historical developments in Norway took place around the time when the Napoleonic Wars in Europe ended.

In 1814, Norway had been united with Denmark for more than 400 years. The state was strongly centralized, with all important state institutions located in Copenhagen. The Danish King Frederik VI sided with France in the Napoleonic Wars. In 1807 the King had two options, both implying an end to Denmark's strategy of remaining neutral in the conflict: He could either yield to the English demand for control over the Danish/Norwegian fleet to secure their geostrategic interests in Northern Europe, or he could join France and its allies in the sea blockade of England. The English side took by force the Danish/Norwegian fleet in Copenhagen in 1807, undertook the first military terror bombing of civilian targets in Copenhagen and landed close to 30000 troops north of Copenhagen (Feldbæk, 1998, p.314-316). Of the two evils, and having lost the fleet to England, the King decided to join the French side (Feldbæk, 1998, p.318). France offered territorial protection if Denmark took part in the sea blockade of England and supported the French/Russian side in the conflict with Sweden. Sweden, who sided with England in the conflict, had lost Finland to Russia in 1809 and were promised Norway as a compensation and later as a reward for helping Russia during the French invasion in 1812 (Feldbæk, 1998, p.325-329).

France and its allies were finally defeated in 1813 and in January 1814 King Frederik was forced to sign the Treaty of Kiel, ceding Norway to Sweden. This was not immediately accepted by prominent circles in Norway. A Constitutional Assembly was hastily called, and on May 17th a Constitution of an independent Norway was promulgated. Sweden showed some military muscle in order to enforce the Treaty of Kiel, and on November 4th an extraordinary session of the Norwegian Parliament decided to revise the Constitution and accept a union with Sweden, which lasted until 1905. Basic structures of the May 17th Constitution were, however, maintained. Norway was referred to as an independent kingdom united with Sweden under a common king, and it kept all state institutions that characterize an independent state, except the foreign service, which was joint with Sweden. In or shortly after 1814, therefore, Norway established its own Parliament (Stortinget), its own government and central administration, its own Supreme Court (operative from 1815), and its own Central Bank, Norges Bank. In addition, a Norwegian university had been founded by King Frederik in 1811 and was operative from 1813. Concerning monetary policy, the original Constitution of May 1814 listed among the duties of Parliament that it should oversee the monetary system; no reference was made to a Central Bank. The revised Constitution of November 1814, however, explicitly stated that Norway should keep its own Bank and monetary system. Hence the Norwegian Parliament pre-

served its independent legal authority to decide on Norway's monetary system and institutions under the union with Sweden.² The Bank was established by the Central Bank Act of 14th June 1816. It took, however, some time before the bank became operational. The first book entries came in 1818. In 1819 the bank was fully operational.

3. A brief overview of the book

Chapter 2 contains an overview of the early work on historical monetary statistics in Norges Bank. Director of the Statistics Department in Norges Bank, Jon P. Holter, started this work in the mid-1990s with a limited aim of improving the rather crude and incomplete consumer price index which had been used since 1978. This index was constructed on the basis of only five goods and used data for every 10th year in the period before 1865. After 1865 the index was spliced with different price indices available from Statistics Norway. Holter's work concentrated on filling in price information for the missing years, based on annual observations of different brands of grain and potatoes. Meat prices were still only observed every 10th year and the intermediate observations were based on (linear) interpolation. The revised index, which covered more items of consumer goods than the previous index, was documented in Holter (1996). After this initial work the scope of the historical project was broadened to cover the main monetary variables which would shed some light on the development in the price index, such as exchange rates (Holter, 1997), monetary aggregates (Holter and Tørum (1999) and the production and circulation of coins (Holter, 2000a). In August 2001 the project was transferred to the Research Department, and in the fall of 2002 the ambitions for the project increased further.³ The final part of Chapter 2 provides an overview of the development of monetary statistics in Norges Bank, and describes the main principles behind the compilation of monthly tables of monetary statistics which were viewed as necessary for operational purposes.

In Chapter 3 Ola H. Grytten⁴ gives an overview of the principles underlying the construction of a new historical *consumer price index* for the period 1516-1871. Grytten has taken up the challenge left by Jon Petter Holter and has constructed a new CPI for Norway, spanning almost five centuries, 1516-2003. The CPI is constructed by splicing existing CPIs from 1871 onwards, with the new CPIs 1516-1819 and 1819-1871. The new indices are, like those they are spliced with, calculated

²The increased level of precision in the text of the revised Constitution of November 1814 indicates that the Parliament felt a need to clarify Norway's legal right to an independent monetary system before entering the union with Sweden (NOU 1983:39, p.105-106). The purpose of these clarifications was to avoid a common monetary system and a common central bank with Sweden (Syrstad 2003, p.204), see also Aschehoug (1892, p.384).

³Preliminary investigations into the Historical Archive on Prices and Wages at the Norwegian School of Economics and Business Administration, assembled in the 1930s by the School's first rector Professor Ingvar Wedervang, revealed the potential for achieving a significant gain in the quality of the historical consumer price index if we could utilize this material more systematically. See Chapter 3 for a presentation of Professor Wedervang and a more detailed description of these historical archives on prices and wages.

⁴Ola H. Grytten is Professor at the Norwegian School of Economics and Business Administration in Bergen and has been associated with the project since 2002.

according to the Laspeyre formula. This means that annual price movements are weighted by the included item's share of private consumption in the households in the base year. In order to construct this new CPI, most price data are compiled from the Wedervang Archive (see footnote). Information on consumption expenditure weights are taken from research carried out by scholars in economic and social history along with surveys undertaken by the central administration and Statistics Norway. Figures 1 and 2 show the development in consumer prices and annual rates of inflation over the period 1516–2003.

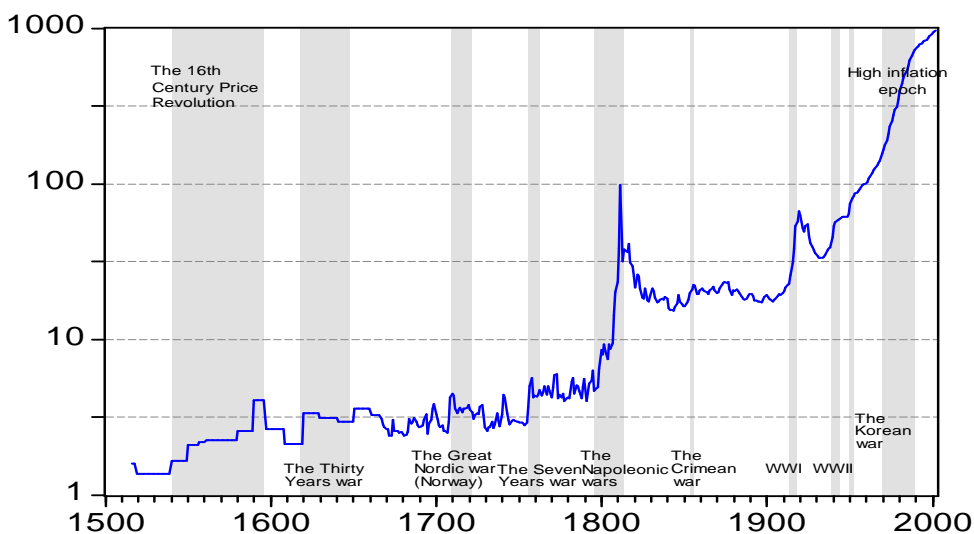


Figure 1: Historical consumer prices 1516–2003. Semi-logarithmic scale. The shaded areas designate periods of war and other periods with high inflation.

In the 16th century prices were increasing but the inflation rate was not so high. Inflation periods are mainly related to wars: The Thirty Years War in Europe (1618-1648), the Great Nordic War (1709-1721), the Seven Years War (1756-1763), the Napoleonic Wars (1796-1814) with hyperinflation, the Crimean War (1854-1856), WWI (1914-18), WWII (1939-45) and The Korean War (1951-1953). A special period is the inflation epoch of the 1970s and the first half of the 1980s. Then we had inflation and no war. We see that for hundreds of years it was normal to have a stable price level with variations around this level and shifts in the price level seem mainly to be associated with periods of war, famine, blockades and/or severe social distress. After WWI there has been a steady rise in the price level.

We had hyperinflation during The Napoleonic Wars, very high inflation after WWI and we observe high inflation in the 1970s and the first half of the 1980s. We observe the highest annual inflation rate in 1812 (152 per cent) and the largest rate of deflation in 1813, when prices fell by 68 per cent.

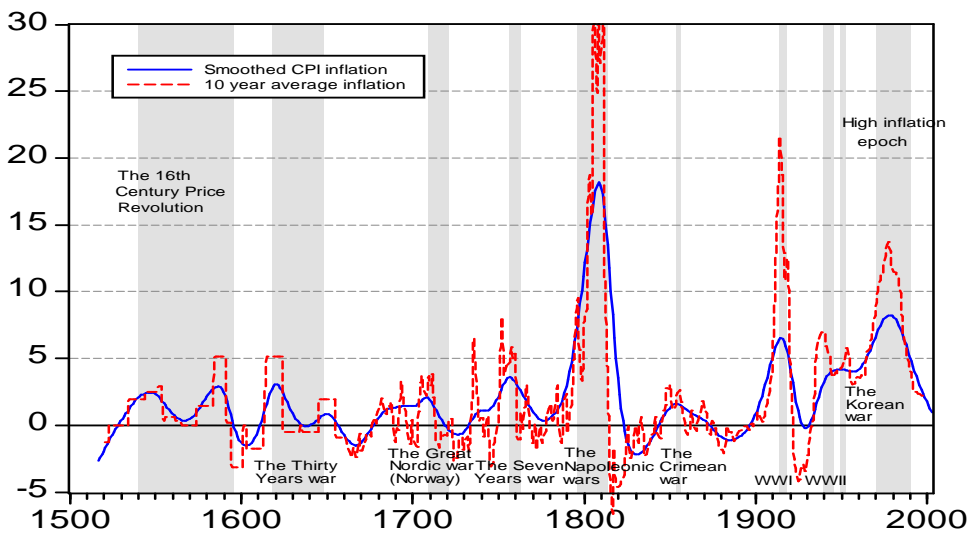


Figure 2: Smoothed rates of annual inflation 1516–2003 (HP-filter with smoothing parameter equal to 1000). The shaded areas designate periods of war and other periods with high inflation.

The longest period of price stability was observed in 1842-1914 when the average inflation rate was 0.6 per cent with a standard deviation of 4.6 percentage points. During this period we had a fixed exchange rate regime with the silver standard (1842-1874) followed by the gold standard (1874-1914). But also the period from 1630 to 1700, when the average inflation rate was 0.3 per cent (with standard deviation 7.5 percentage points), stands out as a period of price stability. However, the last 15 years (1990-2003) have also been a good period for central bankers that like price stability. During this period the average inflation rate has been 2.4 per cent with a standard deviation of 0.9 percentage points.

Is it meaningful to construct such long time series? Let us think of Bach’s cello suite (no 1-3) which you can find on a CD from EMI classics. That CD could be purchased for 190 NOK in Oslo in 2003. We can then calculate that this CD would have been priced at 0.75 NOK (75 øre) in 1720 when the music was composed. Is it meaningful to make such calculations? One could perhaps ask the question: What would have been the price of a concert in the Royal Palace (in Copenhagen at that time) with a cellist playing “live”? One would also need to know the weight of live music concerts in the consumption basket of the average consumer in 1720 (not large!) compared to the weight of CDs in the consumer basket of today! When weighting together the different goods in the bundle of consumer goods, we need price data. For meat we had data for cows sold at the market. One would perhaps think it is easy then to find the price of a kilo of meat. But not so. We learned through the

process of making this book that a cow producing milk and meat in 2003 is a very different animal than the cow that produced the same goods 100 years ago. We now know that in the early 19th century the weight of a cow was lower than that of a pig today.

In Chapter 4 Jan T. Klovland presents new empirical evidence on the development in *bond yields* from 1820 to 2003. The first part concentrates on sources and methods for measuring monthly yield data on bonds issued by the Norwegian government (from 1820 onwards), Kongeriket Norges Hypotekbank⁵(from 1852 onwards) as well as private bonds in the period after 1921. The bond yield estimates are derived from market quotations for Norwegian bonds traded on the main financial bourses of Northern Europe. Before 1921 the character of the bonds only permits the computation of the average yield on long-term maturities. After 1921, however, the data encompass all maturities along the yield curve, with some gap at the short end in the early years. Figure 3 shows nominal bond yields for the entire period from 1822 to 2003.

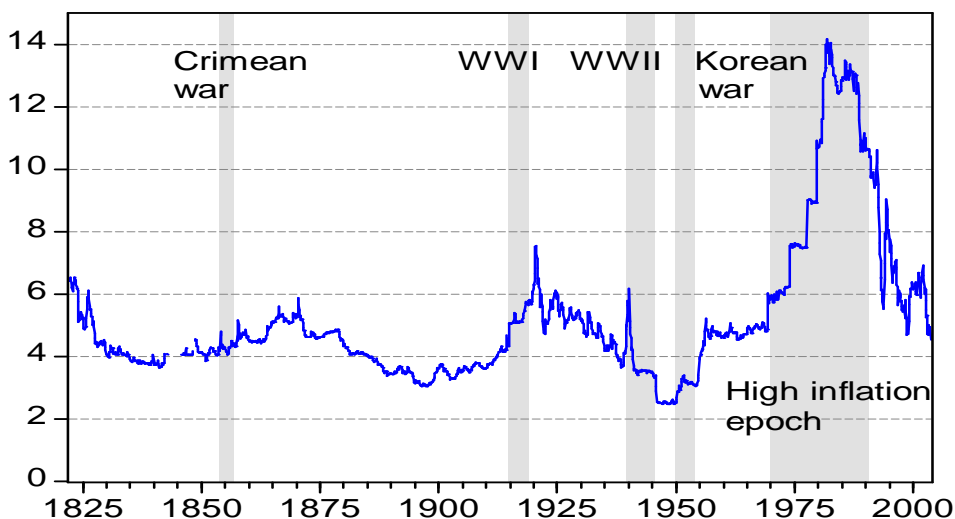


Figure 3: Yield (in per cent) on Government bonds March 1822 - December 2003

The average yield in 1819-2003 is 5.1 per cent with a standard deviation of 2.2 per cent. The yield today is 4 1/2 per cent. The highest yield (13.7 per cent) was observed in 1982 and the lowest yield (2.5 per cent) was observed in the late 1940s.

Chapter 5 is also written by Jan T. Klovland and contains a detailed description of data on *monetary aggregates* and key items on the central bank's balance sheet. Historical time series on the stock of

⁵Kongeriket Norges Hypotekbank was established in 1852 as a state bank for mortgage loans.

money and its components for the period extending back to 1819 have not appeared in published form until now, although earlier vintages of the broad money stock estimates have been used in some econometric studies and tabulated in appendices. Most of the time series presented are revised versions of data which first appeared in Klovland (1984a,1984b). Figures 4 and 5 show the levels and growth rates of M0, M2 and notes and coins for the period 1819 - 2003.

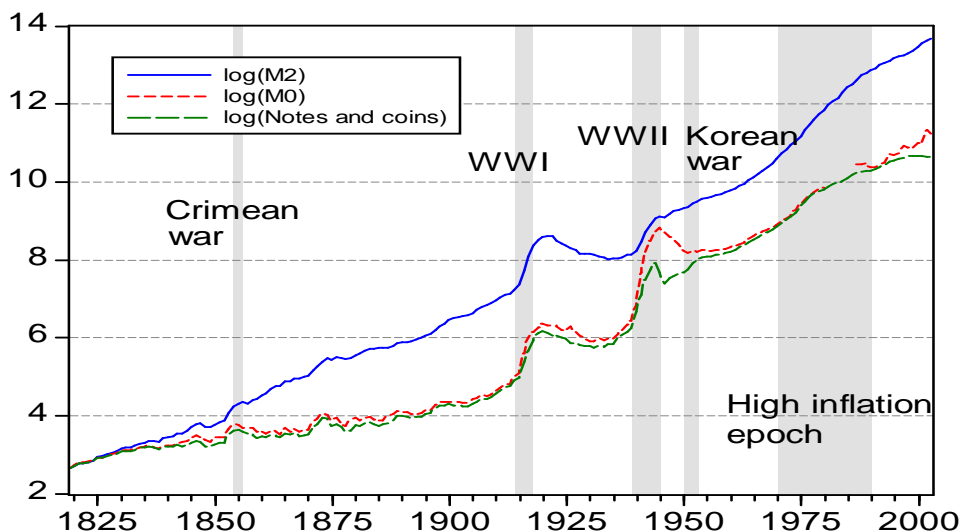


Figure 4: Monetary aggregates 1819–2003. Logarithmic scale.

Chapter 6 is written by Ola H. Grytten and contains a detailed description of sources and data underlying recent calculations of the level of GDP in Norway in the period 1830-1865. These data are combined with Statistics Norway's national accounts data for GDP in Norway from 1865 and revised national accounts 1970 and onwards. Figures 6 and 7 show the development in levels and five-year average annual growth rates of GDP (million NOK in 2000-prices).

The average annual growth of GDP during the entire period 1830-2003 was 2.9 per cent. Growth rates in sub-periods were 2.4 per cent (1830-1870), 2.1 per cent (1870-1914) and 2.5 per cent (1914-1945). Then we had the period of high growth 1945-1970 when the annual average growth rate was 5 per cent. In the most recent period 1970-2003 the growth rate was 3.4 per cent. The highest annual growth rate was 17.1 per cent in 1919; the largest annual decrease was 9.7 per cent in 1921. Note that these episodes cannot be read from Figure 7 which shows five-year average growth rates. The fall in GDP in 1921 is comparable to that of Finland in 1991/92 (-10 per cent), Korea in 1998 (-7 per cent) and Argentina in 2002 (-11 per cent).

In Chapter 7 Jan T. Klovland gives an overview of sources and data for *exchange rates* quoted on

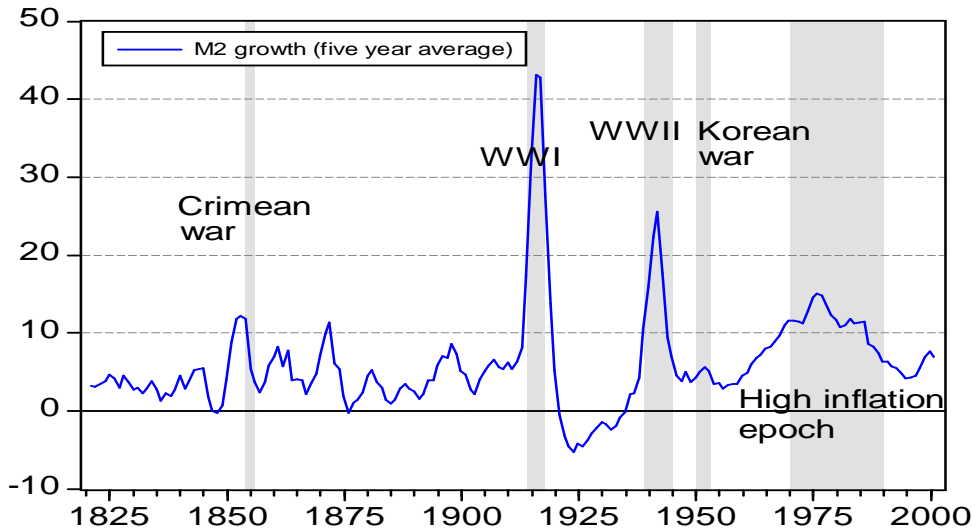


Figure 5: Monetary aggregates 1819–2003. Average annual growth rates over five years.

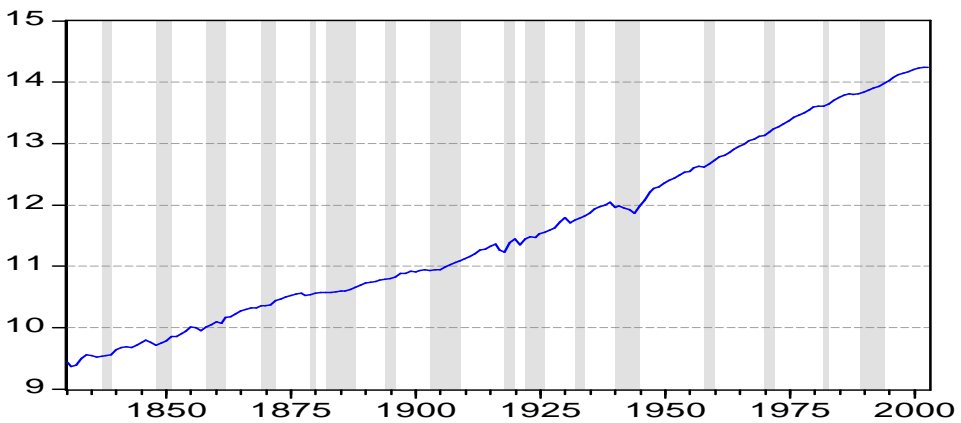


Figure 6: The gross domestic product of Norway 1830–2003 (million NOK in 2000-prices). Logarithmic scale. Shaded areas designate recession periods.

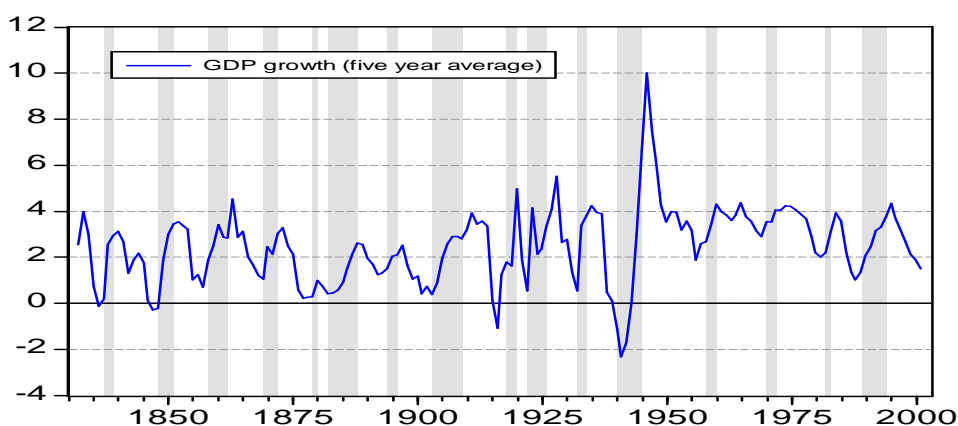


Figure 7: The gross domestic product of Norway 1830–2003. Average annual growth rates of five-year periods. Shaded areas designate recession periods.

the Christiania Stock Exchange since 1819. Monthly quotations are recorded for the most important exchange rates over the 185-year period from 1819 to 2003. In the first decades the most active markets were generally the “long” bill of exchange (time bills). At the end of the 1850s the prices of “short” bills of exchange, which were payable at sight (*a vista*), became the standard market quotation for bills in London and Hamburg. Chapter 7 shows how the recorded prices of time bills must be corrected for the interest component in order to derive a consistent (short) exchange rate series. Figure 8 shows monthly quotations of nominal exchange rates for the British pound and US dollar from 1819 to 2003.

The first years after the establishment of Norges Bank and introduction of our own currency, there were large fluctuations in the exchange rate. In 1823 the Government and Norges Bank decided to re-establish the silver parity. It took 19 years to achieve this target (1842). Norway adopted the gold standard in 1874 and this regime lasted until WWI broke out in 1914. We note from Figure 8 the remarkable stability in the price of the British pound between 1842 and 1914. During the gold standard era from the early 1870s the British pound was the key exchange rate of the international monetary system. After WWII the Bretton Woods System was established with the US dollar as the core medium of exchange.

Chapter 8 is written by Jan T. Klovland and gives an overview of sources and data for *stock exchange indices* quoted on the Oslo Stock Exchange (OSE) since 1914. The material consists of the available stock market indices (with the addition of two months in 1940). The main purpose of this chapter is to present time series without level breaks for the entire period after 1914. It should also be noted that price quotations for shares traded on the Christiania Stock Exchange exist back to 1881. It is thus

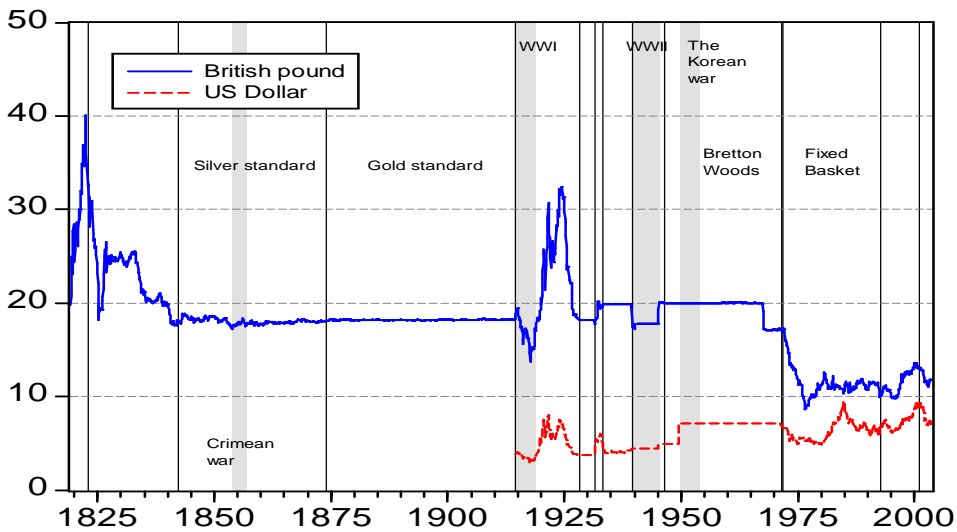


Figure 8: Nominal exchange rates April 1819 - December 2003. Kroner per British pound and kroner per US dollar.

possible to extend the existing indices backward from 1914, but this task is left for future research. Figure 9 shows the monthly development in three stock price indices from September 1914 - July 2001.

In Chapter 9 Øyvind Eitrheim and Solveig Erlandsen⁶ present long runs of historical *house price indices* for the four Norwegian cities Oslo, Bergen, Trondheim and Kristiansand, as well as an aggregated house price index from 1819 to 2003. The house price indices for the period 1819 to 1985 are estimated on the basis of nominal transaction prices of real property, compiled from the property registers of the four cities, using the repeat sales method. The new house price indices are spliced with existing house price indices from 1986. Figure 10 shows the development in the aggregate repeat sales house price index. The shaded areas indicate periods with strong growth in nominal house prices. The credit-fuelled boom-to-bust development in house prices in the 1980s and early 1990s is still fresh in mind. However, as Figure 10 shows there were also episodes with strong growth in house prices in the 19th century. For those who visit Oslo and walk around downtown, it is easy to recognize the buildings that were built during the boom period in the 1890s and which ended abruptly in 1899 with the Christiania-crash (see also Chapter 10). Not much new construction of housing was done in Oslo again until WWI.

Chapter 10 is written by Øyvind Eitrheim, Karsten Gerdrup and Jan T. Klovland. This chapter

⁶Solveig Erlandsen is a research officer in the Research Department in Norges Bank.

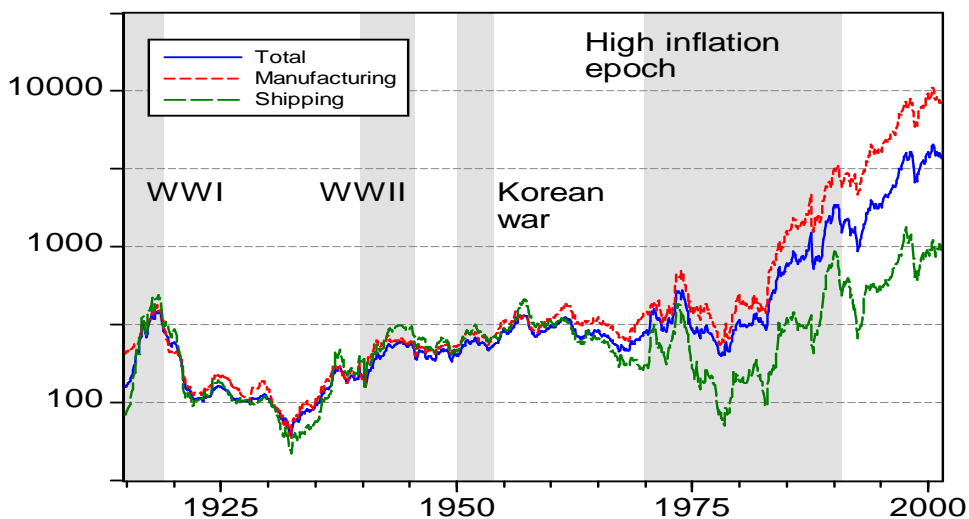


Figure 9: Stock price indices September 1914 - July 2001. Semi-logarithmic scale.

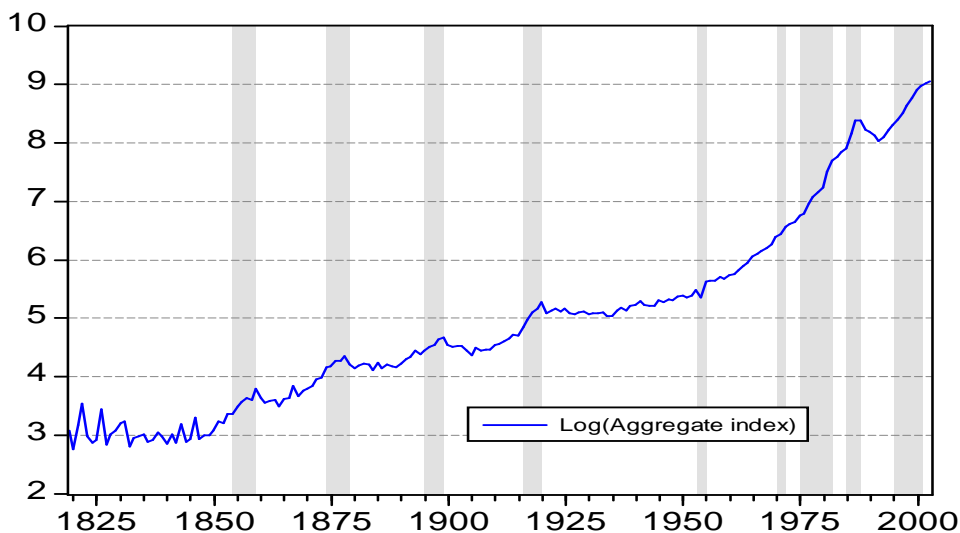


Figure 10: House price indices 1819–2003 (1912=100). Logarithmic scale. The shaded areas designate periods with strong growth in nominal house prices.

gives an overview of sources and data for the credit granted by savings banks and commercial banks from 1840 to 2003. Prior to 1840 the bulk of credit granted to the non-financial private sector came from Norges Bank. The central bank's share of total lending was 82 per cent in 1840. This share fell thereafter as Norges Bank gradually evolved into a more typical central bank in the sense that extension of short-term loans and the use of the discount rate as a monetary policy instrument became more important. Figure 11 shows the development in commercial bank and savings bank lending from 1819 to 2003. We see that bank lending from savings banks and commercial banks tend to show strong growth rates during wars. We also see the credit-financed housing bubble in Oslo in 1899. The large lending in the 1850s is mainly related to the start-up of commercial banking in Norway. Figure 12 shows the annual growth rate of total credit to the general public from 1900 to 2003.

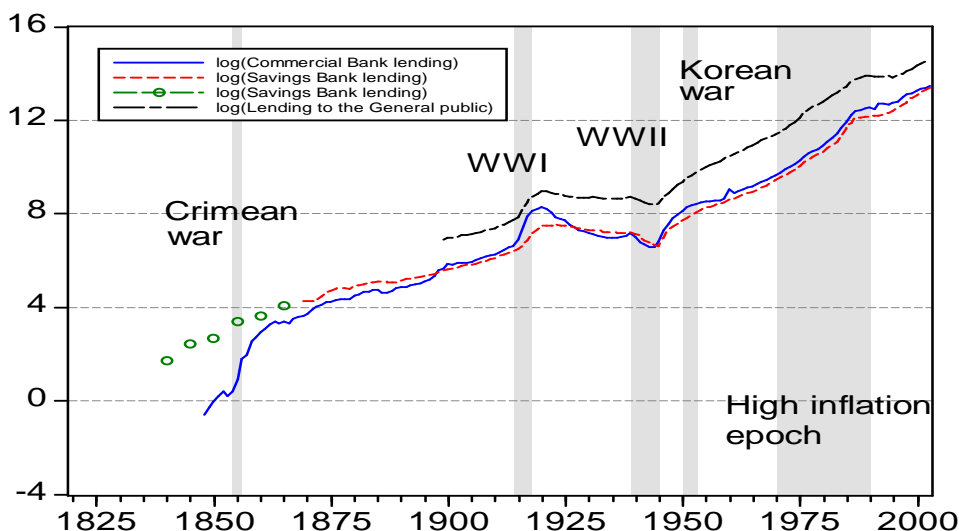


Figure 11: Commercial bank and savings bank lending 1819-2003. Logarithmic scale.

Figure 13 shows the structure of bank lending from 1840 to 1990. We have made extensive use of the material collected by Matre (1992a,1992b) and we also draw on the work reported in Gerdrup (2003). Developments in the banking sector have some interesting implications for developments in the velocity of money. Bordo and Jonung (1987) show that many countries, Norway included, experienced a sharp drop in the velocity of money in the period from 1870 to 1914. Later in the 20th century the fall in velocity was reversed in many countries which led to a U-shaped pattern for the long run trends in velocity. Main monetary developments are summarized in Chapter 10 where we draw heavily on the historical time series described in previous chapters.

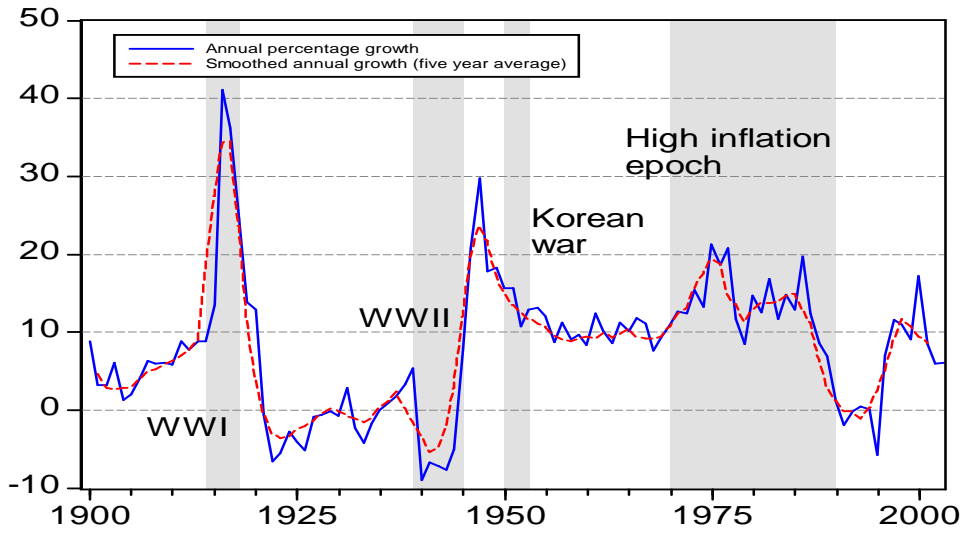


Figure 12: Total credit to the general public 1900-2003. Average annual growth rates.

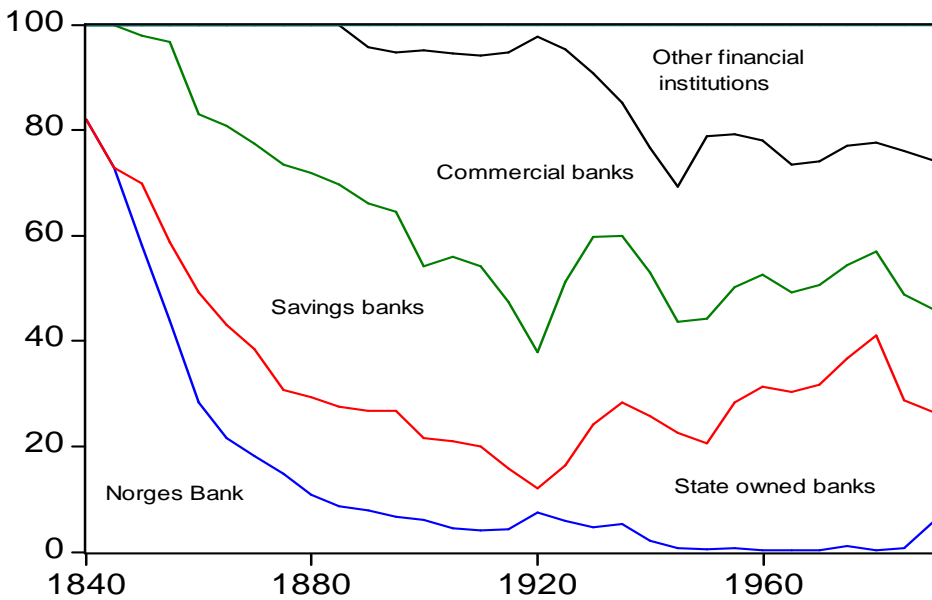


Figure 13: Credit institutions' lending at the end of each decade 1840–1990 (as percentage of total lending).

4. A bird's eye perspective on the data

The aim of this book is to present historical data for monetary variables which can contribute to our understanding of long run economic developments of economic variables such as GDP, and the rate of inflation. To reiterate a point made earlier in this introduction, the focus of the project has been to construct long time series for a limited number of macroeconomic variables. The selected variables are considered to be of central importance in the areas of price stability and financial stability. We hope that increased availability of historical data will stimulate further research and analysis in these areas. In the writing of this book we have deliberately resisted the temptation to start analyzing the data. Instead we have maintained a strong focus on the data themselves and the principles behind their construction. We hope that the readers find that the material is presented in a sufficiently clear manner and in appropriate length to allow a thorough evaluation of the validity and reliability of the data.

As an introduction to further analysis of the data collected in this book, and admittedly, also to fulfill some of our desire to look at some properties of these data in a more analytical context, we will wrap up this introduction with a list of questions and issues which illustrate some potential areas for future work. The list of questions is not complete and the approach we take here relies on simplistic eyeball techniques rather than rigorous analysis, so be aware. Among the indicators we present in the following are the level of real interest rates, measures of cyclical developments in economic activity, i.e., the output gap, as well as real exchange rates, the velocity of money and real house prices. In each case we combine data presented in different chapters of the book, and we start out by focusing on the developments in the real interest rate over a period of more than 180 years.

4.1. What is the historical real interest rate?

Figure 14 shows a smoothed measure of the annual inflation rate based on the consumer price index presented in Chapter 3 and a corresponding *ex post* real rate of interest based on the bond yields in Chapter 4.⁷ To help smooth the inflation series we have used a two-sided Hodrick-Prescott filter with smoothing parameter $\lambda = 1000$.

One answer to the question asked in this subsection is that the average real interest rate over the period 1822 to 2003 is 2.2 per cent. If we split into sub-periods, we find the average real interest rate to be 5.4 per cent in 1822-1842, 3.1 per cent in 1842-1914, 0.4 per cent in 1914-1945, -0.5 per cent in 1945-1970, -2.0 per cent in 1970-1985 and 5.1 per cent in 1985-2003. The lowest real rate of interest was observed during WWI. We also had a period of low real rates of interest during and after WWII, and especially in the first half of the 1970s. In the inter-war period and from the late

⁷Note that the interest rate in the early part of the sample refers to bonds with fixed silver value. See Chapter 4 in this book for details.

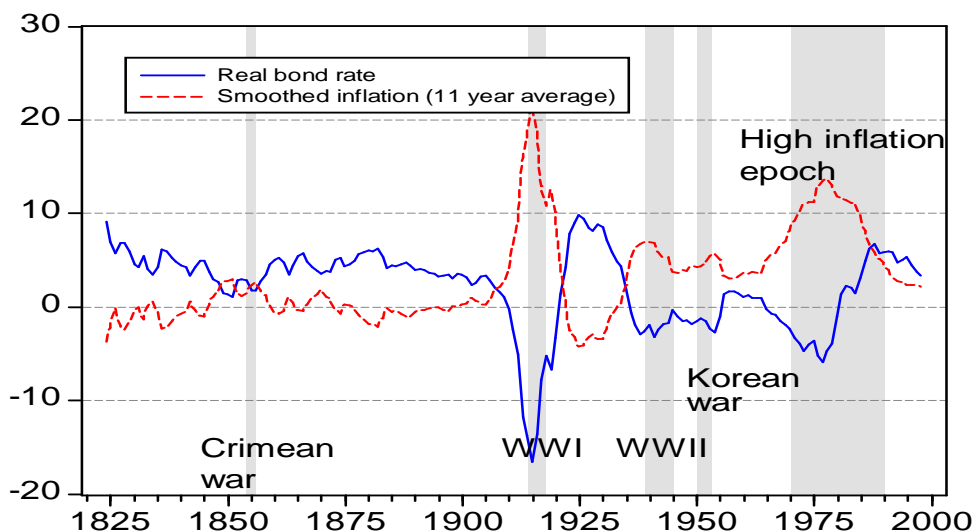


Figure 14: Real bond rates and smoothed inflation 1822–2003

1980s the real rates have been quite high.

4.2. What is the historical output gap?

The output gap is a measure of the deviation between the actual output level and the steady state output level denoted as the GDP potential. Figure 15 shows the difference between the (log of) the GDP potential and the (log of) the actual GDP level. The GDP potential cannot be observed and numerous methods have been proposed in the literature regarding how to measure it. We use a simple detrending method where we apply a two-sided Hodrick-Prescott filter with smoothing parameter $\lambda = 100$. The detrending is based on the (log of) real GDP for the entire period 1830–2003.

The lowest capacity utilization in the economy was observed during WWII. We see that other periods of low capacity utilization (“bad times”) were

- 1848–1851 (-5 per cent). This is the period when the Irish emigrated to the USA. An agricultural crisis was followed by a more general commercial crisis.
- 1882–1888 (-2.5 per cent). In the UK at that time this period was called the Great depression. In Norway there was a large emigration flow to America and bank crises.
- 1903–1909 (-3.4 per cent). This period is associated with repercussions from the housing crisis

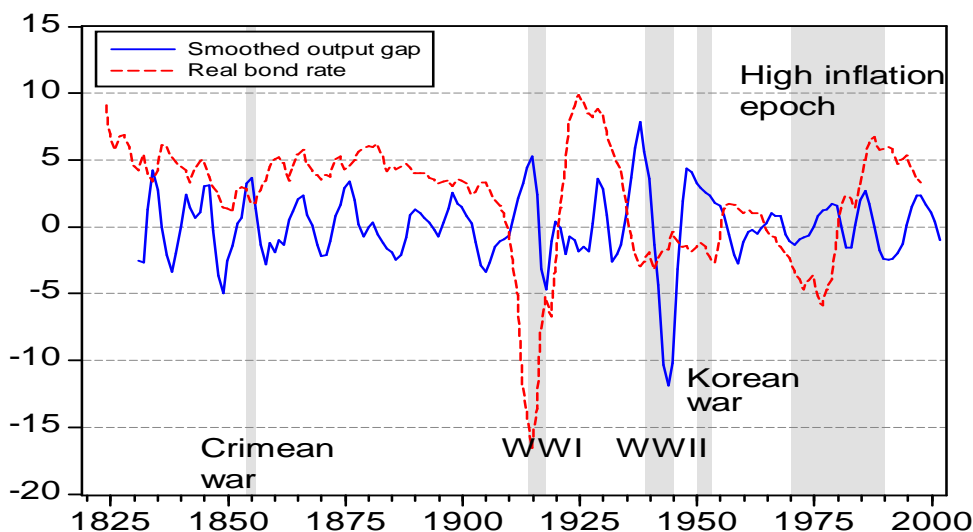


Figure 15: Real interest rates and output gaps 1830–2003

in Christiania, as Oslo was called at that time, in 1899.

- 1958-1959 (-2.8 per cent). International recession was aggravated by an unintentional tax tightening in connection with a tax reform.
- 1989-1994 (-2.4 per cent). Repercussions from the boom-to-bust cycle of the 1980s as well as the overly tight monetary policy following German reunification in 1991.

We note that the “hard 1930s” are not on this “short list” of bad times.

4.3. What is the historical real exchange rate?

Is there a relationship between the development in prices and the nominal exchange rate in the long run? The real exchange rate is computed as

$$R = \frac{S \cdot P_{UK}}{P_{NOR}}$$

where S is the nominal spot exchange rate and P_{NOR} and P_{UK} are price indices for Norway and the United Kingdom, respectively. For Norway we use the consumer price index presented in Chapter 3. For Britain the cost of living indices for the century before WWI have been spliced with the official cost of living or consumer prices index after 1914, see Chapter 7 for details. Figure 16 shows the

nominal and real exchange rates of the Norwegian speciedaler and krone against the British pound over the 185 years from 1819 to 2003.

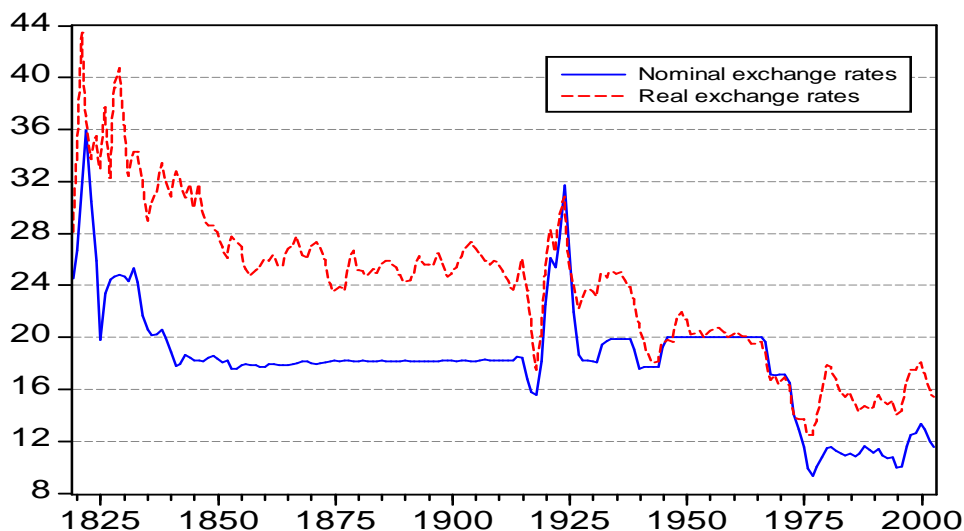


Figure 16: Nominal and real exchange rates against the British pound 1819 - 2003

4.4. What is the historical velocity of money?

Is there a relationship between the price level and the level of the money stock in the long run? This is perhaps most succinctly stated in the monetarist view of inflation — that inflation is always and everywhere a monetary phenomenon (Friedman (1963) p.17).

The velocity of money is derived from the “equation of exchange” identity associated with the quantity theory of money which goes back to Fisher (1911). We can express the velocity of money as

$$V = \frac{CPI \cdot GDP}{M2}$$

When calculating the velocity of money we use as a proxy for the scale variable the historical *GDP* series presented in Chapter 6 multiplied by the consumer price index (*CPI*) presented in Chapter 3. These data are combined with the data on the stock of broad money, *M2*, presented in Chapter 5, into a measure of the velocity of money.

The resulting velocity series is shown in Figure 17. We note that during the period of strong growth in the banking sector the amount of money in the economy grew much faster than nominal output, thus the velocity of money fell substantially over a prolonged period of almost 100 years. The declining

share of currency in $M2$ has been included as a measure of financial sophistication in previous velocity studies, cf. Figure 17. Figure 18 reveals that as the number of banks seems to be almost perfectly negatively correlated with velocity prior to 1920, indicating increased monetization, the stagnation and subsequent decline in the number of banks in the post-WWII period is a less likely explanation of velocity behaviour in this period. We see, however, that the currency-money ratio seems to pick up a similar effect as hypothesized by Bordo and Jonung (1987) and Siklos (1993), giving some support to the view that velocity behaviour depends on the maturity and degree of sophistication of the financial sector.

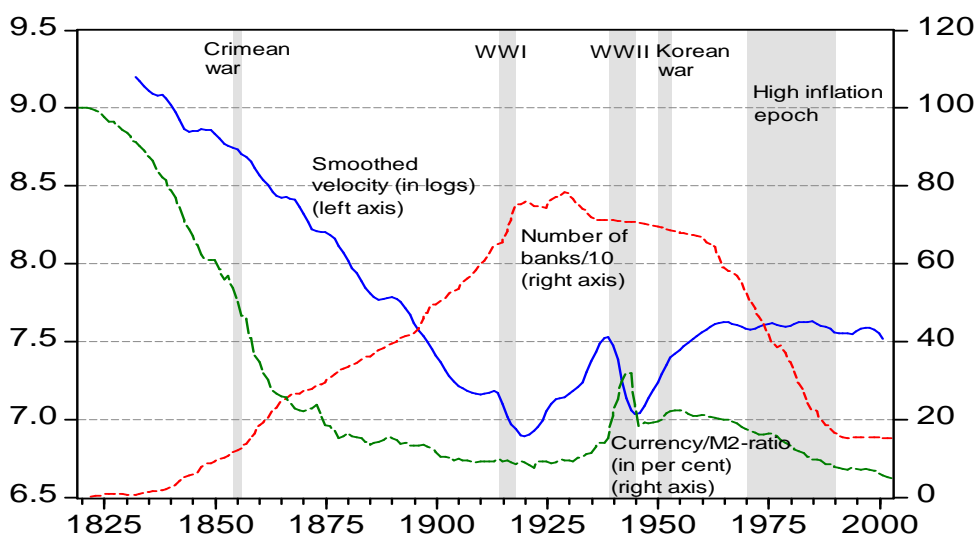


Figure 17: The velocity of money 1830–2003, the number of banks and the share of currency (notes and coins) in $M2$.

During the first 100 years of this period we see that a farmers’ and fishermen’s society based on a barter economy is slowly transformed into a modern society with money and banks (the dotted line). We also see that money, which in the beginning meant cash, gradually is transformed into bank deposits (the dashed line). Money today consists only of 7 per cent cash, the rest is bank money. The dotted line shows that the number of banks today is back to the level of 1860.

From the quantity equation we can also see that as long as the velocity of money is relatively constant, the price level is proportional to the stock of money scaled with the level of economic activity, i.e., CPI is proportional to $M2/GDP$. In Figure 18 we have plotted CPI against $M2/GDP$, setting both indices to 100 in 1960. The constant velocity over the last 50 years is reflected in the close mapping of the two indices over this period. So, if we disregard the first hundred years, when the Norwegian society was introduced to money and finance, we observe a very close link between the

development of the *CPI* and the ratio of the money stock *M2* to *GDP*. This relationship does not, however, say anything about the causality or third factors that influence both money and prices.

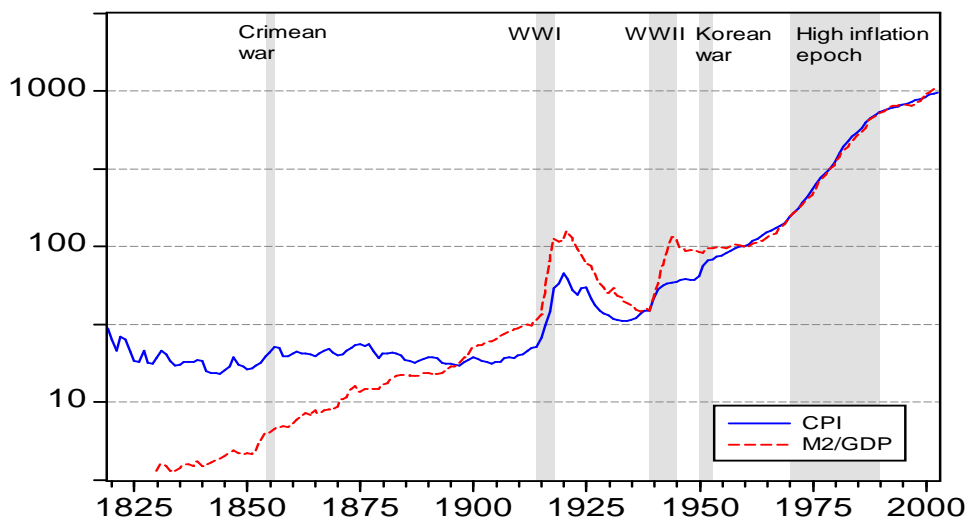


Figure 18: The price level *CPI* and the stock of money scaled with the level of economic activity, *M2/GDP*. 1960=100

4.5. What is the historical equivalent of a Taylor rule?

In Figure 19 below we have done something really courageous. We have calculated what the interest rate would have been according to a simple interest rate rule of the type suggested in Taylor (1993), hereafter dubbed a Taylor-rule. The Taylor rule can be expressed as

$$i_t = r^* + \pi^* + 1.5(\pi_t - \pi^*) + 0.5(y_t - y_t^*), \quad (1)$$

where r^* , π^* , π_t , y_t and y_t^* are the equilibrium real interest rate, the inflation target, the current rate of inflation, production (GDP) and trend-GDP respectively. As an approximation we let the equilibrium real rate of interest vary between the different sub-periods for which we presented sample averages above. Hence, we assume that r^* takes the values 5.4 per cent (1830-1842), 3.1 per cent (1842-1914), 0.4 per cent (1914-1945), 0 per cent (1945-1985) and 3.5 per cent (1985-2003).⁸ The inflation target, π^* , has been set at 0 per cent in the period 1819-1914, and 2.5 per cent thereafter except during the high inflation period 1970-1985 when we have set the inflation target to 5 per cent.

⁸For the sub-periods 1945-1970 and 1970-1985 where we found negative average real interest rates we have set the equilibrium rate to 0

There are a number of caveats with this type of counterfactual calculations. One is that during the silver standard and gold standard periods, i.e., from 1842 to 1914, the prevailing exchange rate regime would in fact be inconsistent with interest rates following a Taylor-rule, hence the calculations have less relevance for this period. A second caveat is that our use of the bond yield does not take into account movements in the yield curve, thus we make the short-cut of equating short-term and long-term interest rates. This being said, with a Taylor interest rate as a reference one would say that monetary policy was more or less in place during the nineteenth century, except during 1870s when it was somewhat tight. On the other hand monetary policy was not tight enough during WWI, too tight in the 1920s and the beginning of the 1930s, and not tight enough in the 1970s. But this analysis is of course much too crude and rudimentary. John Taylor came up with his analysis of simple representations of the reaction function of the central bank in the early 1990s and, although there are links between modern theory of monetary policy and the work of Wicksell on the natural level of interest rates, this illustration is just meant as an appetizer for further studies.

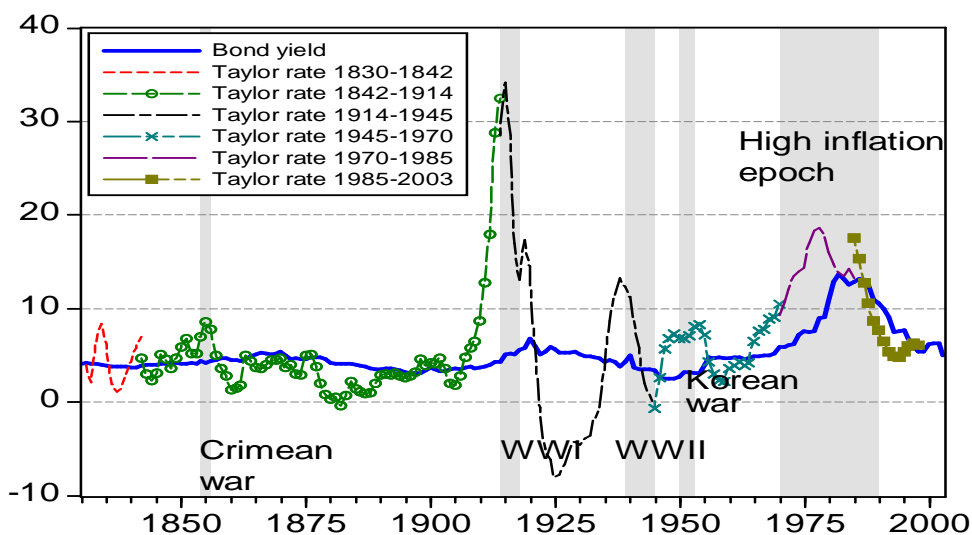


Figure 19: Nominal bond interest rate and calculated Taylor interest rates 1830–2003

4.6. What is the bond premium for an embryonic nation?

We take an emerging market view and compare bond yields for Norwegian government bonds with yields on UK consols from 1819 to 1914 to get an idea about the premium facing the Norwegian government when raising capital in foreign markets in the 19th century and until World War I. Figure 20 shows the spread (in basis points) between the government bond yields and UK consol yields using annual data. The UK consol yield data are from Mitchell (1971). The decline in the spread

in the 1820s and early 1830s may indicate embryonic costs of lending in the early period covered by our data. Such costs may be of a considerable size initially, but are expected to be reduced as time passes. As shown in Chapter 4, however, the Norwegian government issued primarily its debt in Hamburg banco in this period and the increase in the spread against UK consol yields in the mid-19th century also reflects the fact that German interest rates were higher than in the UK.

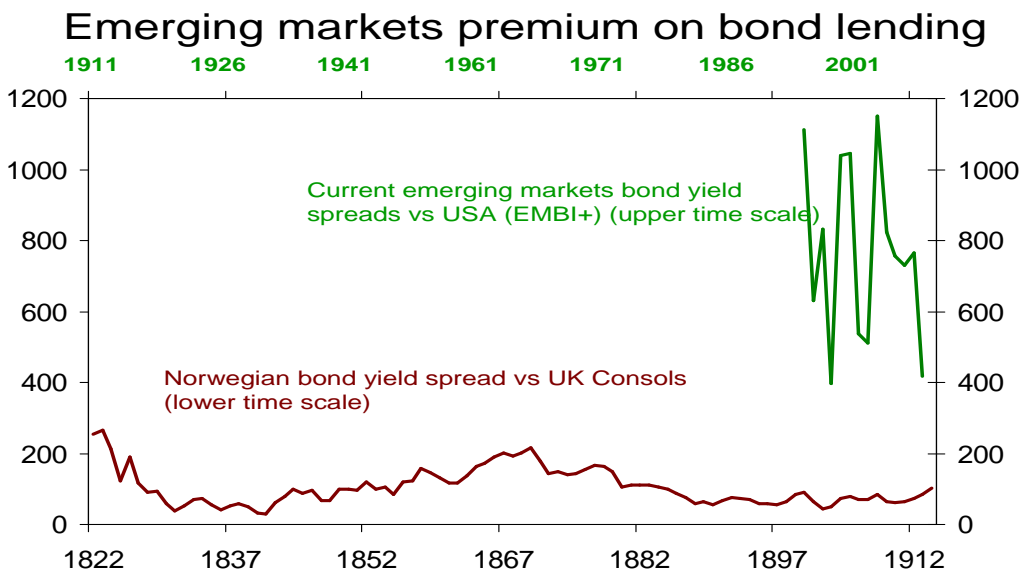


Figure 20: Bond yield spread vs UK Consols (basis points) 1819-1914

Norway borrowed abroad in 1820. The government bonds were traded at a premium of 250 basis points above the best rate obtained by other borrowers in the international capital market. But the Kingdom of Norway very soon became a respected borrower on the international market. The market premium the Kingdom of Norway had to pay is by today's standard surprisingly low. We see that emerging markets have to pay premiums of quite a different magnitude. The fiscal budget of the government in Norway was kept in order. Government expenditure had to be met by government income.

4.7. What is the real house price development?

Figure 21 shows the development in a real house price index for Norway from 1819 to 2003. The repeat sale indices in Chapter 9 are deflated by the consumer price index from Chapter 3 and normalized such that 1912=100.

Figure 21 puts the boom and bust of house price developments in the 1890s in perspective. The

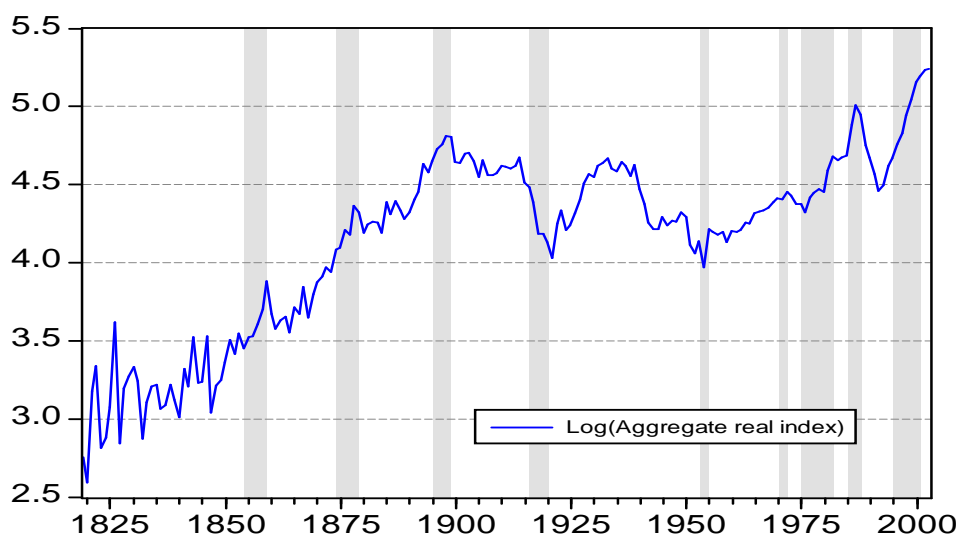


Figure 21: Aggregate real house price index 1819–2003 (1912=100). Logarithmic scale. The shaded areas designate periods with high growth in nominal house prices.

investor who bought a house in 1899 did not get his real money back until the mid-1980s. The figure also indicates that the timing of entering the housing market is important.

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Chapter 2 – A historical perspective on monetary statistics in Norway

Jon P. Holter¹

1. Prices

The "Statistical office" - previously part of the Department for Credit Policy in Norges Bank - received numerous requests from the general audience with questions about the historical value of money in older times. These requests could typically arise in connection to local historical research; renewal of rental contracts; inheritance and gifts - as well as in the context of providing background to plays covering life in older times. Examples of such requests are:

- "How many kroner today corresponds to the purchasing power of one krone in 1910?"
- "How much has the value of money diminished since 1930?"
- "What would be the equivalent of 10 speciedaler in 1835 today?"

Norges Bank decided in 1978 that the best way to handle such requests was to construct a consumer price index which could represent the development in the consumer price level back to 1835, where the period 1835-1865 at the beginning were represented with data for every 10th year. From Statistics Norway a number of subindices were available which covered the period 1865-1900 (on the basis of National Accounts for Norway 1865-1960), and for the period 1901-1977 cost-of-living/consumer price indices were available (Historical Statistics for Norway 1978). For the 10-years intervals 1835-1855 Norges Bank constructed a price index based on market prices on a bundle of food items limited to potatoes, oats, butter, pork and mutton (Historical Statistics 1968). The choice of weights for the different categories was assessed using some fair amount of judgement at the time. The different subindices were linked together such that we obtained a continuous price index for the entire period from 1835 to 1977.

Regarding the price index for the period 1835-1865, which was constructed in Norges Bank, the users were specifically informed that the numbers were not official and without responsibility for

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the Central Bank. However, in a sentence by the Norwegian Supreme Court in 1995 - in connection to the regulation of rental contracts for land negotiated in 1827 and 1854 - it was decided that the regulation should be based on this unpublished price index from 1835, which had been put at the disposal for the Supreme Court. In their ruling the Supreme Court stated that: "The index which has been used has its weaknesses, but there exists no better alternative".

This somewhat primitive and incomplete price index - each year updated with new price information - was used until 1995. In 1994 Director Jan F. Qvigstad of Norges Bank took the initiative to develop a more complete consumer price index for Norway - inspired by an article published in the Quarterly Bulletin from Bank of England: "Inflation over 300 years" which covered the years 1694 -1994. This initiative formed the basis for the later work on a somewhat broader scale on Historical Monetary Statistics in the Statistical Department of Norges Bank, which eventually was established as a project under the Research Department. The illustration and price index figure below are taken from the article from Bank of England.



POLITICAL RAVISHMENT or The Old Lady of Threadneedle Street in danger!
Cartoon by James Gillray, published in 1797

Figure 1: We have borrowed inspiration from Bank of England. Source: Quarterly Bulletin from Bank of England.

For several reasons the work on improving Norges Bank's historical price index using additional price information did not really start until 1996. The primary sources of price information available was limited in the sense that we decided to maintain the starting point of the index in 1835 - as in the previous index - and the work concentrated on filling out price information for each of the years covered by the previous ten year intervals 1835-1865, and at the same time the basis for the price calculations was broadened and covered more items of consumer goods. The basis for these calcula-

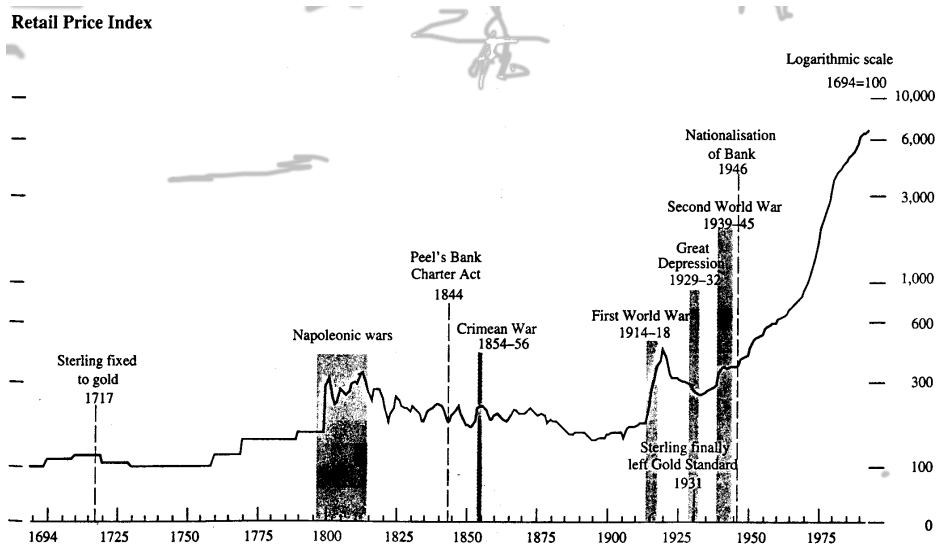


Figure 2: A retail price index for UK 1694-1994. Source: Quarterly Bulletin from Bank of England.

tions has - in addition to the above mentioned market prices - also consisted of annual observations of market prices of grain and potatoes published by Statistics Norway in Statistical Overviews from 1948, market prices in Oslo for beef, mutton and pork (Historical Statistics 1968), price indices for private consumption 1865-1920 (National Accounts 1865-1960), consumer price index 1920-1992 (Historical Statistics 1994) and consumer price index 1992-1996 (Statistical Monthly Bulletin - Statistics Norway).

For the years 1835-1865 we judgementally assumed that out of 100 kilogram food the division between meat and grain is 30/70 hence we set the meat share to 30 per cent and the grain share to 70 per cent. Furthermore we assumed that the relative share of land used for wheat, rye, oats and potatoes also represents these goods' relative weight in consumption. Market prices for beef, mutton and pork were only available for the years 1835, 1845, 1855 and 1865. Inbetween these years we assume (for simplicity) a linear development. The basis for these weights is the relative number of winter-fed livestock.

The calculated index for Norge shows a development in the price level which generally seems to follow the same pattern as presented for England in the same time period, see figures 2 and 3.

Below we have described the development in the consumer price level through important periods and years based on the index published in Holter (1996) :

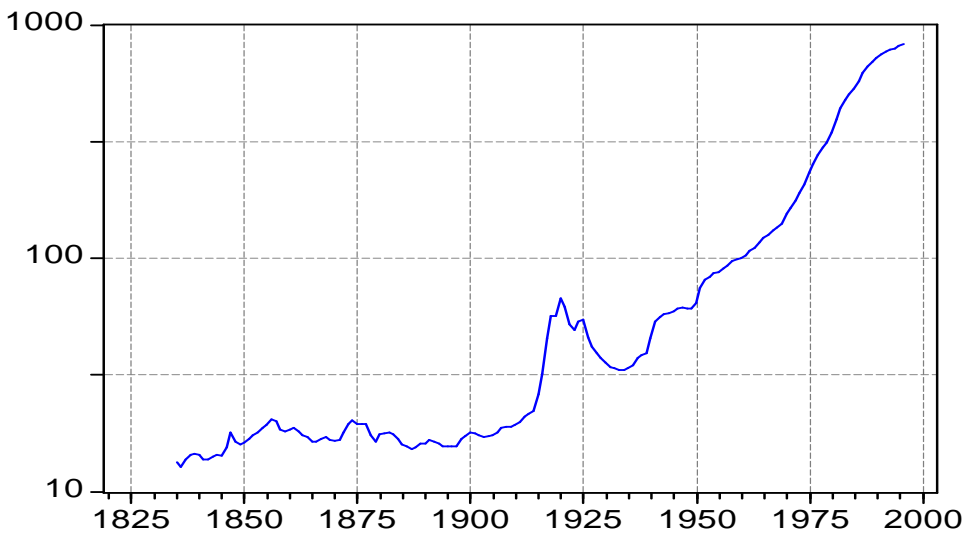


Figure 3: Historical consumer prices 1835–1996 published in Holter (1996). Logarithmic scale.

- In a historical perspective years of war and famine seems to be associated with high inflation.
- In the period 1853-1856 the Crimean war contributed to a strong rise in the general price level.
- In the period 1915-1920 prices were surging - strongly influenced by WWI.
- During the 1920s and up and until 1933 a strong international downturn and the restoration of exchange rates to their pre WWI par levels contributed to a pro-longed period of falling prices.
- Significant parts of the post WWII period showed high inflation, often associated with periods of expansionary economic policies aiming at full employment and cost driving outcomes of the rounds of wage negotiations.

High inflation during the years:

- 1847 with 15.8 per cent (famine in Europe)
- 1918 with 24.5 per cent (WWI)
- 1941 with 17.7 per cent (WWII)
- 1951 with 15.8 present (Korean war)
- 1981 with 13.7 per cent (catch up effect following a period of price controls)

Largest decline in prices in 1922 with minus 16,4 per cent (post war recession)

In the fall of 1999 the Norges Banks historical consumer price index was revised once more. While Statistics Norway had previously only published subindices back to 1865, Statistics Norway had now calculated an aggregated chained index from 1865, but based their index on a different set of subindices than used in Norges Banks historical index. Statistics Norway had (a.o.) used the following sources in their index:

- 1865-1901: Price deflator for private consumer expenditures in the National Accounts
- 1901-1916: Cost of living index calculated by the Statistical Office of Kristiania (Oslo)
- 1916-1919: Cost of living index calculated by the Ministry of Social Affairs
- 1919-1960: Cost of living index calculated by Statistics Norway

When Statistics Norway in 1999 published their historical index back to 1865, Norges Bank decided to replace their historical index with one that was chained with the new index from Statistics Norway - notwithstanding the almost negligible differences between the two series. For the years 1835-1865 Norges Bank decided to maintain the trajectory of the old historical index. While the Statistics Norway index is equal to 100 in 1998 we have maintained 1920 as reference year and the historical price index published by Norges Bank has 1920 = 100. The combined historical price index has replaced the old historical price index on Norges Banks web-site.

The aim of Norges Bank was, however, to extend the historical price index back to 1815. In an internal memo it was outlined how one could make additional adjustments to the historical price index in two steps. The idea was to first adjust the weights used to calculate the price index for the period 1835-1865 with more information on the import shares of the different goods. In addition we would calculate a new price index for the period 1815-1835. The calculations for this period are done on the basis of price observations from the city of Trondheim collected by Svein Henrik Pedersen. His report from November 2001 contained annual observations of prices on different brands of grain in this period, using reference prices quoted in Trondheim for the years 1815-1835. Prices of grain are quoted per barrel and - with the exception 1815 - the prices are quoted in speciedaler, ort and shillings. We base the further calculations on the following definitions: One barrel corresponds to 139 liter and 100 liter of Rye, Barley and Oats corresponds to 72, 64 and 53 kilograms respectively (source: The Norwegian Agricultural Authority).

During a preliminary review of these results in 2002 it was decided to use these results only as preliminary indicators as the indices were subject to a number of weaknesses as pointed out by professor Ola H. Grytten at the Norwegian School of Economics and Business Administration. The

lack of completeness and inherent weaknesses of these data triggered an alternative approach to improve the quality of the price index for the entire period before 1865. It was decided to extend the project on Historical Monetary Statistics to cover a broader set of information on historical consumer prices based on data from a previously underutilized sources - the Professor Ingvar Wedervang Price- and Wage-Historical Archive at the Norwegian School of Economics and Business Administration in Bergen. It was also decided that the collection of data from the Wedervang Archive was best organized as student projects under the supervision of Professor Grytten. This change in Norges Banks project aiming at compiling historical price indices at least back to 1819 has obviously delayed the finishing of the project, but it was at the same time possible to increase the ambition of the project to produce more reliable information on the development in consumer prices in the period before 1865. We refer to Chapter three by Ola H. Grytten for a detailed description of historical consumer prices in Norway for the period 1516-1871. Chapter three also contains a detailed discussion of the principles of construction of these historical price indices as well as a description of the Wedervang Archive.

2. Monetary aggregates

2.1. Establishing monetary statistics in Norges Bank

In 1971 Director Einar Magnussen in Norges Banks Department of Monetary Policy took the initiative to compile statistical information on monetary aggregates on a monthly basis. The outline of the statistical compilations are described in an internal memo written by the author of this chapter and a copy of this letter is stored in the Research Department as part of the documentation of this project. During the 1970s many Central Banks focused on the development in monetary aggregates, so also in Norges Bank cf. the article "Analysing the money stock" in Economic Bulletin 1976/3 ("Pengemengde- og pengemengdeanalyse" in Norwegian only) by Einar Forsbak, head of office at the Monetary Policy Department. From this article we bring the following paragraph (translated from Norwegian):

In recent years there has been an increasing interest in the development in monetary aggregates their determining factors. Some countries have set targets for the growth rates in these aggregates, for example USA and West-Germany.

The growing interest in monetary aggregates reflects a stronger emphasis on the development in credit and liquidity than earlier, and this has also triggered a stronger interest in quantifying the effects of different aspects of economic policy. Someone might say that the increased attention monetary aggregates have been paid lately may be seen as a victory for the monetarist camp of economists. This is not necessarily the case. Neither in USA nor in West-Germany there is ample evidence that monetary authorities are dominated by monetarists. While typi-

cal monetarists like Milton Friedman will argue that it is monetary aggregates which should be at the forefront of monetary policy, the Central Banks in USA and West-Germany seems to have the opinion that although monetary aggregates are important, so are a lot of other indicators such as interest rates, fiscal policy and the development in wages and income. Since 1971 Norges Bank has compiled monthly tables over the development in monetary aggregates in Norway and the main factors behind it. These tables constitute an important part of the statistical basis for the analysis of money and credit in the Annual Report of Norges Bank and in Economic Bulletin. The statistical tables over monetary aggregates show that there are three main groups of factor behind their development, i.e., fiscal policy, credit policy and the operating surplus.

The statistical tables compiled in 1971 were assembled on the basis of the financial balances of the different sectors in the Credit market statistics. The general public included all domestic sectors in the economy except the Central government, Banks and Social benefits. The money stock was defined as the general public's holdings of domestic currency (notes and coins), domestic bank deposits (excluding tax exempted savings) and unused cash credits. For practical reasons the consolidated balance of the financial sectors was only available annually, and with several months publication lag. It was therefore decided that monthly tables were necessary for operational purposes based on the following material:

- Banking statistics (Weekly Statistical Bulletin from Statistics Norway, WSB)
- Foreign sector accounts (WSB)
- Monthly balance of the Government Pension Fund (WSB)
- Norges Banks liquidity table plus working tables

The main sources behind changes in the monetary aggregates were related to:

- Central government budget balance (surplus net of borrowing)
- Credit to the private non-financial sector (loans and bonds)
- Net foreign capital inflow (total effect of net capital inflow and the current account)

These components were in part calculated from published tables and in part estimated. The money stock statistical tables was by and large produced according to these procedures and were published in the Annex to Economic Bulletin and on Norges Banks web-cite.

In november 2000 new definitions were introduced in the statistical tables for monetary aggregates. The most important change was the exclusion of unused credit facilities from the money stock to align Norwegian monetary statistics with international standards.

At the same time the principles for decomposing a given change in the money stock in its different counterparts were simplified. The new procedures follow the international standards advocated by the International Monetary Fund (IMF) and are based on a consolidated balance sheet for the complete banking system. A given change in the money stock can now be decomposed in the following set of counterparts:

Changes in the bank system's net claims on the foreign sector
+ changes in the bank system's net claims on the central government
+ changes in the bank system's net claims on the general public
- changes in the bank system's other net liabilities than money
= Change in the money stock

2.2. The construction of historical statistics for the money stock

In 1999 the Statistical Department compiled a historical time series for the money stock for the period 1819-1998. The procedures are documented in Holter and Tørum (1999). This paper shows the developments in the money stock for the period 1819-1998 and a breakdown of the series in currency (notes and coins) and bank deposits. According to the definitions used in the article, the money stock in 1819 - converted to kroner - was 16.7 million kroner or about 18 kroner per capita. Calculated in 1998-prices this corresponds to about 1 200 kroner per capita. For comparison the money stock by the end of 1998 was 608.4 billion kroner, or 137 722 kroner per capita. Statistics Norway has published official figures for GDP for Norway back to 1865, and the money stock measured as a fraction of GDP has increased from 28 per cent in 1865 to 55 per cent in 1998. Compared with the level of GDP the money stock is almost doubled over this period and this reflects the development of the role of money in the modern society as well as the developments in monetary institutions. From the first savings bank, Christiania Sparebank, was established in 1822 the number of savings banks in Norway increased to 90 in 1850 and peaked at 633 in 1929. The first commercial bank, Christiania Bank og Kreditkasse, was established in 1848 and in the period until the turn of the century the number of commercial banks increased to 83 and peaked at 200 in 1918. In 2000 the number of banks has been reduced to 20 commercial banks and 130 savings banks.

The money stock in these publications is defined as the money holding sectors stocks of notes and coins (currency), bank deposits and bank certificates. Unused overdraft facilities and building loans are not included. The money holding sectors are defined as the local government, non-financial corporations, households and some financial corporations (not including banks and state lending

institutions). The central government and the social security sector is excluded from the list of money holding sectors. According to these calculations the currency fraction (notes and coins) of the money stock has been considerably reduced from 100 per cent of the money stock in 1819 to only 7.5 per cent in 1998 (see Holter and Tørum, 1999). From 1851 the currency fraction has been below 50 per cent of the money stock and bank deposits has been the dominant component of the monetary holdings over the last 150 years.

Because of lack of data we have not been able to filter out in detail the distribution of the stock of currency between money holding and non money holding sectors. Instead we have made the assumption that the money holding sectors has all available stocks of currency (notes and coins). The Royal Mint was a subsidiary under the Treasury until 1962 when it was transferred to Norges Bank. We have therefore divided the sources for the amount of notes and coins in circulation accordingly and look independently on the periods 1819 - 1961 and 1962 - 2003. The main source for the time series for the money stock is Historical Statistics (1968, 1978 and 1994) published by Statistics Norway.

2.3. Notes and coins in circulation

To give an idea of the steps involved in the construction of the money stock series we present some details on the time series of notes and coins in circulation.

1819 - 1961:

For the years 1819 - 1913 the figures for the notes in circulation are from table 246 in Statistics Norway's Historical Statistics 1968, which shows selected items in the balance sheet for Norges Bank by December 31st, including notes in circulation. For the years 1914 - 1961 the figures are from table 247 in the same publication. For the WWII years 1940 - 1945 balance sheet information is missing in this table. We have therefore used information about notes in circulation for 1940 - 1944 from the publication Norges Bank during the occupation (in Norwegian only), and for 1945 we have used information from Annual Report of Norges Bank 1945.

Coins in circulation for the years 1952 - 1961 are published in Annual Report for Norges Bank 1962. At the time there were no available data for previous years, and we have therefore calculated a historical time series for coins in circulation based on rough extrapolations. In 1875 Norway introduced kroner as its currency replacing the former speciedaler. The Royal Mint (1964) shows that the accumulated production of the new coins (kroner and øre) in 1874 and 1875 was 7.69 mill NOK. During this short period there were probably only minimal losses or melting of the new coins and by the end of 1875 we set the amount of coins in circulation equal to the accumulated production. In 1875 coins in circulation were about 20.7 per cent of notes in circulation (37.2 mill NOK by the end of 1875). By the end of 1952 coins in circulation amounts to 94.3 mill NOK or 3.2 per cent of

notes in circulation (2915.7 mill NOK in 1952). On average this share has increased with 0.2273 percentage points for each year we move back towards 1875. This seems quite reasonable since the demand for coins for transaction purposes was relatively more important in the first part of this period. We have relatively little information about coins in circulation before 1875. If we make the same assumption about the development for the period from 1819-1875 as we calculated for the period 1875-1952 then coins in circulation would be about 33.4 per cent of notes in circulation in 1819.

1962 - 1998:

For the years 1962 - 1993 the amount of Notes and coins in circulation are taken from table 24.1 i Statistics Norway's publication Historical Statistics 1994, and for 1994 - 1998 we have used Annual Reports from Norges Bank as source for notes and coins in circulation.

2.4. Summary of results

The development in the money stock 1819 - 2002 is illustrated in the following chart.

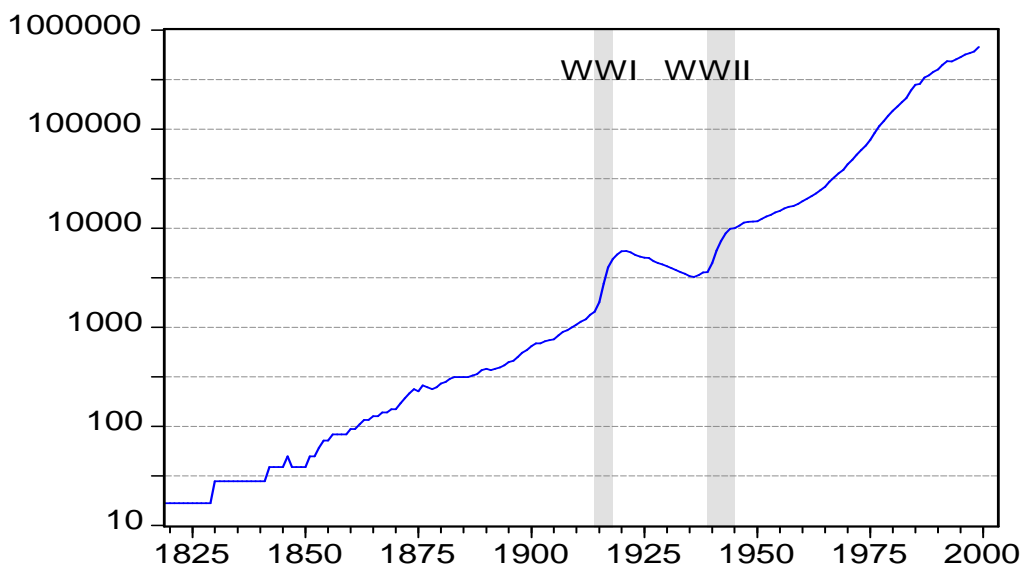


Figure 4: Historical money stock 1819–1998 published in Holter and Tørum (1999)

The development in notes and coins as fraction of M2 1819 - 2002 is illustrated below.

- The money stock has increased from 16.7 mill NOK in 1819 to 608.4 mill NOK in 1998, i.e.,

and increase from 18 kroner per capita in 1819 to 137 722 kroner per capita in 1998.

- The money stock as fraction of the gross domestic product (in current prices) has increased from 28 per cent in 1865 to 55 per cent in 1998.
- Notes and coins as fraction of M2 has decreased from 100 per cent in 1819 to 7.6 per cent in 1998.
- The fastest rate of growth in M2 was recorded in 1916 (54 per cent) and the consumer price growth this year was 23 per cent.

Sources:

- European Historical Statistics 1750 - 1970. B.R. Mitchell, published 1975
- Historical Statistics from Statistics Norway, published 1968, 1978 and 1994
- Norges Bank through 150 years (in Norwegian only), by Gunnar Jahn (1816- 1940), Alf Erik- sen (1940 - 1945) and Preben Munthe (1945 - 1966), published 1966.
- Norges Banks history I and II (in Norwegian only), by Nicolai Rygg, published 1918 (Part I) and 1954 (Part II)
- Norges Bank during the occupation (in Norwegian only), by the Direction of Norges Bank, published 1945.

2.5. The production and circulation of coins

Historical statistics over production and circulation of coins were published in Holter (2000a). The Silver Mine at Kongsberg was established in 1824. From 1628 there was production of mint in Christiania, under the walls of the fort Akershus, where silver from Kongsberg was melted to Speciedaler. The Christiania mint was in production until 1695 when the Silver Mine at Kongsberg took over the entire mint production when The Royal Mint was established in 1686. (Source: Monetary history, Norges Bank history, published in 1989). The Royal Mint was formally under the Treasury until 1962 when it was transferred to Norges Bank.

In earlier days the production of mint could vary substantially from year to year and was in fact zero in some years. In this period the Silver Mine at Kongsberg and The Royal Mint shared a common administration and the Royal Mint "borrowed" manpower from the Silver Mine in periods with high mint production and downsized this production line in periods of low demand for new mint. This flexible arrangement ended in 1957 when the Silver Mine was closed. In its peak years of production

the Silver Mine had 4000 employees and 78 mines. The peak year of production was in 1771 with 8.5 tonnes of silver.

Information on mint production can be found in the following sources:

Norwegian Mints 1628 - 1873 by Bjørn R. Rønning (in Norwegian). The book contains information on the number of mints of different values of speciedaler and shilling. The total nominal value of this stock of mints was estimated by us. When kroner replaced the speciedaler in 1875 we have used the conversion rate one speciedaler (= 120 shilling) equals four kroner. On this basis we have estimated the nominal value of each years mint production of different values from 1819 until 1873.

- Production (in kroner) of Norwegian mints 1874 - 1962 published by The Royal Mint in 1964.
- In the following years the production of coins are estimated on the basis of tables in Annual reports from Norges Bank. We have estimated the total value of coins on the basis of the production of mint in different values.

The table below shows the production of mint at the Royal Mint 1819 - 1998, incl. gold coins produced in the period 1874 - 1910.

Table 1: Production of mint at the Royal Mint 1819 - 1998, incl. gold coins produced in the period 1874 - 1910. 10-year periods

Period	Mill NOK	Period	Mill NOK
1819 - 1828	2.652	1909 - 1918	18.893
1829 - 1838	1.472	1919 - 1928	37.388
1839 - 1848	5.077	1929 - 1938	5.043
1849 - 1858	4.391	1939 - 1948	53.561
1859 - 1868	2.184	1949 - 1958	60.273
1869 - 1878	17.583 ¹	1959 - 1968	194.023 ²
1879 - 1888	5.175	1969 - 1978	481.422 ²
1889 - 1898	4.250	1979 - 1988	1352.702 ²
1899 - 1908	5.633	1989 - 1998	3215.207 ²

¹ The relatively large production in the period 1869 - 1878 has to do with production of mint denominated in the new currency *kroner* which replaced the old speciedaler in 1875.

² The rapid increase of the production of coins in the last 40 years of the 20th century has to do with the introduction of new values of coins replacing old mint values and also by the increasing rates of inflation in the period 1970 - 1987.

Tables over coins in circulation from 1952 and onwards are published in the annual reports from Norges Bank. Annual reports from Norges Bank for earlier years - and in parliamentary documents

(*Stortings Forhandling*) - we can find information on the production and circulation of coins corrected for amounts of coins which were withdrawn or melted. In the Parliamentary Proposition No. 28 (in *Stortings Forhandling i Aaret 1881*) we can find information about the production of silver coins in different values minted by the end of 1880. There is also information about the fraction of the minted amount of silver coins which was in circulation.

Because of the transition from speciedaler to kroner in 1874 we have limited ourselves to stop the calculations of coins in circulation in 1880. The estimates shows that the relative amounts of notes and coins seems to have stabilized around 50 per cent in the earliest part of this period. This is a much higher estimate compared with the extrapolated values reported in Holter and Tørum (1999). Gold coins in the values of 10-kroner and 20-kroner dominated as a fraction of the total amount of coins in circulation in the latter part of the 19th century. Compared with the wage level of that period these were large values and gold coins were typically used to store wealth and less for transaction purposes. According to wage statistics from Statistics Norway (Statistical overview 1948, table 193) and the parliamentary document *Stortings Forhandling* the annual wage for maids in cities was NOK 78 in 1880, NOK 203 for servants in the cities and NOK 1 402 for office clerks at the Norwegian Telegraph Company. There were substantial wage differentials in that period which also has affected the demand for notes and coins of different values. In Holter (2000a) and the above mentioned background document we have constructed time series for coins in circulation from 1880 to 1999 and the distribution over different values. For practical reasons the calculations were limited to five-year intervals, cf. the table below.

Table 2: Coins in circulation (Mill NOK), including gold coins. Figures before 1952 have been estimated.

Time	Amount	Time	Amount
1880, 31.12	18.358	1945, 31.12	83.656
1885, 30.06	18.927	1950, 31.12	110.875
1891, 31.12	21.871	1955, 31.12	129.986
1895, 31.12	23.232	1960, 31.12	151.879
1900, 31.03	25.179	1965, 31.12	252.708
1905, 31.03	28.186	1970, 31.12	340.147
1910, 30.06	34.769	1975, 31.12	524.022
1915, 30.06	39.076	1980, 31.12	803.340
1920, 30.06	47.006	1985, 31.12	1515.640
1925, 31.12	50.357	1990, 31.12	2069.040
1930, 31.12	55.150	1995, 31.12	2695.740
1935, 31.12	58.199	1999, 31.12	3434.840
1939, 31.12	60.757		

The relative importance of gold coins has diminished over time. In 1880 gold coins (10-kroner and 20-kroner values) amounted to 75 per cent of the total value of coins in circulation. In 1960 this

fraction had decreased to 15 per cent. Table 3 in Holter (2000a) shows the total amounts of notes in circulation and their distribution on different values back to 1880 (for every fifth year). The table also allows for a comparison with the amount of coins in circulation. One may wonder about the high values of some of the notes in the early part of the period. A 1000-krone note corresponds to the annual salary for an typical employee at the Royal Mint at Kongsberg. The 1000-krone is still the largest value of Norwegian notes. The five-krone note represented a relatively high value relative to the wage level, e.g., it covers more than two days salaries for a typical farm worker earning 1.83 kroner per day (Statistical Overviews 1948, Table 193). In 1880 the 1000-krone notes counted for 13 per cent of the total amount of notes in circulation and in 1999 this share had increased to 67 per cent.

In terms of the relative amounts of coins and notes in circulation the same main trends are reported in the article by Holter (2000a) on historical mint production as was reported in the article on historical monetary aggregates by Holter and Tørum (1999). The main picture is that coins cover a larger share as we move backwards in time. If we start in 1998 and move backwards to 1940 the coin/notes ratio has varied between four and eight per cent. As we move back to 1930 the ratio increased to 18 per cent. However, because of the exchange rate policy of the 1920s, aimed at restoring the exchange rate at its par value (pre WWI), the amounts of notes in circulation fell during the 1920s while the amount of coins was held fairly constant. Hence, as we move from 1930 to 1920 the coin/notes ratio fell from 18 per cent to ten per cent. As we move back before 1920 there is a rising trend in the coin/notes ratio which seems to level out at about 50 per cent around 1880.

Coins seems to have played a more important role than notes in the early part of the sample. As coins were available in smaller values than notes they were typically more suitable for transaction purposes but the fact that values of coins down to 10 øre were available in precious metals from which they may have gained additional popularity.

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Chapter 3 - A Consumer Price Index for Norway 1516-2003

Ola H. Grytten¹

1. Theme

This article presents a consumer price index (CPI) for Norway 1516-2003. Existing CPIs for Norway neither go that far back in time nor do they cover such a long time-span. For the period prior to 1871 a new CPI has been constructed.

The new price index is basically constructed on the basis of monthly and quarterly price registrations of 47 representative commodities in Norwegian towns and cities back to 1830. For the years 1819-1830 the CPI is constructed on the basis of 29 representative commodities with annual price observations from major Norwegian cities. Most data have been collected from Professor Ingvar Wedervang's Historical Archive on Prices and Wages at the Norwegian School of Economics and Business Administration in Bergen.

For the period previous to 1819 it is not possible to construct a CPI with the same high validity and reliability as for the period from 1819 onwards. However, we have been able to construct a CPI for Norway 1516-1819, which has been spliced with the 1819-1871 index. The new indices 1516-1871 have then been spliced with existing series from 1871 onwards.

2. Background

The historical CPI for Norway has so far covered the years from 1850 onwards. The "official" CPI, published by Statistics Norway, starts in 1919. During its first 40 years it was a cost of living index. Its statistical base was extended in 1959 when it was transformed into a CPI.² In

¹ The primary data used in this work are compiled from archives by three research assistants. These are Tatiana Budkova, Signe Lade Sølviik and Monica Mjøs Værholm, all students at the Norwegian School of Economics and Business Administration, Bergen.

² NOS 1978, 518-519.

addition, Statistics Norway has estimated an implicit deflator for private consumption in connection with their historical national accounts.³ Cost of living indices have also been calculated for the capital Oslo (Kristiania) for 1850-1916, and for the major cities 1916-1919.⁴

Jon Petter Holter at the Central Bank of Norway has constructed a preliminary CPI for Norway covering the period 1835-1996. He assembled his index by splicing existing indices from Statistics Norway from 1865 onwards, with a new index calculated by himself for the period prior to 1865.⁵ The Holter index 1835-1865 covers eight products, four types of grain, potatoes and three types of meat. He used annual prices for grain and potatoes published by Statistics Norway. As for meat, he used market prices on beef, mutton and pork reported in 1835, 1845, 1855 and 1865 in Oslo (Christiania). For the years between these four benchmark years, he chose linear interpolations.

According to conventional method, Holter used a Laspeyre formula. His weights were partly established on the basis of intuition and partly on empirical sources. He assumed that the consumption of grain and potatoes was reflected in proportionate use of land. His weights for meat are found on the basis of estimated weights of the winter cattle stock. Finally, he assumed that crops accounted for 70 per cent of consumption and meat for 30 per cent. With 1835 as his base year, Holter then went on to calculate a consumer price index for Norway up to 1865. The Holter index serves as a first step to establish a consistent CPI for Norway covering more than 160 years. It reflects the major long run movements in consumer prices of the period.

There are several problems connected to the Holter series. In the first place, the index 1865-1900 given by Statistics Norway, which he utilised, is not at all documented. Both its validity and its reliability are therefore dubious. Secondly, there are several shortcomings in Holter's own estimates for 1835-1865. The price data, used for grain are fairly reliable. One problem is, however, that they are product and wholesale prices rather than consumer prices. Another problem is that they only reflect prices on domestically produced crops, while a significant portion of the crops consumed was imported.⁶ An even more serious problem is revealed when one reads the description of the sources. The prices are not given in nominal, but deflated figures. More precisely, they were adjusted for exchange rate fluctuations from the

3 NOS 1968, 352-353.

4 NOS 1994, 290-291.

5 Holter 1996.

6 Hodne 1975, 149-152.

par value of the speciedaler.⁷ For the period 1835-1842, when the speciedaler was weak, but appreciating, this means that the prices are corrected significantly downwards, and do not mirror the nominal price fluctuations. The prices for meat only cover the capital city, Oslo. In addition, they are taken for four years only, out of a period spanning over 31 years.⁸ The linear interpolations then carried out to cover the entire period neglect significant annual price variations.

Thirdly, the estimated consumer expenditure weights are found on the basis of the use of arable land, and not on consumption. Wheat and rye were basically imported, while both oat and barley to a significant degree was used as animal fodder. To give weights on meat on the basis of stocks is hardly reliable. The weights were estimated on the basis of present output and size of animals. These have changed dramatically over the last two centuries. The cattle stock did also provide different products. Pigs were used for meat, cows basically for milk, secondary for meat, bulls for meat, while sheep were basically used for the production of wool. Additionally, the relative shares of cattle stock consumption to agrarian consumption lack any empirical founding. Fish is not included at all. Fourthly, the interpolation method applied can give a misleading picture of the price movements. Prices did not change linearly, but fluctuated significantly annually and seasonally.

3. Establishing a new historical CPI

The challenge left by Jon Petter Holter is taken up in the present work. A new CPI for Norway is constructed, spanning over almost five centuries, 1516-2003. The CPI is constructed by splicing existing CPIs from 1871 onwards, with the new CPIs 1516-1819 and 1819-1871. The new indices are, like those they are spliced with, calculated according to the Laspeyre formula. This means that annual price movements are weighted by the included item's share of private consumption in the households in the base year. In order to construct this new CPI, most price data are compiled from the Wedervang Archive. Information on consumption expenditure weights are taken from research carried out by scholars in economic and social history along with surveys taken by the central administration and Statistics Norway.

7 NOS 1915, 2*-3*.

8 NOS 1969, 530.

The Ingvar Wedervang Historical Archive on Wages and Prices

The Wedervang Archive was first established in the 1930s at the Department of Economics at Oslo University. The archive gained its name from its pioneer, Professor Ingvar Wedervang.

Most of the wage and price data in the archive were collected in the 1930s by a group of scholars under the supervision of Wedervang. The aim was to examine historical business cycles to be able to explain and forecast upturns and downturns in the economy. However, due to lack of financial support and the following German occupation 1940-1945, the project was postponed.

Wedervang moved to Bergen to take up a chair as professor at the Norwegian School of Economics and Business Administration (NHH). The archive followed him. However, it was seldom used until the 1970s and 1980s when the Department of Economic History at the NHH took up research on the basis of data from the archive.

This new activity ended in a number of publications, among them aggregated series of prices, wages and real wages, basically for the latter part of the nineteenth century.⁹ In the late 1980s and 1990s the archive hosted international research on the standard of living.¹⁰ Today it serves as a valuable source in the construction of historical national accounts for Norway.¹¹

4. Method

To be able to construct a reliable CPI, we need a set of annual (t) consumer prices (p) for representative products (i). To compute an aggregated index for these products, their relative shares of consumption have to be found. These shares determine the weight each product will have in the index. The standard method for computing a CPI is to apply the Laspeyre formula. Micro indices (p_M) for all commodities (i) are constructed according to equation (1):

$$(1) \quad p_M^i = p^i / p_0^i$$

9 Gjølberg 1974, Ramstad 1982, Lønningdal 1984, Minde & Ramstad 1986, 90-121.

10 Fischer & Nordvik 1988, 14-35, Hodne 1995, Minde & Grytten 1997, 61-82

11 Brautaset 2002, Grytten 2004.

Price indices for the consumption groups are then constructed on the basis of the micro indices. The commodities are weighted according to their relative share of total expenditures within their consumption group according to equation (2), where c denotes consumption group:

$$(2) \quad p_L^c = \frac{\sum(p_t^i q_0^i)}{\sum(p_0^i q_0^i)}$$

Finally, to reach at a general CPI, the sub-indices for the consumption groups are summed up. Consumption groups are given weights according to their share of total consumption in the base year. Thus, we apply the aggregated Laspeyre formula as shown in equation (3):

$$(3) \quad P_L = \frac{\sum(p_t^c q_0^c)}{\sum(p_0^c q_0^c)}$$

P_L denotes the Laspeyre price index as the sum of prices (p) in year (t) multiplied by their quantity (q) in the base year (0), divided by the sum of the corresponding prices in the base year multiplied by their quantity in that year.

The method described above is the most commonly used method when calculating historical CPIs. During the last years it has become more common to construct geometrical indices by Cobb-Douglas functions. The advantage with the latter method is that one implicitly takes substitution effects into account. In the arithmetic Laspeyre approach the real weights will change according to relative price fluctuations between the commodities. Thus, the nominal and real weights may differ significantly. Using a geometric approach will eliminate the huge annual fluctuations in real weights.

A drawback with geometric weights is that the implicitly given substitution effects are mathematical rather than empirically founded. Thus, we cannot conclude that one approach is sounder than the other. Based on the fact that the CPIs we splice our new index with are constructed on the basis of arithmetic approaches, we also use this approach here. However, we also construct two CPIs 1819-1871 by geometric approaches. Unfortunately we are not able to construct geometrical micro indices. Thus, the first of them are constructed by calculating geometrical sub-indices (p_G) for each consumption group according to equation (4), where n denotes number of commodities:

$$(4) \quad P_G^c = \prod (p_i^i q_i^i)^{1/n} / \prod (p_{i0}^i q_{i0}^i)^{1/n}$$

Substitution between the consumption groups must have been marginal, e.g. consumers did not substitute cod for skin. Accordingly, we have summed these geometric sub-indices up to an arithmetic general index P_{GA} :

$$(5) \quad P_{GA} = \sum (p_G^c q^c) / \sum (p_{G0}^c q_{0}^c)$$

Finally, we calculate an index with geometric averages both on consumption group and aggregated level, by summing up the geometrical sub-indices in a geometrical index. This is done according to equation (6), where N denotes the number of consumption groups:

$$(6) \quad P_G = \prod (p_G^i q_i^i)^{1/N} / \prod (p_{G0}^i q_{i0}^i)^{1/N}$$

The choice of base year is decisive for the results, since the base decides the relative importance of the weights. To be able to give each consumption group a weight we have investigated different reports and estimates of consumption around the middle of the periods in question. On the basis of existing sources, we have been able to construct weights both for consumption groups and for commodities within these groups in 1850. This year also seems to be one of the most representative in the period. Thus, 1850 is our chosen base year for 1830-1871.

Since we are constructing the CPI for 1819-1830 with less commodities and consumption groups than that for 1830-1871, revised weights are calculated for 1830, which is the chosen base year for 1819-1830. For the period prior to 1819 we use several base years when constructing CPI-series for different subperiods before we finally splice them into one CPI with 1750 as reference year.

5. Archival sources for prices

The bulk of the price data in the new CPI is taken from the State Archive and the City Archive of Bergen for the period 1516-1819 and Professor Ingvar Wedervang's Archive on Wages and Prices 1819-1871. Reporting more than a million observations this latter archive is one of the

richest archives on historical wages and prices in Europe. The bulk of the price data in the Wedervang Archive covers the years between 1830 and 1920, but there is also a fairly comprehensive coverage back to 1819. Thus, for the period 1819-1920 it is possible to find consistent annual prices on several commodities. Some prices, as for grain, even go back to the 17th and 18th century. However, they are not annual and their reliability is lower than for those collected from 1819 onwards.

Most price data from the State Archive are appraisal prices taken in Western Norway. In the City Archive of Bergen we have derived price data from merchant houses in Bergen. Most of the data in the Wedervang Archive was collected from official reports and investigations, local reports on prices reported to the central administration, from institutions, private business archives, price current¹² and research on prices carried out by scholars. In most cases the price series cover several decades. They are taken monthly, quarterly or annually in different towns and cities. Different price series report similar commodities and enable us to cross check the data. They are reported both on disaggregated and different aggregated levels in respect to time and location. In many cases both market and product prices are reported along with import prices and some export prices. Experts on historical prices have concluded that the reliability of the price data is very good.¹³

6. Commodities and consumption groups

We have been able to establish consistent annual consumer price series for of up to 21 commodities 1666-1819, 29 commodities representing eight consumption groups 1819-1830, and 47 commodities representing nine consumption groups 1830-1871. For the years prior to 1666 we have more random observations for grain. The chosen consumption groups and commodities 1819-1871 are listed in table 2 in the appendix of the article.

On the basis of surveys we can conclude that for the period up to 1666 the products represented, i.e. grain, accounted for about 20 per cent of total consumption. From 1666 the commodities should indicate the price movements of more than half of the total consumption. For the period 1819-1830 the consumption groups in the new price index should represent 80

12 Price currents are agreed catalogue prices decided by suppliers of goods. Market prices may deviate from the price currents, e.g., due to negotiated rebates.

13 Minde & Ramstad 1986, 100-112.

per cent of private consumption at the time, and from 1830 onwards, 90 per cent.¹⁴ For the years 1516-1666 the reliability of the price index must be considered moderate. For the period 1666-1819 it is fairly good. The 1819-1830 index is even better. Finally, for 1830-1871, the reliability must be considered good.

The only major consumption groups missing from 1819 onwards, are those connected to services. These were of minor importance at the time. However, some products within the established consumption groups are missing. One such important product is housing. Nevertheless, arguable prices on wood give an indication on the long-term development of rental prices as it mirrors prices on material for building and construction. And in fact, some sources do not necessarily split between wood for building and construction and wood for fuel. This means that the prices on commodities within the consumption groups' chosen should be fairly representative for the general consumer price development in Norway 1819-1871. The data for interest rates on government bonds reported in Chapter four in this book and the data for house prices in reported in Chapter nine could potentially shed some light on the likely development in the housing component of CPI. This challenge is left for future work.

7. Prices 1516-1666

The price data for this first period are scarce, and they cover grain only. In 1888 the Norwegian economist T.H. Aschehoug published his work on Norwegian prices on grain since the discovery of America. His data were later included in the Wedervang Archive.¹⁵ From 1516-1640 Aschehoug basically collected random price observations from state institutions. He compiled prices of rye, barley, oat and maslin from the Citadel in Bergen, official accounts from the county of Akershus and church accounts. The bulk of the data was taken in cities Bergen and the Christiania-area (Oslo). In addition Bergen and Christiania were the two major import ports, handling more than half of the rye imported to Norway. From 1641 Aschehoug used appraisal prices for Christiania and Akershus collected by public servants.

For some periods prior to 1641 there are significant lacunas in the price material. Aschehoug convincingly argues that grain prices in Norway and Denmark followed each other

14 Minde 1983, 47-51, Grytten & Minde 1998, 52-54.

15 Aschehoug 1888, 81-116, W155.

closely. This is also shown empirically. Thus, we apply grain prices for Denmark, collected by Falbe-Hansen and Scharling as indicators for the price movements of grain in Norway, where Norwegian data are missing.¹⁶

8. Prices 1666-1819

For the period 1666-1819 the number of price observations are significantly higher. It is for this period possible to come up with an annual price index. From 1666-1709 we basically use appraisal prices collected in several parishes in Western Norway. In most cases the vicars were responsible for the data collection. The observations were submitted to the bishop's office in Bergen, and summarised there. During the years 1666-1709 we trace price information for 7-21 commodities from these sources kept at the State Archive in Bergen.¹⁷ However, none of these were collected at a permanent basis, and the coverage varies almost annually. Thus, we have to construct several sub-indices and splice these, to obtain one consistent annual CPI for 1666-1709.

From 1709 onwards, we basically use price data from merchants at the central Norwegian market place at the time, i.e. Bryggen in Bergen. The data are partly taken from merchant accounts and partly from price courants, reporting prices on traded goods between the northern parts of Norway and Bergen. We have compiled 18 more or less consistent price series from these sources, including grain, vegetables, beverages, colonial goods, manufacturing goods, fish, foodstuffs and skins. Some observations are taken directly from the City of Bergen Archive, some indirectly from Coldevin's work on prices in North-Norway in the eighteenth century.¹⁸

The sources we have used for the period up to 1819 do not allow us to construct a pure consumer price index. The appraisal prices for domestically produced goods should in many cases be considered product prices. However, the majority of domestically produced food was consumed at the farms. Thus, the product prices also reflect consumer prices. Prices

16 Falbe-Hansen 1869 and Scharling 1869.

17 The State Archive of Bergen, Bergen Domkapittelsprotokoller, 1639-1933.

18 The City Archive of Bergen, Nordfarkladder 1709-1819, A-0581 Rb 0001, Nordfaruttrekk 1712-1819, A-0581 Ra 0001, A-0597 Ra 0001, A-620 Ra 0001 Bergens Pris-Courant for Nordlandshandlerne 1739-1818 and Coldevin 1938.

of imported goods more often reflect wholesale or consumer prices. The same apply for prices according to the price currents.

Another problem with most of the price data before 1819 is that most prices are reported only once or twice a year. For the period 1815-1819 prices were to a significant degree collected and reported monthly. However, this was a period of financial and monetary chaos, which makes it more difficult to interpret the data. According to notations made in the old currency, the *rigsdaler*, there was a significant inflation in 1816 and 1817. According to the notations made in the new currency, the *speciedaler*, there was deflation in these years. The notations in the new currency have been used in this work.

9. Prices 1819-1830

Private archives from merchant houses are important sources for consumer prices prior to 1830. In this work prices on refined sugar, plain sugar, salt, vinegar, rice, peas, rye, rye flour, barley, barley flour, fresh cod (round fish) and stockfish are compiled from such sources now kept at the Wedervang Archive. We use prices from merchant houses located in Tromsø, Oslo, Stange, Bergen, Trondheim, Grundset, Kristiansand, Ringsaker, Fredriksvern, Akershus, Fredrikstad, Kongsberg and Halden.¹⁹ Some institution prices are also included, like prices paid for commodities bought by the Central Hospital in Christiania and the Garrison Hospital in Bergen.²⁰

The geographical distribution also seems satisfactory, since the merchants and institutions in the archive were located in all major districts of the country, some in the major cities, some in smaller towns, and some even in rural areas. Admittedly, the coverage is poorer for the first years than for the last years. However, the data still give us a fairly good indication of annual price movements every year 1819-1830.

In addition to the merchant prices, the Wedervang Archive also holds a significant number of price data on fish and fish products 1818-1830.²¹ These are prices collected by the Norwegian Inspector of Fisheries during the last part of the nineteenth and first part of the twentieth century, Fredrik Meltzer Wallem. Wallem collected an impressive number of fish

19 The Wedervang Archive, files W 051, W 210 and W 217.

20 W 217.

21 The Wedervang Archive, file W 397.

prices from different sources, spanning over significant parts of the nineteenth century. His data contain both exports, product and consumer prices. Most prices are taken from Norwegian ports, and the bulk of these from Bergen. For the period up to 1830, Wallem also collected price data from Stavanger, Trondheim, Kristiansund and Tromsø, along with some price data from merchant houses. His price observations start in 1818 and include cod, coalfish, clipfish and stockfish. The prices reported by us, are Wallem's calculated averages for each item. The prices basically stems from market prices reported by civil servants, price courants from fish markets and commodity bourses and private merchant archives. The prices reported by civil servants, bourses and fish markets were in principal collected each month or even more frequently. Some prices were recorded seasonally and some of the prices in the merchant archives even randomly. However, the bulk of the prices were collected at a regular basis. They probably constitute the most reliable existing price series for Norway 1819-1830.

One problem with Wallem's prices is that they are adjusted for exchange rate fluctuations from the official par silver value of the Norwegian speciedaler. We have readjusted these back to nominal prices by using exchange rate notations of the speciedaler.²²

The final source for price data 1819-1930 is the Bergen Price Courant for the major market seasons.²³ These report prices of about 60 commodities traded between Bergen and the rest of the country, basically North-Norway and other towns and cities North of Bergen. They mirror the price level in the northern, middle and western parts of the country, and to a degree also the southern and the coastal districts of the eastern part of Norway. About 15-20 of these commodities can be part of a CPI. Some of the data were originally collected once a month, and then included in this courant. The bulk of the data, however, originates from the two major market seasons in Bergen during spring and autumn. The data reflect the officially agreed prices set by all privileged merchants from Bergen engaged in trade during the hectic market seasons. This source basically reports prices of fish and fish products, grain, colonial goods, beverages and skins.

22 Chapter 7 in this book.

23 The Wedervang Archive, file W 270.

10. Prices 1830-1871

Most price data for 1830-1871 are taken from consistent series of data collected by civil servants in Norwegian towns and cities. One major source is called "Market prices in Norwegian towns".²⁴ Market prices for 15 commodities were collected quarterly by the local magistrates' office in 40 towns and cities all over the country. The commodities reported were rye, wheat, barley, oat, potatoes, peas, flax, hemp, salt, iron, spirits, tar, wool, herring and stockfish (dried cod). 13 of these 15 commodities were basic consumer goods at the time. Iron and tar were not. Thus, these two are omitted here.

Data exist for all commodities every year, except from wool, where some lacunas exist. However, these lacunas can be filled with data from other sources in the Wedervang Archive.²⁵ We also find lacunas in the data for several towns. Nevertheless, the coverage must be considered reasonably good for most years, and satisfactory for the rest. The quarterly reported data were collected at the same time in every town, more precisely in the middle of the first month of every quarter. They have been summed up and annual averages are calculated for each item in every town and city. Thereafter, aggregated national averages are computed on an annual basis.

These price data must be considered some of the most valid and reliable for our purpose. In the first place, they report market prices. Secondly, they are taken from all major towns and cities. Thirdly, they are reported quarterly. Fourthly, they were collected by the town magistrate offices, assessed by them and assessed and assembled by county, and finally by departmental civil servants. The data were collected on the basis of a departmental circular from January 1816, instructing the local public servants how and where the prices should be collected and on which commodities.²⁶ Wedervang's staff collected data from these local reports in the 1930s. They left out most of the period before 1832. From then on, we have consistent data sets. Thus, we conclude that the data reported in "Market prices from Norwegian towns" must be highly relevant and reliable for our purpose. The persistent records of these data in the Wedervang Archive basically came to a halt in 1871.

24 The Wedervang Archive, file W 272.

25 The Wedervang Archive, files W 139, W 269, W 271 and W 383.

26 Circular from 4th Department dated January 20th 1816 to all executive county public servants, kept at the Wedervang Archive, W 272.

A second important source from the Wedervang Archive is "Market place prices on retail goods", where annual prices on 24 commodities are reported.²⁷ These are rye, wheat, barley, oat, potatoes, oat flour, rye flour, oatmeal, veal, beef, mutton, pork (denoted bacon), butter, eggs, grouse, wood, hay, salt, sugar, coffee, spirits, malt, peas and tallow. Of these hay cannot be considered a consumer good, and is not included. The bulk of the price data covers the period 1830-1913. Prices were basically collected monthly or quarterly and reported annually by calculating averages for each town represented in the data set. Data for some months are lacking.

Price data were reported consistently for the four major cities in Norway, the capital city Oslo, Bergen, Trondheim and Stavanger. More sporadic data are taken from Levanger, Kongsberg and Drammen. The prices reported were basically market place prices. These were in principle recorded monthly, but in some cases quarterly. Local civil servants or local commodity bourse officers took the records. They were reported to the town magistrates' office or the bourse offices.

The coverage of the data is very good. The series are consistent, despite some lacunas for some cities. There are at least some observations on each product from minimum one city almost every year between 1830 and 1880. Market place prices also represent consumer prices. Compared to local price courants and other sources of consumer prices taken at the time, they also seem reliable.²⁸ Thus, we conclude that they are valid and reliable. In some cases they can be used to close existing lacunas. In addition, the "Market place prices on retail goods" cover more products, and these excess commodities are added to our list.

A third important source of data is price courants.²⁹ The relevant courants in the Wedervang Archive are basically prices reported in the price courant for Bergen. Some observations are also made for other major cities, as Oslo, Trondheim, Kristiansund, Aalesund, Bodø and Tromsø. Prices on a significant number of products are reported in these courants. They cover various time spans. However, the bulk of the data starts in 1830 or 1861 and ends in the early nineteen hundreds. We have compiled prices for herring, cod, stockfish, clipfish, fish oil, buckskin, goatskin and calfskin, wheat, rye, barley and their respective kinds of flour, butter, milk, rice, malt, beer, tobacco, salt, sugar, spirits, hemp and flax from this source.

27 The Wedervang Archive, file W 269.

28 W 269

29 The Wedervang Archive, files W 271, W 383.

Prices were recorded monthly or quarterly. Most observations for Bergen are consistent over time. As for the other cities and towns, the price courants are more sporadic. Thus, these prices are basically used to fill in gaps and to establish prices for consumer goods not covered by other sources in the Wedervang Archive. Official price mediators at Bergen Commodity Bourse collected the prices. There were strict instructions for those monitoring this work. A number of observations had to be included in the reported prices each month. Thus, they seem reliable. The market in Bergen was also a meeting point for traders from all over Western and Northern Norway, and thus, the prices seem representative for larger parts of the country. The price courants from other towns and cities were more sporadic. However, for some products they seem fairly consistent.

A fourth important source is “Retail and market place prices” from the capital city, Oslo. Market place prices on consumer goods were collected monthly from 1848 onwards up to 1919. Though some prices lack for several products in the 1850s. We have utilised price data for Oslo from several files in the Wedervang Archive.³⁰

We have basically used the price data reported solely from Oslo as supplement to existing prices, to fill in gaps, and to a limited extent to establish additional price series. We have utilised prices on vegetable oil, beer, vinegar, refined sugar, rice, wheat flour, eggs, milk, cream, grouse, beef, veal, mutton, pork, cod and firewood from birch, spruce and pine. These data are market place prices, and were collected by the measurement office of the capital. They were taken on a monthly basis, but in some cases more seldom. Some prices for other major cities and towns are also included in parts of the material. These price series are considered very reliable.³¹ Because of their limited geographical coverage, we mainly use them as supplements to other sources.

Fifthly, the bulk of our prices on fish from 1830 onwards, are taken from two files in the Wedervang Archive.³² One reports retail prices on fish and fish products from merchant archives from Bergen, Trondheim, Kristiansand, Kristiansund and Trondheim.³³ This file also contains price data for 1819-1830, and is already described above. The other file is a better

30 The Wedervang Archive, files W 128, W 139, W 206, W 220, W 275, W 276, W 383 and W 396.

31 Minde & Ramstad 1986, 102.

32 The Wedervang Archive, files W 051 and W 397.

33 W 051.

source. It contains data collected by the Norwegian Fishery Inspector of the last decades of the nineteenth century, Fredrik Meltzer Wallem.³⁴

Wallem's prices are built on a significant amount of observations for each year. The bulk of Wallem's data are taken from Western and Northern Norway. Bergen, the central port for the fish industry, was his most important source. Prices were also included from other important fishing ports, as Egersund, Stavanger, Haugesund, Aalesund, Kristiansund, Bodø, Tromsø, Vadsø and Vardø. In addition, we have supplemented some consumer prices on fish from other sources already mentioned.³⁵

Reliable consumer prices for herring are more difficult to find in Wallem's material. However, we have already compiled consumer prices for herring from the major files on market prices.³⁶ This data series report prices on herring in the major Norwegian cities 1830-1831 and in most Norwegian towns from 1832 onwards. Thus, we consider this series both valid and reliable.

Together these data enable us to construct valid and reliable annual price series for herring, cod, coalfish, stockfish and clipfish for every year 1830-1871. Most price observations are taken monthly or even in some cases weekly. And every reported price observation is the average of several observations in the very same port, city or town. Wallem's prices are considered reliable.³⁷ As long as we apply his consumer prices added with consumer prices on fish products from non-ports, they should also be valid in our case.

11. Readjusting for exchange rate fluctuations

As already mentioned, there is a significant drawback both with Wallem's price data and with some of the other market prices reported by magistrates and commodity bourses. In the nineteenth and early twentieth century there was a tendency of reporting deflated prices instead of nominal prices. More precisely, prices were often adjusted for exchange rate fluctuations. The most common way of doing this before 1874 was to adjust prices for exchange rate fluctuations from the par silver value of the currency. For the period of investigation in this work, this

34 W 397.

35 W 269, W 272, W 220, W 383.

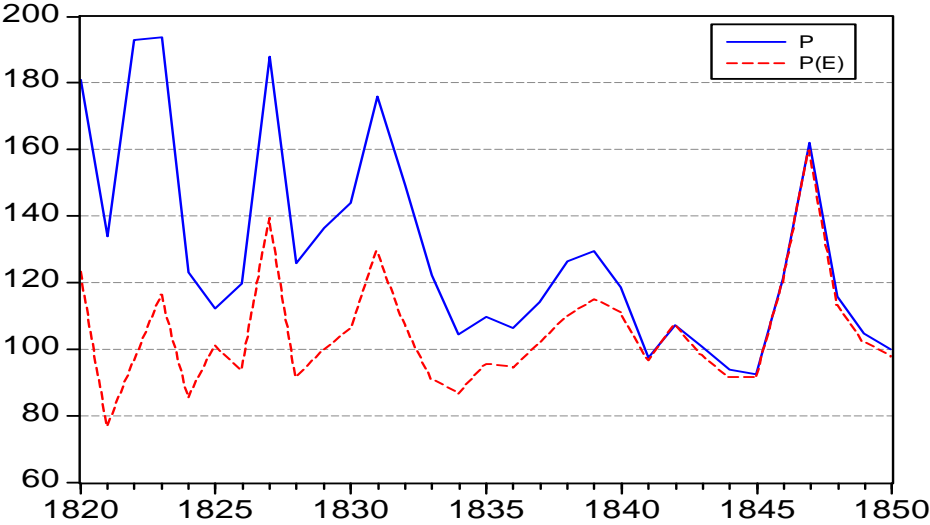
36 W 269, W 271 and W 272.

37 Brautaset 2002, 63-71.

applies to the years 1819-1842, when the Norwegian speciedaler fluctuated significantly from the official par value.

To account for this source of error in our data sets, we have to readjust Wallem's and other relevant price observations and price series back to their current values. This is done by using exchange rate quotations.³⁸ In the entire period 1819-1842 the market value of the speciedaler was far below the official par value. Thus, the price observations are readjusted with this factor. More precisely, they are inflated with the difference between the market rate and the par value. The effect of this readjustment is illustrated in Figure 1 where we show prices on grain and flour calculated with and without readjusting for exchange rate fluctuations.

Figure 1. Prices on grain and flour with and without readjustments for exchange rate fluctuations. P denotes the readjusted price and P(E) the deflated price on grain and flour.



12. Base years

To be able to construct a final CPI the different commodities must be weighted together in the index. According to the Laspeyre approach, the weights should be established on the basis of

38 Chapter 7 in this book.

their share of total consumption in the base year. We then need to choose representative base years for the periods. Next, we will have to find the weights of each item in the base years.

For the period 1830-1871 we aim at finding a representative base year towards the middle of the period, i.e. around 1850. In the last years prior to 1850, both the international and the domestic economy were marked by turbulence, due to a revolutionary and contra-revolutionary wave over continental Europe. As for the years after 1850, the economy was hit by the Crimean War. Thus, 1850 seems to be the most representative year towards the middle of the period.

As for the period 1819-1830, it is more difficult to find a representative base year. The Norwegian economy was hit by a post-war recession, protectionism from its most important trading partner, the United Kingdom, huge exchange rate fluctuations and institutional chaos. None of the years previous to 1830 could be considered normal or representative years. Thus, we have chosen 1830 as the base year for the period 1819-1830.

For the years prior to 1819 it is not easy to find any representative base year. One problem is that all commodity price series have lacunas, some of them are significant. This implies that the number of items included in the index varies a lot. Thus, the price index covering the years 1516-1819 in fact consists of several indices, which are spliced together. However, on the basis of Coldevin's work we have been able to use 1750 as the main base year, with 1600, 1670, 1675, 1680, 1685, 1700, 1704 and 1790 as base years for the sub-indices.

13. Weights

To be able to establish weights for each item and consumption group, we need to map the consumption pattern of the households. We first look at Jan Ramstad's estimates of consumption 1850-1910. He reports weights for ten consumption groups. His extra group, compared to ours, was hygiene. However, this was of marginal importance, and accounted for less than three per cent in 1850. In his work meat accounted for seven per cent, fish for two, milk products and eggs 27, bread and flour 14, vegetables two, colonial goods ten, beverages and tobacco one, lighting and heating 16, and clothing and footwear 18 per cent.³⁹

39 Ramstad 1982, 492.

There are problems in using Ramstad's weights. In the first place, they are drawn from a consumer expenditure survey from 1912/1913. Ramstad assumed the same fixed weights in 1850 and adjusted them by the price differences between 1850 and 1912/1913. He did not take into account the changes in consumption that took place in the more than 60-year period. It has later been shown that the pattern of food consumption changed dramatically during this period.⁴⁰ Secondly, Ramstad's survey accounts for the capital city Oslo only, where the diet was very different from e.g. Western and Northern Norway, where people consumed far more fish. As for beverages, the consumption of alcohol was reduced dramatically during the second half of the nineteenth century and the early 1900s. Teetotalism, Puritanism and the labour movement became stronger and Norwegians became increasingly more sober after having consumed close to 20 litres of pure alcohol per capita in the 1830s.⁴¹ We conclude that Ramstad's weights cannot be taken as representative for 1819-1871.

In connection with Statistics Norway's calculations of historical national accounts for Norway, estimates were made of consumption expenditures for 1865. According to this work food accounted for 46.5 per cent, beverages and tobacco 6.5, rents, lighting and heating 19.9, durable household goods and household operation 7.5, clothing and footwear 11.0, personal health care and hygiene 1.0, travelling and transportation 1.2, lodging etc. 2.0 and finally, other consumption 4.2 per cent.⁴²

Kjell Bjørn Minde has examined consumer expenditure surveys taken in 1800, 1867, 1879 and 1890. The groups reported were cereals, meat, milk and dairy products, fish, potatoes, fruit and vegetables, colonial goods, other foodstuffs and beverages, and others.⁴³ The accountability of the surveys varied, in particular prior to 1890. However, it is obvious that cereals and flour were the most important products, followed by milk and dairy products, meat and colonial goods. On the basis of these and the 1865-estimates we are able to arrive at reasonable weights for 1830-1871 with 1850 as base year.

The relative weights of the different consumption groups are reported in table 1. The table includes the weights for each item within the consumption group. Camilla Brautaset has calculated Norwegian exports of fish, where she also gives empirical founded indications of

40 Grytten & Minde 1998, 52-55.

41 Hodne & Grytten 2000, 278-281, has estimated the consumption of spirits in 1835 to 17,5 litre per capita compared to Statistics Norway's estimate of 1.1 litre pure spirits per adult over 15 years in 1991.

42 Bjerke 1966, 76.

43 Minde 1983, 49.

domestic consumption.⁴⁴ By drawing information from her work we find relative weights for each fish product within their consumption group. As for meat and milk, new calculations of output, input, value added and consumption for Norway have been made.⁴⁵ We apply these figures to find weights for each item within their respective consumption groups.

After having established weights for 1850, we are able to extrapolate these back to 1830. This can partly be done by drawing on production and consumption information from established work on agriculture and fisheries, on public consumption surveys, and assuming the same trends 1830-1850 as 1850-1865. Two important sources in this matter are the contemporary work by Anton Martin Schweigaard and Martin Braun Tvethe. In 1840 and 1848 these two scholars established estimates for the size of the Norwegian economy around 1835 and 1845.⁴⁶

However, some important modifications are made. Since rent, lighting and heating are represented with two commodities only, this group's share of the consumption basket is reduced from 20 to 15 per cent. Since we have good coverage for different fish products, their share is adjusted upwards from ten to 15 per cent.

The weights for 1819-1830 with 1830 as base year are also reported in table 1. Weights for each item are reported in table 2 in the appendix.

For the years prior to 1819 it is not easy to find any representative weights. One problem is that all commodity price series have lacunas, some of them are significant. This implies that the number of items included in the index varies a lot. Thus, the price index covering the years 1516-1819 in fact consists of several indices, which are spliced together. It is, however, clear that the typical consumption basket did not change significantly during the sixteenth, seventeenth and eighteenth century. For the first 150 years we only have price data on grain, and thereafter for staple consumer goods.

In his work on prices in the eighteenth century, Coldevin suggests different weights for the commodities.⁴⁷ We base our weights on his estimates. However, since the number of items varies significantly the actual weights differ a lot within the entire time span.

44 Brautaset 2002, 97-114.

45 Grytten 2004, 47-76.

46 Schweigaard 1840, Tvethe 1848.

47 Coldevin 1938, 206-220.

Table 1. Weights of consumer expenditure for consumption groups 1819-1871.

Consumption groups	Weight of total	
	1819-1830	1830-1871
A. Fish and fish products	0.15	0.07
B. Milk and milk products	0.15	0.14
C. Meat	-	0.07
D. Crops and flour	0.25	0.18
E. Vegetables	0.08	0.07
F. Colonial	0.05	0.05
G. Beverages and tobacco	0.05	0.05
H. Rent, lighting and heating	0.15	0.21
I. Clothing	0.15	0.16
A-I. Total	1.00	1.00

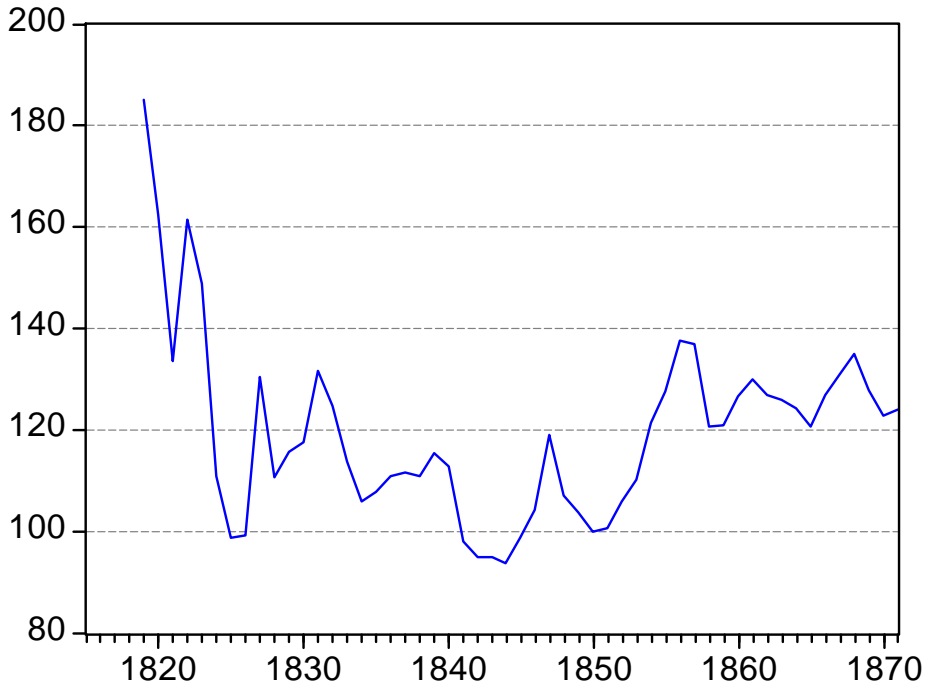
14. CPI for Norway 1819-1871

We are now in a position to construct a CPI 1819-1871. We first construct 47 micro indices 1830-1871. We sum these up to nine sub-indices and one general CPI. We then proceed with the construction of a CPI for 1819-1830. First we establish 29 micro indices. Then we summarise them into eight consumption group indices, and finally one general index. By splicing the index 1819-1830 with that for 1830-1871 we establish a continuous CPI.

The general CPI 1819-1871 is shown in Figure 2 below. Despite huge fluctuations, prices came down dramatically between 1819 and 1844. Most of the fall in prices came before 1842. During 1819-1842 prices fell by about 50 per cent. At the same time the Norwegian speciedaler appreciated by about 100 per cent. In other words, the fall in prices and the appreciation of the speciedaler were symmetric 1819-1842. From 1845 prices rose until 1856 and

thereafter stabilised. This picture is well in line with the picture of consumer price developments in other countries during the same period.⁴⁸

Figure 2. CPI for Norway, general index 1819-1871 (1850=100).



15. Geometric indices 1819-1871

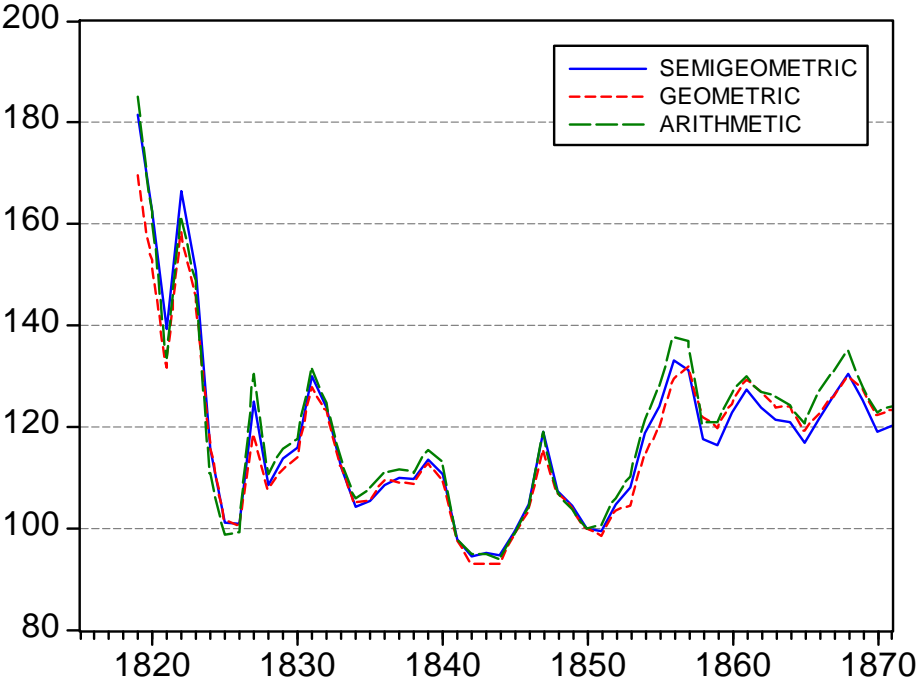
To be able to throw light on the substitution problem we have also computed the CPI for Norway 1819-1871 as a semi-geometric index (Semi- Π) and as a geometric index (Π).

In the Semi- Π we first found micro indices and thereafter constructed sub-indices for the consumption groups by geometric averages of the micro indices within the consumption groups. Given, marginal substitution between consumption groups we calculated a general index as an arithmetic average of the geometric sub-indices.

48 Scholliers & Zamagni 1995, 203-266, Wagemann 1935.

Assuming that cross-consumption group substitution took place, it would also be of interest to compute a geometric index (\prod), i.e. to calculate geometric averages of the geometric consumption group indices. Both these alternatives are compared to the traditional full arithmetic approach in Figure 3. As shown, the deviations between the series are modest, except for the first years of the period in question. According to the geometric approach prices did not fluctuate as significant as indicated by the arithmetic series. In particular the deflation period 1819-1825 is adjusted downwards by using the geometric approach. The same accounts for the strong inflation in 1827.

Figure 3. CPI for Norway 1819-1871 (1850=100). Arithmetic and geometric indices

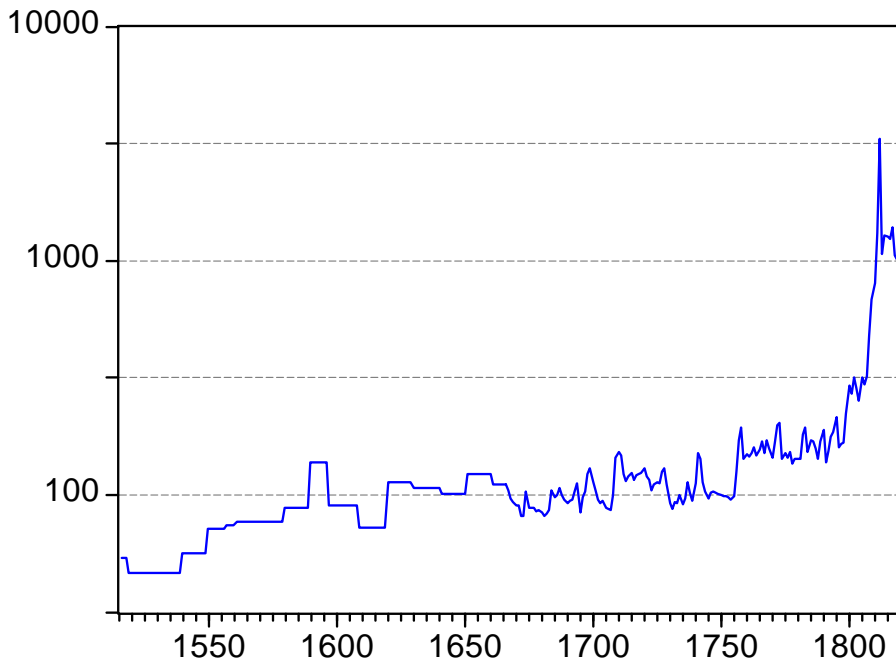


16. CPI 1516-1819

On the basis of the price data 1516-1819 and the relative weights suggested by Coldevin, it has been possible to construct a series of minor price indices each covering periods of three to twenty years. Different baskets of commodities are included in each series. However, types of grain, butter and fish are represented in most of these sub-indices. By splicing them, we obtain one continuous series 1516-1819. Some lacunas for the period up to 1641 are filled by extrapolating by Danish price data as argued above. From 1666 we have annual price data, and thus a continuous annual price index. The prices reflect both wholesale and consumer prices, which were quite similar in many cases.

The CPI for Norway 1516-1819 is reported in Figure 4. The index is presented with a semi-logarithmic scale.

Figure 4. CPI for Norway 1516-1819. Semi-logarithmic scale (1750=100).



17. CPIs from 1871 onwards

By splicing the new CPIs with similar indices we arrive at an annual CPI for Norway from 1516 to present. In 1982 Jan Ramstad constructed a cost of living index for working class families in Oslo 1850-1910.⁴⁹ Using a Laspeyre formula, he adopted weights derived from the 1912/1913 consumption expenditure survey for Oslo. The weights represent the reported average consumption of the lowest income group in the study. The index does not include house rents, which Ramstad was unable to find reliable sources on. Travel and cultural activities were of negligible portions, and were left out. Nevertheless, his sample of 55 products represents 77 per cent of the total consumption expenditure for working class families in Oslo.⁵⁰

Ramstad used price data from the Wedervang Archive. He managed to construct price series for 55 commodities in ten consumption groups annually. For some years, in particular the first two decades of the period covered by the index, price data were lacking. Lacunas were closed by interpolations and extrapolations.

A significant problem regarding Ramstad's index is his choice of linear interpolations and extrapolations. Thus, price movements were smoothed. Another problem is that Ramstad's index covers Oslo only. Thirdly, Ramstad assumed a fixed consumption basket. Despite shortcomings in Ramstad's work for 1850-1870, his index from the 1870s onwards, gives a valid picture of the price development. Hence, we splice it with ours from 1871 onwards to 1901.

In the historical national accounts for Norway, an implicitly given price index for private consumption is reported back to 1865.⁵¹ The index has never been documented. By comparing the figures of the historical national accounts deflator for private consumption with that for Sweden, we find very high correlation.⁵² We cannot exclude the option that the CPI for Norway 1865-1900 is a revised version of a Swedish deflator for private consumption. Hence, it cannot be considered reliable, and is not used here.

On the basis of consumption among working class families the Statistical Office of Kristiania (Oslo) calculated a price index back to 1901. The weights of the different products were computed in connection with the consumption survey of 1912/1913. The number of

49 Ramstad 1982, 158-238.

50 Statistical Office of Kristiania 1915.

51 NOS 1968, 352-353.

52 Lindahl 1937, 21-46, Johansson 1967.

products included was limited, and varied significantly. The prices and weights were taken from Oslo exclusively. However, this index has been considered fairly reliable by Statistics Norway, and it is published as the standard cost of living index for Norway 1901-1916. Hence, we splice it with Ramstad's index in 1901.

In 1916 the Ministry of Social Affairs started the calculation of a cost of living index. In principle, their index applied for the entire country. The base year was 1914, and the weights were derived from the survey of consumption in six major cities of the country in 1912/1913, i.e. Oslo, Bergen, Trondheim, Kristiansand, Drammen and Hamar. The price data were taken from up to 16 towns, the number of commodities was around 60, mainly related to food and fuel.⁵³ The numbers of towns, products and product categories were increased significantly after Statistics Norway took over monitoring the cost of living index in 1919, running from 1920. We splice this index by the one from the Statistical Office of Kristiania (Oslo) in 1916.

As for 1920-1960, Statistics Norway monitored a cost of living index, which dates back to 1919. Again, the first weights were drawn from the consumption survey taken in 1912/1913. As mentioned, the survey included working class families in six major cities. The price data were taken in towns from entire country. The 1912/1913 weight bases were used up to 1929. The consumption weights were revised according to a survey taken in 1927/1928. In 1949 the survey was replaced by one from 1947/1948, reporting consumption in working class households in 31 towns and industrial centres. Prices were reported from a representative set of shops and plants all over the country. During the next years significant changes took place in the pattern of consumption. Thus, the weights were again revised on the basis of a new survey among working class households in 27 towns and industrial centres in 1951/1952. These weights were kept until 1960, when the cost of living index for working class households was substituted by a consumer price index for households in general, on the basis of new consumption expenditure surveys from 1959 and later.⁵⁴

To sum up, Statistics Norway's cost of living index was calculated from price data taken in a representative number of shops and plants from towns and urban centres all over the country. In 1919 prices were recorded from 16 towns. The following year the number increased to 26. It reached 31 in 1928, 53 in 1949, and finally 100 towns and densely built-up

53 NOS 1978, 518-519.

54 NOS 1994, 292.

areas in 1959. The number of items reported was 120 in 1920, 180 in 1928, some 340 in 1949, and around 700 in 1959. The original weights of the different product categories from 1912-1913 were changed two times based on consumption surveys in 1927-1928 and 1947-1948.⁵⁵ We have spliced Statistics Norway's cost of living index 1919-1960 with the corresponding index by the Ministry of Social Affairs in 1919.

Finally, in 1959/1960 the cost of living index for working class households was replaced by Statistics Norway's consumer price index (CPI) for all households. In this index as well, the calculations are made according to the Laspeyre formula. The weight bases have been ascertained through family budget surveys. Statistics Norway's CPI covered average consumption in private households in the whole population as ascertained through the large-scale family budget survey of consumer expenditure in 1958. Special studies were undertaken during the preceding years relating to the consumption of farmers, fishermen and pensioners. Then, the weight bases were revised through extensive consumer expenditure surveys held in 1967 and 1973. From 1974 annual consumer surveys have been taken.⁵⁶ The main purpose has been to give descriptions of the consumption of private households in order to update the weights assigned for the consumer price index.

Since 1967 the surveys have covered all private households, i.e. persons living in the same dwelling and eating at least one meal together daily. Consumption expenses have been registered by means of detailed accounting and interviews. The net sample size has varied from 1.000 to 1.500 households annually.

The CPI 1960-1969 had 1959 as base year. For 1968-1975, 1968 was the base. 1974-1979 had 1974 as is base, and 1978-1982 1978. From 1982 onwards, the weights have been found on the basis of consumer expenditure surveys of periods of three years, i.e. three year moving averages. They are now updated annually. At the turn of the twentieth century Statistics Norway replaced its arithmetic CPI with a geometric CPI.

The survey holds data from a set of approximately 1.000 representative commodities. These have been selected according to their importance in average household consumption. Their corresponding prices are collected from a representative sample of stores within retail trade and service establishments. In sum, the survey comprises 40.000 to 45.000 observations

55 NOS 1978, 519.

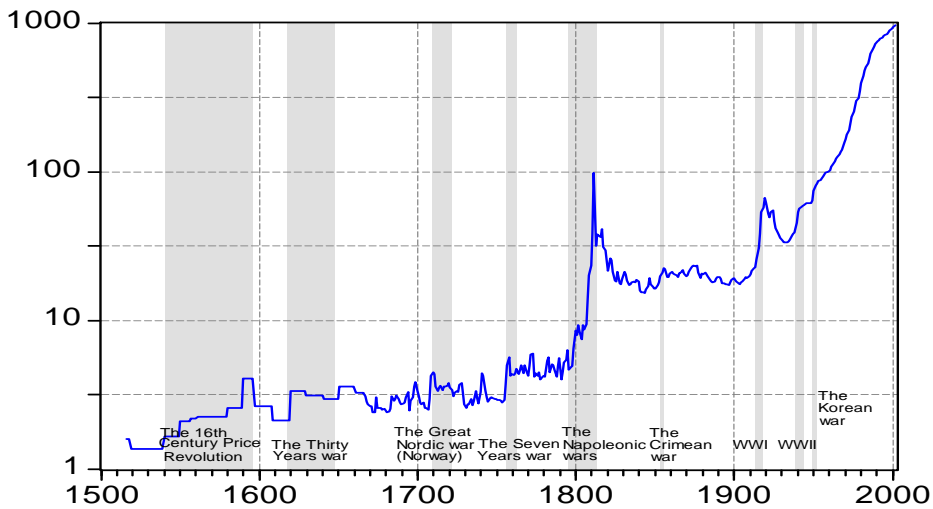
56 NOS 1994, 289-292.

per month.⁵⁷ Statistics Norway’s consumer price index 1960 to present is spliced with their cost of living index in 1960.

18. CPI for Norway 1516 to present

By splicing the new consumer price index 1516-1819 and 1819-1871, the Ramstad index 1871-1901, Statistical Office of Christiania’s index 1901-1916, the Ministry of Social Affairs’ index 1916-1919, Statistics Norway’s index 1919-1960 and Statistics Norway’s index from 1960 onwards, we finally arrive at an annual CPI for Norway 1516 to present. This CPI is reported in Figure 5 (1960 set as reference year). The graph reveals two distinct features, one in the short and one in the long run.

Figure 5. CPI for Norway 1516-2003, semi-logarithmic scale (1960=100)



In the first place, with the exception of World War I and its aftermaths, pre-twentieth century short run prices fluctuated significantly more than twentieth century short run prices. Secondly, in the long run prices stepped up in the sixteenth century; they were more stable in the seventeenth century and increased in the eighteenth century. After the hyperinflation under

57 NOS 1994, 293.

and just after the Napoleonic Wars and the distinctive depression until the *speciedaler* reached par silver value in 1842, long-run prices stayed remarkably stable during the nineteenth century. This gives an indication of financial stability during the heydays of the silver and gold standards 1842–1914. In fact, due to the long nominal depression 1873–1896 prices in 1900 and even as late as 1913 were quite similar to those around 1830.

From 1914, the twentieth century was characterised by inflation, with the exception of the interwar period. After the Second World War prices increased steadily until the 1970s. Inflation then increased its pace until the late 1980s, when the inflation rate retarded.

19. Conclusions

Until now there has not been a consistent, valid and reliable price index for Norway previous to the 1870s. Thus, the present article offers a new CPI for Norway 1516–1871. This consists of two indices. The most valid and reliable, covering the period 1819–1871, reflects market or consumer price data from Norwegian towns and cities compiled and reported in the *Wedervang Archive* at the Norwegian School of Economics and Business Administration in Bergen, Norway.

The *Wedervang Archive* contains rich data sets on wages and prices. We have been able to construct price indices for 29 consumer commodities 1819–1830 and 47 commodities 1830–1871. The index and its corresponding sub-indices have been constructed according to the Laspeyre formula. This means that we have constructed consumption expenditure weights for two base years: 1830, covering the period 1819–1830; and 1850, covering the period 1830–1871. Weights are given for consumption groups and for commodities within these groups. The weights are estimated on the basis of former research in economic and social history, consumer expenditure surveys and consumption figures in the historical national accounts for Norway.

By using a geometric approach in the construction of the CPI, we conclude with alternative price series. With the exception of the period 1819–1927, when huge price fluctuations allowed for significant substitution effects, the CPI constructed by a traditional arithmetic approach and the alternative geometric approaches are well in line.

The price data necessary to compute the CPI 1516–1819 are basically taken from the State Archive of Bergen and the City Archive of Bergen. They are partly appraisal prices

partly market prices collected from merchants and price courants. The new CPI for Norway 1516-1871 has been spliced with existing CPIs and cost of living indices from 1871 onwards. We then obtained a national CPI 1516-2003.

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Table 2. Consumption expenditure weights 1819-1871.

Commodities	Weight		Commodities	Weight	
	1819-1830	1830-1871		1819-1830	1830-1871
<i>A. Fish and fish products</i>	0.15	0.08	<i>E. Vegetables etc</i>	0.08	0.07
1. Herring	0.25	0.20	24. Potatoes	-	0.70
2. Stockfish	0.15	0.10	25. Peas	0.70	0.15
3. Cliffish	0.08	0.10	26. Rice	0.30	0.15
4. Cod	0.35	0.40	<i>F. Colonial goods</i>	0.05	0.05
5. Coalfish	0.17	0.20	27. Raffinade	0.35	0.30
<i>B. Milk products and eggs</i>	0.15	0.14	28. Sugar	0.35	0.25
6. Butter	0.45	0.40	29. Coffee	-	0.30
7. Cream	-	0.10	30. Salt	0.30	0.10
8. Milk	0.55	0.40	31. Vinegar	-	0.05
9. Eggs	-	0.10	<i>G. Beverages and tobacco</i>	0.05	0.05
<i>C. Meat and meat products</i>	-	0.07	32. Spirits	0.50	0.35
10. Grouse	-	0.05	33. Malt	0.20	0.10
11. Beaf	-	0.35	34. Beer	-	0.25
12. Veal	-	0.15	35. Tobacco	0.30	0.30
13. Mutton	-	0.30	<i>H. Rent, lighting and heating</i>	0.15	0.20
14. Pork	-	0.15	36. Pinewood	-	0.15
<i>D. Grain and flour</i>	0.25	0.18	37. Whitewood	-	0.10
15. Rye	0.07	0.05	38. Birchwood	-	0.30
16. Wheat	-	0.05	39. Tallow	0.60	0.25
17. Barley	0.15	0.10	40. Fish oil	0.40	0.15
18. Oat	0.18	0.10	41. Veg. oil	-	0.05
19. Rye flour	0.15	0.15	<i>I. Clothing</i>	0.15	0.16
20. Oat flour	0.15	0.10	42. Wool	-	0.35
21. Barley flour	0.15	0.10	43. Flax	0.35	0.25
22. Wheat flour	-	0.25	44. Hemp	0.15	0.10
23. Oatmeal	0.15	0.10	45. Buckskin	0.15	0.10
			46. Goatskin	0.20	0.10
			47. Calfskin	0.15	0.10

Sources, Minde 1982, 49, Bjerke 1966, 76, Ramstad 1982, 492 and Grytten 2004, 73-76.

Table 3. CPI for Norway 1819-1871. Group A. Fish and fish products (1850=100).

	1. Herring	2. Stockfish	3. Clipfish	4. Cod	5. Coalfish	A. All
1819	184,7	163,0	278,6	179,2	160,0	184,0
1820	173,2	168,9	260,1	162,2	144,0	171,8
1821	162,2	172,9	245,5	161,7	140,7	167,7
1822	182,3	172,5	268,0	174,5	154,2	181,3
1823	158,1	164,8	256,7	129,6	113,3	150,3
1824	105,0	106,8	186,3	82,5	86,5	101,4
1825	85,0	82,8	150,0	48,7	85,4	77,7
1826	87,6	82,5	131,1	55,8	81,1	78,5
1827	115,0	108,4	154,9	82,8	89,2	102,2
1828	94,0	79,9	144,0	53,4	87,4	81,0
1829	84,0	79,3	133,5	72,9	72,8	82,0
1830	105,0	86,2	153,8	98,8	72,3	99,0
1831	110,8	85,5	202,8	122,7	54,7	111,0
1832	102,6	86,1	194,2	126,4	59,7	111,1
1833	109,3	97,7	197,8	125,6	54,4	112,5
1834	107,9	107,0	166,8	123,1	73,8	113,0
1835	100,9	92,7	149,2	119,9	83,5	109,1
1836	104,4	92,9	162,9	93,1	96,2	103,0
1837	95,6	85,7	134,4	59,0	88,5	82,4
1838	102,6	90,9	152,1	102,5	102,8	106,4
1839	105,8	87,2	168,5	129,4	97,1	117,9
1840	107,0	104,2	230,3	149,3	80,4	130,6
1841	104,1	98,4	168,8	144,7	71,4	119,7
1842	110,5	92,3	158,9	118,4	79,3	110,4
1843	106,1	100,0	167,3	129,1	76,6	114,9
1844	92,4	110,6	170,9	119,2	76,6	109,6
1845	89,8	121,2	165,5	148,5	66,7	119,4
1846	111,4	96,5	132,7	96,8	73,3	98,6
1847	106,1	89,1	149,1	77,3	79,9	91,9
1848	111,1	100,0	141,8	74,1	96,7	95,4
1849	105,8	110,6	149,8	106,4	120,1	113,8
1850	100,0	100,0	100,0	100,0	100,0	100,0
1851	91,5	91,6	87,3	72,7	78,1	80,9
1852	95,9	86,2	105,5	81,1	66,1	84,0
1853	107,6	82,5	96,7	62,2	48,0	73,9
1854	116,3	86,2	93,5	81,1	63,1	86,3
1855	118,1	107,6	146,0	64,8	48,0	84,5
1856	123,0	118,6	129,8	90,7	69,1	99,5
1857	136,7	129,3	129,8	116,9	90,1	118,0
1858	118,1	120,3	162,2	124,6	96,1	120,9
1859	119,2	94,1	151,3	121,5	93,7	115,7
1860	115,5	106,1	210,9	134,5	108,1	130,2
1861	121,3	130,4	162,2	130,3	102,1	126,1
1862	108,5	138,4	170,9	141,2	114,1	131,9
1863	107,9	157,0	177,5	155,5	123,1	141,9
1864	114,9	157,7	186,2	155,6	122,5	144,1
1865	115,5	133,4	157,8	158,6	126,1	140,9
1866	123,9	119,6	129,8	120,8	91,9	116,4
1867	128,3	128,6	129,8	119,7	90,1	117,4
1868	122,4	120,3	113,5	112,4	84,1	109,6
1869	112,8	123,9	174,5	165,0	132,1	144,8
1870	110,5	133,9	194,5	160,9	126,1	144,5
1871	122,7	178,1	189,1	162,2	132,1	152,6

Sources, W 051, W 139, W 270, W 271, W 272, W 396 and W 397.

Table 4. CPI for Norway 1819-1871. Group B. Milk products and eggs (1850=100).

	6. Butter	7. Cream	8. Milk	9. Eggs	B. All
1819	185,2		203,5		193,3
1820	160,1		189,5		174,5
1821	140,4		159,9		149,6
1822	162,1		184,6		172,8
1823	132,6		138,2		134,3
1824	117,9		124,6		120,4
1825	88,4		131,4		110,9
1826	91,9		130,1		111,8
1827	123,8		138,0		130,3
1828	125,5		118,9		120,7
1829	95,5		98,9		96,4
1830	110,5	90,9	92,3	92,3	99,5
1831	120,2	97,0	100,0	95,4	107,3
1832	110,5	90,9	92,3	91,5	99,4
1833	102,6	87,9	92,3	91,5	95,9
1834	92,1	83,3	84,6	90,8	88,1
1835	116,7	97,0	100,0	94,6	105,8
1836	121,9	100,0	100,0	94,6	108,2
1837	115,8	95,5	100,0	94,6	105,3
1838	101,8	87,9	92,3	93,8	95,8
1839	124,6	103,0	107,7	97,7	113,0
1840	122,8	98,5	100,0	96,9	108,7
1841	98,2	89,4	92,3	96,2	94,8
1842	89,9	83,3	84,6	95,4	87,7
1843	103,5	97,0	100,0	98,5	100,9
1844	101,8	93,9	92,3	97,7	96,8
1845	107,9	98,5	100,0	100,0	103,0
1846	109,2	98,5	100,0	100,0	103,5
1847	122,8	104,5	115,4	101,5	115,9
1848	114,0	103,0	107,7	100,8	109,1
1849	109,6	101,5	107,7	100,8	107,2
1850	100,0	100,0	100,0	100,0	100,0
1851	111,4	101,5	107,7	100,8	107,9
1852	114,0	101,5	107,7	100,8	108,9
1853	116,7	103,0	107,7	100,8	110,1
1854	129,8	104,5	115,4	103,1	118,8
1855	133,8	103,0	115,4	102,3	120,2
1856	153,5	106,1	123,1	103,1	131,5
1857	159,6	104,5	130,8	103,8	137,0
1858	138,6	86,4	115,4	102,3	120,5
1859	149,1	87,9	123,1	93,8	127,1
1860	143,0	92,4	123,1	90,8	124,7
1861	138,2	110,6	115,4	90,0	121,5
1862	128,1	104,5	107,7	80,8	112,8
1863	122,4	101,5	100,0	87,7	107,9
1864	132,9	103,0	107,7	78,5	114,4
1865	133,8	103,0	107,7	83,8	115,3
1866	143,9	104,5	115,4	70,0	121,2
1867	135,5	101,5	107,7	77,7	115,2
1868	138,2	101,5	107,7	76,9	116,2
1869	139,0	101,5	107,7	79,2	116,8
1870	139,5	98,5	115,4	73,8	119,2
1871	137,7	92,4	107,7	79,2	115,3

Sources, W 269, W 270, W 271, W 272, W 275, W 276 and W 396.

Table 5. CPI for Norway 1819-1871. Group C. Meat and meat products (1850=100).

	10. Grouse	11. Beef	12. Veal	13. Mutton	14. Pork	C. All
1819						
1820						
1821						
1822						
1823						
1824						
1825						
1826						
1827						
1828						
1829						
1830	78,3	105,9	116,3	88,4	101,9	100,2
1831	91,7	111,8	122,0	97,7	113,0	108,2
1832	88,3	114,7	123,4	102,3	109,3	110,2
1833	85,0	108,8	120,6	93,0	103,7	103,9
1834	133,3	105,9	119,1	90,7	100,0	103,8
1835	80,0	97,1	100,7	88,4	96,3	94,0
1836	70,0	150,0	107,8	120,9	114,8	125,7
1837	83,3	141,2	107,1	100,0	109,3	116,0
1838	85,0	120,6	90,1	81,4	100,0	99,4
1839	58,3	147,1	110,6	114,0	114,8	122,4
1840	58,3	141,2	117,0	111,6	111,1	120,0
1841	63,3	105,9	97,2	86,0	92,6	94,5
1842	65,0	85,3	92,2	74,4	83,3	81,8
1843	46,7	83,8	84,4	67,4	79,6	76,5
1844	66,7	100,0	86,5	74,4	87,0	86,7
1845	95,0	102,9	95,7	100,0	100,0	100,1
1846	91,7	100,0	85,8	81,4	88,9	90,2
1847	108,3	111,8	96,5	102,3	103,7	105,3
1848	91,7	129,4	96,5	114,0	114,8	115,8
1849	105,0	105,9	93,6	90,7	103,7	99,1
1850	100,0	100,0	100,0	100,0	100,0	100,0
1851	70,0	105,9	92,2	95,3	105,6	98,8
1852	105,0	117,6	133,3	104,7	118,5	115,6
1853	65,0	120,6	93,6	97,7	133,3	108,8
1854	88,3	147,1	101,4	127,9	142,6	130,9
1855	59,2	152,9	106,4	127,9	140,7	131,9
1856	91,7	161,8	114,2	144,2	146,3	143,5
1857	106,7	170,6	107,8	158,1	155,6	152,0
1858	115,0	158,8	111,3	144,2	135,2	141,6
1859	101,7	155,9	112,1	132,6	133,3	136,2
1860	83,3	150,0	102,8	93,0	127,8	119,2
1861	100,0	157,4	117,7	89,5	155,6	127,9
1862	79,2	158,8	127,0	110,5	155,6	135,1
1863	70,8	161,8	83,7	125,6	124,1	129,0
1864	83,3	145,6	128,4	118,6	120,4	128,0
1865	75,8	132,4	80,9	111,6	113,0	112,7
1866	75,8	154,4	92,2	120,9	140,7	129,1
1867	93,3	157,4	90,8	117,4	140,7	129,7
1868	109,2	167,6	103,5	134,9	150,0	142,6
1869	84,2	164,7	102,8	140,7	157,4	143,1
1870	100,0	161,8	104,3	130,2	157,4	139,9
1871	92,5	157,4	102,1	133,7	144,4	136,8

Sources, W 128, W 269, W 272 and W 275.

Table 6. CPI for Norway 1819-1871. Group D. Grain and flour (1850=100).

	15. Rye	16. Wheat	17. Barley	18. Oat	19. Rye flour	20. Oat flour	21. Barley flour	22. Wheat flour	23. Oat meal	D. All
1819	199,1		290,8	242,5	194,2	202,1	230,0		260,4	224,7
1820	163,6		231,2	195,4	159,5	169,8	180,2		205,7	180,9
1821	140,3		141,2	139,0	136,8	138,7	140,5		140,9	133,9
1822	169,2		240,9	234,3	149,7	182,9	216,1		191,4	193,0
1823	177,1		249,7	212,3	157,9	189,2	220,5		191,4	193,7
1824	103,4		150,2	146,4	98,2	135,4	132,5		114,8	123,1
1825	75,2		142,7	139,1	81,9	128,3	122,8		102,9	112,3
1826	106,6		149,0	131,8	97,1	123,7	134,3		119,6	119,7
1827	136,3		240,0	248,9	124,0	180,0	189,0		210,5	187,9
1828	133,2		113,0	161,1	120,5	114,9	121,4		148,3	125,7
1829	131,6		168,4	168,4	119,3	120,5	121,7		155,5	136,5
1830	133,2	125,8	217,6	168,4	122,8	114,9	122,2	134,4	157,9	143,8
1831	168,1	143,5	280,9	229,0	140,4	132,6	150,9	156,3	201,4	176,0
1832	168,2	152,4	154,8	138,6	152,0	141,4	110,0	153,1	166,7	149,3
1833	133,1	122,9	111,7	107,2	133,7	119,7	90,0	134,4	114,3	122,1
1834	117,2	98,3	92,9	90,2	113,9	94,2	80,0	115,6	99,8	104,4
1835	116,9	94,7	103,8	100,7	112,0	103,2	99,3	112,5	125,0	109,6
1836	114,2	90,8	115,1	113,7	99,0	115,0	110,6	100,0	124,0	106,3
1837	114,2	99,8	117,2	125,5	107,8	132,0	120,0	109,4	129,4	114,2
1838	131,8	118,2	133,1	139,9	119,3	139,0	133,7	118,8	136,1	126,3
1839	131,4	144,0	135,6	137,9	121,8	140,2	134,9	118,8	147,7	129,5
1840	119,3	137,4	121,3	129,4	109,6	112,9	110,0	109,4	149,2	118,6
1841	114,5	110,7	100,0	96,1	95,2	84,6	85,0	90,6	114,3	97,3
1842	119,3	120,1	104,6	92,2	111,1	87,0	87,0	109,4	118,7	107,3
1843	117,9	101,1	107,1	97,4	102,2	100,0	96,2	93,8	109,3	100,9
1844	104,1	95,1	111,3	100,0	85,8	97,8	94,1	81,3	116,1	93,9
1845	111,5	91,5	104,6	90,2	86,3	86,8	83,5	84,4	118,1	92,4
1846	150,0	125,9	126,8	111,8	121,6	105,3	101,2	118,8	132,4	121,1
1847	175,0	155,8	172,8	158,2	163,7	139,4	134,1	159,4	182,4	162,1
1848	117,6	112,6	124,7	116,3	109,9	107,2	109,6	115,6	129,0	115,9
1849	98,0	104,3	107,1	98,7	101,8	106,7	107,1	106,3	112,7	104,7
1850	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1851	112,2	103,4	105,4	115,7	93,6	113,8	120,0	109,4	100,5	105,7
1852	132,8	105,3	125,9	119,0	98,2	119,5	125,0	118,8	123,4	115,5
1853	146,3	122,4	138,9	126,8	133,3	109,5	97,4	139,1	136,6	131,5
1854	168,9	150,2	149,8	143,8	126,3	109,1	123,0	165,6	148,2	145,4
1855	174,7	156,0	159,4	150,3	133,3	143,9	152,5	190,6	157,7	159,5
1856	189,2	168,6	184,9	166,0	142,7	162,0	147,4	212,5	177,3	174,3
1857	148,6	143,4	165,7	149,0	117,0	107,3	132,5	159,4	162,9	144,7
1858	126,4	117,1	139,3	130,1	99,4	112,2	102,0	106,3	144,1	115,1
1859	122,6	111,3	133,9	137,9	102,3	118,8	102,2	109,4	124,5	114,5
1860	136,1	128,6	151,9	158,8	122,8	130,0	97,4	121,9	143,7	129,6
1861	148,0	140,6	160,7	160,1	135,3	140,9	132,8	137,5	166,6	144,7
1862	156,4	140,4	149,0	141,8	141,8	130,6	131,0	143,8	141,9	142,6
1863	139,5	118,8	133,1	130,7	126,7	101,3	113,0	137,5	121,9	128,8
1864	124,3	108,5	127,6	126,8	107,1	100,1	108,0	103,1	122,5	112,7
1865	119,9	102,8	162,8	122,9	112,6	95,9	100,2	96,9	123,6	114,4
1866	137,5	116,7	149,0	142,5	126,6	116,8	120,1	118,8	145,5	129,8
1867	167,2	144,0	166,9	145,8	164,6	123,4	132,5	118,8	161,5	147,1
1868	195,9	154,5	189,5	171,9	178,6	161,3	127,4	156,3	182,9	168,4
1869	155,1	129,5	172,8	160,1	142,9	155,2	118,0	115,6	141,5	138,1
1870	136,1	115,2	141,4	136,6	128,8	117,9	94,0	106,3	135,0	122,0
1871	135,1	120,3	140,2	135,9	128,7	134,0	97,4	121,9	136,1	126,4

Sources, W 210, W 213, W 219, W 269, W 270, W 271, W 272, W 383, W 396, Bergen Domkapitelsprotokoller.

Table 7. CPI for Norway 1819-1871. Group E. Vegetables etc (1850=100)

	24. Potatoes	25. Peas	26. Rice	E. All
1819		186,0	236,7	154,9
1820		158,4	210,0	133,9
1821		117,1	190,0	107,0
1822		151,5	221,7	132,8
1823		172,2	230,0	145,9
1824		151,5	223,3	133,2
1825		144,6	186,7	121,0
1826		137,7	181,7	116,2
1827		165,3	190,0	132,9
1828		137,7	180,0	115,8
1829		110,2	193,3	104,0
1830	84,0	116,9	164,5	101,0
1831	90,3	133,0	201,4	113,4
1832	89,1	145,5	166,7	109,2
1833	79,8	126,2	114,3	92,0
1834	66,4	119,0	99,8	79,3
1835	79,8	110,5	125,0	91,2
1836	84,9	110,5	124,0	94,6
1837	89,1	112,4	129,4	98,6
1838	95,0	115,2	136,1	104,2
1839	74,8	115,7	147,7	91,9
1840	74,8	114,3	149,2	91,9
1841	72,3	105,5	114,3	83,6
1842	79,0	106,9	118,7	89,1
1843	79,0	98,3	109,3	86,4
1844	69,7	94,5	116,1	80,4
1845	73,9	100,0	118,1	84,5
1846	89,1	119,3	132,4	100,1
1847	116,0	150,7	182,4	131,1
1848	92,4	116,3	129,0	101,5
1849	88,2	107,2	112,7	94,7
1850	100,0	100,0	100,0	100,0
1851	88,2	95,6	100,0	91,1
1852	106,7	111,6	95,0	105,7
1853	100,8	122,9	95,0	103,3
1854	85,7	149,3	105,0	98,1
1855	121,8	146,0	113,3	124,2
1856	133,6	165,0	121,7	136,5
1857	125,2	152,9	101,7	125,8
1858	105,9	149,6	110,0	113,1
1859	105,0	141,3	111,7	111,5
1860	120,2	144,1	111,7	122,5
1861	138,7	154,3	108,3	136,4
1862	120,2	148,2	106,7	122,3
1863	115,1	138,8	86,7	114,4
1864	110,9	131,7	81,7	109,6
1865	105,9	132,2	75,0	105,2
1866	116,8	141,9	80,0	115,0
1867	137,0	155,4	78,3	130,9
1868	158,0	174,4	78,3	148,5
1869	121,8	157,6	78,3	120,7
1870	116,8	144,1	75,0	114,6
1871	100,0	134,7	76,7	101,7

Sources, W 213, W 217, W 269, W 270, W 271, W 272 and W 396.

Table 8. CPI for Norway 1819-1871. Group F. Colonial goods (1850=100).

	27. Raffinade	28. Sugar	29. Coffee	30. Salt	31. Vinegar	F. All
1819	207,6	202,7		171,2		181,3
1820	184,2	179,8		155,8		162,0
1821	166,6	162,7		155,4		150,6
1822	194,4	189,8		225,6		188,0
1823	201,7	197,0		291,4		211,1
1824	192,8	188,2		216,2		184,3
1825	149,5	146,0		188,0		148,6
1826	147,4	143,9		169,2		142,0
1827	153,6	150,0		136,3		136,8
1828	164,9	161,1		164,5		152,0
1829	175,3	171,1		140,4		151,9
1830	176,3	176,6	128,2	150,4	125,1	156,8
1831	163,9	164,2	170,9	161,6	137,7	164,5
1832	158,8	159,0	190,9	165,1	132,8	167,8
1833	148,5	148,7	185,5	162,7	125,7	159,9
1834	135,1	135,3	147,3	146,8	113,1	138,9
1835	132,0	132,2	146,4	134,1	113,1	135,6
1836	145,4	145,6	138,2	134,1	125,7	141,2
1837	142,3	142,5	124,5	138,9	125,1	135,8
1838	126,8	127,0	112,7	138,1	110,9	123,0
1839	121,6	121,9	116,4	138,9	108,7	121,2
1840	117,5	117,7	110,9	119,8	104,9	115,2
1841	109,3	109,5	100,9	112,7	102,7	106,8
1842	96,9	97,1	81,8	105,6	91,1	93,0
1843	94,8	95,0	76,4	101,6	89,2	89,7
1844	95,9	96,0	74,5	99,2	90,1	89,6
1845	110,3	110,5	76,4	96,8	103,7	98,5
1846	106,2	106,4	76,4	111,1	99,8	97,5
1847	108,2	108,4	80,0	112,7	101,8	99,9
1848	106,2	106,4	80,0	109,5	99,8	98,4
1849	103,1	103,3	86,4	100,0	96,9	97,5
1850	100,0	100,0	100,0	100,0	100,0	100,0
1851	99,0	100,0	99,1	97,6	100,0	99,2
1852	96,9	90,2	89,1	95,2	100,0	92,9
1853	102,1	103,3	101,8	105,6	100,0	102,5
1854	108,2	106,6	110,9	113,5	100,0	108,7
1855	113,4	123,0	110,9	99,2	98,4	112,9
1856	127,8	150,8	108,2	100,8	96,2	123,4
1857	143,3	175,4	117,3	100,0	96,7	136,9
1858	129,9	149,2	117,3	97,6	97,3	126,1
1859	120,6	144,3	122,7	88,1	91,8	122,5
1860	122,7	144,3	141,8	89,7	88,0	128,8
1861	121,6	150,8	127,3	93,7	85,2	126,0
1862	124,7	150,8	139,1	92,9	90,2	130,6
1863	120,6	142,6	154,5	89,7	94,5	131,9
1864	118,6	147,5	152,7	90,5	99,5	132,3
1865	118,6	139,3	145,5	88,9	95,6	127,7
1866	112,4	139,3	141,8	86,5	97,3	124,6
1867	111,3	136,1	131,8	88,9	101,1	120,9
1868	110,3	137,7	121,8	91,3	102,7	118,3
1869	114,4	144,3	121,8	88,1	104,9	121,0
1870	118,6	150,8	120,0	86,5	101,1	123,0
1871	123,7	149,2	124,5	86,5	101,1	125,5

Sources, W 137, W 210, W 269, W 270, W 271, W 272, W 396 and W 397.

Table 9. CPI for Norway 1819-1871. Group G. Beverages and tobacco (1850=100).

	32. Spirits	33. Malt	34. Beer	35. Tobacco	G. All
1819	153,3	164,2		175,0	152,6
1820	128,3	146,7		165,0	132,2
1821	98,3	124,2		150,0	107,0
1822	123,3	148,3		200,0	130,6
1823	135,0	140,8		158,3	132,6
1824	116,7	100,8		133,0	104,6
1825	106,7	83,0		111,1	91,2
1826	101,7	86,0		125,0	90,2
1827	123,3	148,3		133,3	130,6
1828	103,3	105,6		111,4	100,4
1829	93,3	104,7		108,3	95,2
1830	100,0	118,6	103,0	108,3	105,1
1831	126,7	148,8	133,3	108,3	125,0
1832	120,0	139,6	127,3	108,3	120,3
1833	100,0	105,9	93,9	107,5	101,3
1834	86,7	88,6	75,8	132,5	97,9
1835	80,0	98,8	84,8	120,0	95,1
1836	80,0	106,7	97,0	127,5	101,2
1837	120,0	100,2	90,9	117,5	110,0
1838	93,3	119,9	100,0	125,0	107,2
1839	86,7	132,5	118,2	125,0	110,6
1840	73,3	118,6	106,1	100,0	94,0
1841	66,7	109,5	97,0	92,5	86,3
1842	66,7	99,0	87,9	82,5	80,0
1843	73,3	106,2	93,9	82,5	84,5
1844	60,0	104,9	93,9	82,5	79,7
1845	66,7	104,2	93,9	92,5	85,0
1846	80,0	137,7	118,2	92,5	99,1
1847	93,3	168,2	139,4	92,5	112,1
1848	86,7	126,6	115,2	105,0	103,3
1849	93,3	106,1	106,1	100,0	99,8
1850	100,0	100,0	100,0	100,0	100,0
1851	100,0	107,2	106,1	130,0	111,2
1852	100,0	126,3	115,2	100,0	106,4
1853	100,0	135,9	124,2	100,0	109,7
1854	100,0	159,0	130,3	105,0	115,0
1855	120,0	164,6	151,5	112,5	130,1
1856	133,3	180,2	160,6	120,0	140,8
1857	140,0	172,0	197,0	175,0	167,9
1858	133,3	179,1	203,0	175,0	167,8
1859	133,3	173,2	203,0	182,5	169,5
1860	133,3	194,5	206,1	182,5	172,4
1861	146,7	223,4	245,5	175,0	187,5
1862	133,3	223,4	227,3	187,5	182,1
1863	133,3	225,3	215,2	192,5	180,7
1864	126,7	234,9	224,2	187,5	180,1
1865	126,7	247,6	236,4	175,0	180,7
1866	126,7	247,6	236,4	175,0	180,7
1867	126,7	250,7	239,4	147,5	173,5
1868	140,0	282,5	269,7	142,5	187,4
1869	133,3	285,6	272,7	130,0	182,4
1870	126,7	215,8	206,1	145,0	160,9
1871	133,3	228,5	218,2	152,5	169,8

Sources, W 210, W 269, W 270, W 271, W 272, W 396 and Hodne 1978, 218.

Table 10. CPI for Norway 1819-1871. Group H. Rent, lighting & heating (1850=100).

	36. Pinewood	37. Whitewood	38. Birchwood	39. Tallow	40. Fish oil	41. Veg oil	H. All
1819				132,2	130,9		112,7
1820				130,0	125,0		109,5
1821				116,7	108,0		96,9
1822				128,8	123,3		108,3
1823				119,7	77,0		87,8
1824				110,4	61,6		77,8
1825				101,2	57,9		71,8
1826				82,8	62,8		64,0
1827				82,8	82,4		70,7
1828				87,5	92,4		76,5
1829				138,1	154,4		123,7
1830	92,7	101,4	101,8	142,7	127,1	150,0	116,8
1831	100,0	106,5	120,0	157,3	142,6	156,3	130,2
1832	98,8	105,1	120,0	161,5	136,2	148,8	129,6
1833	92,7	101,4	115,0	155,2	106,4	129,4	119,8
1834	90,2	95,2	113,1	149,0	82,7	120,8	112,7
1835	86,8	90,1	119,3	124,0	87,0	116,2	107,7
1836	98,8	102,3	121,3	122,9	107,5	110,7	113,8
1837	113,5	122,9	134,4	115,6	106,6	112,5	120,2
1838	97,0	114,2	124,9	110,4	110,7	103,1	112,8
1839	95,4	95,2	114,6	132,3	96,5	112,5	111,4
1840	94,8	97,4	106,0	130,2	87,4	117,7	107,3
1841	78,9	91,2	99,2	115,6	76,8	114,3	96,9
1842	89,3	86,8	106,6	101,6	80,6	109,6	97,0
1843	77,4	85,2	89,6	89,1	92,2	105,4	88,4
1844	87,0	103,8	100,5	84,4	98,8	94,0	94,2
1845	98,8	124,6	108,9	99,0	96,1	93,8	103,8
1846	98,2	118,8	107,5	108,3	78,5	98,5	102,6
1847	121,7	131,2	126,7	115,6	74,6	98,1	114,4
1848	99,4	126,5	106,6	126,0	68,4	101,9	106,4
1849	106,7	99,3	108,3	109,4	79,5	105,0	102,9
1850	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1851	102,4	102,9	108,0	87,5	104,3	57,5	98,5
1852	111,3	112,3	118,2	101,0	104,0	73,1	107,9
1853	120,1	121,6	128,5	102,1	102,6	89,4	114,1
1854	134,6	143,3	140,7	126,0	101,7	83,1	127,7
1855	128,5	139,7	128,7	127,1	116,6	83,8	125,3
1856	152,3	157,5	148,7	122,9	126,0	81,3	136,9
1857	148,5	153,5	152,8	125,0	134,1	78,1	138,7
1858	130,6	128,4	125,5	106,3	101,2	75,0	115,6
1859	123,3	125,8	125,5	120,8	94,4	78,8	117,0
1860	119,6	149,9	132,6	119,8	95,4	83,1	121,1
1861	114,3	144,5	125,1	115,1	93,3	81,3	116,0
1862	107,6	112,8	117,8	108,3	108,1	76,9	109,9
1863	112,4	107,7	128,2	103,6	132,2	76,9	115,7
1864	111,5	105,7	128,2	84,9	136,1	79,4	111,3
1865	106,3	107,7	124,5	84,4	114,4	73,8	106,0
1866	118,8	127,4	129,7	100,0	101,4	75,0	113,4
1867	140,5	121,2	146,3	98,4	104,6	90,0	121,9
1868	117,7	120,1	140,7	78,6	102,5	91,9	111,5
1869	112,6	117,2	119,3	80,7	96,5	93,1	103,7
1870	109,9	111,3	117,7	83,3	89,7	75,0	101,0
1871	118,8	127,4	129,3	77,6	99,8	66,9	107,1

Sources, W 206, W 210, W 269, W 270, W 271, W 386 and W 396.

Table 11. CPI for Norway 1819-1871. Group I. Clothing (1850=100).

	42. Wool	43. Flax	44. Hemp	45. Buckskin	46. Goatskin	47. Calfskin	I. All
1819		284,3	199,9	144,4	184,6	111,7	200,6
1820		266,0	190,2	135,0	175,3	108,9	189,3
1821		220,8	160,3	120,7	150,8	90,0	159,8
1822		278,4	197,3	133,2	175,0	94,6	192,2
1823		261,7	180,2	119,9	161,5	74,5	176,4
1824		185,6	135,1	106,6	128,0	59,5	133,0
1825		178,2	115,8	106,6	134,4	44,8	126,7
1826		162,4	120,1	83,3	111,0	42,9	113,6
1827		155,0	139,4	79,9	121,1	44,8	115,7
1828		155,0	152,3	79,9	121,1	44,8	117,6
1829		155,0	182,3	79,9	121,1	63,2	124,7
1830	124,5	155,0	143,7	83,3	121,1	66,9	120,1
1831	129,6	161,7	152,2	83,3	110,4	70,8	124,8
1832	123,6	154,8	147,3	83,3	125,0	73,8	120,7
1833	120,3	139,4	131,3	91,7	125,0	72,8	115,7
1834	122,3	131,6	122,5	100,0	128,6	70,8	115,1
1835	119,1	141,4	117,9	100,0	128,6	60,0	114,8
1836	117,2	140,1	112,3	100,0	125,0	59,0	113,2
1837	126,9	132,3	113,1	100,0	126,5	61,0	114,9
1838	129,6	119,4	105,5	100,0	115,8	60,7	111,8
1839	126,2	120,6	113,5	100,0	114,3	70,2	112,7
1840	132,1	124,2	119,4	108,3	114,3	78,7	118,8
1841	86,0	116,5	115,9	108,3	114,3	78,7	100,3
1842	88,7	108,9	111,2	75,0	89,3	66,9	91,1
1843	102,3	106,3	106,9	83,3	100,0	80,7	97,8
1844	105,8	96,6	95,4	83,3	100,0	84,3	95,8
1845	102,3	95,8	96,8	83,3	110,7	89,8	95,1
1846	110,9	100,1	99,9	91,7	113,4	98,0	102,0
1847	105,0	108,1	99,5	91,7	125,0	98,4	101,9
1848	101,7	108,2	105,8	102,5	121,4	108,2	104,5
1849	103,2	102,7	110,4	107,5	119,6	108,2	105,2
1850	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1851	107,7	97,4	99,5	100,0	114,3	109,2	102,9
1852	98,3	108,8	98,7	100,0	89,3	98,4	101,3
1853	102,3	106,5	99,0	108,3	107,1	119,0	105,9
1854	114,5	120,6	126,5	108,3	121,4	129,8	117,5
1855	118,4	133,6	151,4	108,3	100,0	149,5	126,6
1856	117,2	130,1	128,4	108,3	107,1	154,1	123,5
1857	125,4	122,2	120,3	116,7	142,9	130,5	122,8
1858	120,7	117,2	111,3	91,7	107,1	102,3	111,2
1859	119,0	116,8	103,8	91,7	107,1	118,0	111,4
1860	123,0	124,4	106,2	100,0	133,9	152,5	120,0
1861	124,2	125,1	107,5	102,5	133,9	157,4	121,7
1862	124,8	115,4	107,1	105,0	134,8	159,3	120,2
1863	127,9	127,5	116,4	112,5	138,4	167,2	127,5
1864	139,5	136,6	116,2	125,0	143,8	172,1	136,8
1865	131,1	131,3	115,5	115,0	140,2	167,2	130,0
1866	144,3	133,8	112,4	130,0	146,4	174,3	138,6
1867	138,7	131,1	115,2	125,0	142,9	168,0	134,6
1868	139,0	130,3	117,7	125,0	144,6	173,2	135,3
1869	130,4	127,5	118,5	115,0	139,3	171,4	129,5
1870	126,9	127,6	121,6	112,5	138,4	170,4	128,0
1871	128,8	124,4	104,9	112,5	133,0	167,2	125,9

Sources, W 139, W 270, W 271, W 272, W 383 and W 386.

Table 12. CPI for Norway 1819-1871 with sub-indices (1850=100).

	A. Fish & fish products	B. Milk & milk products	C. Meat & meat products	D. Grain & flour	E. Vegetables	F. Colonial goods	G. Beverages & tobacco	H. Rent, lighting & heating	I. Clothing	J. General
1819	184,0	193,3		224,7	154,9	181,3	152,6	112,7	200,6	185,0
1820	171,8	174,5		180,9	133,9	162,0	132,2	109,5	189,3	162,4
1821	167,7	149,6		133,9	107,0	150,6	107,0	96,9	159,8	133,6
1822	181,3	172,8		193,0	132,8	188,0	130,6	108,3	192,2	161,5
1823	150,3	134,3		193,7	145,9	211,1	132,6	87,8	176,4	148,8
1824	101,4	120,4		123,1	133,2	184,3	104,6	77,8	133,0	111,0
1825	77,7	110,9		112,3	121,0	148,6	91,2	71,8	126,7	98,7
1826	78,5	111,8		119,7	116,2	142,0	90,2	64,0	113,6	99,2
1827	102,2	130,3		187,9	132,9	136,8	130,6	70,7	115,7	130,5
1828	81,0	120,7		125,7	115,8	152,0	100,4	76,5	117,6	110,7
1829	82,0	96,4		136,5	104,0	151,9	95,2	123,7	124,7	115,6
1830	99,0	99,5	100,2	143,8	101,0	156,8	105,1	116,8	120,1	117,5
1831	111,0	107,3	108,2	176,0	113,4	164,5	125,0	130,2	124,8	131,6
1832	111,1	99,4	110,2	149,3	109,2	167,8	120,3	129,6	120,7	124,7
1833	112,5	95,9	103,9	122,1	92,0	159,9	101,3	119,8	115,7	113,7
1834	113,0	88,1	103,8	104,4	79,3	138,9	97,9	112,7	115,1	105,8
1835	109,1	105,8	94,0	109,6	91,2	135,6	95,1	107,7	114,8	107,7
1836	103,0	108,2	125,7	106,3	94,6	141,2	101,2	113,8	113,2	110,9
1837	82,4	105,3	116,0	114,2	98,6	135,8	110,0	120,2	114,9	111,6
1838	106,4	95,8	99,4	126,3	104,2	123,0	107,2	112,8	111,8	110,9
1839	117,9	113,0	122,4	129,5	91,9	121,2	110,6	111,4	112,7	115,5
1840	130,6	108,7	120,0	118,6	91,9	115,2	94,0	107,3	118,8	112,8
1841	119,7	94,8	94,5	97,3	83,6	106,8	86,3	96,9	100,3	97,9
1842	110,4	87,7	81,8	107,3	89,1	93,0	80,0	97,0	91,1	95,0
1843	114,9	100,9	76,5	100,9	86,4	89,7	84,5	88,4	97,8	94,9
1844	109,6	96,8	86,7	93,9	80,4	89,6	79,7	94,2	95,8	93,6
1845	119,4	103,0	100,1	92,4	84,5	98,5	85,0	103,8	95,1	98,7
1846	98,6	103,5	90,2	121,1	100,1	97,5	99,1	102,6	102,0	104,2
1847	91,9	115,9	105,3	162,1	131,1	99,9	112,1	114,4	101,9	119,1
1848	95,4	109,1	115,8	115,9	101,5	98,4	103,3	106,4	104,5	107,1
1849	113,8	107,2	99,1	104,7	94,7	97,5	99,8	102,9	105,2	103,8
1850	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1851	80,9	107,9	98,8	105,7	91,1	99,2	111,2	98,5	102,9	100,6
1852	84,0	108,9	115,6	115,5	105,7	92,9	106,4	107,9	101,3	106,0
1853	73,9	110,1	108,8	131,5	103,3	102,5	109,7	114,1	105,9	110,2
1854	86,3	118,8	130,9	145,4	98,1	108,7	115,0	127,7	117,5	121,3
1855	84,5	120,2	131,9	159,5	124,2	112,9	130,1	125,3	126,6	127,7
1856	99,5	131,5	143,5	174,3	136,5	123,4	140,8	136,9	123,5	137,7
1857	118,0	137,0	152,0	144,7	125,8	136,9	167,9	138,7	122,8	136,7
1858	120,9	120,5	141,6	115,1	113,1	126,1	167,8	115,6	111,2	120,7
1859	115,7	127,1	136,2	114,5	111,5	122,5	169,5	117,0	111,4	120,8
1860	130,2	124,7	119,2	129,6	122,5	128,8	172,4	121,1	120,0	126,6
1861	126,1	121,5	127,9	144,7	136,4	126,0	187,5	116,0	121,7	130,0
1862	131,9	112,8	135,1	142,6	122,3	130,6	182,1	109,9	120,2	126,9
1863	141,9	107,9	129,0	128,8	114,4	131,9	180,7	115,7	127,5	125,9
1864	144,1	114,4	128,0	112,7	109,6	132,3	180,1	111,3	136,8	124,2
1865	140,9	115,3	112,7	114,4	105,2	127,7	180,7	106,0	130,0	120,7

Sources, W 051, W 128, W 137, W 139, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218 and Bergen Domkapittelsprotokoller.

Table 12. CPI for Norway 1819-1871 with sub-indices (1850=100).

	A. Fish & fish products	B. Milk & milk products	C. Meat & meat products	D. Grain & flour	E. Vegetables	F. Colonial goods	G. Beverages & tobacco	H. Rent, lighting & heating	I. Clothing	J. General
1866	116,4	121,2	129,1	129,8	115,0	124,6	180,7	113,4	138,6	126,9
1867	117,4	115,2	129,7	147,1	130,9	120,9	173,5	121,9	134,6	130,9
1868	109,6	116,2	142,6	168,4	148,5	118,3	187,4	111,5	135,3	135,0
1869	144,8	116,8	143,1	138,1	120,7	121,0	182,4	103,7	129,5	127,9
1870	144,5	119,2	139,9	122,0	114,6	123,0	160,9	101,0	128,0	122,9
1871	152,6	115,3	136,8	126,4	101,7	125,5	169,8	107,1	125,9	124,1

Sources, W 051, W 128, W 137, W 139, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218 and Bergen Domkapittelsprotokoller.

Table 13. CPI for Norway 1819-1871 with sub-indices (1850=100). Geometric approach.

	A.	B.	C.	D.	E.	F.	G.	H.	I.	General		
	Fish	Milk	Meat	Grain	Vegetables	Colonial	Beverages	Rent	Clothing	Semi- Π	Π	Σ
1819	188,9	184,9		223,6	177,5	172,8	161,8	114,6	180,2	181,5	169,5	185,0
1820	177,8	165,9		180,6	154,3	154,6	144,0	111,0	171,0	162,4	152,8	162,4
1821	173,4	142,7		136,3	126,2	144,5	120,7	97,8	145,4	139,2	131,6	133,6
1822	186,7	164,8		190,7	155,0	181,3	152,0	109,7	168,5	166,6	158,4	161,5
1823	157,9	128,9		193,1	168,3	202,4	142,5	83,7	150,1	150,7	145,8	148,8
1824	108,3	115,4		121,4	155,6	177,8	114,5	71,8	117,9	115,7	116,9	111,0
1825	84,8	102,6		107,7	139,0	143,2	98,1	66,7	108,3	101,1	101,5	98,7
1826	84,4	104,2		119,2	133,8	137,0	101,6	62,8	97,2	100,9	100,2	99,2
1827	107,4	124,5		180,0	149,9	131,0	132,8	72,0	101,0	125,0	118,5	130,5
1828	87,2	116,3		126,3	133,2	146,3	105,3	78,3	102,8	108,5	107,7	110,7
1829	86,1	92,5		136,0	123,5	144,5	100,5	127,2	114,2	113,8	111,6	115,6
1830	99,9	96,2	97,2	141,3	117,3	149,7	107,3	117,3	111,0	116,0	113,9	117,5
1831	120,8	102,7	106,6	172,7	134,3	159,2	128,4	128,4	113,0	130,1	127,8	131,6
1832	118,9	96,0	106,9	147,6	129,3	160,2	123,3	126,4	113,8	123,7	123,3	124,7
1833	123,6	93,4	101,5	117,7	104,8	153,0	101,7	115,0	110,7	112,0	112,4	113,7
1834	119,7	87,6	108,8	99,5	92,4	134,9	93,7	106,3	110,3	104,2	105,0	105,8
1835	113,7	101,7	92,2	107,2	103,3	131,1	94,7	102,7	107,4	105,3	105,5	107,7
1836	107,2	103,6	109,5	108,7	105,1	137,6	101,4	110,2	105,3	108,5	109,4	110,9
1837	89,5	101,1	106,6	116,8	109,0	134,4	106,5	117,3	106,6	110,0	109,1	111,6
1838	108,4	93,8	94,4	129,7	114,2	122,7	108,7	109,7	102,3	109,6	108,8	110,9
1839	114,3	107,8	104,4	134,4	108,5	121,1	114,1	106,9	105,6	113,4	112,7	115,5
1840	125,2	104,1	103,6	121,4	108,4	114,0	98,0	104,6	111,4	110,6	109,8	112,8
1841	112,3	94,0	87,7	98,4	95,5	106,9	90,0	94,8	102,1	97,8	97,7	97,9
1842	108,8	88,2	79,5	104,6	100,1	94,2	83,2	95,1	88,5	94,5	93,1	95,0
1843	111,9	99,7	70,8	102,5	94,7	91,0	88,2	89,4	96,0	95,1	93,1	94,9
1844	109,8	96,4	82,1	97,8	91,5	90,7	83,6	94,5	93,9	94,7	93,0	93,6
1845	112,3	101,5	98,7	94,5	95,6	98,7	88,1	103,0	96,1	99,1	98,5	98,7
1846	100,2	101,8	89,3	120,7	112,1	99,1	104,8	100,8	102,1	104,8	103,1	104,2
1847	97,3	110,7	104,4	159,4	147,2	101,5	119,3	109,4	104,1	119,1	115,4	119,1
1848	102,5	106,3	108,4	115,6	111,5	99,8	107,3	102,8	107,8	107,4	106,8	107,1
1849	117,5	104,8	99,6	104,6	102,1	97,7	101,2	100,8	108,5	104,5	104,0	103,8
1850	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1851	83,9	105,3	92,8	107,9	94,5	99,1	110,3	91,8	104,5	99,5	98,5	100,6
1852	85,9	105,9	115,4	118,2	104,2	94,2	109,8	102,2	98,8	104,8	103,4	106,0
1853	76,2	106,9	99,1	126,9	105,6	102,5	114,0	109,8	106,9	108,1	104,5	110,2
1854	86,3	112,7	119,2	141,5	110,4	107,7	121,4	119,4	120,0	118,8	114,5	121,3
1855	89,6	112,9	111,6	156,8	126,3	108,6	135,5	119,2	125,3	124,0	119,4	127,7
1856	103,5	119,9	129,0	171,1	138,9	115,1	146,7	128,4	123,2	133,1	129,4	137,7
1857	119,3	122,7	137,0	141,5	124,9	123,3	169,7	128,8	126,0	131,1	131,8	136,8
1858	122,5	109,0	131,7	118,7	120,3	116,6	170,7	109,2	107,9	117,5	121,8	120,7
1859	114,1	110,9	125,7	117,5	118,4	111,5	171,0	109,8	109,0	116,4	119,7	120,8
1860	130,3	110,2	108,8	131,2	124,6	114,6	176,7	114,5	122,1	122,8	124,6	126,6
1861	127,8	112,2	120,9	146,5	132,3	113,3	193,7	110,3	123,8	127,3	129,3	130,0
1862	132,8	103,9	122,4	141,6	123,9	117,0	188,8	104,3	123,1	123,7	126,7	126,9
1863	141,9	102,2	108,4	124,1	111,5	117,6	187,8	108,5	130,5	121,3	123,7	125,9
1864	145,1	103,7	117,3	113,8	106,1	119,2	188,1	105,6	137,8	120,8	124,0	124,2
1865	137,2	105,6	100,5	113,8	101,6	115,4	189,8	100,2	132,3	116,9	119,3	120,7

Sources, W 051, W 128, W 137, W 139, W 155, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218 and Bergen Domkapitelsprotokoller.

Table 13. CPI for Norway 1819-1871 with sub-indices (1850=100). Geometric approach.

	A. Fish	B. Milk	C. Meat	D. Grain	E. Vegetables	F. Colonial	G. Beverages	H. Rent	I. Clothing	General		
										Semi- Π	Π	Σ
1866	116,4	105,0	112,9	129,8	109,9	113,3	189,8	106,9	139,0	121,7	122,7	126,8
1867	118,2	103,6	117,1	146,0	118,6	112,4	183,0	115,0	135,8	126,2	125,9	130,9
1868	109,6	103,8	130,8	167,4	129,2	111,6	197,4	106,7	137,2	130,4	129,7	135,0
1869	139,7	104,8	125,9	142,2	114,6	113,2	191,7	102,3	132,5	125,2	127,4	127,9
1870	142,3	104,0	128,2	122,5	108,1	113,4	169,1	96,5	131,7	119,0	122,3	122,9
1871	154,7	102,1	123,5	127,0	101,1	115,0	178,4	100,2	127,1	120,3	123,2	124,1

Sources, W 051, W 128, W 137, W 139, W 155, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218 and Bergen Domkapittelsprotokoller.

Table 14. CPI for Norway 1516-2003 (1850=100).

Year	CPI	Year	CPI	Year	CPI	Year	CPI	Year	CPI
1516	9,8	1566	13,9	1616	13,1	1666	20,1	1716	21,0
1517	9,8	1567	13,9	1617	13,1	1667	19,0	1717	22,0
1518	9,8	1568	13,9	1618	13,1	1668	17,5	1718	22,2
1519	8,4	1569	13,9	1619	13,1	1669	16,8	1719	22,4
1520	8,4	1570	13,9	1620	20,6	1670	16,4	1720	23,5
1521	8,4	1571	13,9	1621	20,6	1671	16,3	1721	21,8
1522	8,4	1572	13,9	1622	20,6	1672	14,7	1722	21,0
1523	8,4	1573	13,9	1623	20,6	1673	14,8	1723	18,9
1524	8,4	1574	13,9	1624	20,6	1674	18,6	1724	20,2
1525	8,4	1575	13,9	1625	20,6	1675	15,9	1725	20,6
1526	8,4	1576	13,9	1626	20,6	1676	15,9	1726	20,4
1527	8,4	1577	13,9	1627	20,6	1677	15,9	1727	22,6
1528	8,4	1578	13,9	1628	20,6	1678	15,5	1728	23,5
1529	8,4	1579	13,9	1629	20,6	1679	15,7	1729	20,0
1530	8,4	1580	16,0	1630	19,4	1680	15,3	1730	16,7
1531	8,4	1581	16,0	1631	19,4	1681	14,7	1731	15,8
1532	8,4	1582	16,0	1632	19,4	1682	15,1	1732	16,9
1533	8,4	1583	16,0	1633	19,4	1683	15,7	1733	16,7
1534	8,4	1584	16,0	1634	19,4	1684	18,9	1734	18,1
1535	8,4	1585	16,0	1635	19,4	1685	17,7	1735	16,5
1536	8,4	1586	16,0	1636	19,4	1686	18,2	1736	17,5
1537	8,4	1587	16,0	1637	19,4	1687	19,4	1737	20,6
1538	8,4	1588	16,0	1638	19,4	1688	18,1	1738	18,5
1539	8,4	1589	16,0	1639	19,4	1689	17,3	1739	17,1
1540	10,2	1590	25,1	1640	19,4	1690	16,7	1740	20,4
1541	10,2	1591	25,1	1641	18,4	1691	17,1	1741	27,2
1542	10,2	1592	25,1	1642	18,4	1692	17,3	1742	25,9
1543	10,2	1593	25,1	1643	18,4	1693	18,6	1743	20,6
1544	10,2	1594	25,1	1644	18,4	1694	20,4	1744	18,7
1545	10,2	1595	25,1	1645	18,4	1695	15,3	1745	17,5
1546	10,2	1596	25,1	1646	18,4	1696	17,7	1746	18,5
1547	10,2	1597	16,3	1647	18,4	1697	18,7	1747	18,7
1548	10,2	1598	16,3	1648	18,4	1698	22,2	1748	18,5
1549	10,2	1599	16,3	1649	18,4	1699	23,5	1749	18,3
1550	13,0	1600	16,3	1650	18,4	1700	20,4	1750	18,1
1551	13,0	1601	16,3	1651	22,2	1701	19,0	1751	17,9
1552	13,0	1602	16,3	1652	22,2	1702	17,3	1752	17,9
1553	13,0	1603	16,3	1653	22,2	1703	16,7	1753	17,7
1554	13,0	1604	16,3	1654	22,2	1704	17,2	1754	17,3
1555	13,0	1605	16,3	1655	22,2	1705	16,0	1755	17,9
1556	13,0	1606	16,3	1656	22,2	1706	15,8	1756	22,6
1557	13,4	1607	16,3	1657	22,2	1707	15,5	1757	30,9
1558	13,4	1608	16,3	1658	22,2	1708	18,1	1758	35,0
1559	13,4	1609	13,1	1659	22,2	1709	26,1	1759	25,9
1560	13,4	1610	13,1	1660	22,2	1710	27,6	1760	27,0
1561	13,9	1611	13,1	1661	20,0	1711	26,8	1761	26,3
1562	13,9	1612	13,1	1662	20,0	1712	22,2	1762	27,2
1563	13,9	1613	13,1	1663	20,0	1713	20,8	1763	29,0
1564	13,9	1614	13,1	1664	20,0	1714	21,8	1764	26,8
1565	13,9	1615	13,1	1665	20,0	1715	22,4	1765	28,4

Sources, Bergen Domkapittelprotokoller, 1639-1833, Nordfarkladder 1709-1819, Nordfarut-trekk 1709-1819, W 051, W 128, W 137, W 139, W 155, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218, Coldevin 1938, 206-220 and Statistics Norway 2003.

Table 14. CPI for Norway 1516-2003 (1850=100).

Year	CPI	Year	CPI	Year	CPI	Year	CPI	Year	CPI
1766	30,7	1816	223,6	1866	126,8	1916	189,7	1966	776,5
1767	27,4	1817	252,7	1867	130,9	1917	235,6	1967	811,2
1768	30,9	1818	192,2	1868	135,0	1918	331,1	1968	838,3
1769	28,6	1819	182,5	1869	127,5	1919	354,0	1969	865,3
1770	26,1	1820	155,5	1870	122,5	1920	412,6	1970	958,0
1771	30,3	1821	132,4	1871	123,7	1921	382,4	1971	1016,0
1772	36,0	1822	161,4	1872	131,1	1922	320,6	1972	1089,3
1773	36,6	1823	156,1	1873	138,0	1923	301,3	1973	1172,4
1774	25,7	1824	130,6	1874	142,5	1924	330,3	1974	1282,5
1775	27,4	1825	113,2	1875	144,4	1925	336,1	1975	1431,2
1776	26,1	1826	111,9	1876	141,9	1926	285,9	1976	1562,6
1777	27,6	1827	130,8	1877	144,1	1927	256,9	1977	1703,6
1778	24,7	1828	110,0	1878	129,7	1928	239,5	1978	1842,6
1779	25,7	1829	108,3	1879	117,9	1929	229,8	1979	1931,5
1780	25,9	1830	117,2	1880	126,7	1930	222,1	1980	2142,0
1781	25,7	1831	131,2	1881	126,2	1931	210,5	1981	2433,7
1782	32,9	1832	124,7	1882	128,3	1932	206,7	1982	2709,9
1783	35,0	1833	113,7	1883	125,6	1933	204,7	1983	2937,8
1784	27,6	1834	105,8	1884	122,4	1934	204,7	1984	3121,3
1785	31,0	1835	107,7	1885	115,0	1935	208,6	1985	3299,0
1786	30,7	1836	111,0	1886	112,9	1936	214,4	1986	3536,5
1787	28,6	1837	112,0	1887	110,7	1937	229,8	1987	3845,6
1788	25,9	1838	110,9	1888	112,6	1938	237,6	1988	4102,5
1789	30,5	1839	115,4	1889	116,7	1939	239,5	1989	4289,8
1790	34,4	1840	112,5	1890	119,8	1940	280,1	1990	4465,6
1791	24,8	1841	97,7	1891	119,7	1941	328,4	1991	4620,1
1792	28,0	1842	94,9	1892	117,5	1942	347,7	1992	4726,3
1793	32,1	1843	94,7	1893	109,5	1943	357,3	1993	4834,5
1794	33,5	1844	93,4	1894	109,0	1944	361,2	1994	4904,0
1795	39,1	1845	98,5	1895	108,1	1945	367,0	1995	5025,7
1796	28,8	1846	104,2	1896	107,5	1946	376,6	1996	5083,7
1797	29,8	1847	119,3	1897	106,3	1947	378,6	1997	5216,9
1798	30,2	1848	107,2	1898	111,1	1948	376,6	1998	5334,8
1799	40,3	1849	103,7	1899	115,4	1949	376,6	1999	5458,4
1800	52,9	1850	100,0	1900	119,0	1950	396,0	2000	5628,3
1801	48,8	1851	100,7	1901	115,9	1951	459,7	2001	5800,2
1802	57,2	1852	106,2	1902	112,4	1952	500,3	2002	5876,3
1803	52,0	1853	110,6	1903	110,9	1953	509,9	2003	6020,4
1804	45,7	1854	121,7	1904	108,2	1954	533,1		
1805	57,5	1855	128,1	1905	110,9	1955	538,9		
1806	53,6	1856	138,1	1906	112,0	1956	558,2		
1807	58,3	1857	137,0	1907	117,2	1957	573,7		
1808	87,1	1858	120,6	1908	119,8	1958	600,7		
1809	123,2	1859	120,8	1909	118,4	1959	616,1		
1810	144,8	1860	126,5	1910	122,3	1960	616,1		
1811	238,0	1861	129,9	1911	124,8	1961	631,6		
1812	599,7	1862	126,7	1912	132,5	1962	666,4		
1813	194,4	1863	125,6	1913	137,5	1963	683,7		
1814	232,3	1864	123,9	1914	139,1	1964	722,4		
1815	228,9	1865	120,3	1915	159,2	1965	753,3		

Sources, Bergen Domkapittelprotokoller, 1639-1833, Nordfarkladder 1709-1819, Nordfarut-trekk 1709-1819, W 051, W 128, W 137, W 139, W 155, W 206, W 210, W 213, W 217, W 219, W 269, W 270, W 271, W 272, W 275, W 276, W 383, W 386, W 396, W 397, Hodne 1978, 218, Coldevin 1938, 206-220 and Statistics Norway 2003.

Figure 6: CPI for Norway 1819-1871. Group A. Fish and fish products (1850=100), cf. table 3.

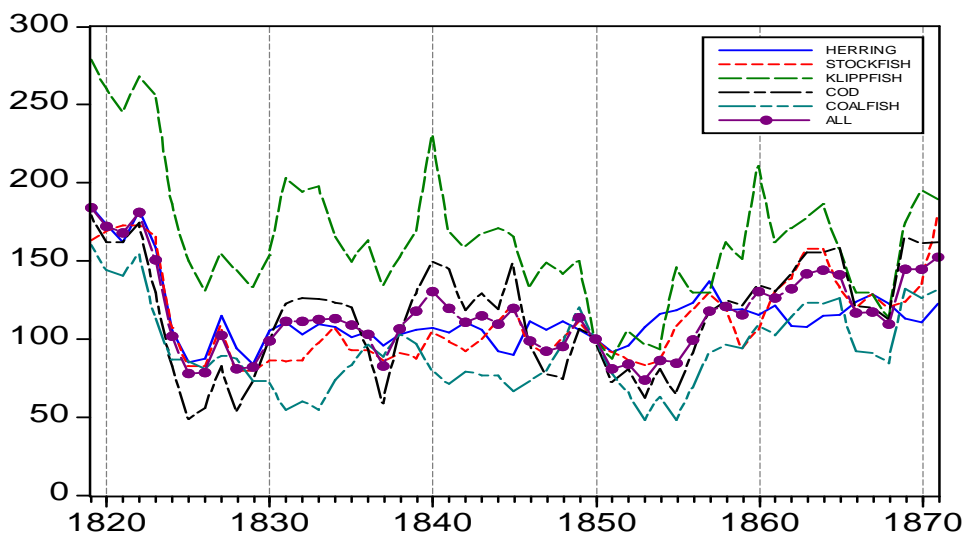


Figure 7: CPI for Norway 1819-1871. Group B. Milk products and eggs (1850=100), cf. table 4.

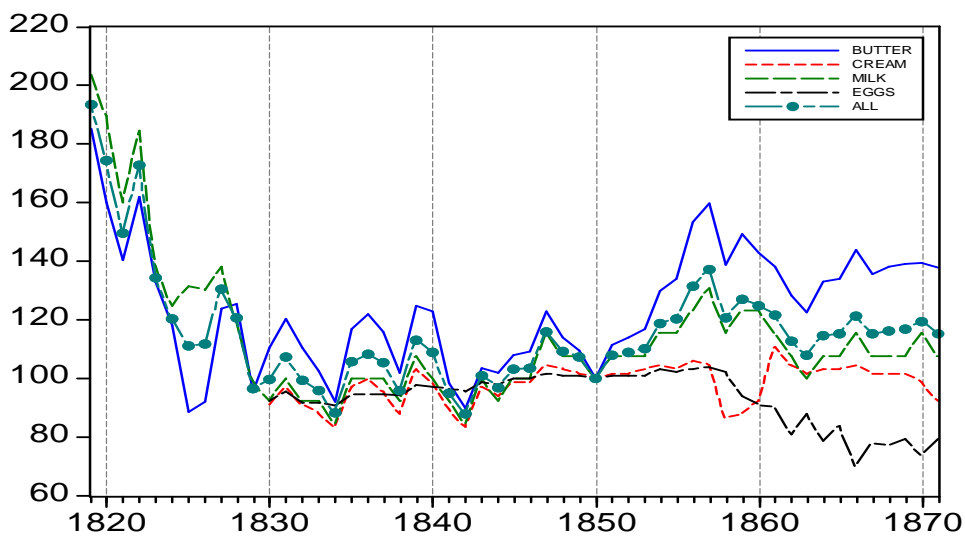


Figure 8: CPI for Norway 1819-1871. Group C. Meat and meat products (1850=100), cf. table 5.

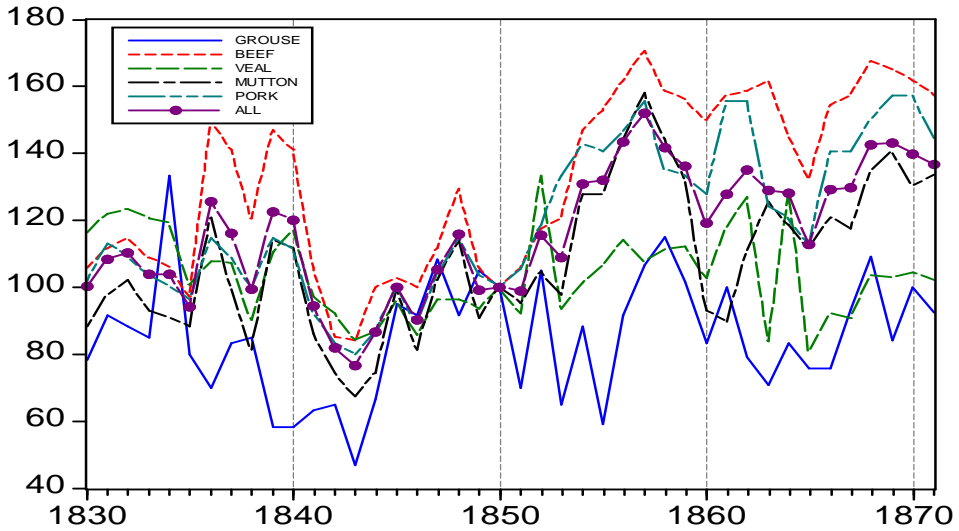


Figure 9: CPI for Norway 1819-1871. Group D. Grain and flour (1850=100), cf. table 6.

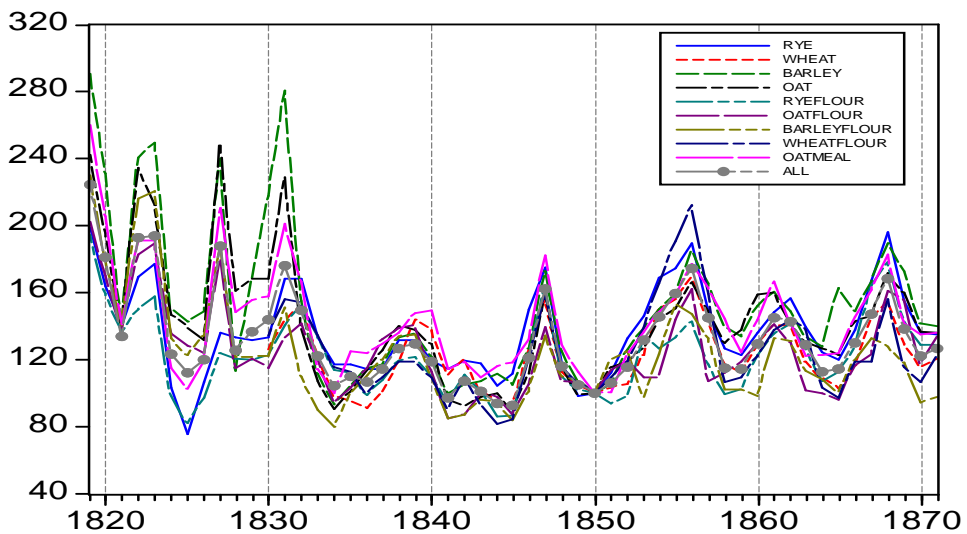


Figure 10: CPI for Norway 1819-1871. Group E. Vegetables etc. (1850=100), cf. table 7.

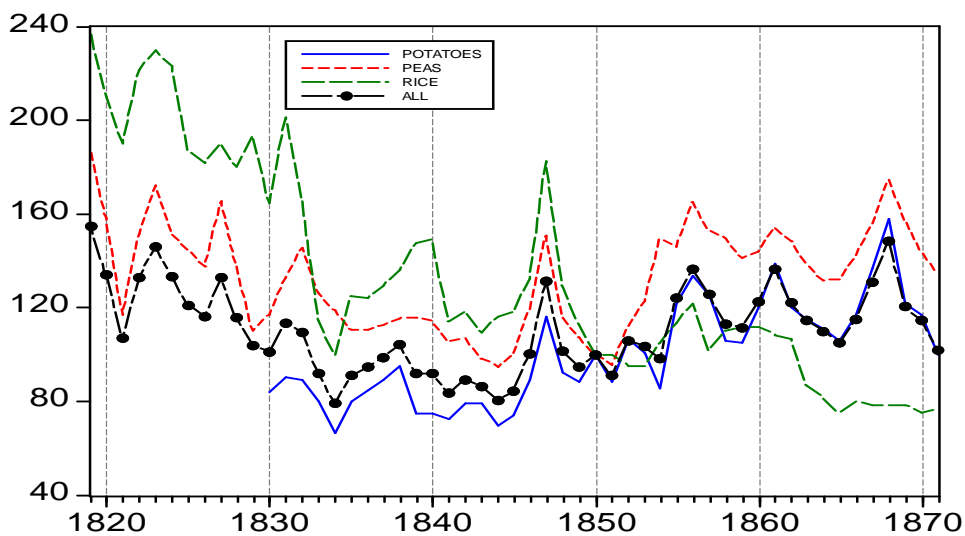


Figure 11: CPI for Norway 1819-1871. Group F. Colonial goods (1850=100), cf. table 8.

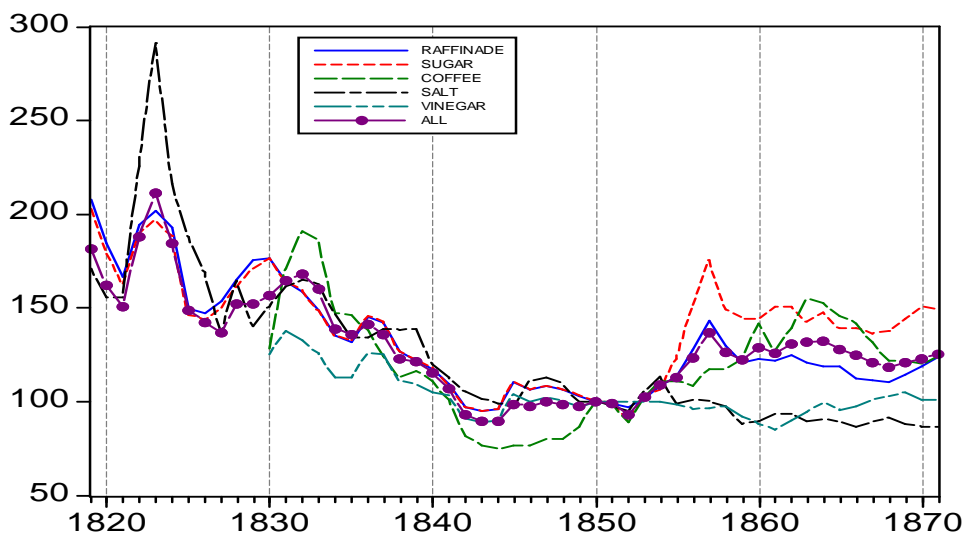


Figure 12: CPI for Norway 1819-1871. Group G. Beverages and tobacco (1850=100), cf. table 9.

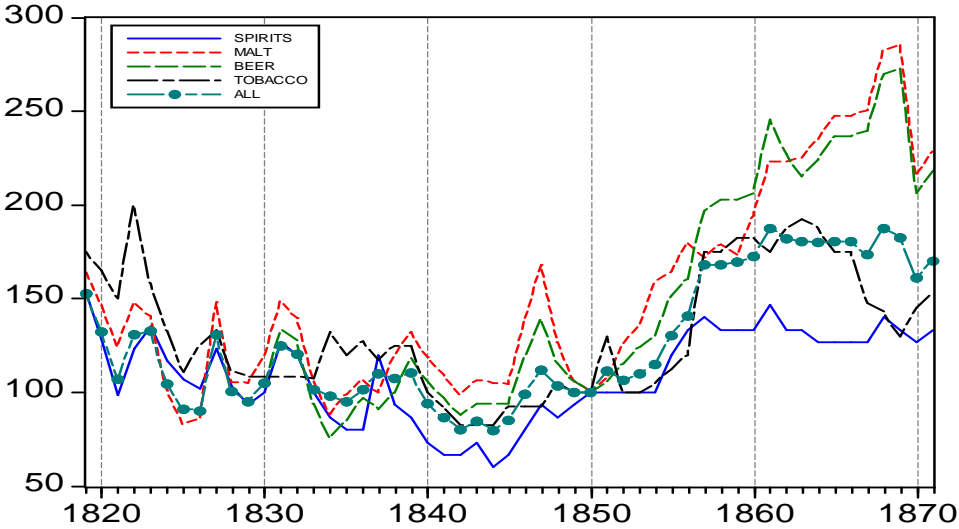


Figure 13: CPI for Norway 1819-1871. Group H. Rent, lighting & heating (1850=100), cf. table 10.

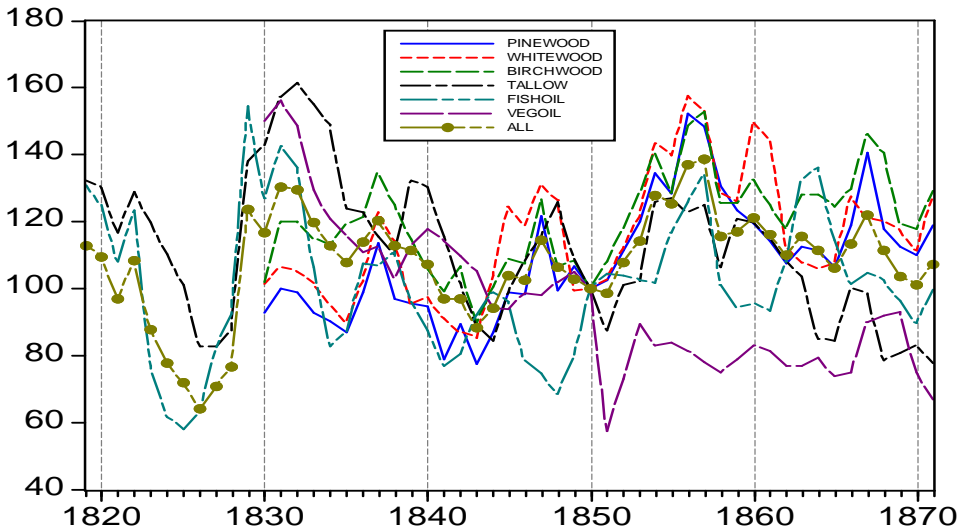


Figure 14: CPI for Norway 1819-1871. Group I. Clothing (1850=100), cf. table 11 .

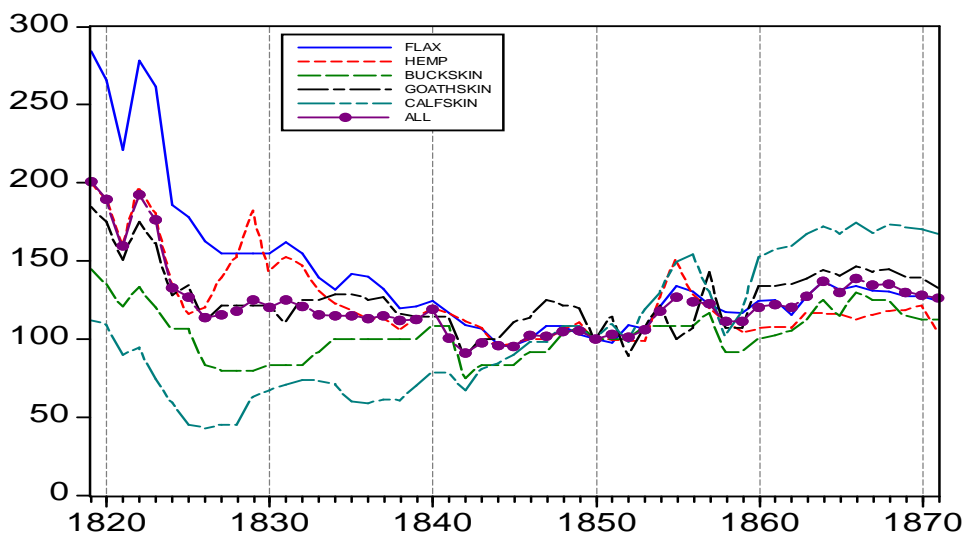
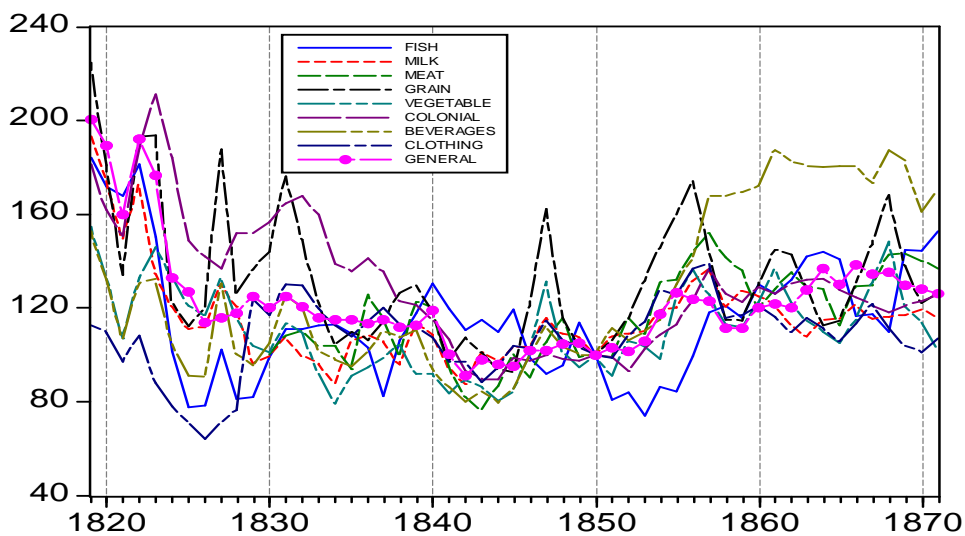


Figure 15: CPI for Norway 1819-1871 with sub-indices (1850=100), cf. table 12.



Chapter 4 – Bond markets and bond yields in Norway 1820–2003

Jan Tore Klovland¹

1. Introduction

The first bond issue of the newly reborn Kingdom of Norway was negotiated with the banking firm of Bennecke Brothers in Berlin early in 1820. In the following century most long-term bond issues were raised abroad, which implied that the main markets for Norwegian government bonds were to be found initially in Hamburg and Copenhagen, later also in London and Paris. From the First World War (WWI) Norwegian government bonds were chiefly traded on the Oslo Bourse rather than abroad. But even before WWI there had been a market for the bonds issued by the state bank for mortgage loans founded in 1852, the Kongeriket Norges Hypotekbank.

In this chapter yield series for these bonds are presented. Some important institutional features of bond markets are presented briefly - not in any way intended to be a complete history of the development of capital markets - but rather as hopefully relevant background material in order to understand how and under which market conditions the data series have been generated.²

2. The data

Monthly yield data on bonds issued by the Norwegian government, Kongeriket Norges Hypotekbank as well as private bonds, are tabulated in the appendix. In this section we focus briefly on the sources of bond prices and some of the main principles of the yield calculations.

With one minor exception (Hypotekbank bonds in Christiania (Oslo) prior to 1881), all yield estimates are derived from market quotations on Norwegian bonds traded on the bourses of the main financial centres of Northern Europe (in the century until 1920) and in Christiania/Oslo (beginning 1881). Bond quotations are basically transcribed from contemporary newspaper sources before 1960³; thereafter the official lists published daily by the Oslo Stock Exchange have been used. The

¹I would like to thank Forrest Capie for comments on this chapter. I am also indebted to Øyvind Eitrheim for useful discussions on methodological issues concerning yield curve estimation.

²Schön (1989) presents a broader view of Swedish capital import and the foreign borrowing policy of the Swedish government before WWI, which contains many interesting observations relevant to Norway as well.

³The most important domestic newspaper source is *Morgenbladet*, which provided Norwegian bond prices from foreign

monthly samples of potentially useful bond quotations increased from a few bonds in the early years before 1850, to about 50 monthly observations of government and Hypotekbank bonds in the period 1920 to 1945. The data base also includes yields on bonds issued by private credit enterprises, beginning in 1920, and private industrial companies from 1960. After the reinvigoration of the domestic second-hand bond market in the early 1980s the number of bonds listed on the Oslo Bourse increased considerably. In the peak years of the mid-1980s we have monthly data for more than 250 bonds issued by credit enterprises, about 100 industrial firms and 70 bonds issued by the government or carrying government guarantees. For each of these bonds all technical aspects of the loan contracts that were relevant to the correct calculation of the yield were coded and fed into a computer program that calculated the yields on individual bonds.

The main purpose here is to derive a representative monthly yield series for each of the issuer categories referred to above. Before 1921 the character of the bonds traded only permits the computation of the yield on long-term maturities. However, we are able to present yield estimates of all maturities along the yield curve, although with some gaps at the short end, beginning in 1921 for government bonds. Such estimates have also been derived for the bonds of private credit enterprises and industrial companies as from 1960, but short-term maturities are available only from the 1980s.

In order to derive time series of bond yields we need to clarify the principles involved in (1) computing the yield on individual bonds, (2) which bonds to include in the samples from which monthly yield estimates are computed, and, finally (3) the method used to estimate the yield for a given maturity. We comment briefly on each of these issues.

The calculation of the yield of individual bonds follows the principles advocated by the International Securities Market Association, using the concept of *redemption yield* as our yield measure.⁴ A *redemption yield* is (in contrast to simple or current yield) what is usually referred to somewhat loosely as the 'effective yield' of a bond; more formally it is the discounting factor that would make the sum of the present value of all assumed future expected cash flows (coupon payments and repayments of capital) equal to the market price of the bond. In conformance with recent practice an annual compounding period is used, which makes the calculated yield comparable across bonds with different coupon periods per year.⁵

At present nearly all actively traded bonds in the Norwegian market are straight bullet loans, i.e.

markets for nearly a century starting in March 1822. In a few periods quotations were not printed. For the years 1867 - 1880 and 1912 bond prices in Hamburg were taken from *Hamburger Börsenhalle*. London quotations beginning December 1876 were transcribed from *The Investor's Monthly Manual*, a monthly supplement to *The Economist*. Norwegian bonds were quoted on the Paris Bourse from 1886 and were found in *L'Economiste Français*. Other sources used include *Berlingske Tidende*, *Farmand*, *Dagbladet* and *Bergens Tidende*.

⁴See Brown (1998). Norske Finansanalytikeres Forening (2001) provides some details on institutional features of the bond markets in Norway at present which are useful in this connection.

⁵In the 120 year period prior to the 1980s nearly all bonds considered here carried half-yearly coupons. From the early 1990s all government bonds and bills as well as many private bonds have annual coupons. Before 1860 quarterly coupon payments was a normal feature of government and Hypotekbank bonds.

bonds with fixed coupons and a single redemption date. In this case yield calculations are fairly straightforward. Before 1990, however, for the vast majority of bonds, capital repayments were distributed over a number of years, which is often referred to as a sinking fund. In such cases calculating the yield as if the bond was held until the final maturity date is less relevant than a yield measure that takes into account the expected life of the bond. A key concept in this regard is the *average life* of a bond issue, which is defined as the average of the sinking fund dates weighted by the repayments. In this chapter we mainly use average life as a summary measure of the expected time to maturity. In yield calculations we use a slight modification of the average life concept, which is *equivalent life*, obtained by discounting capital repayments at the redemption yield.⁶

A further complicating feature in yield calculations of long-term bonds is the existence of call options. Typically this allows the issuer to redeem the bond at par after a certain period from the date of issue, say 5 or 10 years, but well before the scheduled final maturity date. This option is of value to the issuer if a funding operation can be undertaken whereby the original bond is redeemed and a new issue is launched at a lower interest rate. This presents a major problem in yield calculations during long periods of a generally falling nominal interest rate level, such as the early 1880s and much of the 1930s.⁷ In general, we follow as a rule the conventional practice of computing the yield to the first call date if the bond is trading above par and disregarding the call option if it is quoted at par or lower. However, the likelihood of the call option being exercised will always depend on the circumstances prevailing at the time, and each case must be evaluated separately. Generally, the most consistent estimates of long-term bonds in such cases are obtained by relying on bonds with the lowest coupon rates.

Having computed the yield on individual bonds, the next issue to be dealt with is the selection of bonds to be included in the estimates of the representative yield series. We use a weighted average of the yields on all bonds (within the relevant maturity range) whose yields are not distorted by such extraneous factors as call features and other factors that make them unrepresentative of the present state of the market. The weights are recalculated each month on the basis of the updated sizes of the bonds in the sample. For bonds where a sinking fund is in operation the amounts outstanding are reduced gradually in line with the redemption schedule. Ideally, we would like to base our estimates of the relative volumes traded, but this is infeasible. The amount outstanding is clearly a proxy for the liquidity and marketability of the bond, although far from perfect in this regard. But it seems intuitively reasonable to regard the yield of a large bond issue as more 'representative' than a smaller one, which normally would be less frequently traded.

⁶A related measure is the *duration* of a bond, which is defined as the average life of the present values of all future cash flows from the bond. Thus, the duration concept implies discounting both capital and coupon payments, while equivalent life only uses the present value in the case of capital payments.

⁷The historical literature abounds with examples of bond yield estimates being distorted because of the influence of early redemption on the market price of the bond. For one example affecting Norwegian government bonds, see Statistics Norway (1965, p. 305).

Until 1920 the government and Hypotekbank bonds traded on the bourses were nearly all of very long maturity. This is due to the fact the new bonds issued were extremely long-term, mostly 30 to 60 years to final maturity. In addition, the period of falling nominal interest rate level extending from the early 1870s to the late 1890s implied that many issues were redeemed at an early date, typically after about 10 years of issue, and converted into bonds with lower coupon rates. During the 1920s, however, a sufficient number of observations belonging to the short end of the yield curve gradually emerge, enabling us to estimate representative yields for the whole maturity range above one year.

There are several methods that can be used to estimate the term structure of interest rates. A widely used technique is to estimate spot yield curves (as well as forward rates) by econometric methods.⁸ We made some attempts with the modified Nelson-Siegel model suggested by Svensson (1995). However, during part of the period considered here we lack yield observations at the very short end of the yield curve, i.e. one year or less, which often resulted in rather extreme functional forms of the estimated yield curve at the short end. It was decided instead to use a non-parametric averaging method around each maturity, which gives a smoothed but quite flexible functional form of the estimated yield curve.⁹ In short, this procedure estimates the yield at a specific point of the yield curve, say 5 years of average life, by first calculating a weighted average of two size-weighted portfolios of bonds within a fixed range on either side of 5 years. The weights decline with the distance from the 5 year maturity.¹⁰ Then the yields of these two portfolios are weighted together so that the average life is exactly five years. Thus the weight given to a particular yield observation will be higher the closer the bond is to the chosen maturity and the greater the size of the bond issue.

3. The period 1820 - 1914: The integrated European bond market era

3.1. The bond markets

3.1.1. Government bonds 1820 - 1914

The foreign loan of 1820 was only the first of many foreign loans that were raised by the Norwegian government in the period to 1914, as can be seen from Table 1, which summarizes some important features of the long-term government bond issues.¹¹

⁸See for example Anderson, Breeden, Deacon, Derry and Murphy (1996) for a general overview.

⁹A similar (but not size-weighted) method is currently used by the Oslo Stock Exchange to compute bond indices, see www.oslobors.no for further technical details.

¹⁰The weights are assumed to follow the normal distribution, which is a conventional (but not theory based) assumption.

¹¹In addition to the long-term bonds several other external loans of short duration were contracted. These include a loan denominated in pound sterling, amounting to 4 million kroner, from Baring Brothers during the commercial crisis in 1857, and a loan of 6 million kroner provided by Skandinaviska Kreditaktiebolaget in Stockholm in 1876. Both loans were repaid within one or two years and do not seem to have been among the listed securities on the bourses. Some small bond issues that were seldom quoted on the markets are also excluded from the table, including 1.3 million kroner of sterling and krone bonds in 1899, which were issued in connection with the government purchase of the shares of Hovedbanen, the first Norwegian railway line.

The Kingdom of Norway, the new sovereign state born in 1814, made some vain attempts at raising a badly needed foreign loan in London and Amsterdam in 1817 and 1818. The failure may be due to a number of political and economic factors, including market perceptions of the viability of the newly constructed nation as well as stringent money markets. It is also surmised that the poor credit rating of Norwegian businessmen at the time was transferred to the sovereign.¹² Eventually, a loan was concluded with the banking firm of Bennecke in Berlin in January 1820, using Norway's custom revenues as collateral. The exact cost of the loan is somewhat ambiguous, as there is conflicting information about the net price, but the effective rate of interest was probably in excess of 12 per cent.¹³ As a new borrower it is likely that Norway had to pay a certain risk premium to obtain this loan, but it is not clear how large this premium was, considering the very strict terms other sovereigns faced on the European bond markets at the time.¹⁴

The high interest cost and, in particular, the patronizing and costly administration of the Bennecke loan, led to the conviction that the bond issue was a national disgrace and was thus conducive to its early redemption in 1825. A new loan was agreed with the banker C. J. Hambro in Copenhagen already in 1822, which marked the beginning of a long-standing financial relationship. Over a period of more than 150 years the banking firm of Hambro was to serve as bankers to the Norwegian government. Hambro played a leading role in all new bond issues in the next 30 years following the 1822 loan and in the relatively large bond issues of the 1870s and 1880s.¹⁵ As was the case with several of the issuing houses figuring in Table 1, the financial connections established during pre-WWI period were still actively used a hundred years later; the Deutsche Bank was involved in many government loans in the 1960s and 1970s and the most recent loan floated by Hambros Bank was a USD loan in 1978. The most prominent lender to governments in large parts of the nineteenth century, however, the House of Rothschild¹⁶ is not on the list. In the crisis year of 1848 the Norwegian government did in fact approach the Frankfurt house of the Rothschilds with regard to a loan, but in the end the Hambro connection was what secured a loan contract.¹⁷

There are several general features of the pre-WWI bond markets to be noted from this table. With some minor exceptions the Norwegian government bearer bond issues of this period were floated abroad. Hamburg, London, Copenhagen and Berlin provided most of the funds until the 1890s.¹⁸

¹²Kristiansen (1925, 1931) provides a useful overview of the economic and financial development of Norway between 1814 and 1830.

¹³The figures given in Table 1 are based on the information in Kristiansen (1931, pp. 289-290).

¹⁴The Austrian 5 per cent *metalliques* bonds yielded about 7 per cent at the end of 1819, the 4 per cent Prussian government bond was quoted at 71.625 yielding 5.6 per cent, according to the data in Kahn (1884). See also the discussion in Kristiansen (1931, p. 290).

¹⁵See Bramsen and Wain (1979) for the history of the Hambros.

¹⁶Ferguson (2000).

¹⁷In a report to the Storting from the Department of Finance dated October 1848 it emerges that Baron Rothschild had politely declined to give a loan to Norway, although he held the highest regard for the credit rating of the Kingdom. He also stated that his opinion was that only Hambro was able to provide such a loan at the moment (*Norwegian Parliamentary Papers, St. prp. no. 3 of 1851*).

¹⁸The banking firm of C. J. Hambro and Son moved from Copenhagen to London in 1838.

Beginning with the loan of 1894 French capital became very important, being the chief source of all the relatively large loans raised during the next eleven years up to and including the 1905 loan. After the major conversion loan operations of 1886 and 1888 London, which was equivalent with Hambro, was not involved until the final pre-WWI government bond of 1911. Ever since 1822 Danish banks had participated in many issues, typically taking a 10 - 25 per cent share of the loan. Beginning 1896 this applied to Swedish banks as well.

Looking at the list of issuing houses and the currencies of denomination, it is evident that financial markets in Europe were highly integrated. In many cases banking firms from several countries participated in floating the loans, which were typically launched simultaneously on the bourses of Hamburg, London, Paris, Copenhagen, Stockholm and Oslo.¹⁹ A typical mixture of lenders in the 1870s and 1880s was German banks and Hambro of London. In the 1890s German and French banks, with some Scandinavian participation, were leading the issues - but French and British capital together was never observed.

The international character of the secondary markets for these bonds went beyond the issue market. The four loans issued between 1822 and 1834 were contracted with Hambro of Copenhagen, but also extensively traded in Hamburg. The 1886 and 1888 loans, for which Hambro of London was the sole bank of issue, were traded on the bourses of Paris, Hamburg and the Scandinavian capitals. Prior to the loan of 1876 the Hamburg bourse provides the most consistent source of secondary market quotations for Norwegian government bonds, which signals that the German market was the most important in these years. The loan of 1876 marked the beginning of a period of strong British participation, and during the next twenty years London and Hamburg were the major markets. In the first decade of the twentieth century Paris was indisputably the leading market for Norwegian government bonds.²⁰ The strong position of Paris in the late 1890s and in the 1900s is worth noting, even the domestic loan of 1895, which was denominated in kroner only, was quoted in Paris. After 1909 the French dominance seems to have subsided somewhat. The loan of 1911 witnessed the return of Hambro to the Norwegian issue market. In this case Hambro cooperated with another London based merchant bank, Swiss Bankverein, as well as with German and Swedish banks.

All bonds listed in Table 1 were payable in currencies of fixed silver or gold value. Before 1874 all bonds were in silver. Hamburg Banco was the standard unit of account during the silver standard period.²¹ This currency was equivalent to a fixed amount of fine silver, but it was not minted in silver specie, i.e. coins.²² The Norwegian currency prior to 1873, the *speciedaler*, obtained a fixed market value in terms of silver only in 1842. The *speciedaler* loans of 1828 and 1834 were therefore

¹⁹The name of the capital of Norway was Christiania or Kristiania until 1925, but for simplicity we refer to the city as Oslo throughout the period in this chapter.

²⁰This was explicitly stated (p. 2) in the 1902 issue of Kierulf's *Haandbok over norske obligationer og aktier*. The same source notes that these bonds were also traded in London, and to a lesser extent, in Hamburg.

²¹The United Kingdom was on a gold standard as early as 1821. Even so, the 1848 and 1851 loans, in which Hambro (then based in London) played a leading role, were denominated in silver (*banco*) only.

²²See Keilhau (1952, p. 40-41).

denominated in silver specie rather than in speciedaler valued at the market rate, which made them more readily marketable in Copenhagen and Hamburg.

After most European countries had abandoned silver in favour of gold in the early 1870s bonds could cross the borders freely without much consideration of exchange rates. As can be seen from the table, in most cases these securities were even formally multicurrency bonds, being denominated in various currencies convertible at fixed exchange rates. The loan contract of the 1884 loan, for example, stated that bonds of, say, £100 were equal to 2520 French francs, or 2040 reichmarks or 1813.33 kroner. The bondholders could freely choose in which currency the payment of coupons or amortization should be made by presenting the documents at the proper location.²³

²³The Commerz- und Disconto-Bank in Hamburg was the sole contractor of the 1884 loan, and was of course its agent in Hamburg, but according to the contract, payments could also be effected by London and Hanseatic Bank in London, Banque d'Escompte de Paris in Paris, Deutsche Bank in Berlin, Deutsche Effecten- und Wechselbank in Frankfurt, the House of Lippmann, Rosenthal and co. in Amsterdam as well as by Christiania Bank og Kreditkasse in Oslo.

Table 1. The bearer bond issues of the Kingdom of Norway
1820 - 1914

Year of issue	Coupon rate	Net contract price	Net interest cost	Nominal loan amount	Issuing houses	Currency denominations	Year of scheduled maturity	Actual year of redemption
1820	5.0	58.9	12.56	3.6	Bennecke	H Banco	1840	1825
1822	6.0	83.3	8.13	9.6	Hambro	H Banco	1852	1834
1825	4.0	92.0	5.42	3.4	Hambro	H Banco	1840	1836
1828	4.0	91.0	4.89	1.2	Hambro	Nspd silver	1858	1858
1834	4.0	95.0	4.93	4.8	Hambro	[H Banco, Nspd silver]	1849	1847
1848	4.0	91.0	4.94	6.0	[Hambro, Heine]	H Banco	1878	1878
1851	4.0	97.0	4.39	4.8	[Hambro, Heine]	H Banco	1881	1881
1858	4.5	96.0	5.09	14.4	[NorddB 50, Heine 29, Erlanger 21]	H Banco	1888	1880
1863	4.5	96.5	4.98	6.0	[NorddB, Heine, Suhr, PrivbK]	H Banco	1893	1880
1871	4.5	98.6	4.83	1.0	none	kr	1881	1881
1872	4.5	97.5	4.77	6.0	[DnC, CBK, DanskeLM]	Nspd(kr)	1903	1884
1874	4.5	97.5	4.79	20.0	[Hambro, NorddB, Warschauer, PrivbK]	rmk,kr	1905	1884
1876	4.5	95.0	5.08	24.0	Hambro	£	1916	1887
1878	4.5	95.0	5.08	30.9	[Hambro, NorddB]	£,rmk	1932	1889
1880	4.0	97.7	4.32	21.0	[Hambro 67,	£,rmk,frcs	1934	1892

Table 1. The bearer bond issues of the Kingdom of Norway
1820 - 1914

Year of issue	Coupon rate	Net contract price	Net interest cost	Nominal loan amount	Issuing houses	Currency denominations	Year of scheduled maturity	Actual year of redemption
					NorddB 33]			
1884	4.0	98.1	4.19	25.0	CommerzDB	£,rmk,frcs,kr	1926	1888
1886	3.5	96.1	3.75	30.9	Hambro	£,rmk,frcs,kr	1961	1961
1888	3.0	86.1	3.69	64.6	Hambro	£,rmk,frcs,kr	1963	1963
1892	4.0	98.9	4.12	10.0	[CommerzDB 25	rmk,kr	1942	1903
					DeutscheB 27, BerlinHG 27, NationalbD 20]			
1894	3.5	96.2	3.76	39.7	[Behrens, Bleichröder, DiscontoGB, CNEParis, DanskeLM]	£,rmk,frcs,kr	1944	1944
1895	3.5	99.4	3.59	12.1	ChrHBank	kr	1920	1920
1896	3.0	98.2	3.12	25.4	[ChrHBank 4, SEB 28, CrLyonnais 34, BPPays-Bas 34]	frcs,£,kr	1946	1946
1898	3.5	96.6	3.93	20.9	[SEB 13, DanskeLM 7, PrivbK 7, CrLyonnais 30, BPPays-Bas 30, Behrens 7, NorddB 7]	frcs,£,kr	1918	1918
1900	3.5	91.0	4.08	32.4	(as for 1898 loan)	frcs,£,kr	1950	1950
1902	3.5	96.0	3.74	36.4	[CentralbN 5, SEB 11, DanskeLM 5, PrivbK 5,	frcs,£,kr	1962	1962

Table 1. The bearer bond issues of the Kingdom of Norway
1820 - 1914

Year of issue	Coupon rate	Net contract price	Net interest cost	Nominal loan amount	Issuing houses	Currency denominations	Year of scheduled maturity	Actual year of redemption
					CrLyonnais 27, BPPays-Bas 27, DeutscheB 10, Behrens 5, NorddB 5]			
1903	3.0	91.2	3.53	13.3	CNEParis	frcs,£,rmk,kr	1953	1953
1904	3.5	97.1	3.68	41.2	[CentralBN 7, SEB 11, Danske LM 7, PrivbK 7, CrLyonnais 27, BPPays-Bas 27, Behrens 7, NorddB 7]	frcs,£,kr	1964	1964
1905	3.5	96.0	3.75	36.2	[CrLyonnais, BPPays-Bas]	frcs,£,kr	1964	1964
1911	4.0	98.0	4.15	40.0	[Hambro 15, SwissBV 20, NationalbD 15, SchaaffhBV 15, BHIBerlin 15, SEB 7, StockhH 7, BSödraS 5]	£,frcs,rmk,kr	1971	1938

NOTES by column: Coupon rate: Coupon payments were made half-yearly, except in the case of the loan issues of 1822 through 1851, which had quarterly coupons. The coupon rate of the 1886 loan was reduced to 3 per cent in 1898. Net contract price: This is the percentage of the face value paid by the loan contractors to the government. Net interest cost: The net borrowing cost, computed as an annually compounded rate on the assumption that all bonds are redeemed at par according to the scheduled plan. The calculation takes into account the net issue price, costs of bond issue incurred by the government, including any commission paid by the borrower in connection with the payments of coupon interest and amortization. Beginning with the loan of 1858 the semi-annually net interest rate calculated by the Department of Finance has been used after converting it to an annually compounded rate; for the loan issues of 1820 through 1851 this figure is calculated here on the basis of information in loan contracts and other sources listed below. Nominal loan amount: Nominal value of bonds issued, calculated in millions of Norwegian kroner. Issuing houses: In the case of several contractors the numbers given are their percentage share of the issues; if no number is given the shares are equal. The abbreviations used are: Bennecke = Bennecke Brothers, Berlin; Hambro = C.J. Hambro & Son, London (located in Copenhagen before 1839); Heine = Salomon Heine, Hamburg; NorddB = Norddeutsche Bank, Hamburg; Erlanger = Raphael Erlanger, Frankfurt; Suhr = J. V. Suhr, Copenhagen; PrivbK = Privatbanken i København; DnC = Den norske Creditbank; CBK = Christiania Bank og Kreditkasse; Danske LM = Danske Landmandsbank, Copenhagen; Warschauer = Rob. Warschauer, Berlin; CommerzDB = Commerz- und Disconto-Bank, Hamburg; DeutscheB = Deutsche Bank, Berlin; BerlinHG = Berliner Handels-Gesellschaft; NationalbD = Nationalbank für Deutschland, Berlin; Behrens = L. Behrens & Sons, Hamburg; Bleichröder = Bleichröder, Berlin; DiscontoGB = Direction der Disconto-Gesellschaft, Berlin; CNEParis = Comptoir National d'Escompte, Paris; ChrHBank = Christiania Handelsbank; SEB = Stockholms Enskilda Bank; CrLyonnais = Credit Lyonnais, Paris; BPPays-Bas = Banque de Paris et des Pays-Bas, Paris; CentralbN = Centralbanken for Norge, Oslo; SwissBV = Swiss Bankverein, London; SchaaffBV = A. Schaaffhausenscher Bankverein, Berlin; BHIBerlin = Bank für Handel und Industri, Berlin; StockhH = Stockholms Handelsbank; BSödraS = Bankaktiebolaget Södra Sverige, Helsingborg. Currency denominations: H(amburg) Banco had a fixed silver content throughout the period, which in practice made this currency equivalent to silver species. Nspd silver = Norwegian speciedaler in fixed silver value, kr = kroner (Norwegian, Swedish or Danish), rmk = German reichsmarks; frcs = French francs. **SOURCES:** Details on the loan issues are taken from the annual volumes of *Norwegian Parliamentary Papers* (published as *St. prp.* or *St. med.*) Much information is also available from *Kierulfs haandbok over aktier og obligationer* of 1902 and later issues, covering the loans from 1886 onwards; see also Kristiansen (1931), Woxen (1889) and *Farmand* March 10, 1894, for useful summaries.

3.1.2. The bonds of Kongeriket Norges Hypotekbank 1851 - 1914

In 1851 the Norwegian parliament decided to establish a public bank whose purpose was to offer mortgage loans to private individuals. The Kongeriket Norges Hypotekbank soon became the primary source of long-term credit in connection with the conveyance of farms and landed property. The share capital was provided by the parliament, but otherwise it was dependent on floating long-term bonds on the market with respect to funding the mortgage loans.²⁴

The long-term bearer bonds issued by the Hypotekbank were sold on tap from its main office in Oslo and on commission in Hamburg, Altona and Copenhagen.²⁵ This pattern remained much the same throughout the 19th century; the domestic market and German investors purchased the bulk of the

²⁴The general history of the Hypotekbank is written by Kaartvedt and Hartsang (1952). It contains much interesting material on the development of the bond markets in Norway and abroad in this period. A short account of the financial activities of the bank up to 1890 is given by Aschehoug (1891). Annual reports and detailed accounts were sent to the Storting and were published in Norwegian Parliamentary Papers as *Stortingsmelding*.

²⁵The commissioners in Hamburg and Altona in the 1850s and 1860s were the bankers C. H. Donner and Salomon Heine; in Copenhagen J. P. Suhr was their commissioner. Later Behrens and Söhne in Hamburg and Danske Landmandsbank in Copenhagen were the chief connections.

new bonds, some bonds were also sold in Denmark. The English market was never opened to the bonds of Kongeriket Norges Hypotekbank, but between 1900 and 1909 Credit Lyonnais and Banque de Paris et des Pays-Bas were the sole purchasers of the bond issues. The dominance of French capital markets as a source of finance in the first decade of the twentieth century parallels the case of government loans discussed above.

From the annual accounts of the Hypotekbank we know the geographical distribution of the interest payments to bondholders. These bonds were, as was the case for most government bonds, multi-currency bonds, denominated in kroner and reichsmark at a fixed exchange rate. Between 1900 and 1909 bond issues were also denominated in French francs. On the assumption that bonds presented for payment in Oslo were owned by Norwegians, those presented in Hamburg were held by Germans etc. an estimate of the distribution of the stock of Hypotekbank bonds can be readily made. This assumption is quite plausible before August 1914 because of the small currency fluctuations during the metallic standards.²⁶

Between 1854 and 1860 as well as from 1870 to 1893 more than 50 per cent of interest payments were made in Norway. In the 1860s Copenhagen and Altona/Hamburg accounted for 50 to 70 per cent. The German proportion grew steadily from 26.9 per cent in 1880, passing 50 per cent in 1894. The domestic proportion was reduced from more than 60 per cent in 1889 to 20 to 25 per cent around the mid 1890s, at which level it was maintained until WWI. This was a period of heavy capital import to Norway, and it is also consistent with the fact that government bonds were less frequently quoted in Christiania in the 1890s and 1900s than in the 1880s. Beginning 1900 the French issues increase the proportion of interest paid in Paris, passing Hamburg in importance in 1910. At the eve of WWI almost 45 per cent of the bonds were presented for payment in France.

The connection between the location of interest payment and the nationality of the bond holders is far more questionable after 1914, as reichmarks and francs depreciated against Norwegian kroner. By 1917 Swedish kronor had appreciated against Norwegian kroner. We know that the Hypotekbank allowed Danish and Swedish bondholders to get their coupon payments in Copenhagen and Stockholm, in Danish kroner and Swedish kronor, respectively. It was consequently more profitable for French and German bondholders to claim payment in Swedish kroner, which was honoured in 1917 (when 26 per cent was paid there), but not thereafter, although these bondholders were offered payment in Norwegian kroner.²⁷ From 1914 the proportion of domestic interest payments increased rapidly, by 1918 98.4 per cent was paid in this country and by 1920 only a small fraction (0.7 per cent) was still presented for payment in Stockholm.

²⁶This was also the practice according to Kaartvedt and Hartsang (1952, p. 373).

²⁷After 1920 French bondholders also claimed payment in gold because the text of the bonds stipulated a fixed gold content of the currency of denomination. This became a major legal issue between foreign bondholders and the Hypotekbank in the 1920s, as well as a political issue between the French and Norwegian governments. The gold clause was never honoured by the Hypotekbank. See Kaartvedt and Hartsang (1952, pp. 372-382) for a discussion.

Table 2 gives an overview of the nominal amounts of Norwegian government and Hypotekbank bonds on the markets in selected years between 1850 and 1920. The currency note circulation of Norges Bank is also included as a benchmark. Exact figures of domestic holdings of government bonds are unavailable for the period before 1899, but it is evident that only a small amount was held in this country. Of the loans listed in Table 1 the issues of 1871, 1872 and 1895 were intended for the domestic market. In addition, there were some perpetual bonds issued at several occasions during the nineteenth century. These amounted to approximately 8 million kroner until 1886-1887, when they were redeemed.²⁸

Table 2. Nominal amount outstanding of government and Hypotekbank bonds 1850 - 1920. Millions of NOK.

Year	Government bonds		Hypotekbank bonds		Currency circulation
	total amount	of which held domestically	total amount	of which held domestically	
1850	14	(8)	0	0	20
1860	31	(8)	20	14	26
1870	30	(8)	36	20	28
1880	106	(11)	55	30	39
1890	115	(0.2)	80	45	50
1899	197	10	119	28	62
1914	358	6	220	64	134
1920	892	379	249	247	492

NOTES: The figures in parentheses in column 3 for the years before 1899 are government loans in Norwegian kroner issued in Norway only. Beginning 1899 the figures refer to estimates of government bonds actually held by domestic sectors, taken from Skånland (1967, pp. 100-101). The amount of Hypotekbank bonds held by domestic sectors is based on the fraction of interest payments presented in Oslo, see text for more discussion. Other sources are *Statistical Survey 1948*, *Statistics Norway, Oslo, 1949* and Klovland (1984).

The total amount of government bonds was larger than that of Hypotekbank bonds except in 1870. However, the amount of Hypotekbank bonds held by domestic sectors was much greater than the amount of government bonds in all the pre-WWI period. In summary, the active markets for Norwegian government bonds in the years before WWI were all abroad, initially in Hamburg and Copenhagen, later also in London and Paris. Hypotekbank bonds were traded actively in both Oslo and Hamburg, and, beginning in 1900, also in Paris.

3.1.3. Bond yields before WWI

A consular report from May 1820 referred to by Kristiansen (1931, p. 293) stated that the Norwegian loan of 1820 was quoted on the bourses in Hamburg and Berlin at 75 and 78 (to yield 7.5 and 7.2 per cent, respectively). As the loan was obtained from the bankers Bennecke in Berlin at a net price

²⁸See Woxen (1889) for further details on loans issued in 1822 (redeemed by 1872) and 1828 (redeemed by 1858).

of 61.7 per cent in January 1820, this seems to imply a handsome profit for the issuing house.²⁹ However, a yield of about 7.5 per cent in 1820 was very much in line with the level at which Danish government bonds, denominated in silver, were traded at the time.³⁰ Accordingly, the market did seem to have reasonable confidence in the financial resilience of the Kingdom of Norway right from its first year as a borrower on the international loan markets.

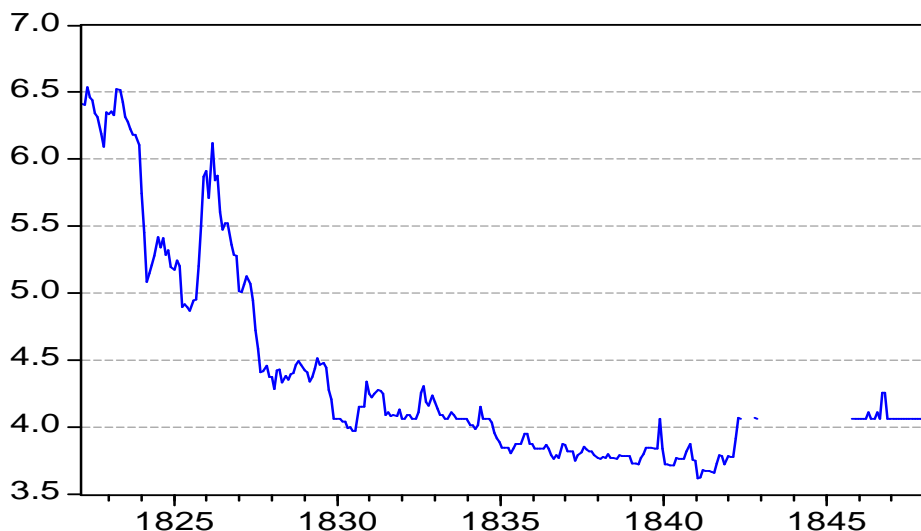


Figure 1: Yield on long-term Norwegian government bonds March 1822 - March 1848. Silver (Hamburg banco) bonds traded in Hamburg, Berlin and Copenhagen

Our continuous monthly yield data start in March 1822, when the Norwegian newspaper *Morgenbladet* began to publish regular reports on the market prices of government loans quoted in Berlin and Hamburg. A representative yield series is shown in Figure 1 for the period through March 1848.³¹

The figure shows a significant decline in the long-term interest rate during the 1820s; by the beginning of 1830 the 4 per cent loan of 1828 was trading at par. There was a marked but short-lived rebound in the level of the yield in the autumn of 1825 and winter of 1826, which is in conformance with the final phase of the international business cycle boom and money market stringency at the time. The rest of the period until 1848 is very tranquil with respect to long-term interest rate move-

²⁹However, the report also surmised that the price could be brought down towards 70 by purchasing large volumes directly from Bennecke.

³⁰See Danmarks Statistik (1969) for quarterly prices and yields of bonds quoted in Copenhagen.

³¹Before February 1824 the yield is derived from Berlin quotations; thereafter mostly Copenhagen, between February 1836 and December 1839 also Hamburg. The government yield data which are used in the graphs in this chapter can be found in Table A4 of the appendix. This series is considered to represent the most representative long-term yield on Norwegian government bonds. See the text for details on the actual maturities and market places used in computing the yield data in the various subperiods.

ments. Yields dipped below 4 per cent in 1834 and edged gradually downwards to 3.6 per cent in 1840-1841. In the middle of 1842 the yield rose to slightly above 4 per cent, around which it seems to hover until 1848. In the 1840s the amount of Norwegian government bonds traded on the market became very small, no longer being quoted on the bond market lists published in the contemporary newspapers.³² The exceptionally strong financial position of the Norwegian government in the 1840s is thus the reason why our interest rate series exhibit significant gaps in the mid 1840s.

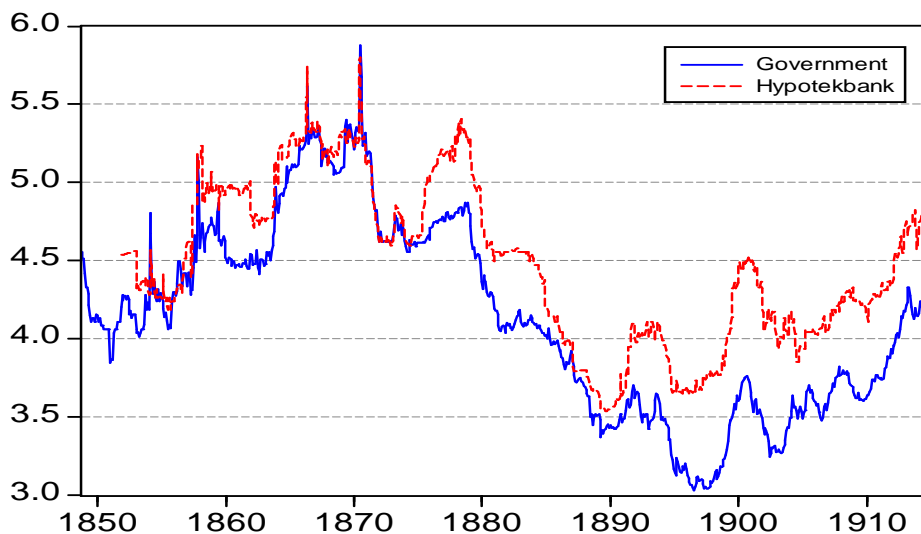


Figure 2: Yield on long-term Norwegian bonds October 1848 - December 1914

The new 30-year bond issue of 1848 was quoted on the Hamburg Bourse in October of that year at a price of 94.5, yielding 4.56 per cent. At first this loan was also regularly quoted in Copenhagen, but from the early 1850s it is evident that Hamburg superseded Copenhagen as the leading market place for Norwegian bonds. This did not only apply to government bonds, but to the bonds issued by the Kongeriket Norges Hypotekbank, which found its greatest market there in the 1850s. The monthly yields on government and Hypotekbank bonds from 1848 to 1914 are shown in Figure 2.³³

³²By December 1842 there were only two loans still on the market, the small issue of 1828 (0.8 million NOK still not redeemed) and the rapidly diminishing stock of the 1834 loan (2.5 million still outstanding), scheduled to mature in 1849. Both issues were listed on the official price list of the Copenhagen Stock Exchange (*Københavns Kongelige Adressecomptoirs Efterretninger*, published in the Danish Newspaper *Berlingske Politiske og Avertissement Tidende*), but there are no quotations in 1843 and 1844. However, beginning November 1846 a new price list of stocks and bonds appears in *Berlingske Tidende*, which contains quotations on the 1828 issue (until March 1848) and the 1834 issue (discontinued after January 1847). The same conclusion as to the non-availability of price quotations of Norwegian government bonds in these years can be inferred from Danmarks Statistik (1969, pp. 160-163).

³³The government bond yield curve is based on Hamburg quotations October 1848 to November 1876; thereafter and until the end of 1914 an unweighted average of London and Hamburg prices is used (the latter through October 1911 only), from February 1887 also Paris. The Hypotekbank series is based on Hamburg data before February 1881 and Oslo Bourse prices thereafter.

1848 was a year of economic crisis in Europe, and as the depression in economic activity lingered on, bond prices followed their normal course upwards, peaking in the winter of 1851, when the yield was once more below 4 per cent. The influence of business cycle events is evident from Figure 2. A particular example is the great commercial crisis of 1857, culminating in the autumn of that year, which is mirrored in a sharp peak of the government bond yield in November, a time of panic at the bourses of Northern Europe. The business cycle peak of 1866 and its concomitant financial market crisis in Europe is another example.

Business cycle effects are not the only factors shaping the short-run fluctuations in Figure 2, however. On several occasions, notably in February 1854, around the end of 1863 and July 1870 war events affecting Germany caused the prices of all bonds on the Hamburg market to plunge, even those of a small non-implicated country like Norway.³⁴ From the late 1870s, when the holdings of Norwegian bonds were shared between Hamburg and London, later also Paris, such war event effects seem to be less transparent. It is noteworthy that no political events emanating from Norway is evident from the graph. Even in the spring and summer of 1905, when Norway was on the brink of war with Sweden over the dissolution of the personal union, the yield series are hardly affected.³⁵

The long-run trends in the level of the interest rates is evidently visible in the graph, swamping the cyclical fluctuations when a longer run view of Figure 2 is taken. From a low in the early 1850s the level rises to above 5 per cent towards the latter half of the 1860s and the year 1870, then falling to a secular low of slightly above 3 per cent in 1897. Towards WWI the trend of nominal interest rates is again rising, with the usual disturbances caused by business cycles. This picture is much in line with the evidence from the yield of other European nations' debt.³⁶ The long-run picture in Figure 2 is also yet another visualization of the strong correlation between nominal interest rates and the *level* of commodity prices in the pre-WWI era, known as the Gibson paradox.³⁷

It is evident from Figure 3, showing the yield differential between Hypotekbank and government bonds, that the Norwegian government was in general able to borrow on international markets at lower rate of interest than the Hypotekbank. Over the 1852 - 1914 period the yield differential averaged 34 basis points (0.34 per cent). There is a marked structural break in the mid-1870s, however, when the yield differential increased markedly. Between January 1852 and November 1876 the yield differential was 16 points, compared to 46 basis points from December 1876 until the Great War. The introduction of Norwegian government bonds to the London market following the Hambro loans of 1876 and 1878 may have contributed to the lower yield. This follows from the fact

³⁴The first episode is related to the start of the Crimean war. The other two war events are the German-Danish conflict over Schleswig-Holstein early in 1864 and the Franco-Prussian war of 1870, respectively.

³⁵As noted below, the prices of Norwegian government bonds in London were unusually weak relative to those in Hamburg and Paris in the first half of 1905, but it is not known whether there are any political considerations underlying this episode.

³⁶See for example Homer (1977).

³⁷Following the contributions of Irving Fisher it has been more natural to test for a positive relationship between the *rate of change* in prices and interest rates rather than looking for a connection between the *level* of prices and interest rates, hence the latter relationship is thought of as a paradox. See for example Friedman and Schwartz (1982) for further discussion.

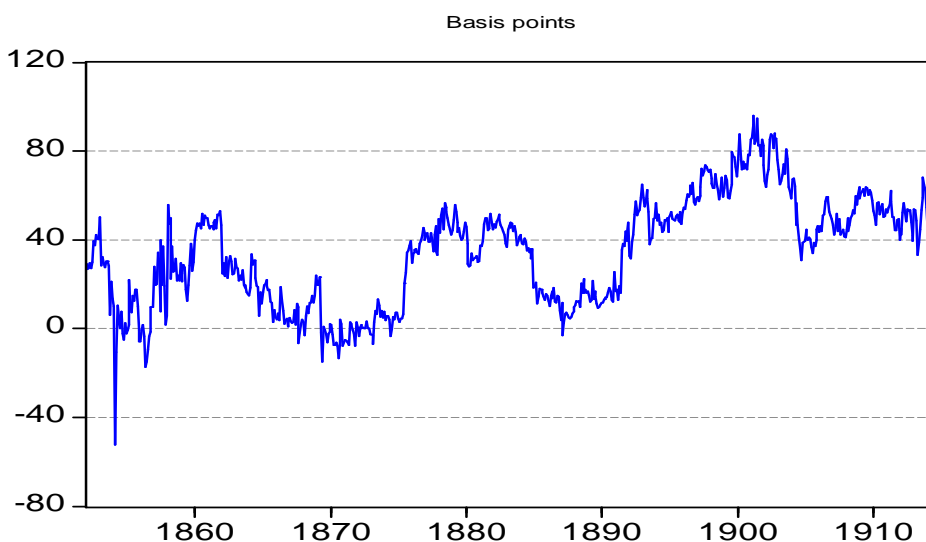


Figure 3: Yield differential (basis points) between Hypotekbank and government bonds 1852 - 1914

that the rate of interest on high-grade investments was as a rule lower in London than in Hamburg.

In the early years there are also some shorter periods of a negative yield differential, i.e. the government bond yield was higher than that of the Hypotekbank bonds, both being quoted in Hamburg. It occurs in some cases during periods of rapidly falling bond prices, as in the onset of the Crimean War in February 1854 and the Franco-Prussian War in 1870. The market for government bonds reacted evidently more quickly to unfavourable news than the market for Hypotekbank bonds, as would be typical of a larger and more liquid market.

The yield differentials derived from Norwegian government bonds quoted in London, Hamburg and Paris are shown in Figure 4. Disregarding for the moment the observations in 1887 and the first half of 1888, which are distorted by special factors,³⁸ the broad impression is that yield differentials were rather small. The great majority of observations of yield differentials fall within 10 basis points of each other.³⁹ Over the period from July 1888 to December 1912 the *mean* yield differentials between London, Hamburg and Paris were 3 basis points or less in any of the three pairwise comparisons that can be made.⁴⁰ Over the same time period it emerges that the mean yield differential was less than 2

³⁸The Hamburg observations are based on the 4 per cent 1880 loan through June 1888, whose price was affected by expectations of an early call being exercised by the government.

³⁹Note that a direct comparison of published bond *prices*, rather than *yields* would not be appropriate. On the London and Paris bourses the convention was to quote the dirty price, i.e. the transaction price including accrued interest, whereas in Hamburg (and Oslo) the clean price (net of accrued interest) was quoted. Our yield calculations take into account these differences.

⁴⁰In absolute value terms the average yield differentials were 5 basis points or less.

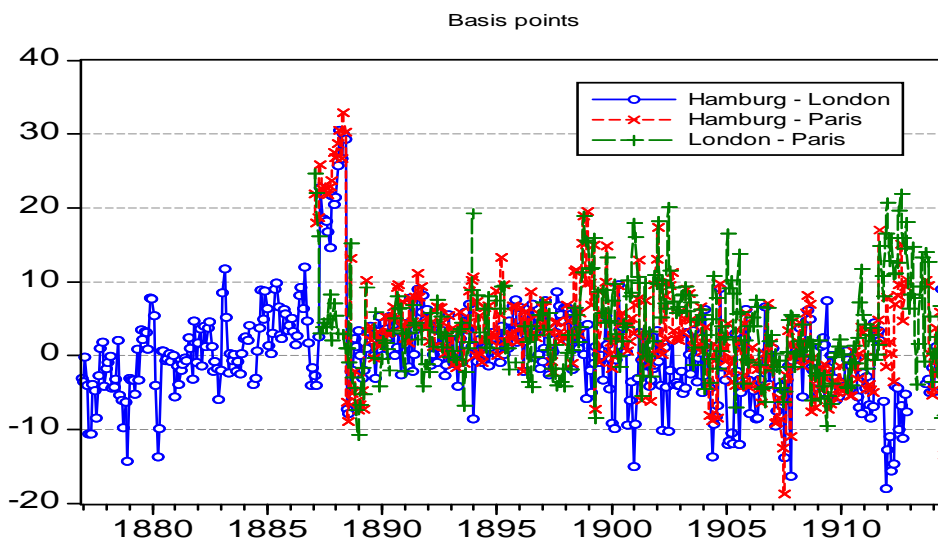


Figure 4: Yield differentials (basis points) on Norwegian government bonds quoted in London, Hamburg and Paris 1876 - 1914

points between Oslo and London, although it will be seen from the appendix table that these bonds were infrequently traded in Oslo in large periods after 1898.⁴¹

Thus, these data indicate that any large price differentials seem to have been quickly arbitrated away, as one would expect in an efficient market. Whether there still were unexploited profit opportunities after taking into account transaction costs has not been examined, but the broad impression is that the European market for Norwegian government bonds in this period can be regarded essentially as *one* single market. This implies, then, that although these bonds were crowded out from active trading on the domestic bond market in Oslo by the higher-yielding Hypotekbank bonds during large parts of the pre-WWI period, their yields, as inferred from quotations on foreign bourses, can be regarded as representative of krone denominated Norwegian government bonds.

The yield differentials on Hypotekbank bonds traded in Oslo, Hamburg and Paris are visualized in Figure 5. These curves highlight some important features of these data. To obtain a domestic yield series before 1881 we have to rely on information on the Hypotekbank bonds sold directly from its main office in Oslo, and our quotations are based on the recorded sales prices. During the money market stringency in 1857 and 1858 the Hypotekbank was severely curtailed on the domestic market

⁴¹It should be noted that these comparisons in many cases do not strictly refer to yield comparisons of identical bond issues. Bonds of the large issue of 1888 were frequently quoted in both London, Hamburg and Paris, but otherwise the most actively traded issues differed somewhat between the capitals. In Paris, the predominantly French issues of 1896 through 1905 (see Table 1) accounted for the bulk of trading in Norwegian bonds, but these were not quoted in London or Hamburg. Even so, yield differentials involving Paris were not greater than the London-Hamburg differential.

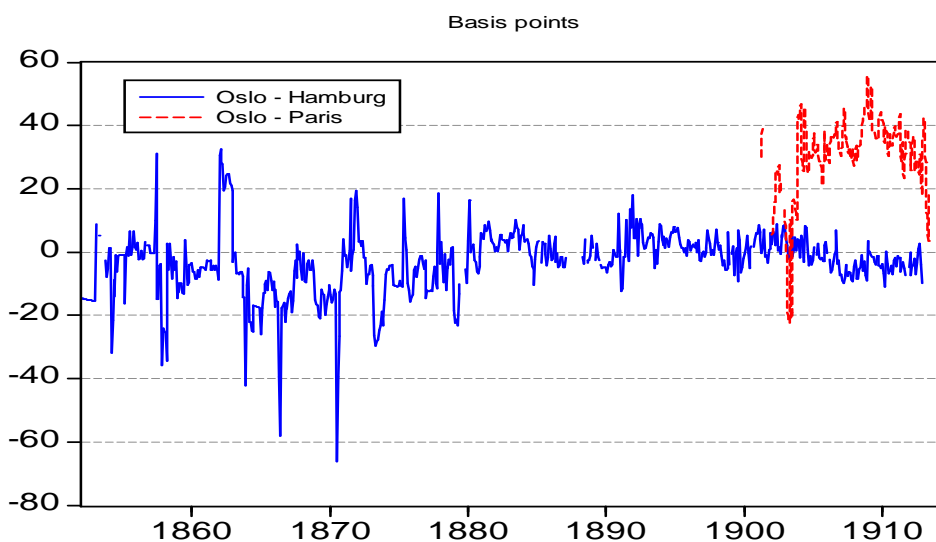


Figure 5: Yield differentials (basis points) on Hypotekbank bonds quoted in Oslo, Hamburg and Paris 1852 - 1914

because of the clause in the bank's rules that 4 per cent bonds could not be sold domestically below 92 per cent.⁴² Also in later periods of capital market stringency sales tended to dry up, as the bank was generally slow to adjust its bond prices at home to the falling market prices in Hamburg. During such periods the domestic yield series derived from the primary market may be a biased estimate of the true market rate of interest. In addition, for some years the information on how bond prices varied over the year is somewhat ambiguous. Consequently, prior to 1881, the Hamburg series should be considered as more representative than the Oslo data.

More significantly, during the period from 1881 to the end of 1912, when the Hypotekbank bonds were quoted on the Oslo Stock Exchange, there is a close covariation between Oslo and Hamburg. The mean yield differential was less than 1 basis point. The Hypotekbank issues traded in Hamburg were the same as those actively traded in Oslo, and the prices of these bonds fluctuated closely together. The French issues of 1900 through 1909, however, were not introduced to the Hamburg market, and infrequently traded in Oslo. As can be seen from Figure 5 there was a fairly large and persistent yield differential between Oslo (based on the 1885 - 1898 issues) and Paris. This may be another manifestation of the relative capital market easiness of the French market in the early 1900s, but it should be pointed out that there is also a possibility that the yield differential is due to

⁴²This clause was in line with the usury laws which did not permit mortgage rates being above 5 per cent. This had the effect that mortgage credit through regular financial intermediaries dried up during periods of high interest rates. See Kaartvedt and Hartsang (1952, pp. 114-131) for an account of this episode.

a technical aspect of the bond issues.⁴³

4. The period 1915 - 1945: The growth of domestic bond markets

During the First World War the markets for Norwegian bonds changed character in several respects. The fluctuating exchange rates implied that the prices and yields of the multicurrency Norwegian bond issues now differed between the various financial centres.⁴⁴ The large surpluses on the current account in 1915 and 1916 were in part mirrored by the repatriation of Norwegian government and Hypotekbank bonds held abroad.⁴⁵ Disputes arose regarding gold clauses attached to the pre-WWI bonds and the right of bondholders to claim payments of coupons and amortized bonds in appreciated currencies (chiefly pound sterling or Swedish kronor). In the 1930s new legalization was introduced to prevent the flow of bond capital across the borders. All these features transformed the bond markets from being international to being primarily domestic.

In this period bonds issued by the Norwegian government dominated the market. The Hypotekbank also remained an important player on the domestic market, and other state banks (chiefly Norges Kommunalbank) gradually increased their funding on the bond markets as these institutions developed in the 1930s. The interwar years also experienced a nascent market for bonds issued by private credit enterprises.

We now give a brief overview of the activities on the new issue markets before turning to the yield data.

4.1. The new issue markets

After the outbreak of WWI loans denominated in Norwegian kroner (NOK), which were intended for the domestic market only, constituted the bulk of new issues. The bond issues floated abroad were now of the *foreign bond* category, i.e. they were denominated in the currency of the foreign country only.⁴⁶ The multicurrency bonds that dominated the pre-WWI era were no longer issued, reflecting the change in exchange rate regimes and less globalized capital markets. Table 3 shows the amount and currency composition of new issues for this period.

The foreign bond issues of this period will not be subject to further analysis here, but we note the

⁴³The French Hypotekbank issues of 1902 through 1909 were all redeemable by drawings *or* purchase, whereas the latter option was not available in the case of the German issues prior of 1898 and earlier. Assuming that the bonds traded below par and that the government made use of the repurchase option to fulfill the redemption requirement, this might increase bond prices slightly above the market level and produce a spuriously low yield.

⁴⁴Compare the yields in Oslo, London and Paris for the years 1915 to 1920 in Tables A1 and A2 of the data appendix.

⁴⁵A similar tendency of repatriation of government bond issues can be observed in Sweden, see Franzén (1989).

⁴⁶In the modern financial market literature (see e.g. Solnik and McLeavey (2003, p. 313)) the term *foreign bond* refers to a bond issued on a local market by a foreign borrower, denominated in the local currency. A *domestic bond* is issued locally by a domestic borrower.

heavy concentration on USD loans in the 1920s.⁴⁷ The traditional links to European bond markets from the pre-war gold standard era were now severed with the sole exception of a pound sterling loan in 1921 arranged by Hambros and Barclays in London. In the 1930s several relatively small bond issues were raised on the Swedish market by the government as well as by the Hypotekbank and other state banks. A new feature is also a small government loan in Swiss francs in 1938.

The activity on domestic bond markets was significantly higher during the three decades following the outbreak of the First World War than in previous or later decades. In contrast to the international character of the pre-WWI markets Norwegian government bonds denominated in NOK were now to a large extent traded at home. Some of the pre-war multicurrency bond issues were still quoted in London in the interwar years, but amortization and repatriation of these bonds gradually dried up the markets abroad.

The outbreak of the great war thus marked the watershed as to bond market activity in Norway. Kongeriket Norges Hypotekbank continued to finance their mortgage loan business by bearer bond issues, which in contrast to the pre-war years were now almost exclusively sold at home. Other state banks also increased their bond financing activities on the home market, surpassing the Hypotekbank as to the volume of new issues from the 1930s. But, as is evident from Table 3, the government was now the largest player on the market, being particularly active in the first half of the 1920s. Many new issues were also floated in the 1930s, which contributed to sustain an active market, but much of the activity was linked to conversion operations.

A new feature of the bond market in this period is represented by the private credit enterprises. The first bearer bond series issued by these institutions were launched in 1909. The bonds were very long term, with a final maturity date linked to the maturity of the mortgage loans which the bonds financed, often more than fifty years. The amounts issued were initially quite small, but increased gradually, particularly from the second half of the 1930s.

The war years mark a very special period in the financial history of Norway. The vast amounts of money needed to finance the expenditures of the Wehrmacht were obtained directly from Norges Bank by orders from the German administration. The result was that currency held by the public and bank reserves rose dramatically.⁴⁸ The Quisling government floated a number of unprecedentedly large government loans and Treasury bills in order to stem some of the inflationary pressure. Table 3 exhibits a strong increase in new government bonds in the 1940 - 1945 period; net issues during the five war years were far higher than in the previous 25 years. New bond issues were generally

⁴⁷It may be surmised that the six relatively large loans in US dollars floated in New York between September 1920 and February 1928 were, at least in part, motivated by the decision to bring the depreciated Norwegian currency back to gold parity. Once this was achieved, on May 1 1928, borrowing in dollars ceased. The new dollar issues negotiated in 1936 and 1937 were conversions of old loans, undertaken with a view to reducing the coupon payments of the dollar debt.

⁴⁸The monetary base increased from 685 million NOK at the end of March 1940 to 4413 million in May 1945 (see chapter 5 of this volume). See Statistics Norway (1945) and Milward (1972) for an overview of various aspects of the Norwegian economy in the war years.

welcomed by the commercial and savings banks, which were in desperate need of investment opportunities because of their swelling liquid reserves. For these reasons the wartime bond market was quite active in Norway.

4.2. The bond yield data

In the early 1920s the number of government and Hypotekbank bonds quoted on the Oslo Stock Exchange increased markedly as a consequence of the enhanced new issue activity. The effective range of maturities of government bonds was broadened as well, initially mostly due to the issuance of a 5 year government bullet loan in 1920. A more general feature which permitted the computation of medium term and short yields was the fact that when the long term market interest rates fell and many bond price series consequently stayed firmly above par the effective maturity was radically shortened. In line with market conventions it is most correct to calculate the yield to the time of the first possible call date rather than the scheduled final maturity.⁴⁹ Table A3 of the appendix lists government bond yields for a range of maturities from 2 years to the very long-term category of 20 - 60 years. Similar long term yields can be found for Hypotekbank bonds and bonds issued by private credit enterprises.⁵⁰ All yield data are size-weighted averages centered at the respective maturities, using the same procedures as in the previous periods.

Figure 6 shows the monthly yields of the short and the very long end of the yield curve. The series referred to as 'short' is the shortest maturity for which yields could be calculated; from January to May 1921 this is the four year maturity, from June 1921 to March 1922 three years and two years thereafter, except in November 1939 and some months in the first half of 1940. The 'long' series is an average yield of the 20 - 60 year maturity range, which was the most active market segment in most of the period, as most new government bonds issued were in the 30 - 50 year range. In Figure 6 recession periods are shaded, using the business cycle chronology for manufacturing production in Norway presented in Klovland (1998).

The long run trend in bond market yields was definitely downwards from the early 1920s through the war years, interrupted by relative short periods of higher interest rates, which were most pronounced at the short end of the yield curve. At the beginning of the 1920s both short and long term bond yields were high, in early 1921 the long rate was above 6 per cent and short and medium term rates even above 7 per cent in April and May. The contractionary monetary policy beginning in the second half of 1923, manifested by high central bank discount rates, led to high short term bond yields until

⁴⁹It was sometimes possible to verify that this assumption was consistent with market anticipations by comparing yields on bonds having a regular final maturity date, say in two years' time, with yields on bonds having a call option two years ahead. In general the impression is that yields on such bonds were quite similar. It is also a fact that most bond issues were in fact redeemed at the first possible call date during the interwar years.

⁵⁰The bonds issued by De Norske Bykredittforeninger (originally named De Forenede Norske Kredittforeninger) form the basis for the private credit enterprise yield data in this period. Bonds issued by Norges Kreditforening for Land- og Skogbruk were included in the 1920s, but were not used after 1929 because the yields were no longer in line with the Bykreditt bonds, presumably due to a deterioration of the market's credit risk assessment of these bonds.

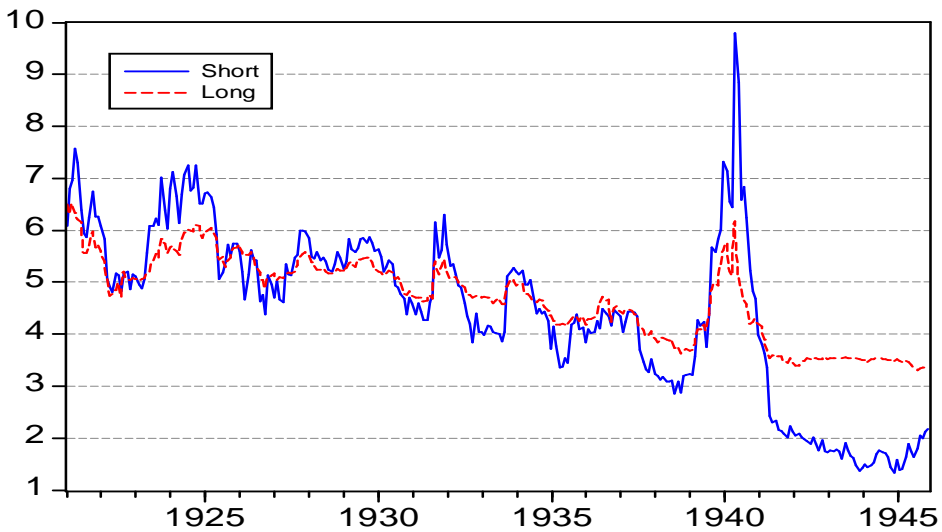


Figure 6: Yield on Norwegian government bonds January 1921 - December 1945

the winter of 1925. Reductions in discount rates, appreciation of the Norwegian currency and a business cycle recession in 1925 brought the level of market interest rates down and inverted the yield curve. During the 1920s long term government bond yields largely remained between 5 and 6 per cent.

There is a clear tendency towards falling interest rates in all recession periods throughout the inter-war years. However, this relationship is broken in September 1931 when Norway followed Britain and left the gold standard. There was a temporary increase in both short and long rates, but in a longer perspective the trend still pointed towards lower interest rates, which allowed the government and the Hypotekbank to carry on a number of conversion operations in the bond markets in the 1930s, reducing the coupon rates of their debt significantly. Domestic and foreign political events account for much of the short term cycles in the rest of the 1930s. The parliamentary election in the autumn of 1933 and the formation of the Labour government in 1935 created some nervousness on the capital markets, particularly in connection with discussions of plans for increased taxation of financial assets.⁵¹ After this the bond markets were easy until the winter of 1939, when international political events brought about a sharp turn upwards in all interest rates.

The German invasion of Norway on April 9 1940 initially created a severe blow to bond prices. The April 1940 data reflect the quotations on April 8 because the Oslo Stock Exchange was closed the following day and did not open until May 21. When the markets opened again trading was extremely

⁵¹See Rygg (1950, pp. 586-587).

thin with few bid or transactions prices which might change considerably within a few days. The yield estimates must therefore be considered as uncertain in May and June 1940. It was decided by the authorities (the Administrative Council) that *coupon* rates on all bonds should be reduced by 20 per cent as from June 1 1940 - implying that a 5 per cent bond now paid a coupon rate of 4 per cent - subject to a maximum coupon rate of 4.5 per cent and a minimum rate of 3.5 per cent. The 3.5 per cent rate became the target rate for long-term government bonds stipulated by the authorities throughout the war.⁵²

Within a short time after the war had begun excess liquidity began to accumulate in the banking sector because of the growing gap between the inflow of deposits caused by monetary expansion and the lack of demand for bank loans. Bonds were in practice the only type of interest bearing assets in which banks could invest their surplus funds. In May 1941 the yield on long term government bonds had fallen to 3.53 per cent, and it would probably have fallen much further if the government had not taken measures to prevent it from falling much below the target rate of 3.5 per cent. In December 1941 the first of six relatively large 3.5 per cent long term bond issues were floated on the market, which soaked up some of the excess liquidity. There were no direct controls of bond prices in the secondary market, but firm statements by the authorities and strict controls of the new issue market conditions ensured that the yield in the secondary market did deviate much from 3.5 per cent for long term government bonds.⁵³ A maximum of 1 per cent change in bond prices from one trading day to the next was introduced in April 1941, but on the whole the bond price quotations were considered as representative of the true market level during the war.⁵⁴

In May 1941 the government decided to introduce Treasury bills. As bank liquidity soared these securities were in great demand by the banking sector. From December 1941 the maturities offered were 2, 3, 4, 5, 6, and 9 months, in November 1942 one and two year bills were also sold. The interest rates carried by these bills ranged from 0.5 per cent for 2 month bills to 1.5 per cent for two year bills.⁵⁵ The Treasury bills were not quoted on the bourse, but we have included them in our yield curve estimates, because it helps anchoring the short end of the yield curve to a representative market level for short term government papers.⁵⁶

The development of the yield differentials of Hypotekbank and private credit enterprise bonds against

⁵²The notion of a target long term rate of 3.5 per cent was firmly established by 1942, see Statistics Norway (1945, p. 23). This source contains a useful review of the financial events in the war years.

⁵³Market commentaries in the controlled financial press typically informed the public that '[I]t has repeatedly and firmly been stated that the rate of interest now is 3.5 per cent and that the market therefore cannot or will not be allowed to fall below this level' (*Økonomisk Revue*, p. 840, no. 43-44, December 1942). The same source commented in June 1943 (p. 271, no. 23-24) that '[t]he monetary policy of the government is clear. As long as the war lasts the long term rate of interest shall be kept at 3.5 per cent, and later it will under no circumstances be a general increase in interest rates, rather a further reduction of the level of interest rates may take place.'

⁵⁴This evaluation was made after the war in the foreword to the 1945 edition of Kierulf's *Håndbok over norske obligasjoner og aksjer*.

⁵⁵The maturities offered and the discount rates were slightly altered in October 1943, see Statistics Norway (1945, p. 23).

⁵⁶The interest rates were transformed from a discount basis to an equivalent bond yield according to standard procedures, see for example Credit Suisse First Boston (1988).

government bonds show some interesting features in this period. Such yield differentials computed from data in Table A3 are shown for long term bonds (20 - 60 years) in Figure 7. Before studying this graph in more detail a word of caution is required with respect to the interpretation of short term movements in these yield differentials. The government bond market was generally the most active market, representing a broader base from which yields could be computed. The yield on private long term bonds in particular may in some periods of falling interest rates be affected by pending conversion operations, which prevented bond prices from falling much below par, thus biasing the yield estimates. It might also happen that general shocks to the demand for bonds were not immediately reflected in bid or transaction prices in the less active markets. As a consequence it is more safe to focus on trend movements in the yield differential curves, too much significance should not be attached to observations from a single month.

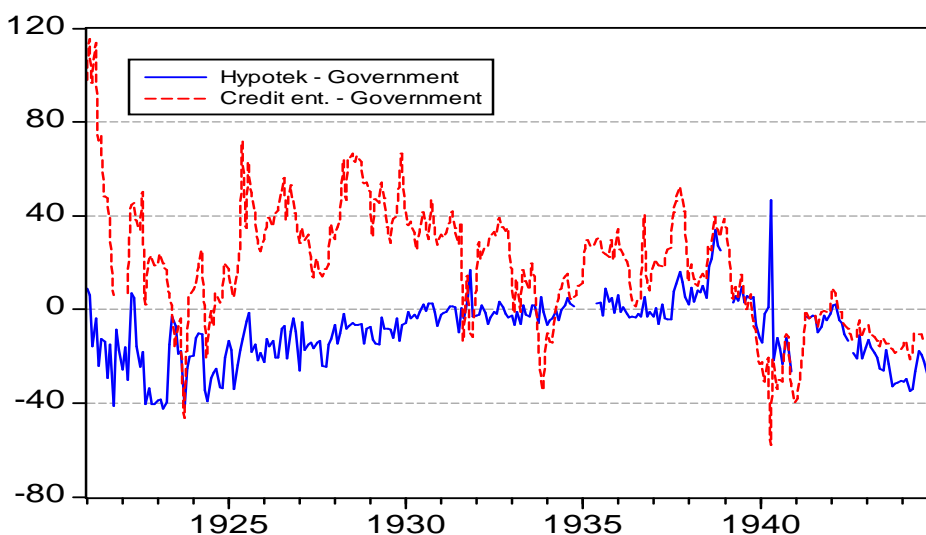


Figure 7: Yield differentials (basis points) against Norwegian government bonds January 1921 - December 1944

The broad conclusions are nevertheless evident from an inspection of Figure 7. In the 1920s the Hypotekbank bond yields were in fact lower than the government bond yields, reflected in Figure 7 as a negative yield differential. The yield gap was as high as 40 basis points in 1923, thereafter it gradually moved towards zero in the rest of the decade. Early in 1930 it had practically ceased to exist. The reasons for the negative yield gap in the 1920s are not obvious - it may reflect growing concern over the mounting government debt, which made the mortgage backed bonds issued by the Hypotekbank look relatively more attractive.⁵⁷ The apparent positive yield gap in 1938 is probably

⁵⁷Distress sales of government bonds by troubled commercial banks may also have contributed to the depression of bond prices, but whether this effect was stronger in the case of government bonds than with respect to Hypotekbank bonds is not evident.

mostly a fiction of the data, as the call provisions of the Hypotekbank bonds created a bias to the yield estimates before April 1939. The private credit enterprise bonds yielded on the average some 20 to 30 basis points more than government bonds in the 1920s and 1930s - deviations from this level during several short periods may be partly spurious.

The yield differentials in the wartime are of some historical interest. A notable feature is the fact that the bonds issued by the prewar government were somewhat higher priced than Quisling bonds of similar maturity. This might to some extent be explained by anticipations of a future reversal of the reduced coupon rate, but it also had some political overtones.⁵⁸ In a similar way we see that after early 1941 government bonds yielded more than both Hypotekbank and private bonds. Political reasons are rather evident in this case as well - the Quisling government was presumably not particularly more popular with bondholders than with the rest of the population, and the Hypotekbank was a more 'neutral' institution. This motivation was not wholly emotional, as a rational investor might feel considerable uncertainty as to the fate of the bonds issued by the Quisling government after the war was over. The ultimate disastrous effects of inflationary finance might also play a role here; market commentaries often referred to the relative buoyancy of bonds backed by mortgage loans, i.e. Hypotekbank and private credit enterprise bonds.

After the war was over in May 1945 the bond markets were still buoyant, but as there was considerable uncertainty as to the future interest policy of the reinstated Norwegian government, bond prices changed only to a moderate extent in 1945. The yields edged somewhat downwards during 1945 for some of the medium term maturities, but rose slightly for short term bonds.

5. The period 1946 - 1979: The regulated era

The reduction of the discount rate of Norges Bank from 3 to 2.5 per cent on January 9 1946 was a decisive signal to the market that the general level of interest rates was to be adjusted downwards. Early in 1946 the government launched a series of new bond issues on the market. In January a 40 year loan with a 3 per cent coupon rate and 15 year loan paying 2.5 per cent were floated with great success. The heavy oversubscription of these loans allowed the government to offer a 2.5 per cent loan with a maturity of 30 years in March 1946.⁵⁹ Although this loan was met with somewhat less enthusiasm by the market, it was now considered that the 2.5 per cent level for long term government bonds had been firmly established.⁶⁰ Later in 1946 five more 30 year loans carrying 2.5 per cent interest were issued.

⁵⁸This affected the prewar government loans with original coupon rates above 3.5 per cent, which had been reduced in June 1940. The first (rational investor) explanation can be found in *Økonomisk Revue*, p. 287, no. 25-26, June 1943. The second (politically motivated) investor theory is strongly endorsed in *Statistics Norway* (1945, p. 22). Both sources may be right.

⁵⁹Note that because of the steeply upward sloping yield curve an increase in maturity for a given coupon rate represents an easing of market conditions with respect to new issues.

⁶⁰This is the evaluation made in the preface to the 1946 edition of Kierulf's *Håndbok over norske obligasjoner og aksjer*.

The yield estimates during the transition to the new target level of interest rates in the first half of 1946 are somewhat uncertain because of the pending conversion operations of the existing prewar loans and the yet uncertain fate of the 3.5 per cent Quisling government bonds.⁶¹ Some information from the new issue market has therefore been built into the long term yield estimates in the first months of 1946, but the exact timing of the fall of the long end of the yield curve down to 2.5 per cent is difficult to pin down with certainty. A similar problem affects the bonds issued by the private credit enterprises. In Table A3 it appears that the new level of 2.5 per cent was established in May 1946 for private bonds, when new issues bearing 2.5 per cent coupons came on the market.⁶² The yield estimates in the previous months are likely to be biased upwards because of the anticipated conversions affecting the prices of the higher coupon bonds.

Figure 8 shows the most representative long government bond yield (15 - 20 years maturity through 1949 and 10 - 15 thereafter) and the short term (2 year) rate for the period from January 1946 to December 1979. The most striking feature of Figure 8 is the appearance of almost pervasive control over interest rates in this period exercised by the monetary authorities. In this period the authorities basically controlled both quantities and prices in all new issue markets. The level of interest rates was administratively fixed. In general there was upward pressure on interest rates in the markets throughout the period from 1950, to which the government yielded on several occasions, heralded by an increase in discount rates. This occurred in February 1955, September 1969, March 1974, September 1976, February 1978 and November 1979.⁶³ These discount rate increases are reflected in Figure 8 as distinct steps in the bond yield series.⁶⁴

The excess liquidity in the banking sector made it fairly easy to keep the long term bond yields at the 2.5 per cent level targeted in 1946 until the spring of 1950. At that time several factors began to exert an upward pressure on interest rates: the excess reserves of the banking sector had been significantly reduced, the Korean War created increases in consumer prices and higher interest rates elsewhere in Europe engendered expectations of a similar development in Norway.⁶⁵ The long bond yield edged above 3 per cent at the end of 1950 and rose further to 3.39 in November 1951 before falling back slightly in 1952. The government managed to stabilize the bond yields at that level in the following years, which was in line with the decision taken in 1952 to pursue a policy of low and administered interest rates.⁶⁶

⁶¹ At the end of June 1946 the coupon rates of the 3.5 loans issued by the Quisling government were changed permanently to 2.5 per cent, formally in breach of the loan contracts, as the first call dates of these loans were in 1947 and later.

⁶² Between May 1946 and December 1949 the size-weighted average private credit bond yields in Table A3 also include bonds issued by Norges Hypotekforening for Næringslivet.

⁶³ The discount rate was reduced from 5.5 per cent to 5 per cent in October 1975, but raised to 6 per cent in September 1976.

⁶⁴ The exceptions are the 1976 and 1978 discount rate changes which were not accompanied by an increase in bond yields. Instead a 1.5 percentage point rise in bond yields was permitted in December 1977, when the first steps toward a liberalized bond market were taken.

⁶⁵ A useful review of the financial events in the 1950s can be found in Statistics Norway (1965), but note that the bond yield depicted on page 305 is highly misleading because it is a mixture of a short-term yield until the autumn of 1950 and long-term thereafter, see Klovland (1976).

⁶⁶ See Hanisch, Søylen and Ecklund (1999, pp. 183-187) for a survey of the contemporary discussion of monetary policy

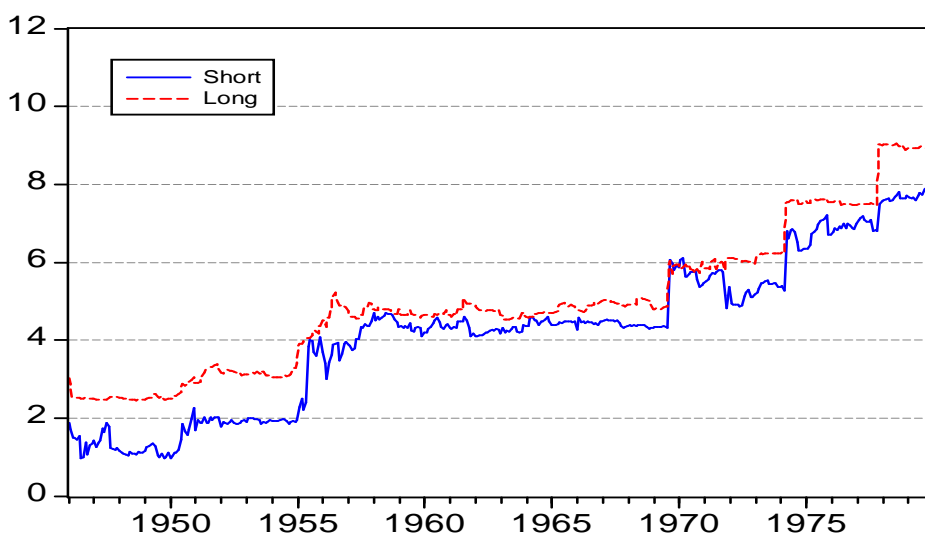


Figure 8: Yield on Norwegian government bonds January 1946 - December 1979

The government bond yield data of Table A3 are as far as possible based on bonds redeemable by drawings only. The new government bonds issued from 1946 to 1950 were also redeemable by purchase, but beginning with the 2.5 per cent issue of 1952 this option was no longer present, presumably intended as a slight concession to the market. From the mid 1950s the purchase option began to exercise an increasing upward pressure on the prices of these bonds, which resulted in their yields no longer being representative of the true market yield, and these issues were consequently no longer included in our sample.⁶⁷

Because of the limited number of government bonds traded on the Oslo Stock Exchange the bonds issued by state banks and state owned companies that were fully guaranteed by the government were included in the sample beginning in January 1960. A regression equation was run for each monthly sample in which the yield of the individual bonds was regressed on terms including the time to maturity (average life) and a set of dummy variables taking on the value of unity for each bond category except government bonds.⁶⁸ This equation gave a monthly series of estimates of the yield differential against government bonds for state bank and other bonds with government

and the control measures taken.

⁶⁷This feature of the bond market was noted by Schilbred (1972).

⁶⁸The regression format is a simplified version of the Nelson-Siegel model adopted by Svensson (1995). Let R be the yield, m the average life and D a vector of dummy variables representing bond categories. The regression equation is specified as

$$R_i = \beta_0 + \beta_1 \exp(-m_i) + \beta_2 \cdot [1 - \exp(-m_i)]/m_i + \gamma D_i$$

Please note that the yield curve estimates are *not* derived from this model. The sole purpose is to estimate the γ coefficient, representing the average yield differential against government bonds. Experiments with adding coupon rate terms to the equation were done but the results were considered to be more robust without these terms.

guarantees. Typically this yield difference was about 20 to 30 basis points. Before applying the procedure used in estimating the size-weighted average yield for each maturity the estimated yield gap was subtracted from the non-government bond yields. Thus an implicit assumption here is that there is a liquidity or risk premium on non-government bonds that is constant along the yield curve and that the term structure of the non-government bonds is the same as for government bonds except for this constant risk premium. This is not obviously true, and may introduce a bias here, but there is a tradeoff between ‘purity’ (using only government bonds) and spanning the whole maturity range with a sufficient number of observations. If the sample had been restricted to government bonds only the yield estimates would have spanned a smaller portion of the yield curve during some periods.⁶⁹

The rise in the long interest rate following the discount rate rise in February 1955 may have gone further than desired by the government, as it passed the 5 per cent level in the summer of 1956. From early 1957 to September 1969 the long-term interest rate was kept in a narrow range between 4.5 and 5 per cent. During this period a number of new control measures and legislation were introduced with a view to ensure full control over all aspects of the bond markets.⁷⁰ The 1960s and 1970s constitute a period of low bond market activity on the Oslo Stock Exchange. Commercial and savings banks were enforced to purchase bonds through annual ‘agreements’ with the authorities; from 1965 new legislation formalized such measures by stipulating that a certain percentage of the increase in bank assets were to be invested in bonds. The new issue market was closely regulated by the authorities, while it might seem as if the secondary market on the stock exchange was subject to hostile neglect. Many bond issues were placed directly with financial institutions and never quoted on Oslo Stock Exchange. In January 1978 there were six government bond issues on the A-list, of which five were issued by the Quisling government during WWII. Seven more government bonds could be found on the B-list, which were traded twice weekly.

Although trading on the bond markets as a whole was at a low level this period nevertheless saw some interesting developments with regard to private bonds. The expansion of the activities of the credit enterprises were severely restricted by quotas set by the authorities regarding their bond finance, but these institutions consolidated their importance during this period.⁷¹ Yield data for credit enterprises are presented in Table A3. In principle these are size-weighted averages of all credit enterprises, but some of the early low coupon bond issues have been excluded from the sample.⁷²

Subject to government approval some industrial companies were allowed to issue bonds, often re-

⁶⁹Three month Treasury bills were used in the same way as in the years 1941 - 1945 to determine the very short end of the yield curve. The bill market became inactive and the yield on Treasury bills was well below market levels after the war but this hardly affects the estimated yield on bonds with two year of average life, which is the shortest maturity reported here.

⁷⁰See Hanisch et al. (1999).

⁷¹See for example Strømme Svendsen (1984).

⁷²By January 1979 this category includes bonds issued by De Norske Bykredittforeninger, Den Norske Hypotekforening for 2. prioritets pantelån, Eksporthfinans, Norges Hypotekforening for Næringslivet, Næringskreditt, Sparebankenes Kredittselskap, Norges Skibhypotekforening, Norsk Skibs Hypotekbank and Redernes Skibskredittforening. In this month there are 114 yield observations from which the yield data are computed.

ferred to as ‘paragraph 15 bonds’. Within a monetary policy regime of credit rationing this form of long term finance was considered as attractive. Bond finance was only granted for purposes that were favoured by the authorities, mostly export oriented manufacturing companies or projects associated with electricity supply.

Long term bond yields have also been estimated for industrial companies. These data begin in 1960. Because credit ratings may differ considerably between industrial companies a difficult decision is which bonds to include in the sample. Bond yields that were significantly above the average yield were evaluated and possibly excluded from the sample. This affected for example several paper mills in the late 1960s and early 1970s as well as a number of individual cases throughout the period. It is difficult to make a yield series of private bonds that is perfectly homogenous over time, as some credit risk will nearly always be attached to private companies, but the most obvious extreme observations have been removed from the sample. The private credit and industrial bond yield data are printed in Table A3 for the most active maturity ranges, which were from 5 years and upwards.

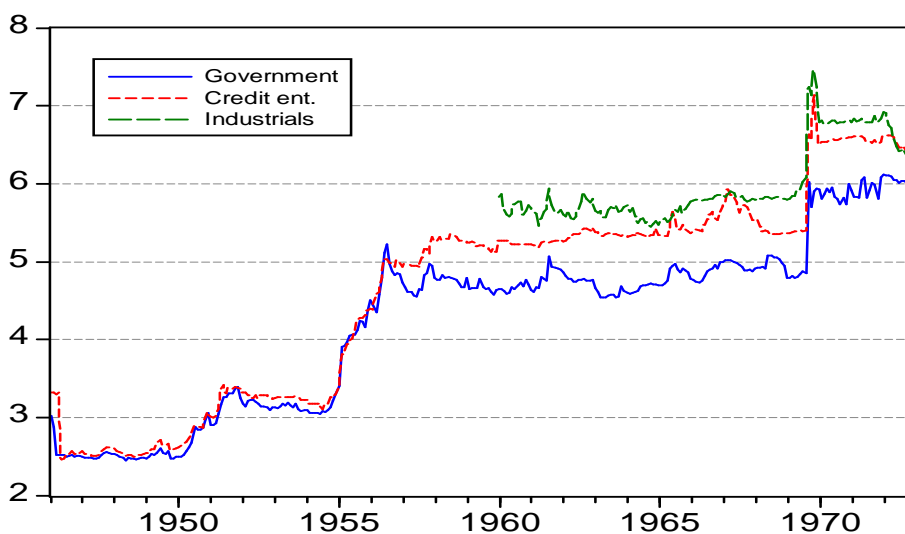


Figure 9: Yield on long-term Norwegian government and private bonds January 1946 - December 1979

Figure 9 shows the long term (more than 10 years) yields on government and credit enterprise bonds. Also shown is the 5 year yield on private industrial bonds. The credit enterprise bond yields were very close to government bond yields in the first ten years of the postwar period, but as from the mid-1950s we see a yield gap emerging. In the 1960s this gap typically was about 60 to 80 basis points, sometimes rather lower in the 1970s. There was no public concern over the solidity of the credit enterprises in this period, in contrast to the 1990s, and these bonds were generally more actively

traded than government bonds, so that such a risk premium may perhaps seem to be on the high side. Although still below a hypothetical free market level the yield on credit bonds may have been closer to such a level than government bonds. The yield on private industrial bonds are mostly slightly above the credit bonds until the mid-1970s, when the reverse situation emerges. It must be borne in mind that the former are 5 year bonds, which would require a lower yield than long-term bonds with 10 years to maturity or more, given the steeply upwards sloping yield curve in this period.

6. The period 1980 - 2003: The normalized bond markets

Following the publication of the report of a public commission on monetary policy in 1980 (NOU 1980:4 (1980)), a general deregulation process of credit markets was initiated. The bond market was leading the way in this respect. The two main pillars of the tight regulation system, the strict control of new issues (with respect to both quantity and price) and the bond investment requirement that was enforced on financial intermediaries were both dismantled in several steps during the first years of the 1980s.⁷³ The commercial and savings banks were permitted to float bond issues with increasingly longer maturities. By the end of the decade the bond market was essentially freed from the strict control measures that it had been subject to for the past fifty years - a belated return to normality.

The monetary authorities' attitude to trading in the secondary markets changed radically as well. In 1984 Norges Bank began to operate as a market maker in the government bond market. The responsibility for quoting prices in the government bond market was transferred to a limited number of primary dealers in 1995.⁷⁴ A further boost to market liquidity was introduced in 1991 by the decision to concentrate the government's borrowing to a few relatively large benchmark loans.⁷⁵ These measures increased the liquidity of the Norwegian government bond market. Since the mid-1980s the Norwegian government's domestic borrowing requirement has been small as a consequence of the Treasury's strong financial position, so the size of the market is still modest by international standards.⁷⁶

The liberalization of bond markets also created opportunities for a significant expansion of the activities of the private credit enterprises. The 1980s witnessed a plethora of new bond issues by these institutions and by private industrial companies. In the mid-1980s there are more than 200 different credit enterprise bond issues quoted in our sample and 70 to 100 private industrial issues. Most issues were rather small, which resulted in infrequent trading, with only bid prices being available. During the business cycle downturn starting in the late 1980s it turned out that the rapidly expanding loan portfolios of the private credit enterprises concealed a large number of bad loans, which even-

⁷³See NOU 1989:1 (1989, pp. 76-82) for details.

⁷⁴Winje (1995).

⁷⁵Prøsch (1992, 1994).

⁷⁶For a description of government bond markets in recent years see Søvik (1998) and Hein (2003).

tually led to the failure or restructuring of several leading bond-issuing credit enterprises. As the very high interest rates of the late 1980s receded somewhat, many bond issues were called, because the majority of issues had call options after one to three years, occasionally five years or more. In line with the development in the government bond market the reduced quantity of new bonds sold was concentrated to much larger issues. From 1990 the number of private bonds actively quoted on the Stock Exchange diminished significantly, to somewhat above 20 credit enterprise issues and 10 industrials towards the end of the decade.⁷⁷

The yield data have been constructed much along the same principles as for the previous period. The Treasury bill market was revitalized in February 1985, which provided useful information on the short end of the yield curve.⁷⁸ In the 1980s, particularly in the first half of the decade, there were periods of great uncertainty in many respects in the bond markets, both with respect to the pace and extent of the liberalization process and the direction of interest rate changes.⁷⁹ For government bonds prior to January 1984 and for much of the decade for private bond issues it is a fact that the quoted bid prices did not always adjust immediately to a market clearing level. This applies in particular to small issues and those long-term issues that had reached the final stages of their life.⁸⁰ But since our yield curve estimates are size-weighted such issues usually constitute only a small fraction of our effective samples. In general the yield curve estimates are considered to give a fair estimate of the true market level of interest rates but any use of these data for detailed month-to-month comparisons or for econometric purposes should bear in mind the imperfections of the bond markets in this period.

Bonds issued by private credit enterprises and private companies that experienced severe problems with their credit ratings were excluded from the sample. This applies in particular to some of the largest credit enterprises in the early 1990s.⁸¹ As discussed above for the previous period the industrial firms are much less homogenous with respect to credit risk, and our sample necessarily represent some average quality which may vary over time. Cases of soaring yields on bonds issued by private companies were excluded if it was felt that it reflected a significant downgrading of credit rating by the market.

Figure 10 shows the yield on short (2 years) and the longest actively traded maturity in the gov-

⁷⁷After early 1990 the bid prices of the many small old issues were no longer maintained, only the most actively traded issues were cared for by the market makers.

⁷⁸The market was not particularly well-functioning until 1993, but the prices quoted were probably roughly in line with market conditions.

⁷⁹For a description of the bond market in the early deregulation period see Rostoft (1984).

⁸⁰A lower size limit was applied to different categories of bonds with respect to inclusion in the sample. In the case of government bonds no issue with an outstanding amount of less than NOK 10 million was included. For bonds with less than one year remaining the limits were set much higher, for example NOK 100 million for non-bullet issues, which weeded out many of the most illiquid maturing issues.

⁸¹No bonds issued by Den Norske Hypotekforening were included after March 1990, when this company went out of business. Also excluded were the bonds issued by De Norske Bykredittforeninger and Realkreditt in 1991 as well as Vestenfjelske Bykredittforening between August 1992 and January 1995.

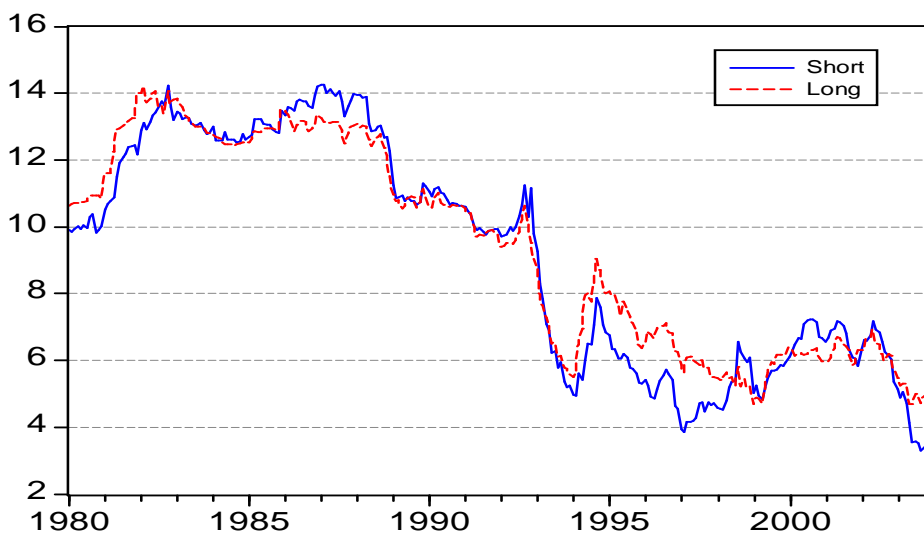


Figure 10: Yield on Norwegian government bonds January 1980 - December 2003

ernment market. Since the early 1990s the policy has been to provide the market with a 10-year benchmark bond, but as a closer inspection of the data in the appendix will show, the longest maturity quoted on the market was less than 10 years during some short periods. The figure portrays the rather dramatic interest rate development of the 1980s and the 1990s - the 10-year yield falling from a true all-time high of 14.07 in October 1982 to a more normal level in the 4 to 7 per cent range from late 1993.

In Figure 11 the 5-year yields of government, credit enterprise and industrial bonds are shown. The yield differentials between government and private bonds vary somewhat over time, as theory and empirical evidence from other countries would suggest. An interesting application of these data might be the use of such yield differentials, serving as an indicator of the market assessment of credit risk, in business cycle analysis, particularly with a view to forecast recessions.⁸² A caveat here is necessary, however, concerning the use of these data in the period when banks were subject to primary reserve requirements, which was the case until September 1987. Investment in private bonds were then less attractive to banks than investment in government bonds because the latter was exempted from the base to which the reserve requirements were applied. Changes in yield differentials may therefore partly reflect regulatory changes in addition to credit risk.

⁸²See for example Duca (1999).

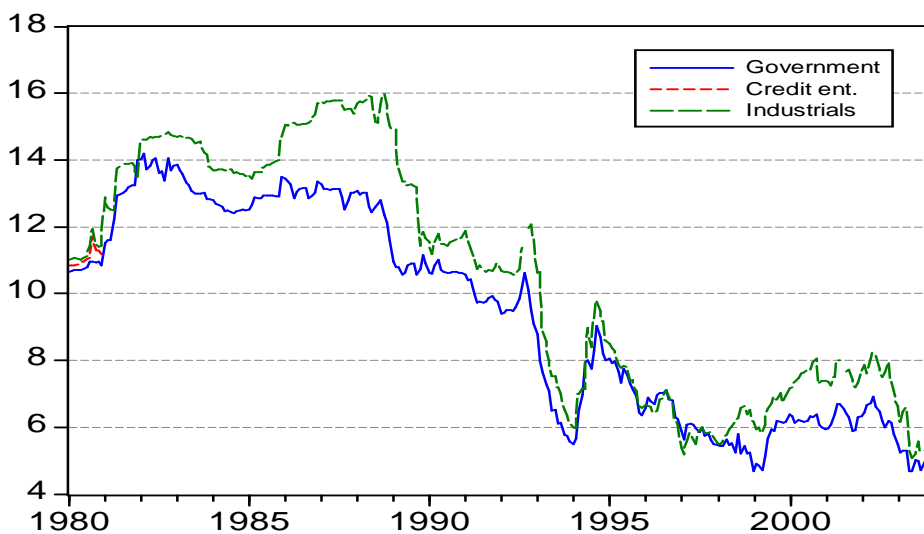


Figure 11: Yield on 5-year Norwegian government and private bonds January 1980 - December 2003

7. A long view of the real rate of interest in Norway

What is the ‘normal’ level of the real rate of interest? There is no single correct answer to this question, but one way of approaching it is to compute an average of real interest rates over long time periods. We exploit the material derived here to produce a 152 year series of long-run real interest rate from 1852 to 2003, using the yield on Hypotekbank bonds before 1915 and the long-run domestic government bond yield thereafter (see above for actual maturities used in each subperiod). The inflation rate is computed from the consumer price data presented in Chapter 3 in this book.

Two variants of the resulting real interest rate series are presented in Figure 12. The actual real rate is calculated by subtracting the annual rate of inflation from the nominal interest rate. A smoother series is obtained by taking the average inflation rate over the past five years.

The average real interest rate over the 152-year period is 2.8 per cent. As is evident from Figure 11 there are many short cycles as well as long run swings in the real rate. The pre-WWI period from 1852 to 1914 is characterized by many short cycles but a relatively stable long run level. The average is 4.1 per cent (using the 5-year average of inflation hereafter).

The positive (higher than expected) inflation surprises during WWI and the negative ones after the war stand out clearly in the figure, causing strongly negative real rates from 1916 to 1920 and real rates close to or even in excess of 10 per cent in the years from 1925 to 1932. The period from 1915 to 1945 as a whole gives an average of 1.7 per cent.

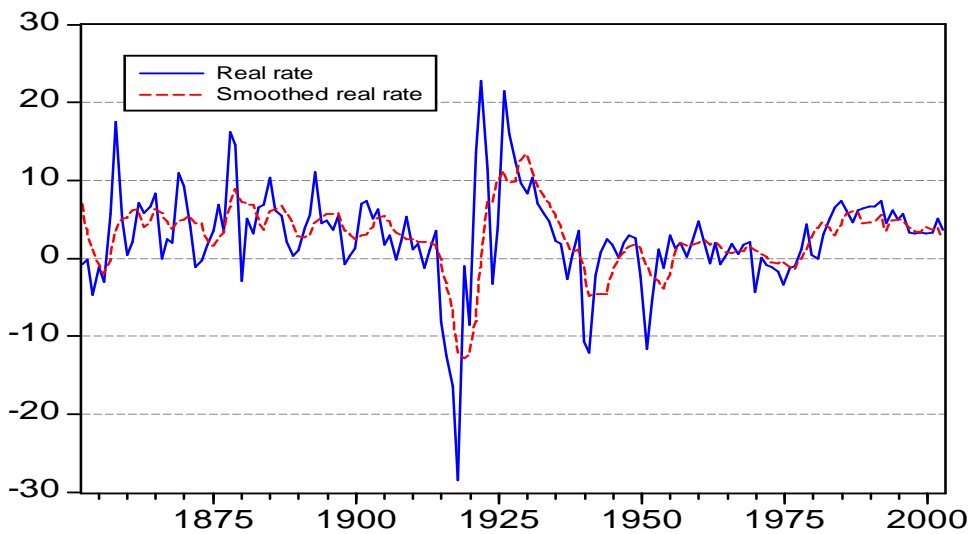


Figure 12: The long-term real interest rate 1852 - 2003

In the postwar years from 1946 to 1980 real rates were often close to zero, making the average only 0.4 per cent. The tightly regulated bond markets in Norway in this period may have contributed to a particularly low rate in this country, but low real interest rates in these years are to a large extent an international feature.⁸³

The return to normality after 1980 is also reflected in the real rate, which is 4.3 per cent on the average. This is not far from the 4.1 per cent average of the 1852 - 1914 period. Within a longer run perspective on globalization and capital market behaviour it is perhaps no coincidence that the two periods produce so similar results. The rich empirical evidence presented in Obstfeld and Taylor (2004) suggests that the pre-WWI decades, and the period of the classical gold standard from 1880 to 1914 in particular, were the years which most closely resemble the most recent decades with respect to capital mobility and market integration. This is also a forceful argument for the usefulness of studying the behaviour of money and capital markets in a longer run historical perspective - there are lessons to be learnt from the history of the nineteenth century that never could be entangled from the quagmire of highly regulated financial markets of the more recent past.

⁸³Chadha and Dimsdale (1999).

Table 3. New bond issues 1915 - 1945
Domestic and foreign issues in millions of NOK.

	1915 -1919	1920 -1924	1925 -1929	1930 -1934	1935 -1939	1940 -1945
Norwegian government						
NOK gross issues	225	625	258	515	628	1950
called loans	0	0	145	435	383	0
NOK net issues	225	625	113	80	245	1950
USD gross issues	18	529	283	0	312	0
called loans	0	0	0	0	312	0
USD net issues	18	529	283	0	0	0
other foreign	0	73	0	0	86	0
Kongeriket Norges Hypotekbank						
NOK gross issues	46	113	147	110	210	150
called loans	0	0	0	56	295	172
NOK net issues	46	113	147	54	-85	-22
foreign issues	0	0	0	0	57	0
Other state banks						
NOK gross issues	20	77	99	178	221	243
called loans	0	0	11		84	122
NOK net issues	20	77	88	178	137	121
foreign issues	0	0	48	61	67	
Private credit enterprises						
NOK net issues	16	22	44	69	152	61

SOURCES: Derived from information on the size of individual loan issues in various volumes of Kierulf's *håndbok over norske obligasjoner og aksjer 1920 - 1946*.

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A. Technical appendix: The data and the yield estimates

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1820													
Berlin					7.16								7.16 *
Hamburg					7.51								7.51 *
1821													
1822													
Berlin			6.41	6.40	6.54	6.46	6.44	6.34	6.31	6.19	6.09	6.35	6.35 *
Hamburg			6.37					6.34		6.32		6.60	6.41 *
1823													
Berlin	6.33	6.36	6.33	6.52	6.52	6.43	6.31	6.28	6.22	6.18	6.18	6.11	6.31
Hamburg	6.65	6.26		6.82	6.75	6.73	6.57	6.53	6.44	6.43	6.43	6.33	6.54 *
1824													
Berlin	5.74	5.03	4.83	5.02									5.16 *
Hamburg	6.19	5.61	5.01										5.60 *
Copenhagen		5.45	5.08	5.15	5.21	5.28	5.42	5.34	5.41	5.29	5.32	5.20	5.29 *
1825													
Berlin	5.33												5.33 *
Hamburg	5.33	5.28	5.32										5.31 *
Copenhagen	5.17	5.24	5.20	4.89	4.92	4.89	4.87	4.95	4.95	5.20	5.50	5.87	5.14
1826													
Copenhagen	5.91	5.71	6.12	5.84	5.88	5.61	5.48	5.52	5.52	5.36	5.28	5.28	5.63
1827													
Copenhagen	5.01	5.01	5.06	5.12	5.07	4.94	4.72	4.58	4.41	4.42	4.46	4.37	4.77
1828													
Copenhagen	4.38	4.28	4.42	4.43	4.33	4.38	4.36	4.39	4.40	4.46	4.49	4.46	4.40
1829													
Copenhagen	4.42	4.41	4.34	4.37	4.44	4.51	4.47	4.48	4.44	4.27	4.21	4.06	4.37
1830													
Copenhagen	4.06	4.06	4.04	4.04	3.99	3.99	3.97	3.97	4.15	4.15	4.15	4.34	4.08
1831													
Copenhagen	4.25	4.22	4.25	4.27	4.27	4.25	4.09	4.11	4.08	4.09	4.08	4.13	4.17
1832													
Copenhagen	4.06	4.06	4.09	4.09	4.06	4.06	4.11	4.26	4.31	4.18	4.16	4.23	4.14
1833													
Copenhagen	4.18	4.13	4.09	4.09	4.06	4.06	4.11	4.09	4.06	4.06	4.06	4.06	4.09
1834													
Copenhagen	4.06	4.01	4.01	3.99	4.01	4.15	4.06	4.06	4.06	4.03	3.95	3.92	4.03
1835													
Copenhagen	3.89	3.85	3.84	3.84	3.80	3.84	3.87	3.87	3.87	3.95	3.95	3.87	3.87
1836													
Hamburg		3.81	3.81	3.81	3.81	3.81	3.81	3.72	3.72	3.72	3.67	3.89	3.78 *
Copenhagen	3.87	3.87	3.87	3.87	3.86	3.93	3.86	3.86	3.80	3.87	3.87	3.85	3.86
1837													
Hamburg	3.88	3.88	3.88	3.88	3.75	3.79	3.79	3.83	3.83	3.80	3.80	3.80	3.83
Copenhagen	3.84	3.75	3.75	3.75	3.75	3.79	3.83	3.88	3.83	3.83	3.83	3.78	3.80
1838													

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Hamburg	3.75	3.75	3.77	3.77	3.77	3.77	3.77	3.76	3.76	3.76	3.76	3.76	3.76
Copenhagen	3.78	3.77	3.77	3.77	3.82	3.77	3.77	3.76	3.81	3.81	3.81	3.81	3.79
1839													
Hamburg	3.75	3.65	3.65	3.64	3.74	3.79	3.90	3.90	3.90	3.90	3.89	4.06	3.81
Copenhagen	3.80	3.80	3.80	3.80	3.80	3.79	3.79	3.79	3.79	3.79	3.78		3.79 *
1840													
Hamburg	3.83	3.61	3.61	3.60	3.59	3.60	3.59	3.58					3.63 *
Copenhagen	3.83	3.72	3.72	3.71	3.71	3.77	3.76	3.76	3.76	3.82	3.88	3.75	3.77
1841													
Copenhagen	3.75	3.62	3.62	3.68	3.67	3.67	3.67	3.66	3.73	3.79	3.78	3.72	3.70
1842													
Hamburg					4.33								4.33 *
Copenhagen	3.78	3.78	3.78	3.92	4.07	4.06					4.07	4.06	3.94 *
1843													
1844													
1845													
Copenhagen											4.06	4.06	4.06 *
1846													
Copenhagen	4.06	4.06	4.06	4.06	4.11	4.06	4.06	4.11	4.06	4.26	4.25	4.06	4.10
1847													
Copenhagen	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06
1848													
Hamburg										4.56	4.51	4.51	4.53 *
Copenhagen	4.06	4.06	4.17									4.54	4.21 *
1849													
Hamburg	4.42	4.33	4.33	4.28	4.22	4.15	4.10	4.13	4.13	4.10	4.11	4.15	4.20
Copenhagen	4.56	4.42	4.56	4.42	4.28	4.15	4.15	4.15	4.15	4.15	4.15	4.20	4.28
1850													
Hamburg	4.15	4.11	4.13	4.08	4.08	4.08	4.06	4.06	4.06	4.06	4.06	4.06	4.08
Copenhagen	4.20	4.15	4.15	4.11	4.29	4.24	4.20	4.15	4.15	4.13			4.18 *
1851													
Hamburg	3.85	3.87	3.86	4.04	4.06	4.06	4.06	4.11	4.11	4.11	4.20	4.28	4.05
Copenhagen	4.01					4.06			4.16	4.20			4.11 *
1852													
Hamburg	4.25	4.27	4.27	4.25	4.27	4.25	4.15	4.18	4.13	4.15	4.16	4.16	4.21
Copenhagen					4.35								4.35 *
1853													
Hamburg	4.06	4.04	4.04	4.01	4.04	4.06	4.06	4.06	4.09	4.28	4.18	4.23	4.10
1854													
Oslo					4.30					4.35			4.32 *
Hamburg	4.18	4.81	4.68	4.36	4.29	4.36	4.26	4.24	4.29	4.31	4.24	4.29	4.36
1855													
Hamburg	4.26	4.24	4.19	4.14	4.16	4.11	4.06	4.09	4.06	4.09	4.24	4.30	4.16
1856													
Hamburg	4.30	4.27	4.30	4.35	4.49	4.50	4.44	4.33	4.42	4.41	4.42	4.42	4.39
1857													
Hamburg	4.33	4.42	4.42	4.28	4.31	4.31	4.45	4.66	4.49	4.66	5.16	5.01	4.54

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1858													
Hamburg	4.58	4.67	4.74	4.64	4.56	4.62	4.67	4.68	4.71	4.73	4.73	4.77	4.68
1859													
Hamburg	4.73	4.72	4.66	4.68	4.81	4.87	4.63	4.63	4.59	4.63	4.66	4.62	4.69
1860													
Hamburg	4.52	4.51	4.48	4.52	4.51	4.51	4.47	4.50	4.50	4.45	4.47	4.47	4.49
1861													
Hamburg	4.47	4.46	4.46	4.46	4.48	4.48	4.47	4.50	4.46	4.44	4.45	4.54	4.47
1862													
Hamburg	4.53	4.47	4.48	4.47	4.48	4.57	4.45	4.43	4.41	4.51	4.51	4.50	4.48
1863													
Hamburg	4.46	4.48	4.48	4.55	4.53	4.55	4.50	4.57	4.60	4.65	4.69	4.97	4.59
1864													
Hamburg	4.84	4.80	4.86	4.91	4.93	4.93	4.91	4.96	4.97	5.10	4.99	5.05	4.94
1865													
Hamburg	5.08	5.08	5.11	5.10	5.10	5.12	5.10	5.10	5.11	5.23	5.21	5.22	5.13
1866													
Hamburg	5.21	5.22	5.24	5.27	5.36	5.61	5.25	5.30	5.28	5.34	5.32	5.32	5.31
1867													
Hamburg	5.28	5.29	5.29	5.36	5.27	5.25	5.10	5.15	5.21	5.22	5.16	5.17	5.23
Copenhagen				5.27	5.14	5.17	5.11	5.08					5.15 *
1868													
Hamburg	5.13	5.13	5.14	5.12	5.11	5.10	5.05	5.08	5.05	5.06	5.06	5.07	5.09
1869													
Hamburg	5.09	5.09	5.09	5.10	5.36	5.40	5.26	5.28	5.37	5.37	5.31	5.28	5.25
1870													
Hamburg	5.21	5.24	5.32	5.35	5.33	5.33	5.88	5.67	5.47	5.24	5.27	5.32	5.39
1871													
Hamburg	5.17	5.19	5.19	5.20	5.19	5.07	4.91	4.85	4.82	4.82	4.82	4.69	4.99
1872													
Hamburg	4.62	4.68	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.63
1873													
Hamburg	4.62	4.66	4.73	4.78	4.77	4.77	4.69	4.69	4.73	4.66	4.74	4.70	4.71
Copenhagen	4.62					4.70	4.62	4.59			4.74	4.63	4.65 *
1874													
Hamburg	4.62	4.59	4.55	4.55	4.55	4.63	4.59	4.60	4.60	4.62	4.59	4.59	4.59
Copenhagen		4.41	4.59	4.55	4.55	4.67	4.55	4.59	4.63	4.71	4.71	4.71	4.61 *
1875													
Hamburg	4.61	4.61	4.61	4.61	4.61	4.61	4.62	4.61	4.63	4.65	4.66	4.63	4.62
Copenhagen		4.67											4.67 *
1876													
Hamburg	4.71	4.71	4.71	4.75	4.74	4.75	4.75	4.74	4.75	4.76	4.75	4.76	4.74
London												4.79	4.79 *
1877													
Hamburg	4.75	4.75	4.73	4.75	4.76	4.76	4.74	4.74	4.77	4.78	4.79	4.78	4.76
London	4.79	4.75	4.77	4.85	4.86	4.79	4.79	4.82	4.80	4.77	4.77	4.83	4.80
1878													

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Hamburg	4.80	4.80	4.80	4.81	4.82	4.82	4.80	4.79	4.79	4.82	4.81	4.80	4.81
London	4.82	4.81	4.80	4.86	4.86	4.86	4.78	4.84	4.85	4.92	4.88	4.94	4.85
1879													
Hamburg	4.79	4.78	4.70	4.59	4.57	4.57	4.53	4.54	4.56	4.55	4.54	4.52	4.61
London	4.82	4.82	4.74	4.65	4.56	4.60	4.49	4.52	4.53	4.52	4.53	4.45	4.60
1880													
Hamburg	4.40	4.34	4.39	4.31	4.31	4.30	4.27	4.26	4.29	4.29	4.28	4.27	4.31
London	4.32	4.29	4.43	4.45	4.41	4.29	4.27	4.27	4.30	4.29	4.29	4.27	4.32
1881													
Oslo			4.33	4.33	4.23	4.23	4.23	4.23	4.23				4.26 *
Hamburg	4.16	4.17	4.16	4.15	4.08	4.05	4.04	4.09	4.09	4.06	4.06	4.07	4.10
London	4.22	4.18	4.20	4.17	4.09	4.06	4.05	4.06	4.08	4.09	4.01	4.08	4.11
1882													
Hamburg	4.11	4.10	4.09	4.09	4.08	4.07	4.09	4.10	4.11	4.14	4.14	4.14	4.10
London	4.09	4.06	4.10	4.05	4.06	4.03	4.05	4.09	4.13	4.14	4.16	4.20	4.10
1883													
Hamburg	4.17	4.15	4.15	4.10	4.09	4.08	4.09	4.09	4.11	4.11	4.14	4.13	4.12
London	4.19	4.06	4.03	4.05	4.11	4.08	4.10	4.09	4.13	4.12	4.16	4.13	4.10
1884													
Hamburg	4.12	4.11	4.10	4.11	4.06	4.06	4.06	4.07	4.07	4.08	4.06	4.06	4.08
London	4.10	4.09	4.08	4.07	4.06	4.10	4.10	4.06	4.03	3.99	4.01	3.97	4.06
1885													
Oslo												4.09	4.09 *
Hamburg	4.05	4.02	4.00	4.08	4.04	4.01	4.00	3.98	3.99	3.99	4.01	4.00	4.01
London	3.99	4.01	4.00	4.05	3.95	3.91	3.93	3.95	3.97	3.93	3.95	3.97	3.97
1886													
Oslo	4.09	4.04	4.04	4.04	4.04	3.98	3.98	3.98	3.98	3.98	3.98	3.98	4.01
Hamburg	3.97	3.94	3.94	3.89	3.89	3.87	3.85	3.87	3.91	3.86	3.85	3.87	3.89
London	3.93	3.89	3.91	3.87	3.86	3.79	3.75	3.80	3.79	3.81	3.83	3.91	3.85
1887													
Oslo	3.61	3.62	3.63	3.63	3.61	3.61	3.61	3.61	3.61	3.61	3.64	3.63	3.62
Hamburg	3.91	3.92	3.87	3.84	3.89	3.86	3.87	3.88	3.88	3.87	3.88	3.88	3.88
London	3.93	3.95	3.91	3.81	3.66	3.67	3.68	3.70	3.71	3.72	3.66	3.67	3.76
Paris		3.70	3.69	3.65	3.63	3.63	3.64	3.66	3.66	3.64	3.64	3.60	3.65 *
1888													
Oslo	3.63	3.61	3.58	3.58	3.58	3.58	3.58	3.44	3.43	3.44	3.44	3.44	3.53
Hamburg	3.86	3.87	3.87	3.83	3.84	3.83	3.45	3.46	3.48	3.49	3.50	3.50	3.66
London	3.64	3.62	3.57	3.56	3.54	3.53	3.53	3.54	3.50	3.51	3.48	3.49	3.54
Paris	3.59	3.59	3.57	3.56	3.51	3.52	3.52	3.55	3.35	3.54	3.52	3.56	3.53
1889													
Oslo	3.43	3.43	3.45	3.46	3.41	3.38	3.39	3.39	3.40	3.41	3.43	3.43	3.41
Hamburg	3.49	3.49	3.49	3.45	3.41	3.44	3.42	3.43	3.42	3.44	3.47	3.46	3.45
London	3.46	3.49	3.52	3.47	3.40	3.41	3.38	3.41	3.42	3.47	3.44	3.41	3.44
Paris	3.56	3.56	3.54	3.52	3.30	3.41	3.38	3.41	3.42	3.41	3.44	3.45	3.45
1890													
Oslo	3.41	3.39	3.42	3.42	3.43	3.43	3.43	3.47	3.44	3.48	3.48	3.50	3.44
Hamburg	3.44	3.45	3.45	3.45	3.45	3.46	3.45	3.45	3.47	3.52	3.52	3.56	3.47

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
London	3.42	3.45	3.42	3.43	3.40	3.41	3.42	3.45	3.46	3.49	3.55	3.51	3.45
Paris	3.42	3.43	3.40	3.42	3.42	3.41	3.38	3.40	3.38	3.43	3.48	3.48	3.42
1891													
Oslo	3.50	3.46	3.50	3.50	3.53	3.57	3.57	3.57	3.62	3.66	3.71	3.71	3.57
Hamburg	3.48	3.51	3.49	3.59	3.61	3.63	3.63	3.63	3.63	3.71	3.74	3.70	3.61
London	3.44	3.49	3.50	3.51	3.64	3.63	3.59	3.54	3.55	3.65	3.66	3.65	3.57
Paris	3.46	3.46	3.47	3.51	3.57	3.58	3.55	3.51	3.55	3.61	3.70	3.66	3.55
1892													
Oslo	3.71	3.66	3.66	3.66	3.71	3.59	3.53	3.53	3.53	3.53	3.56	3.60	3.61
Hamburg	3.66	3.67	3.67	3.65	3.58	3.53	3.50	3.51	3.54	3.49	3.51	3.55	3.57
London	3.59	3.63	3.68	3.65	3.57	3.54	3.46	3.49	3.51	3.52	3.53	3.50	3.56
Paris	3.60	3.65	3.63	3.64	3.57	3.46	3.43	3.44	3.50	3.49	3.50	3.50	3.53
1893													
Oslo	3.46	3.44	3.44	3.44	3.51	3.57	3.57	3.57	3.71	3.69	3.69	3.67	3.57
Hamburg	3.42	3.44	3.45	3.46	3.46	3.52	3.54	3.62	3.68	3.67	3.67	3.62	3.55
London	3.42	3.41	3.46	3.47	3.51	3.50	3.55	3.56	3.62	3.63	3.60	3.61	3.53
Paris	3.42	3.40	3.47	3.48	3.47	3.46	3.51	3.63	3.64	3.62	3.58	3.52	3.52
1894													
Oslo	3.59	3.53	3.53	3.53	3.53	3.51	3.51	3.47	3.45	3.42	3.32	3.28	3.47
Hamburg	3.49	3.50	3.50	3.50	3.49	3.45	3.47	3.43	3.37	3.36	3.27	3.24	3.42
London	3.57	3.50	3.51	3.48	3.49	3.46	3.47	3.42	3.38	3.35	3.24	3.21	3.42
Paris	3.38	3.50	3.43	3.44	3.49	3.46	3.40	3.41	3.30	3.34	3.24	3.21	3.38
1895													
Oslo	3.25	3.21	3.19	3.28	3.28	3.26	3.19	3.21	3.22	3.22	3.21	3.22	3.23
Hamburg	3.20	3.14	3.14	3.29	3.24	3.19	3.16	3.17	3.18	3.22	3.21	3.21	3.20
London	3.19	3.14	3.15	3.25	3.24	3.18	3.15	3.12	3.15	3.16	3.13	3.20	3.17
Paris	3.11	3.14	3.08	3.16	3.15	3.17	3.14	3.14	3.15	3.16	3.14	3.20	3.14
1896													
Oslo	3.24	3.17	3.17	3.16	3.13	3.13	3.13	3.09	3.11	3.15	3.15	3.17	3.15
Hamburg	3.19	3.17	3.09	3.10	3.09	3.09	3.09	3.06	3.07	3.08	3.13	3.12	3.11
London	3.15	3.10	3.11	3.08	3.06	3.03	3.04	2.99	3.04	3.08	3.13	3.14	3.08
Paris	3.15	3.10	3.11	3.04	3.04	3.07	3.00	3.03	3.04	3.06	3.08	3.08	3.07
1897													
Oslo	3.19	3.14	3.14	3.15	3.11	3.10	3.10	3.09	3.10	3.11	3.11	3.11	3.12
Hamburg	3.10	3.11	3.15	3.11	3.07	3.04	3.04	3.06	3.09	3.08	3.08	3.11	3.09
London	3.11	3.10	3.08	3.08	3.09	3.03	3.04	3.03	3.00	3.01	3.02	3.07	3.06
Paris	3.04	3.07	3.08	3.08	3.04	3.05	3.07	3.02	3.04	3.05	3.06	3.09	3.06
1898													
Oslo	3.10	3.10	3.10	3.10	3.10		3.19	3.19	3.17	3.17		3.27	3.15 *
Hamburg	3.10	3.13	3.13	3.17	3.15	3.15	3.17	3.15	3.21	3.24	3.25	3.24	3.17
London	3.04	3.07	3.11	3.12	3.17	3.10	3.11	3.14	3.19	3.20	3.25	3.30	3.15
Paris	3.08	3.06	3.09	3.14	3.16	3.04	3.06	3.12	3.15	3.09	3.06	3.14	3.10
1899													
Oslo	3.27	3.27			3.41							3.54	3.37 *
Hamburg	3.31	3.28	3.30	3.39	3.42	3.51	3.47	3.51	3.53	3.63	3.60	3.60	3.46
London	3.27	3.30	3.35	3.40	3.41	3.51	3.48	3.51	3.57	3.58	3.59	3.65	3.47
Paris	3.11	3.18	3.23	3.24	3.50	3.42	3.48	3.45	3.48	3.53	3.45	3.60	3.39

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1900													
Hamburg	3.64	3.56	3.58	3.67	3.78	3.75	3.78	3.77	3.77	3.73	3.72	3.72	3.71
London	3.64	3.65	3.68	3.68	3.69	3.71	3.74	3.76	3.76	3.83	3.78	3.76	3.72
Paris	3.62	3.58	3.58	3.65	3.69	3.73	3.72	3.72	3.73	3.73	3.70	3.67	3.68
1901													
Oslo									3.49		3.50	3.50	3.50 *
Hamburg	3.61	3.62	3.60	3.58	3.58	3.62	3.54	3.53	3.50	3.52	3.51	3.52	3.56
London	3.76	3.71	3.63	3.55	3.58	3.59	3.56	3.50	3.54	3.55	3.52	3.53	3.59
Paris	3.58	3.55	3.52	3.45	3.64	3.62	3.46	3.50	3.51	3.58	3.50	3.43	3.53
1902													
Oslo	3.51	3.46	3.46	3.46	3.51	3.42	3.38	3.42	3.42	3.33	3.36	3.36	3.42
Hamburg	3.48	3.44	3.42	3.37	3.42	3.33	3.24	3.29	3.34	3.29	3.30	3.31	3.35
London	3.45	3.45	3.46	3.48	3.41	3.38	3.34	3.31	3.32	3.33	3.34	3.35	3.38
Paris	3.35	3.26	3.41	3.37	3.34	3.31	3.14	3.20	3.23	3.26	3.28	3.28	3.29
1903													
Oslo	3.36	3.36	3.34	3.34	3.34	3.34	3.34	3.34	3.31	3.30	3.36	3.37	3.34
Hamburg	3.26	3.29	3.27	3.29	3.31	3.30	3.28	3.32	3.32	3.34	3.42	3.45	3.32
London	3.30	3.31	3.32	3.33	3.28	3.29	3.30	3.29	3.33	3.38	3.42	3.45	3.34
Paris	3.24	3.23	3.24	3.24	3.22	3.21	3.23	3.30	3.31	3.33	3.38	3.39	3.28
1904													
Oslo	3.40			3.51			3.51	3.54		3.49	3.48		3.49 *
Hamburg	3.41	3.52	3.51	3.51	3.60	3.48	3.54	3.51	3.43	3.60	3.53	3.56	3.52
London	3.46	3.46	3.50	3.54	3.64	3.62	3.63	3.60	3.50	3.51	3.55	3.57	3.55
Paris	3.41	3.50	3.47	3.55	3.68	3.57	3.52	3.52	3.52	3.51	3.51	3.55	3.52
1905													
Oslo	3.51	3.56	3.50		3.53	3.61							3.54 *
Hamburg	3.52	3.46	3.48	3.50	3.49	3.65	3.68	3.67	3.64	3.67	3.67	3.66	3.59
London	3.55	3.58	3.59	3.61	3.61	3.62	3.70	3.79	3.69	3.66	3.64	3.59	3.64
Paris	3.53	3.42	3.50	3.51	3.53	3.69	3.64	3.65	3.63	3.69	3.62	3.60	3.58
1906													
Oslo	3.66												3.66 *
Hamburg	3.57	3.55	3.56	3.56	3.50	3.49	3.47	3.45	3.48	3.58	3.61	3.54	3.53
London	3.60	3.63	3.60	3.61	3.58	3.58	3.50	3.46	3.48	3.52	3.60	3.58	3.56
Paris	3.61	3.59	3.55	3.57	3.51	3.51	3.51	3.51	3.52	3.58	3.54	3.56	3.55
1907													
Oslo							3.66						3.66 *
Hamburg	3.54	3.59	3.59	3.60	3.63	3.67	3.63	3.58	3.73	3.76	3.67	3.83	3.65
London	3.55	3.58	3.68	3.68	3.68	3.71	3.69	3.72	3.76	3.78	3.84	3.84	3.71
Paris	3.52	3.60	3.68	3.69	3.69	3.76	3.76	3.77	3.75	3.73	3.78	3.79	3.71
1908													
Oslo									3.72	3.72	3.72		3.72 *
Hamburg	3.77	3.77	3.78	3.82	3.75	3.77	3.82	3.82	3.82	3.68	3.70	3.66	3.76
London	3.75	3.76	3.78	3.78	3.80	3.78	3.78	3.75	3.77	3.70	3.71	3.70	3.76
Paris	3.77	3.76	3.76	3.78	3.76	3.78	3.77	3.73	3.75	3.76	3.70	3.73	3.75
1909													
Oslo									3.55				3.55 *
Hamburg	3.66	3.63	3.62	3.62	3.62	3.67	3.58	3.58	3.60	3.58	3.56	3.58	3.61

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
London	3.69	3.68	3.61	3.60	3.61	3.60	3.60	3.58	3.60	3.61	3.62	3.63	3.62
Paris	3.72	3.66	3.67	3.64	3.63	3.69	3.65	3.65	3.64	3.62	3.62	3.62	3.65
1910													
Hamburg	3.60	3.60	3.61	3.63	3.64	3.64	3.71	3.73	3.73	3.69	3.75	3.75	3.67
London	3.63	3.65	3.65	3.62	3.65	3.69	3.73	3.74	3.74	3.75	3.82	3.83	3.71
Paris	3.61	3.65	3.65	3.67	3.69	3.70	3.77	3.73	3.75	3.73	3.74	3.71	3.70
1911													
Hamburg	3.75	3.73	3.72	3.70	3.69	3.71	3.83	3.83	3.89	3.95		3.85	3.79 *
London	3.77	3.77	3.75	3.77	3.78	3.77	3.79	3.81	3.86	3.93	3.93	3.91	3.82
Paris	3.72	3.73	3.77	3.74	3.74	3.76	3.79	3.80	3.84	3.78	3.82	3.83	3.78
1912													
Oslo		4.05	4.05	4.05			4.05				4.06	4.20	4.08 *
Hamburg	3.83	3.88	3.91	3.87	3.89	4.04	4.06	4.00	4.10	4.09	4.16	4.14	4.00
London	4.02	4.01	4.02	4.03	4.03	4.08	4.10	4.10	4.17	4.20	4.22	4.22	4.10
Paris	3.85	3.80	3.89	3.87	3.92	3.97	3.97	3.91	3.95	4.04	4.07	4.04	3.94
1913													
Oslo	4.20					4.34							4.27 *
Hamburg										4.16	4.19	4.17	4.17 *
London	4.21	4.21	4.29	4.27	4.31	4.34	4.32	4.27	4.15	4.19	4.22	4.22	4.25
Paris	4.15	4.13	4.14	4.19	4.34	4.32	4.23	4.13	4.16	4.05	4.09	4.17	4.18
1914													
Hamburg	4.12	4.09	4.18	4.22	4.23	4.25	4.15						4.18 *
London	4.13	4.14	4.17	4.22	4.24	4.16	4.21						4.18 *
Paris	4.17	4.14	4.15	4.25	4.17	4.25	4.29	4.67		4.58	4.32	4.33	4.30 *
1915													
Oslo	5.05	5.05	5.05	5.05	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.09	5.06
London	4.61	4.69	4.65	4.63	4.69	5.24	5.38	5.40	5.20	5.17	5.06	5.06	4.98
Paris	4.28	4.27	4.27	4.29	4.27	4.21	4.23	4.30	4.26	4.24	4.43	4.58	4.30
1916													
Oslo	5.18	5.33	5.40	5.36	5.24	5.06	5.12	5.06	5.06	5.07	5.06	5.06	5.17
London	5.08	5.11	5.19	5.14	4.93	4.87	4.83	4.79	5.14	5.05	5.06	5.01	5.02
Paris	4.59	4.42	4.41	4.43	4.47	4.50	4.32	4.34	4.42	4.46	4.56	4.55	4.46
1917													
Oslo	5.06	5.09	5.12	5.12	5.08	5.09	5.11	5.09	5.08	5.15	5.19	5.21	5.12
London	5.03	5.24	4.99	4.93	4.94	4.89	4.71	4.67	4.58	4.42	4.45	4.70	4.80
Paris	4.57	4.64	4.50	4.68	4.48	4.57	4.54	4.49	4.14	4.02	4.20	4.28	4.42
1918													
Oslo	5.30	5.36	5.45	5.45	5.49	5.69	5.76	5.68	5.70	5.69	5.69	5.70	5.58
London	4.89	5.00	4.76	4.84	4.94	4.89	4.87	4.88	4.98	5.49	5.52	5.40	5.04
Paris	4.42	4.63	4.47	4.58	4.63	4.41	4.45	4.39	4.96	5.49	5.37	5.42	4.77
1919													
Oslo	5.62	5.77	5.78	5.80	5.74	5.81	5.69	5.65	5.66	5.76	6.08	5.98	5.78
London	5.42	5.47	5.47	5.50	5.44	5.47	5.67	5.70	5.70	5.78	5.95	6.72	5.69
Paris	5.48	5.30	5.10	4.86	4.74	4.22	4.59	4.12	4.23	4.09	4.02	4.41	4.60
1920													
Oslo	6.01	6.18	6.28	6.28	6.42	6.65	7.50	7.53	7.19	7.23	7.11	6.84	6.77
London	6.82	6.76	6.83	6.99	7.02	7.57	7.71	7.75	8.08	7.57	7.53	7.45	7.34

Table A1. Norwegian long-term government bonds

1820 - 1920

Annualized yield computed from end-of-month quotations in different markets.
Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Paris	4.16	3.90	3.81	3.21	4.29	4.19	5.05	4.55	4.27	3.84	3.52	2.62	3.95

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1851													
Hamburg											4.53	4.54	4.53 *
1852													
Oslo	4.39	4.39	4.39	4.39	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.41	4.40
Hamburg	4.54	4.54	4.54	4.54	4.55	4.55	4.55	4.55	4.55	4.56	4.56	4.56	4.55
1853													
Oslo	4.41	4.41	4.36	4.36	4.36	4.36	4.36	4.37	4.37	4.31	4.32	4.32	4.36
Hamburg	4.56	4.32	4.36	4.31	4.31	4.36	4.36	4.37	4.37	4.34	4.39	4.37	4.37
1854													
Oslo	4.29	4.30	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.26	4.26	4.26
Hamburg	4.28	4.28	4.57	4.46	4.34	4.39	4.26	4.31	4.26	4.26	4.26	4.27	4.33
1855													
Oslo	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.26	4.26	4.25
Hamburg	4.26	4.26	4.41	4.26	4.23	4.26	4.19	4.26	4.24	4.19	4.24	4.24	4.25
1856													
Oslo	4.25	4.30	4.30	4.30	4.32	4.32	4.32	4.33	4.40	4.53	4.53	4.54	4.37
Hamburg	4.24	4.27	4.32	4.32	4.32	4.35	4.35	4.29	4.40	4.51	4.51	4.51	4.37
1857													
Oslo	4.61	4.61	4.62	4.62	4.70	4.70	4.70	4.71	4.82	4.82	4.82	4.83	4.71
Hamburg	4.61	4.62	4.62	4.62	4.60	4.39	4.85	4.85	4.86	4.86	5.18	5.07	4.76
1858													
Oslo	4.88	4.89	4.89	4.90	4.87	4.90	4.91	4.91	4.92	4.91	4.92	4.92	4.90
Hamburg	5.14	5.14	5.24	4.87	4.93	4.88	4.94	5.00	4.93	4.97	4.95	5.07	5.00
1859													
Oslo	4.84	4.85	4.85	4.85	4.86	4.86	4.86	4.87	4.87	4.87	4.88	4.88	4.86
Hamburg	4.94	4.97	4.95	4.95	4.98	4.99	4.82	4.91	4.97	4.97	4.92	4.92	4.94
1860													
Oslo	4.88	4.89	4.89	4.90	4.90	4.90	4.91	4.91	4.92	4.91	4.92	4.92	4.90
Hamburg	4.92	4.95	4.96	4.98	4.98	4.96	4.99	4.96	4.97	4.96	4.97	4.97	4.96
Copenhagen												4.80	4.80 *
1861													
Oslo	4.88	4.89	4.89	4.90	4.90	4.90	4.91	4.91	4.92	4.91	4.92	4.92	4.90
Hamburg	4.94	4.92	4.92	4.92	4.93	4.96	4.96	4.95	4.97	4.95	4.97	5.01	4.95
Copenhagen			4.88			4.81			4.86			4.95	4.87 *
1862													
Oslo	5.09	5.09	5.01	4.99	4.99	5.00	4.99	5.00	4.96	4.96	4.97	4.98	5.00
Hamburg	4.78	4.77	4.72	4.71	4.80	4.80	4.75	4.75	4.71	4.75	4.76	4.78	4.76
Copenhagen			4.73			4.66			4.71			4.71	4.70 *
1863													
Oslo	4.75	4.75	4.75	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.71	4.71	4.71
Hamburg	4.78	4.75	4.75	4.77	4.77	4.77	4.76	4.77	4.78	4.85	4.85	5.13	4.81
Copenhagen			4.71			4.77			4.87			4.99	4.83 *
1864													
Oslo	4.88	4.94	4.98	4.98	4.98	4.99	4.98	4.98	4.98	4.98	4.99	4.99	4.97
Hamburg	4.99	4.99	5.20	5.20	5.23	5.24	5.14	5.15	5.15	5.16	5.16	5.17	5.15
Copenhagen			5.23			5.24			5.15			5.34	5.24 *
1865													

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Oslo	4.98	5.10	5.19	5.19	5.19	5.20	5.16	5.16	5.16	5.17	5.17	5.18	5.15
Hamburg	5.24	5.27	5.31	5.32	5.29	5.29	5.28	5.22	5.23	5.26	5.29	5.27	5.27
Copenhagen			5.22			5.26			5.19			5.18	5.21 *
1866													
Oslo	5.09	5.15	5.15	5.15	5.16	5.16	5.15	5.15	5.16	5.16	5.16	5.17	5.15
Hamburg	5.26	5.26	5.31	5.31	5.55	5.74	5.33	5.33	5.32	5.38	5.33	5.35	5.37
Copenhagen			5.23			5.62			5.36			5.34	5.39 *
1867													
Oslo	5.19	5.19	5.19	5.20	5.20	5.20	5.19	5.17	5.17	5.17	5.18	5.15	5.18
Hamburg	5.33	5.32	5.32	5.39	5.36	5.26	5.22	5.25	5.15	5.20	5.18	5.21	5.26
Copenhagen			5.37			5.29			5.19			5.21	5.27 *
1868													
Oslo	5.07	5.10	5.10	5.13	5.13	5.14	5.14	5.14	5.14	5.15	5.15	5.15	5.13
Hamburg	5.16	5.10	5.19	5.23	5.18	5.18	5.16	5.20	5.20	5.17	5.21	5.31	5.19
Copenhagen			5.20			5.18			5.27			5.29	5.24 *
1869													
Oslo	5.12	5.12	5.12	5.13	5.13	5.13	5.13	5.14	5.14	5.14	5.15	5.15	5.13
Hamburg	5.28	5.29	5.33	5.33	5.34	5.25	5.27	5.27	5.34	5.31	5.29	5.27	5.30
Copenhagen			5.28			5.24			5.29			5.28	5.27 *
1870													
Oslo	5.12	5.12	5.13	5.13	5.13	5.14	5.14	5.14	5.15	5.15	5.17	5.18	5.14
Hamburg	5.23	5.26	5.29	5.28	5.25	5.27	5.80	5.54	5.41	5.27	5.30	5.24	5.34
Copenhagen			5.24			5.22			5.28			5.33	5.27 *
1871													
Oslo	5.15	5.13	5.13	5.09	5.09	5.11	5.10	4.80	4.80	4.80	4.91	4.91	5.00
Hamburg	5.11	5.14	5.14	5.14	5.11	5.10	4.93	4.86	4.81	4.80	4.74	4.71	4.97
Copenhagen			5.19			5.07	4.96		4.77			4.75	4.95 *
1872													
Oslo	4.76	4.68	4.66	4.66	4.66	4.66	4.60	4.60	4.55	4.55	4.55	4.55	4.62
Hamburg	4.62	4.65	4.62	4.64	4.62	4.63	4.62	4.62	4.65	4.62	4.62	4.60	4.63
Copenhagen			4.62			4.75			4.65			4.65	4.67 *
1873													
Oslo	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Hamburg	4.59	4.62	4.66	4.81	4.85	4.84	4.83	4.80	4.79	4.74	4.79	4.76	4.76
Copenhagen			4.62	4.69	4.76	4.69	4.62	4.58	4.59	4.55	4.62	4.42	4.61 *
1874													
Oslo	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Hamburg	4.70	4.62	4.61	4.61	4.59	4.60	4.59	4.66	4.66	4.66	4.66	4.66	4.63
Copenhagen	4.55	4.55	4.55	4.52	4.52	4.59	4.59	4.52	4.59	4.62	4.59	4.63	4.57
1875													
Oslo	4.55	4.55	4.55	4.55	4.85	4.86	4.87	4.87	4.87	4.88	4.88	4.88	4.76
Hamburg	4.66	4.64	4.66	4.66	4.68	4.82	4.83	4.87	4.97	5.00	5.04	5.03	4.82
Copenhagen	4.69	4.69	4.70	4.70		4.85			5.00			5.01	4.80 *
1876													
Oslo	4.87	4.99	5.01	5.02	5.03	5.05	5.07	5.11	5.13	5.14	5.15	5.18	5.06
Hamburg	5.01	5.05	5.05	5.10	5.10	5.10	5.09	5.12	5.15	5.18	5.21	5.21	5.11
1877													

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Oslo	5.02	5.05	5.06	5.07	5.08	5.08	5.08	5.08	5.11	5.12	5.13	5.32	5.10
Hamburg	5.17	5.17	5.18	5.19	5.20	5.21	5.16	5.13	5.21	5.23	5.13	5.14	5.18
Copenhagen									5.37				5.37 *
1878													
Oslo	5.27	5.27	5.28	5.28	5.28	5.29	5.29	5.29	5.29	5.30	5.30	5.31	5.29
Hamburg	5.30	5.24	5.31	5.38	5.29	5.41	5.33	5.34	5.32	5.34	5.29	5.29	5.32
Copenhagen						5.65			5.46			5.35	5.49 *
1879													
Oslo	5.06	5.07	5.07	4.91	4.92	4.92					4.92	4.86	4.97 *
Hamburg	5.25	5.29	5.28	5.15	5.05	5.02	4.97	4.95	4.94	4.94	4.97	4.96	5.06
Copenhagen			5.30						4.86			4.83	5.00 *
1880													
Oslo	4.86	4.86	4.86	4.66	4.66	4.66	4.55	4.55	4.55	4.55	4.55	4.55	4.66
Hamburg	4.82	4.70	4.70	4.66	4.64	4.64	4.58	4.58	4.61	4.62	4.60	4.57	4.64
Copenhagen			4.71			4.61			4.55			4.50	4.59 *
1881													
Oslo	4.55	4.55	4.55	4.55	4.55	4.55	4.54	4.52	4.53	4.55	4.55	4.55	4.55
Hamburg	4.49	4.50	4.51	4.47	4.49	4.48	4.44	4.45	4.50	4.51	4.52	4.53	4.49
Copenhagen			4.48			4.43						4.46	4.46 *
1882													
Oslo	4.55	4.55	4.55	4.55	4.56	4.56	4.56	4.56	4.57	4.58	4.57	4.55	4.56
Hamburg	4.55	4.54	4.55	4.53	4.51	4.51	4.52	4.52	4.54	4.55	4.54	4.55	4.53
Copenhagen			4.50			4.50						4.55	4.52 *
1883													
Oslo	4.55	4.55	4.55	4.55	4.55	4.55	4.53	4.55	4.55	4.49	4.54	4.54	4.54
Hamburg	4.51	4.49	4.51	4.51	4.50	4.49	4.43	4.47	4.48	4.49	4.49	4.49	4.49
Copenhagen						4.50			4.52			4.53	4.52 *
1884													
Oslo	4.53	4.51	4.47	4.47	4.47	4.47	4.43	4.43	4.39	4.39	4.35	4.37	4.44
Hamburg	4.45	4.45	4.44	4.43	4.43	4.44	4.44	4.45	4.44	4.45	4.45	4.40	4.44
Copenhagen			4.48			4.52			4.55			4.52	4.52 *
1885													
Oslo	4.21	4.21	4.21	4.17	4.14	4.14	4.14	4.14	4.14	4.11	4.11	4.14	4.15
Hamburg	4.19	4.17	4.17	4.17	4.17	4.11	4.12	4.11	4.15	4.15	4.12	4.09	4.14
1886													
Oslo	4.10	4.04	4.03	4.03	4.04	3.97	3.98	3.96	3.97	3.98	3.98	3.97	4.00
Hamburg	4.09	4.07	4.05	4.00	3.99	4.00	3.99	4.01	4.01	4.00	4.00	4.02	4.02
Copenhagen			4.09			4.06			4.04			4.01	4.05 *
1887													
Oslo	3.96	3.97	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.82
Hamburg	4.01	3.99	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.83
1888													
Oslo	3.79	3.79	3.79	3.77	3.76	3.73	3.70	3.67	3.67	3.67	3.67	3.68	3.72
Hamburg	3.79	3.79	3.79	3.77	3.77	3.76	3.66	3.67	3.70	3.70	3.70	3.69	3.73
1889													
Oslo	3.67	3.66	3.64	3.61	3.58	3.55	3.56	3.56	3.53	3.53	3.54	3.54	3.58
Hamburg	3.62	3.65	3.64	3.64	3.56	3.57	3.58	3.56	3.57	3.58	3.59	3.59	3.60

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1890													
Oslo	3.54	3.56	3.56	3.56	3.56	3.56	3.58	3.62	3.60	3.61	3.64	3.77	3.60
Hamburg	3.59	3.62	3.60	3.60	3.59	3.61	3.62	3.61	3.61	3.63	3.65	3.65	3.62
1891													
Oslo	3.63	3.66	3.66	3.67	3.80	3.77	3.94	3.94	3.94	4.10	4.10	4.10	3.86
Hamburg	3.63	3.65	3.79	3.79	3.81	3.79	3.84	3.94	3.97	3.96	4.02	3.99	3.85
1892													
Oslo	4.10	3.98	3.98	4.04	4.00	4.02	4.04	4.01	4.02	4.02	4.05	4.10	4.03
Hamburg	3.92	3.93	3.93	3.93	4.01	3.93	3.93	3.93	3.93	3.99	4.04	4.09	3.97
1893													
Oslo	4.07	4.01	4.01	4.04	4.11	4.08	4.06	3.98	4.05	4.05	4.11	4.08	4.05
Hamburg	4.04	3.97	3.97	3.98	4.05	4.02	4.01	4.03	4.04	4.08	4.08	3.99	4.02
1894													
Oslo	4.05	3.99	3.99	3.99	3.95	3.93	3.88	3.87	3.84	3.84	3.75	3.66	3.89
Hamburg	3.96	3.95	3.97	3.94	3.94	3.88	3.85	3.85	3.79	3.78	3.69	3.58	3.85
1895													
Oslo	3.66	3.65	3.65	3.73	3.70	3.66	3.66	3.66	3.65	3.66	3.68	3.67	3.67
Hamburg	3.58	3.59	3.58	3.65	3.65	3.64	3.64	3.64	3.65	3.65	3.68	3.69	3.64
1896													
Oslo	3.68	3.67	3.64	3.66	3.66	3.66	3.65	3.67	3.66	3.73	3.68	3.67	3.67
Hamburg	3.65	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.66	3.69	3.71	3.70	3.66
1897													
Oslo	3.67	3.69	3.67	3.69	3.70	3.76	3.74	3.75	3.78	3.78	3.76	3.79	3.73
Hamburg	3.67	3.68	3.69	3.69	3.69	3.69	3.70	3.72	3.79	3.77	3.77	3.76	3.72
1898													
Oslo	3.79	3.76	3.76	3.78	3.80	3.80	3.76	3.76	3.76	3.80	3.87	3.89	3.79
Hamburg	3.72	3.73	3.73	3.77	3.77	3.81	3.81	3.79	3.82	3.85	3.92	3.83	3.80
1899													
Oslo	3.82	3.89	3.98	4.01	4.03	4.07	4.10	4.14	4.32	4.36	4.32	4.34	4.11
Hamburg	3.86	3.89	3.99	4.00	4.10	4.07	4.08	4.23	4.25	4.32	4.39	4.39	4.13
1900													
Oslo	4.32	4.36	4.49	4.45	4.44	4.45	4.50	4.47	4.49	4.48	4.52	4.50	4.46
Hamburg	4.34	4.37	4.47	4.40	4.44	4.50	4.49	4.46	4.49	4.46	4.48	4.44	4.44
Paris								4.30					4.30 *
1901													
Oslo	4.51	4.49	4.50	4.48	4.43	4.46	4.47	4.34	4.35	4.32	4.36	4.32	4.42
Hamburg	4.45	4.40	4.44	4.44	4.43	4.45	4.39	4.35	4.36	4.36	4.35	4.31	4.40
Paris		3.95			4.13	4.07		4.05					4.05 *
1902													
Oslo	4.17	4.05	4.07	4.10	4.10	4.19	4.12	4.14	4.11	4.17	4.17	4.17	4.13
Hamburg	4.10	4.02	4.00	4.05	4.08	4.10	4.12	4.12	4.12	4.12	4.12	4.09	4.09
Paris		3.99	4.01	3.98	3.95	3.93	3.88	3.86	3.93	3.95	3.94		3.94 *
1903													
Oslo	4.03	4.00	3.93	3.96	3.97	4.01	4.01	4.00	4.13	4.11	4.05	4.05	4.02
Hamburg	3.94	3.95	3.91	3.97	3.99	4.00	3.96	4.01	4.13	4.07	4.04	4.01	4.00
Paris	3.90	3.91	3.94	4.16	4.19	3.91	4.22	4.19	3.96	3.96	3.92	3.95	4.02
1904													

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Oslo	4.01	4.17	4.17	4.17	4.10	4.12	4.03	3.95	3.85	3.85	3.92	3.95	4.02
Hamburg	3.97	4.19	4.12	4.13	4.13	4.14	3.95	3.87	3.84	3.89	3.93	3.99	4.01
Paris	3.58	3.75	3.70	3.89	3.85	3.69	3.58	3.57	3.59	3.60	3.60	3.65	3.67
1905													
Oslo	3.93	3.93	3.93	3.94	3.95	4.06	4.04	4.04	4.04	4.04	4.04	4.06	4.00
Hamburg	3.96	3.92	3.93	3.94	3.96	4.03	4.06	4.06	4.06	4.07	4.07	4.04	4.01
Paris	3.63	3.57	3.56	3.62	3.63	3.72	3.75	3.77	3.78	3.83	3.76	3.68	3.69
1906													
Oslo	4.06	4.03	4.03	4.02	4.04	4.04	4.06	4.07	4.09	4.14	4.11	4.07	4.06
Hamburg	4.03	4.03	4.03	4.04	4.10	4.10	4.09	4.07	4.08	4.07	4.14	4.10	4.07
Paris	3.77	3.71	3.69	3.74	3.69	3.67	3.70	3.69	3.72	3.74	3.70	3.71	3.71
1907													
Oslo	4.03	4.05	4.07	4.11	4.19	4.15	4.15	4.19	4.17	4.19	4.21	4.23	4.14
Hamburg	4.11	4.12	4.16	4.21	4.27	4.19	4.21	4.26	4.23	4.25	4.30	4.32	4.22
Paris	3.71	3.75	3.74	3.71	3.73	3.80	3.78	3.85	3.86	3.86	3.92	3.90	3.80
1908													
Oslo	4.17	4.21	4.27	4.23	4.24	4.28	4.30	4.30	4.30	4.31	4.26	4.30	4.26
Hamburg	4.22	4.24	4.33	4.32	4.32	4.33	4.35	4.31	4.35	4.34	4.34	4.39	4.32
Paris	3.90	3.91	3.93	3.91	3.95	3.95	3.96	3.95	3.88	3.88	3.80	3.85	3.91
1909													
Oslo	4.33	4.24	4.24	4.24	4.25	4.25	4.25	4.24	4.21	4.21	4.22	4.23	4.24
Hamburg	4.29	4.24	4.24	4.25	4.26	4.26	4.28	4.28	4.22	4.22	4.27	4.27	4.26
Paris	3.77	3.79	3.82	3.82	3.72	3.87	3.87	3.88	3.85	3.86	3.84	3.80	3.82
1910													
Oslo	4.19	4.16	4.14	4.11	4.22	4.25	4.25	4.27	4.28	4.29	4.27	4.27	4.23
Hamburg	4.24	4.20	4.21	4.22	4.22	4.28	4.32	4.33	4.34	4.33	4.34	4.30	4.28
Paris	3.75	3.74	3.74	3.77	3.83	3.87	3.95	3.94	3.91	3.95	3.93	3.90	3.86
1911													
Oslo	4.29	4.27	4.29	4.29	4.36	4.32	4.31	4.32	4.31	4.33	4.36	4.37	4.32
Hamburg	4.30	4.31	4.30	4.31	4.37	4.38	4.35	4.35	4.36	4.40		4.37	4.35 *
Paris	3.89	3.90	3.92	3.92	3.92	3.94	4.02	3.97	4.07	4.02	3.98	3.98	3.96
1912													
Oslo	4.33	4.35	4.38	4.48	4.54	4.55	4.52	4.54	4.59	4.66	4.62	4.55	4.51
Hamburg	4.38	4.36	4.45	4.52	4.59	4.57	4.59	4.58	4.58	4.63	4.66	4.65	4.55
Paris	3.97	4.01	4.12	4.18	4.19	4.18	4.26	4.25	4.31	4.41	4.31	4.35	4.21
1913													
Oslo	4.57	4.71	4.75	4.72	4.65	4.71	4.72	4.73	4.74	4.81	4.80	4.82	4.73
Paris	4.39	4.35	4.33	4.43	4.54	4.68	4.53						4.46 *
1914													
Oslo	4.70	4.57	4.65	4.75	4.78	4.78	4.80			5.02	5.08	5.03	4.82 *
1915													
Oslo	4.98	5.00	5.19	5.28	5.33	5.36	5.46	5.47	5.75	5.69	5.67	5.98	5.43
Paris								4.59	4.59	4.46	4.58	4.61	4.57 *
1916													
Oslo	6.33	6.32	6.43	6.35	5.94	5.53	5.50	5.46	5.33	5.36	5.38	5.40	5.78
Paris	4.34	4.36	4.88	4.85	4.58	4.24	4.27	4.33	4.49	4.60	4.59	4.54	4.51
1917													

Table A2. Kongeriket Norges Hypotekbank long-term bonds

1851 - 1920

Annualized yield computed from end-of-month quotations in different markets.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
Oslo	5.43	5.38	5.39	5.37	5.35	5.25	5.25	5.22	5.24	5.29	5.60	5.61	5.37
Paris	4.48	4.47	4.24	4.39	4.36	4.32	4.25	4.03	4.08	3.96	4.06	4.44	4.26
1918													
Oslo	5.85	5.81	5.79	5.85	5.77	5.76	6.05	5.74	6.06	6.07	6.17	6.07	5.92
Paris	4.58	4.63	4.52	4.52	4.56	4.49	4.39	4.58	4.76	5.47	5.39	5.31	4.77
1919													
Oslo	5.88	5.90	6.10	5.93	5.96	5.86	5.77	5.85	5.84	5.93	6.00	6.21	5.93
Paris	5.37	5.34	5.14	5.11	4.89	4.74	4.47	4.27	4.37	4.01	4.11	4.25	4.67
1920													
Oslo	6.43	6.58	6.66	6.76	6.91	7.28	7.73	7.83	7.72	7.65	7.54	7.23	7.19
Paris	4.14	3.95	3.78	2.56	3.69	4.39	4.74	4.62	4.51	4.41	4.15	3.47	4.04

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
1921 JAN			6.09	6.09	6.21	6.27	6.30	6.35	6.44	6.48	6.50	6.58	7.48
FEB			6.79	6.79	6.76	6.72	6.68	6.61	6.42	6.48	6.32	6.38	7.48
MAR			6.95	6.95	7.02	7.01	6.98	6.92	6.68	6.69	6.51	6.35	7.48
APR			7.57	7.57	7.50	7.40	7.31	7.17	6.74	6.57	6.34	6.30	7.48
MAY			7.29	7.29	7.21	7.11	7.02	6.87	6.43	6.38	6.22	5.97	6.94
JUN		6.39	6.39	7.07	7.23	7.21	7.14	6.98	6.46	6.35	6.15	6.02	6.89
JUL		5.94	5.94	6.05	5.74	5.72	5.68	5.90	5.86	5.59	5.56	5.42	6.04
AUG		5.86	5.86	6.39	5.90	5.94	5.97	6.11	6.01	5.71	5.57	5.27	6.04
SEP		6.25	6.25	6.73	6.17	6.15	6.13	6.15	6.09	5.91	5.65	5.50	6.04
OCT		6.75	6.75	7.02	7.06	6.40	6.30	6.15	6.47	6.30	5.98	5.57	6.04
NOV		6.27	6.27	6.65	6.16	6.12	6.08	6.06	6.18	5.98	5.68	5.59	
DEC		6.26	6.18	6.03	6.05	6.07	6.04	6.10	5.98	5.89	5.72	5.55	6.28
1922 JAN		6.09	6.06	6.05	6.05	5.97	5.88	5.81	5.69	5.67	5.60	5.34	
FEB		5.83	5.76	5.64	5.59	5.58	5.55	5.52	5.36	5.44	5.41	5.25	
MAR		5.06	5.18	5.21	5.18	5.21	5.23	5.23	5.13	5.17	5.12	4.82	5.19
APR	4.91	4.89	4.89	4.88	4.83	4.77	4.75	4.87	4.86	4.88	4.75	4.82	5.19
MAY	4.82	4.85	4.83	4.83	4.80	4.79	4.79	4.85	4.82	4.70	4.77	4.82	5.23
JUN	5.17	5.23	5.16	5.14	5.16	5.18	5.28	5.22	5.10	4.91	4.85	4.69	5.23
JUL	5.13	5.12	5.10	5.12	5.13	5.17	5.27	5.19	5.03	4.95	4.99	4.74	5.32
AUG	4.82	4.90	5.03	4.96	4.93	4.93	5.06	4.95	4.76	4.78	4.71	4.53	5.22
SEP	5.17	5.24	5.38	5.29	5.31	5.28	5.26	5.21	5.24	5.24	5.20	4.79	5.22
OCT	5.20	5.25	5.33	5.28	5.32	5.35	5.41	5.33	5.21	5.04	5.05	4.71	5.26
NOV	4.87	5.01	5.17	5.14	5.18	5.22	5.34	5.27	5.19	5.11	5.05	4.65	5.28
DEC	5.14	5.27	5.31	5.19	5.26	5.27	5.38	5.34	5.33	5.25	5.07	4.67	5.26
1923 JAN	5.11	5.25	5.29	5.19	5.24	5.25	5.34	5.24	5.14	5.15	5.06	4.68	5.26
FEB	4.96	5.12	5.16	5.08	5.11	5.11	5.17	5.13	5.10	5.06	5.03	4.65	5.26
MAR	4.89	5.10	5.16	5.08	5.15	5.17	5.25	5.18	5.16	5.08	5.06	4.63	5.26
APR	5.06	5.20	5.17	5.07	5.14	5.18	5.48	5.27	5.27	5.14	5.09	4.69	5.26
MAY	5.57	5.71	5.50	5.35	5.44	5.47	5.64	5.49	5.46	5.16	5.19	5.04	5.26
JUN	6.09	6.03	5.73	5.67	5.62	5.62	5.65	5.54	5.46	5.41	5.20	5.17	5.22
JUL	6.08	6.02	6.08	5.82	5.75	5.73	5.80	5.68	5.61	5.49	5.42	5.35	5.25
AUG	6.22	6.07	6.02	5.88	5.83	5.85	5.96	5.76	5.64	5.64	5.54	5.35	5.46
SEP	6.09	6.07	6.07	5.88	5.81	5.78	5.80	5.70	5.64	5.61	5.48	5.30	5.44
OCT	7.02	6.74	6.68	6.54	6.47	6.41	6.37	6.31	6.24	5.93	5.82	5.41	5.36
NOV	6.39	6.22	6.19	6.15	6.15	6.13	6.19	6.23	6.30	5.95	5.75	5.50	5.57
DEC	6.03	5.92	5.75	5.74	5.78	5.77	5.62	5.97	5.91	5.82	5.57	5.37	5.62
1924 JAN	6.80	6.66	6.47	6.34	6.22	6.10	6.11	6.06	6.01	5.82	5.62	5.47	5.75
FEB	7.12	6.77	6.55	6.42	6.30	6.20	6.25	6.22	6.19	5.94	5.67	5.56	5.79
MAR	6.65	6.50	6.36	6.28	6.20	6.15	6.18	6.12	6.06	5.78	5.60	5.50	5.79
APR	6.13	6.16	5.91	5.83	5.77	5.80	5.77	5.79	5.81	5.68	5.46	5.42	5.78
MAY	6.69	6.55	6.36	6.28	6.20	6.13	6.15	6.15	6.10	5.78	5.63	5.43	5.79
JUN	7.07	6.80	6.94	6.58	6.49	6.37	6.37	6.35	6.29	6.09	5.96	5.57	5.75
JUL	7.25	7.04	7.14	6.72	6.59	6.39	6.45	6.41	6.34	6.24	6.08	5.72	6.00
AUG	6.77	6.77	6.92	6.55	6.46	6.36	6.35	6.36	6.37	6.17	5.99	5.72	5.92
SEP	6.82	6.80	6.98	6.59	6.51	6.43	6.41	6.41	6.40	6.16	5.98	5.72	6.04
OCT	7.25	7.16	7.20	6.74	6.43	6.47	6.43	6.45	6.47	6.18	6.10	5.77	6.13

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
NOV	6.52	6.53	6.64	6.39	6.30	6.31	6.28	6.25	6.20	6.16	5.99	5.75	6.13
DEC	6.52	6.52	6.19	6.15	6.05	6.07	6.21	6.24	6.29	6.11	5.84	5.65	6.05
1925 JAN	6.71	6.71	6.46	6.36	6.16	6.17	6.20	6.18	6.16	6.09	5.92	5.79	6.09
FEB	6.73	6.73	6.48	6.37	6.18	6.20	6.25	6.29	6.34	6.09	5.99	5.81	6.09
MAR	6.64	6.64	6.51	6.36	6.22	6.24	6.27	6.32	6.32	6.04	6.05	5.70	6.10
APR	6.45	6.65	6.30	6.37	6.14	6.16	6.18	6.18	6.16	6.03	5.94	5.70	6.10
MAY	5.93	6.19	5.92	5.86	6.02	6.03	6.02	5.98	5.95	5.79	5.76	5.68	6.10
JUN	5.05	5.12	5.29	5.35	5.63	5.64	5.66	5.68	5.72	5.48	5.44	5.31	6.16
JUL	5.19	4.96	5.10	5.11	5.57	5.54	5.60	5.67	5.72	5.44	5.49	5.45	5.84
AUG	5.38	5.42	5.42	5.51	5.69	5.65	5.67	5.61	5.53	5.46	5.30	5.27	5.92
SEP	5.72	5.55	5.56	5.57	5.75	5.74	5.75	5.67	5.60	5.52	5.42	5.24	5.92
OCT	5.51	5.38	5.27	5.41	5.48	5.57	5.62	5.62	5.57	5.47	5.48	5.33	5.91
NOV	5.74	5.69	5.64	5.73	5.79	5.81	5.83	5.81	5.77	5.64	5.65	5.44	5.95
DEC	5.75	5.71	5.69	5.74	5.78	5.80	5.82	5.85	5.91	5.64	5.68	5.49	5.92
1926 JAN	5.59	5.65	5.69	5.91	5.91	5.90	5.89	5.93	6.00	5.73	5.73	5.50	6.03
FEB	5.21	5.40	5.51	5.67	5.71	5.73	5.74	5.77	5.85	5.64	5.58	5.46	5.93
MAR	4.67	5.14	5.40	5.51	5.58	5.61	5.64	5.66	5.73	5.60	5.50	5.34	5.89
APR	5.15	5.50	5.53	5.77	5.68	5.67	5.65	5.63	5.67	5.61	5.52	5.38	5.88
MAY	5.61	5.70	5.59	5.77	5.70	5.69	5.67	5.69	5.75	5.62	5.57	5.37	5.97
JUN	5.43	5.50	5.53	5.64	5.65	5.66	5.67	5.68	5.74	5.54	5.49	5.29	5.92
JUL	5.42	5.43	5.45	5.54	5.57	5.59	5.62	5.57	5.57	5.41	5.33	5.25	5.83
AUG	4.63	4.88	5.15	5.38	5.41	5.45	5.50	5.38	5.32	5.31	5.19	5.12	5.75
SEP	4.75	4.87	5.04	5.24	5.28	5.31	5.33	5.21	5.17	5.18	5.04	4.83	5.43
OCT	4.37	4.59	4.79	4.92	4.98	5.06	5.09	5.16	5.22	5.13	4.88	4.79	5.42
NOV	5.14	5.23	5.31	5.33	5.35	5.35	5.34	5.37	5.42	5.27	5.07	5.04	5.53
DEC	4.95	5.04	5.17	5.16	5.29	5.31	5.30	5.37	5.45	5.35	5.13	5.03	5.54
1927 JAN	4.70	4.84	4.97	5.07	5.13	5.18	5.18	5.30	5.39	5.29	5.16	4.90	5.44
FEB	5.02	5.10	5.30	5.40	5.35	5.30	5.22	5.25	5.30	5.28	5.05	5.00	5.40
MAR	4.66	4.89	5.08	5.20	5.20	5.20	5.15	5.19	5.24	5.21	5.10	4.93	5.40
APR	4.62	4.84	5.07	5.16	5.18	5.19	5.16	5.18	5.22	5.11	5.08	4.93	5.40
MAY	5.35	5.27	5.33	5.35	5.32	5.30	5.26	5.32	5.36	5.17	5.15	5.01	5.38
JUN	5.15	5.23	5.42	5.44	5.42	5.41	5.33	5.42	5.48	5.19	5.18	5.01	5.31
JUL	5.14	5.26	5.44	5.45	5.43	5.41	5.33	5.39	5.43	5.22	5.16	5.02	5.37
AUG	5.48	5.48	5.47	5.49	5.46	5.41	5.34	5.35	5.37	5.28	5.21	5.07	5.38
SEP	5.52	5.56	5.74	5.63	5.59	5.58	5.51	5.54	5.58	5.35	5.34	5.09	5.48
OCT	5.99	6.01	6.04	5.95	5.88	5.82	5.75	5.77	5.77	5.58	5.49	5.25	5.67
NOV	6.00	6.05	6.13	6.03	5.98	5.92	5.93	5.95	5.97	5.72	5.55	5.40	5.74
DEC	5.97	6.05	6.07	6.00	5.95	5.85	5.87	5.88	5.90	5.76	5.58	5.45	5.94
1928 JAN	5.86	5.83	5.81	5.79	5.76	5.72	5.74	5.74	5.75	5.64	5.50	5.44	5.80
FEB	5.48	5.66	5.72	5.71	5.69	5.63	5.58	5.71	5.74	5.59	5.39	5.24	5.74
MAR	5.46	5.50	5.56	5.59	5.58	5.52	5.46	5.63	5.67	5.40	5.32	5.21	5.69
APR	5.58	5.53	5.60	5.60	5.58	5.50	5.44	5.69	5.71	5.31	5.24	5.22	5.88
MAY	5.43	5.49	5.56	5.58	5.58	5.52	5.45	5.67	5.70	5.23	5.22	5.14	5.69
JUN	5.48	5.58	5.61	5.60	5.59	5.49	5.53	5.76	5.83	5.33	5.23	5.16	5.87
JUL	5.40	5.55	5.60	5.59	5.58	5.48	5.49	5.65	5.71	5.29	5.20	5.14	5.86
AUG	5.25	5.46	5.52	5.51	5.51	5.42	5.42	5.51	5.57	5.21	5.17	5.11	5.80

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
SEP	5.20	5.35	5.45	5.46	5.46	5.37	5.39	5.46	5.52	5.17	5.17	5.10	5.82
OCT	5.34	5.37	5.53	5.50	5.48	5.38	5.41	5.46	5.51	5.26	5.18	5.11	5.81
NOV	5.59	5.40	5.62	5.58	5.57	5.46	5.48	5.56	5.58	5.31	5.26	5.12	5.80
DEC	5.47	5.34	5.56	5.53	5.46	5.40	5.52	5.54	5.55	5.31	5.22	5.14	5.76
1929 JAN	5.26	5.40	5.48	5.46	5.40	5.34	5.44	5.46	5.52	5.29	5.20	5.13	5.70
FEB	5.40	5.48	5.52	5.49	5.41	5.37	5.47	5.49	5.55	5.33	5.28	5.15	5.59
MAR	5.82	5.70	5.71	5.67	5.59	5.48	5.57	5.56	5.60	5.50	5.37	5.22	5.84
APR	5.63	5.58	5.67	5.65	5.58	5.48	5.64	5.66	5.67	5.54	5.39	5.24	5.84
MAY	5.59	5.49	5.60	5.57	5.48	5.44	5.59	5.62	5.66	5.46	5.29	5.25	5.83
JUN	5.65	5.72	5.69	5.67	5.48	5.48	5.61	5.61	5.61	5.46	5.38	5.29	5.85
JUL	5.82	5.84	5.77	5.70	5.51	5.51	5.60	5.59	5.61	5.56	5.43	5.35	5.79
AUG	5.85	5.85	5.81	5.74	5.51	5.54	5.63	5.62	5.65	5.56	5.45	5.37	5.74
SEP	5.76	5.78	5.77	5.74	5.63	5.64	5.71	5.68	5.71	5.59	5.48	5.35	5.87
OCT	5.86	5.93	5.86	5.78	5.64	5.70	5.75	5.73	5.77	5.63	5.47	5.43	5.87
NOV	5.76	5.79	5.74	5.67	5.53	5.57	5.61	5.59	5.60	5.55	5.38	5.25	5.90
DEC	5.61	5.73	5.64	5.54	5.36	5.47	5.54	5.52	5.52	5.34	5.24	5.17	5.90
1930 JAN	5.64	5.66	5.55	5.42	5.27	5.40	5.47	5.44	5.46	5.21	5.20	5.14	5.63
FEB	5.49	5.53	5.51	5.40	5.23	5.37	5.40	5.37	5.41	5.28	5.18	5.17	5.54
MAR	5.21	5.33	5.34	5.31	5.22	5.28	5.30	5.32	5.37	5.17	5.13	5.09	5.50
APR	5.29	5.44	5.41	5.34	5.25	5.33	5.36	5.34	5.34	5.20	5.15	5.13	5.47
MAY	5.42	5.50	5.49	5.36	5.36	5.39	5.41	5.44	5.48	5.30	5.21	5.18	5.47
JUN	5.34	5.42	5.48	5.28	5.27	5.30	5.31	5.34	5.38	5.24	5.17	5.16	5.50
JUL	4.94	5.12	5.28	5.12	5.12	5.19	5.23	5.24	5.27	5.12	5.05	5.07	5.47
AUG	4.90	5.11	5.27	5.13	5.11	5.22	5.27	5.27	5.28	5.15	5.09	5.09	5.47
SEP	4.78	4.98	5.11	5.04	5.07	5.13	5.17	5.17	5.18	5.09	5.04	5.07	5.34
OCT	4.68	4.86	4.96	4.91	4.84	4.87	4.89	4.97	5.09	4.95	4.77	4.79	5.23
NOV	4.38	4.72	4.87	4.84	4.80	4.81	4.83	4.91	5.12	5.02	4.75	4.74	5.11
DEC	4.70	4.86	4.91	4.91	4.87	4.88	4.87	4.96	5.24	5.08	4.83	4.77	5.11
1931 JAN	4.59	4.78	4.82	4.81	4.76	4.77	4.75	4.81	4.97	4.86	4.73	4.71	5.05
FEB	4.39	4.66	4.74	4.73	4.64	4.66	4.66	4.73	4.87	4.85	4.71	4.69	5.01
MAR	4.59	4.76	4.77	4.74	4.72	4.71	4.70	4.75	4.86	4.85	4.71	4.70	5.04
APR	4.44	4.70	4.71	4.68	4.65	4.65	4.65	4.71	4.79	4.78	4.68	4.69	5.05
MAY	4.26	4.55	4.58	4.56	4.55	4.56	4.57	4.64	4.73	4.70	4.62	4.63	5.04
JUN	4.28	4.52	4.51	4.51	4.51	4.52	4.54	4.62	4.75	4.72	4.65	4.66	5.00
JUL	4.61	4.76	4.80	4.78	4.79	4.79	4.81	4.87	4.97	4.90	4.76	4.66	5.03
AUG	4.76	4.88	4.81	4.80	4.81	4.82	4.83	4.83	4.84	4.76	4.68	4.68	5.05
SEP	6.15	6.07	5.96	6.14	5.93	5.90	5.87	5.72	5.48	5.59	5.41	5.37	5.28
OCT	5.47	5.46	5.33	5.40	5.45	5.52	5.54	5.47	5.41	5.27	5.15	5.18	5.29
NOV	5.62	5.55	5.38	5.45	5.48	5.53	5.54	5.48	5.42	5.43	5.31	5.48	5.21
DEC	6.30	6.00	5.89	5.93	5.86	5.83	5.81	5.76	5.68	5.58	5.44	5.41	5.32
1932 JAN	5.72	5.54	5.44	5.47	5.47	5.48	5.46	5.48	5.52	5.37	5.25	5.23	5.33
FEB	5.31	5.17	5.06	5.12	5.14	5.18	5.18	5.19	5.23	5.12	5.07	5.05	5.36
MAR	5.35	5.32	5.17	5.26	5.28	5.32	5.32	5.32	5.38	5.18	5.09	5.10	5.30
APR	5.16	5.11	5.10	5.17	5.20	5.24	5.23	5.28	5.21	5.18	5.10	5.09	5.36
MAY	4.93	4.98	5.01	4.99	5.01	5.02	5.03	5.08	5.12	5.06	5.00	4.94	5.27
JUN	4.91	4.92	4.94	4.95	4.98	5.00	5.02	5.10	5.23	5.07	4.94	4.91	5.25

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
JUL	4.59	4.75	4.84	4.85	4.86	4.87	4.88	5.00	5.15	5.00	4.89	4.88	5.22
AUG	4.34	4.64	4.74	4.72	4.75	4.77	4.80	4.94	5.11	4.96	4.82	4.80	5.13
SEP	4.19	4.46	4.57	4.60	4.64	4.70	4.71	4.83	4.93	4.93	4.76	4.79	5.15
OCT	3.85	4.17	4.32	4.39	4.46	4.52	4.56	4.70	4.84	4.80	4.70	4.71	5.05
NOV	4.40	4.40	4.49	4.55	4.62	4.67	4.71	4.85	4.96	4.82	4.73	4.71	5.07
DEC	4.04	4.26	4.44	4.53	4.62	4.67	4.69	4.81	4.90	4.82	4.74	4.70	5.08
1933 JAN	4.04	4.27	4.44	4.49	4.56	4.62	4.65	4.76	4.83	4.75	4.70	4.67	4.87
FEB	3.99	4.24	4.46	4.51	4.58	4.62	4.69	4.81	4.87	4.70	4.73	4.66	4.71
MAR	4.16	4.28	4.44	4.49	4.56	4.60	4.61	4.73	4.78	4.76	4.70	4.69	4.82
APR	4.14	4.28	4.43	4.52	4.59	4.65	4.67	4.77	4.82	4.76	4.69	4.63	4.68
MAY	4.04	4.22	4.29	4.37	4.44	4.50	4.55	4.65	4.73	4.64	4.60	4.62	4.77
JUN	4.02	4.24	4.28	4.38	4.45	4.53	4.57	4.64	4.68	4.69	4.65	4.63	4.77
JUL	4.01	4.31	4.34	4.43	4.50	4.57	4.60	4.66	4.72	4.73	4.69	4.66	4.77
AUG	3.85	4.10	4.20	4.30	4.37	4.43	4.45	4.54	4.59	4.60	4.57	4.59	4.71
SEP	4.03	4.35	4.30	4.36	4.41	4.45	4.49	4.63	4.64	4.60	4.57	4.59	4.71
OCT	5.11	5.09	5.06	5.02	4.98	4.96	4.97	5.01	5.07	4.83	4.91	4.85	4.81
NOV	5.20	5.14	5.31	5.33	5.31	5.45	5.18	5.17	5.25	5.00	5.06	5.11	4.78
DEC	5.28	5.35	5.19	5.18	5.12	5.10	5.05	5.15	5.20	5.02	5.02	5.01	4.68
1934 JAN	5.20	5.17	5.17	5.11	5.06	5.05	5.11	5.06	5.08	4.86	4.93	4.87	4.83
FEB	5.16	5.14	5.14	5.08	5.02	5.01	5.02	5.04	5.08	4.95	4.97	4.92	4.83
MAR	5.23	5.20	5.14	5.07	4.98	4.98	4.98	5.04	5.09	5.03	4.97	4.93	4.83
APR	4.96	4.92	4.90	4.88	4.86	4.86	4.86	4.89	4.85	4.98	4.82	4.82	4.83
MAY	4.96	4.89	4.85	4.84	4.83	4.83	4.83	4.87	4.85	4.93	4.78	4.74	4.83
JUN	5.04	4.85	4.79	4.75	4.74	4.76	4.79	4.77	4.71	4.73	4.71	4.71	4.80
JUL	4.64	4.58	4.58	4.60	4.61	4.59	4.57	4.63	4.66	4.67	4.63	4.65	4.77
AUG	4.39	4.44	4.49	4.53	4.56	4.54	4.56	4.60	4.61	4.68	4.62	4.67	4.77
SEP	4.48	4.57	4.62	4.65	4.64	4.63	4.64	4.65	4.61	4.70	4.66	4.68	4.70
OCT	4.39	4.51	4.57	4.61	4.63	4.62	4.62	4.65	4.70	4.68	4.65	4.66	4.70
NOV	4.43	4.41	4.45	4.49	4.50	4.48	4.47	4.49	4.45	4.51	4.52		4.58
DEC	4.25	4.16	4.21	4.29	4.32	4.33	4.31	4.29	4.25	4.44	4.45		4.55
1935 JAN	3.72	3.73	3.85	3.99	4.05	4.06	4.05	4.02	4.01	4.19	4.36		4.47
FEB	4.15	4.19	4.22	4.26	4.31	4.30	4.29	4.22	4.19	4.23	4.26		4.52
MAR	3.76	3.79	3.91	4.06	4.07	4.05	4.02	4.08	4.11	4.15	4.18		4.47
APR	3.36	3.46	3.64	3.84	3.86	3.85	3.83	3.93	3.97	4.09	4.18		4.45
MAY	3.37	3.60	3.75	3.91	3.91	3.93	3.90	3.94	3.96	4.09	4.19		4.47
JUN	3.54	3.85	3.99	4.07	4.08	4.08	4.08	4.11	4.11	4.15	4.17	4.19	4.47
JUL	3.45	3.74	3.90	4.01	4.03	4.04	4.04	4.12	4.14	4.16	4.17	4.19	4.46
AUG	4.19	4.32	4.34	4.35	4.38	4.38	4.39	4.44	4.46	4.37	4.30	4.27	4.54
SEP	4.21	4.32	4.35	4.37	4.36	4.36	4.37	4.44	4.45	4.39	4.34	4.43	4.57
OCT	4.39	4.44	4.48	4.51	4.53	4.54	4.45	4.51	4.49	4.41	4.34	4.37	4.56
NOV	4.10	4.15	4.22	4.27	4.32	4.37	4.34	4.46	4.48	4.38	4.28	4.31	4.56
DEC	4.13	4.20	4.24	4.29	4.31	4.35	4.30	4.43	4.45	4.40	4.34	4.32	4.55
1936 JAN	3.84	3.98	4.10	4.17	4.18	4.22	4.17	4.32	4.33	4.27	4.20	4.24	4.52
FEB	4.09	4.23	4.28	4.33	4.38	4.44	4.41	4.54	4.56	4.44	4.31	4.28	4.54
MAR	4.01	4.20	4.25	4.32	4.34	4.39	4.37	4.51	4.53	4.43	4.32	4.30	4.52
APR	4.04	4.19	4.26	4.32	4.36	4.40	4.39	4.51	4.53	4.43	4.33	4.31	4.53

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
MAY	4.25	4.32	4.32	4.35	4.38	4.45	4.47	4.53	4.54	4.46	4.39	4.35	4.56
JUN	4.12	4.34	4.51	4.55	4.55	4.61	4.62	4.62	4.65	4.61	4.56	4.53	4.60
JUL	4.49	4.66	4.80	4.79	4.65	4.82	4.84	4.82	4.84	4.78	4.72	4.68	4.73
AUG	4.41	4.51	4.59	4.69	4.76	4.75	4.75	4.77	4.76	4.70	4.65	4.63	4.69
SEP	4.35	4.52	4.63	4.69	4.77	4.74	4.74	4.76	4.78	4.72	4.66	4.63	4.70
OCT	4.16	4.25	4.33	4.38	4.42	4.31	4.34	4.42	4.43	4.33	4.23	4.29	4.63
NOV	4.48	4.48	4.50	4.53	4.64	4.56	4.56	4.60	4.59	4.54	4.50	4.47	4.62
DEC	4.42	4.42	4.46	4.52	4.61	4.56	4.56	4.58	4.59	4.56	4.54	4.53	4.62
1937 JAN	4.35	4.37	4.41	4.46	4.55	4.49	4.51	4.60	4.63	4.54	4.44	4.41	4.63
FEB	4.05	4.17	4.29	4.39	4.46	4.40	4.43	4.62	4.68	4.54	4.40	4.41	4.61
MAR	4.24	4.30	4.40	4.48	4.51	4.51	4.54	4.72	4.77	4.61	4.44	4.38	4.63
APR	4.43	4.32	4.44	4.45	4.48	4.48	4.50	4.49	4.47	4.47	4.46	4.48	4.64
MAY	4.44	4.29	4.41	4.41	4.50	4.49	4.52	4.51	4.48	4.47	4.45	4.41	4.63
JUN	4.41	4.29	4.39	4.39	4.49	4.47	4.49	4.48	4.46	4.42	4.39	4.34	4.64
JUL	4.35	4.29	4.34	4.44	4.51	4.46	4.48	4.47	4.44	4.41	4.37	4.33	4.63
AUG	3.70	3.95	4.05	4.14	4.13	4.13	4.15	4.23	4.23	4.18	4.12	4.20	4.54
SEP	3.47	3.84	3.90	4.03	3.99	3.97	3.98	4.13	4.14	4.10	4.07	4.18	4.54
OCT	3.32	3.69	3.73	3.87	3.85	3.80	3.81	3.95	3.95	3.97	3.98	4.14	4.50
NOV	3.28	3.59	3.65	3.83	3.75	3.78	3.81	3.93	3.93	3.96	3.97	4.08	4.44
DEC	3.51	3.73	3.81	3.99	3.95	3.99	4.02	4.05	4.07	4.06	4.05	4.10	4.47
1938 JAN	3.23	3.45	3.55	3.74	3.71	3.80	3.85	3.78	3.78	3.84	3.89	3.93	4.03
FEB	3.20	3.36	3.49	3.75	3.64	3.72	3.76	3.70	3.68	3.77	3.86	3.94	4.03
MAR	3.13	3.32	3.51	3.67	3.66	3.70	3.73	3.67	3.64	3.77	3.88	3.92	4.02
APR	3.18	3.41	3.62	3.75	3.70	3.76	3.74	3.74	3.72	3.98	3.92	4.01	4.03
MAY	3.09	3.33	3.55	3.72	3.71	3.76	3.75	3.75	3.74	3.94	3.90	3.98	4.03
JUN	3.09	3.31	3.53	3.67	3.67	3.69	3.65	3.64	3.61	3.94	3.87	3.98	4.03
JUL	3.10	3.30	3.51	3.71	3.68	3.73	3.72	3.73	3.74	3.90	3.90	3.94	4.02
AUG	2.86	3.04	3.27	3.43	3.44	3.49	3.45	3.47	3.48	3.81	3.74	3.91	4.00
SEP	3.08	3.28	3.40	3.47	3.53	3.59	3.54	3.54	3.55	3.85	3.76	3.98	4.01
OCT	2.87	3.10	3.38	3.49	3.60	3.60	3.58	3.58	3.59	3.65	3.69	3.96	4.02
NOV	3.19	3.36	3.52	3.56	3.65	3.64	3.69	3.70	3.73	3.75	3.76	3.96	4.03
DEC	3.21	3.40	3.54	3.63	3.65	3.61	3.68	3.68	3.69	3.75	3.78	3.98	4.03
1939 JAN	3.23	3.35	3.55	3.64	3.70	3.61	3.70	3.69	3.70	3.70	3.67		4.06
FEB	3.21	3.30	3.52	3.59	3.69	3.57	3.62	3.61	3.61	3.67	3.70		4.05
MAR	3.56	3.62	3.83	3.82	3.90	3.82	3.82	3.78	3.76	3.79	3.80		4.06
APR	4.27	4.22	4.29	4.26	4.30	4.31	4.22	4.15	4.13	4.11	4.09	4.12	4.14
MAY	4.17	4.10	4.19	4.08	3.99	4.56	4.56	4.21	4.14	4.11	4.07	4.15	4.19
JUN	4.23	4.27	4.31	4.34	4.41	4.24	4.22	4.19	4.19	4.18	4.18	4.21	4.23
JUL	3.75	3.88	3.98	4.07	4.02	4.01	4.01	4.03	4.04	4.07	4.08	4.18	4.23
AUG	4.41	4.47	4.43	4.49	4.35	4.30	4.31	4.32	4.31	4.30	4.29	4.34	4.38
SEP	5.68	5.54	5.41	5.27	5.13	4.99	5.01	5.00	4.96	4.90	4.86	4.91	4.86
OCT	5.59	5.85	5.80	5.55	5.38	5.33	5.27	5.07	5.02	4.99	4.99	5.04	5.06
NOV		5.84	5.78	5.72	5.59	5.44	5.28	4.99	4.89	4.90	4.94	4.99	4.89
DEC	6.02	6.63	6.73	6.59	6.29	6.14	5.94	5.81	5.76	5.50	5.32	5.26	5.24
1940 JAN		7.33	6.96	6.35	5.95	6.07	6.06	5.85	5.82	5.70	5.62	5.50	5.39
FEB		7.14	7.00	6.87	6.72	6.76	6.73	6.40	6.05	5.88	5.77	5.62	5.54

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	S 15-20	S 20-60	H 20-60	K 20-60
MAR	6.55	6.90	6.85	6.23	5.88	6.10	6.10	5.90	5.81	5.46	5.20	5.18	4.89
APR	6.44	6.94	6.85	6.36	5.94	6.08	6.05	5.99	5.78	5.41	5.13	5.14	4.93
MAY		9.80	8.84	7.67	7.59	7.19	6.95	6.69	6.53	6.31	6.17	6.63	5.59
JUN		8.84	7.99	9.32	7.52	7.25	6.91	6.69	6.60	5.76	5.12	4.92	4.92
JUL	6.59	6.36	6.05	5.75	5.93	6.01	6.08	5.98	5.85	5.33	4.91	4.79	4.57
AUG	6.83	6.90	6.30	6.05	5.74	5.60	5.93	5.80	5.78	5.18	4.71	4.55	4.41
SEP	6.25	6.54	5.89	5.47	5.36	5.26	5.43	5.32	5.31	4.90	4.58	4.35	4.28
OCT	5.21	5.47	5.08	4.90	4.79	4.76	5.04	4.98	4.97	4.55	4.21	4.09	4.10
NOV	4.83	5.12	4.73	4.45	4.39	4.42	4.79	4.75	4.80	4.50	4.24	4.06	4.12
DEC	4.69	4.94	4.65	4.49	4.44	4.53	4.79	4.68	4.67	4.46	4.28	4.02	3.97
1941 JAN	3.99	4.25	4.17	4.19	4.13	4.16	4.36	4.36	4.44	4.31	4.19		3.80
FEB	3.80	3.82	3.91	3.98	3.92	3.93	4.18	4.35	4.23	4.20	4.15		3.77
MAR	3.63	3.63	3.69	3.80	3.73	3.77	4.02	3.88	3.88	3.89	3.90		3.59
APR	3.36	3.38	3.51	3.59	3.56	3.57	3.57	3.55	3.62	3.66	3.70		3.54
MAY	2.42	3.13	3.17	3.25	3.30	3.34	3.35	3.40	3.45	3.50	3.53	3.51	3.53
JUN	2.31	2.97	3.15	3.26	3.35	3.41	3.42	3.50	3.52	3.57	3.59	3.55	3.55
JUL	2.33	2.90	2.99	3.07	3.19	3.27	3.27	3.26	3.29	3.63	3.55	3.53	3.53
AUG	2.15	2.71	2.93	3.06	3.26	3.25	3.25	3.27	3.29	3.65	3.56	3.54	3.54
SEP	2.14	2.67	2.89	2.98	3.15	3.26	3.27	3.36	3.51	3.62	3.56	3.47	3.50
OCT	2.09	2.57	2.80	2.96	3.08	3.19	3.21	3.35	3.49	3.54	3.46	3.40	3.46
NOV	2.02	2.55	2.78	2.94	3.06	3.15	3.19	3.34	3.47	3.47	3.43	3.42	3.44
DEC	2.23	2.71	2.83	3.04	3.10	3.15	3.18	3.24	3.30	3.43	3.52	3.48	3.51
1942 JAN	2.12	2.69	2.84	2.96	3.05	3.14	3.21	3.37	3.52	3.47	3.48	3.47	3.48
FEB	2.05	2.59	2.76	2.91	3.02	3.12	3.16	3.32	3.46	3.48	3.39	3.41	3.49
MAR	2.09	2.66	2.83	2.98	3.07	3.16	3.22	3.37	3.50	3.49	3.39	3.42	3.47
APR	2.02	2.55	2.74	2.91	3.03	3.14	3.18	3.36	3.49	3.48	3.47	3.43	3.48
MAY	1.97	2.49	2.74	2.89	3.02	3.11	3.17	3.33	3.46	3.48	3.46	3.42	3.47
JUN	1.95	2.45	2.70	2.86	2.99	3.05	3.11	3.26	3.36	3.45	3.52	3.42	3.46
JUL	1.89	2.36	2.62	2.84	2.96	3.02	3.06	3.21	3.31	3.47	3.49	3.37	3.42
AUG	2.01	2.42	2.70	2.89	2.98	3.04	3.09	3.23	3.32	3.49	3.52		3.41
SEP	1.88	2.29	2.62	2.86	2.98	3.03	3.08	3.28	3.31	3.48	3.51	3.34	3.40
OCT	1.77	2.18	2.55	2.83	2.95	3.00	3.03	3.25	3.27	3.44	3.49	3.30	3.40
NOV	1.96	2.37	2.79	2.94	3.07	3.18	3.24	3.40	3.48	3.48	3.51	3.41	3.47
DEC	1.75	2.22	2.62	2.88	3.05	3.09	3.12	3.35	3.37	3.51	3.55	3.36	3.45
1943 JAN	1.72	2.11	2.55	2.73	2.90	2.96	3.05	3.27	3.34	3.50	3.53	3.37	3.45
FEB	1.76	2.19	2.59	2.77	2.94	2.98	3.07	3.28	3.33	3.51	3.53	3.40	3.46
MAR	1.74	2.15	2.55	2.72	2.88	2.93	3.01	3.22	3.28	3.46	3.52	3.37	3.43
APR	1.78	2.17	2.48	2.68	2.86	2.89	2.99	3.24	3.30	3.45	3.52	3.35	3.42
MAY	1.75	2.17	2.54	2.69	2.87	2.90	2.99	3.21	3.27	3.44	3.51	3.33	3.40
JUN	1.61	2.05	2.37	2.42	2.70	2.75	2.85	3.13	3.21	3.43	3.51	3.29	3.39
JUL	1.90	2.39	2.65	2.60	2.86	2.90	3.01	3.26	3.36	3.44	3.53	3.29	3.43
AUG	1.76	2.33	2.58	2.54	2.82	2.88	3.02	3.30	3.42	3.49	3.54	3.37	3.40
SEP	1.65	2.20	2.48	2.48	2.77	2.78	2.89	3.14	3.22	3.42	3.51	3.30	3.39
OCT	1.62	2.09	2.40	2.38	2.67	2.69	2.81	3.06	3.15	3.36	3.49	3.21	3.37
NOV	1.48	2.03	2.36	2.37	2.66	2.70	2.82	3.08	3.17	3.35	3.49	3.23	3.36
DEC	1.38	1.93	2.26	2.32	2.66	2.68	2.81	3.07	3.17	3.34	3.47	3.21	3.35

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. H=Kongeriket Norges Hypotekbank. K=Private credit enterprises.

Issuer	S	S	S	S	S	S	S	S	S	S	S	H	K
Maturity	2	3	4	5	6	7	8	10	10-15	15-20	20-60	20-60	20-60
1944 JAN	1.42	1.89	2.16	2.24	2.64	2.63	2.77	3.05	3.14	3.33	3.48	3.20	3.33
FEB	1.50	2.04	2.19	2.23	2.64	2.64	2.79	3.08	3.19	3.36	3.48	3.17	3.33
MAR	1.44	1.89	2.13	2.31	2.60	2.59	2.74	3.03	3.12	3.32	3.45	3.15	3.32
APR	1.47	1.91	2.16	2.19	2.44	2.59	2.74	3.05	3.12	3.38	3.48	3.18	3.31
MAY	1.52	1.91	2.18	2.21	2.22	2.63	2.77	3.07	3.20	3.28	3.48	3.18	3.33
JUN	1.70	2.15	2.39	2.35	2.68	2.84	2.99	3.30	3.36	3.49	3.53	3.27	3.43
JUL	1.76	2.21	2.41	2.40	2.73	2.87	2.99	3.30	3.38	3.44	3.53	3.36	3.42
AUG	1.72	2.24	2.45	2.37	2.72	2.85	2.95	3.25	3.34	3.48	3.53	3.33	3.42
SEP	1.70	2.12	2.34	2.37	2.66	2.81	2.93	3.23	3.32	3.46	3.52	3.30	3.40
OCT	1.63	2.09	2.32	2.34	2.62	2.77	2.88	3.16	3.25	3.43	3.50	3.22	3.36
NOV	1.44	1.95	2.24	2.28	2.60	2.73	2.84	3.11	3.18	3.41	3.48	3.20	3.34
DEC	1.33	1.83	2.17	2.24	2.56	2.71	2.87	3.18	3.23	3.38	3.49	3.14	3.32

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
S=Kingdom of Norway. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 10-15	S 15-20	S 20-60	K 10-60
1945 JAN	1.59	1.97	2.21	2.29	2.40	2.54	2.66	2.94	3.11	3.23	3.35	3.51	3.34
FEB	1.38	1.79	2.05	2.16	2.27	2.40	2.53	2.81	2.97	3.14	3.32	3.47	3.31
MAR	1.41	1.77	2.05	2.15	2.26	2.39	2.52	2.82	2.88	3.25	3.36	3.45	3.29
APR	1.63	1.96	2.11	2.19	2.29	2.42	2.54	2.88	2.91	3.26	3.35	3.46	3.29
MAY	1.89	2.30	2.40	2.43	2.48	2.57	2.66	3.01	3.02	3.35	3.43	3.46	3.38
JUN	1.75	2.25	2.32	2.34	2.39	2.47	2.56	2.88	2.90	3.22	3.35	3.41	3.36
JUL	1.64	2.14	2.25	2.27	2.34	2.43	2.56	2.91	2.91	3.26	3.30	3.36	3.33
AUG	1.79	2.20	2.18	2.25	2.31	2.41	2.55	2.85	2.86	3.22	3.23	3.29	3.34
SEP	2.05	2.34	2.24	2.32	2.37	2.45	2.61	2.93	2.91	3.25	3.27	3.33	3.37
OCT	2.00	2.40	2.20	2.29	2.32	2.34	2.37	2.74	2.94	3.09	3.23	3.34	3.39
NOV	2.11	2.60	2.16	2.29	2.31	2.31	2.33	2.40	2.66	2.95	3.34	3.35	3.35
DEC	2.18	2.63	2.15	2.31	2.30	2.27	2.29	2.38	2.66	3.37	3.39	3.37	3.36
1946 JAN	1.87	1.97	2.00	2.10	2.18	2.26	2.35	2.41	2.45	2.52			3.32
FEB	1.72	1.90	1.99	2.10	2.18	2.26	2.33	2.37	2.41	2.47			3.32
MAR	1.50	1.86	2.05	2.13	2.18	2.24	2.27	2.30	2.34	2.39	2.46	2.52	3.30
APR	1.50	2.02	2.28	2.33	2.33	2.34	2.30	2.31	2.32	2.34	2.43	2.52	3.32
MAY	1.44	1.99	2.23	2.29	2.31	2.32	2.28	2.28	2.28	2.28	2.41	2.52	2.47
JUN	1.55	2.21	2.39	2.41	2.40	2.43	2.34	2.35	2.37	2.38	2.46	2.52	2.48
JUL	0.97	1.31	1.54	1.69	1.79	1.86	2.13	2.19	2.28	2.38	2.50	2.50	2.51
AUG	1.00	1.35	1.59	1.74	1.84	1.91	2.17	2.24	2.31	2.40	2.51	2.51	2.52
SEP	1.37	1.66	1.83	1.93	1.98	2.02	2.17	2.24	2.32	2.41	2.47	2.52	2.57
OCT	1.05	1.43	1.66	1.81	1.89	2.17	2.18	2.24	2.31	2.38	2.52	2.50	2.53
NOV	1.29	1.63	1.82	1.93	2.00	2.20	2.21	2.28	2.36	2.41	2.52	2.50	2.54
DEC	1.35	1.60	1.76	1.87	1.99	2.09	2.18	2.27	2.36	2.41	2.47	2.51	2.54
1947 JAN	1.43	1.60	1.75	1.65	1.76	1.88	2.02	2.14	2.27	2.35	2.52	2.50	2.56
FEB	1.26	1.51	1.67	1.59	1.71	1.84	1.99	2.13	2.27	2.35	2.50	2.48	2.53
MAR	1.39	1.44	1.67	1.60	1.72	1.85	1.99	2.11	2.25	2.32	2.48	2.49	2.52
APR	1.42	1.44	1.65	1.61	1.74	1.87	1.99	2.11	2.24	2.31	2.47	2.48	2.50
MAY	1.74	1.48	1.68	1.67	1.79	1.86	1.90	1.92	2.25	2.37	2.46	2.48	2.50
JUN	1.65	1.47	1.64	1.63	1.72	1.81	1.96	2.13	2.31	2.34	2.47	2.48	2.51
JUL	1.87	1.49	1.63	1.66	1.74	1.84	2.01	2.18	2.38	2.40	2.47	2.48	2.52
AUG	1.79	1.48	1.58	1.65	1.75	1.85	2.04	2.23	2.44	2.46	2.47	2.53	2.55
SEP	1.23	1.46	1.51	1.63	1.74	1.85	2.05	2.25	2.46	2.47	2.49	2.54	2.59
OCT	1.20	1.42	1.43	1.60	1.70	1.82	2.02	2.23	2.46	2.42	2.49	2.56	2.62
NOV	1.19	1.38	1.34	1.56	1.68	1.81	2.05	2.26	2.47	2.43	2.52	2.55	2.61
DEC	1.23	1.43	1.29	1.60	1.70	1.91	2.03	2.22	2.40	2.39	2.49	2.53	2.62
1948 JAN	1.17	1.36	1.37	1.54	1.66	1.81	2.02	2.22	2.40	2.38	2.48	2.53	2.60
FEB	1.12	1.29	1.36	1.49	1.61	1.78	1.97	2.18	2.35	2.35	2.48	2.52	2.57
MAR	1.09	1.23	1.30	1.43	1.57	1.71	1.95	2.17	2.34	2.34	2.49	2.50	2.56
APR	1.06	1.18	1.25	1.40	1.54	1.70	1.90	2.09	2.20	2.26	2.48	2.48	2.53
MAY	1.05	1.17	1.24	1.38	1.52	1.68	1.90	2.10	2.21	2.23	2.45	2.45	2.51
JUN	1.12	1.30	1.40	1.52	1.64	1.80	1.97	2.14	2.25	2.26	2.48	2.48	2.52
JUL	1.09	1.25	1.35	1.48	1.60	1.76	1.93	2.11	2.21	2.22	2.46	2.47	2.52
AUG	1.08	1.23	1.35	1.50	1.66	1.81	1.96	2.12	2.23	2.23	2.45	2.47	2.50
SEP	1.07	1.22	1.34	1.48	1.62	1.78	1.95	2.11	2.23	2.27	2.46	2.46	2.51
OCT	1.13	1.33	1.43	1.55	1.67	1.82	1.98	2.13	2.23	2.29	2.48	2.48	2.52

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
S=Kingdom of Norway. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 10-15	S 15-20	S 20-60	K 10-60
NOV	1.12	1.30	1.43	1.55	1.69	1.86	2.01	2.17	2.26	2.30	2.48	2.48	2.53
DEC	1.12	1.31	1.44	1.57	1.73	1.88	2.04	2.20	2.27	2.31	2.48	2.48	2.54
1949 JAN	1.16	1.37	1.48	1.60	1.74	1.88	2.04	2.19	2.25	2.30	2.48	2.48	2.54
FEB	1.26	1.56	1.63	1.70	1.86	1.97	2.04	2.12	1.87	1.77	2.49	2.50	2.55
MAR	1.29	1.60	1.70	1.80	1.85	1.90	1.91	2.35	2.42	2.41	2.49	2.53	2.59
APR	1.32	1.64	1.73	1.81	1.85	1.90	1.91	2.12	1.86	1.78	2.49	2.52	2.60
MAY	1.36	1.71	1.79	1.85	1.89	1.93	1.96	2.16	1.87	1.81	2.51	2.54	2.67
JUN	1.28	1.56	1.70	1.80	1.89	1.94	1.98	2.20	1.88	1.82	2.60	2.61	2.71
JUL	1.04	1.17	1.40	1.58	1.90	2.00	2.21	2.42	2.33	2.36	2.52	2.54	2.66
AUG	0.99	1.18	1.34	1.50	1.81	1.89	2.08	2.18	2.23	2.31	2.52	2.53	2.64
SEP	1.08	1.28	1.42	1.57	1.88	1.94	2.12	2.18	2.22	2.32	2.57	2.56	2.66
OCT	0.97	1.12	1.30	1.50	1.71	1.89	2.07	2.14	2.17	2.25	2.47	2.47	2.57
NOV	0.98	1.17	1.37	1.57	1.78	1.95	2.12	2.18	2.20	2.27	2.48	2.47	2.59
DEC	1.11	1.33	1.47	1.63	1.83	2.01	2.18	2.21	2.25	2.31	2.50	2.50	2.60
1950 JAN	0.96	1.30	1.43	1.69	2.24	2.16	2.14	2.16	2.18	2.27	2.50	2.47	2.61
FEB	1.01	1.32	1.46	1.71	2.14	2.11	2.12	2.14	2.18	2.27	2.50		2.63
MAR	1.10	1.36	1.47	1.74	2.18	2.14	2.15	2.17	2.20	2.29	2.52		2.65
APR	1.10	1.31	1.44	1.77	2.24	2.18	2.17	2.20	2.23	2.33	2.56		2.69
MAY	1.18	1.34	1.47	1.90	2.33	2.25	2.24	2.26	2.29	2.38	2.62		2.74
JUN	1.44	1.56	1.64	2.02	2.37	2.33	2.34	2.36	2.39	2.47	2.68		2.77
JUL	1.86	1.96	2.04	2.06	2.04	1.88	2.25	2.45	2.57	2.68	2.88		2.88
AUG	1.66	1.75	1.84	2.23	2.52	2.50	2.52	2.54	2.58	2.65	2.85		2.87
SEP	1.57	1.70	1.92	1.93	1.93	1.80	2.15	2.35	2.47	2.60	2.85		2.87
OCT	1.70	1.82	2.03	1.99	1.95	1.84	2.19	2.39	2.51	2.63	2.86		2.87
NOV	1.96	2.00	2.04	2.07	2.10	2.20	2.32	2.44	2.56	2.60	3.00		3.01
DEC	2.26	2.34	2.41	2.37	2.31	2.36	2.44	2.52	2.61	2.63	3.08		3.07
1951 JAN	1.69	1.76	2.08	2.11	2.15	2.27	2.38	2.49	2.61	2.63	2.92		3.01
FEB	1.94	1.78	2.01	2.06	2.08	2.21	2.34	2.46	2.59	2.60	2.93		2.99
MAR	1.88	1.71	2.01	2.08	2.13	2.26	2.38	2.51	2.63	2.63	2.95		3.02
APR	1.88	1.71	2.05	2.15	2.22	2.23	2.44	2.58	2.67	2.79	3.04		3.11
MAY	2.02	1.85	2.17	2.30	2.29	2.50	2.65	2.75	2.82	2.93	3.17		3.32
JUN	1.88	1.69	2.05	2.20	2.18	2.47	2.71	2.95	3.12	3.12	3.26		3.42
JUL	1.87	1.71	2.03	2.16	2.12	2.41	2.63	2.85	3.00	3.06	3.26		3.31
AUG	2.01	1.81	2.06	2.11	2.07	2.38	2.60	2.82	2.94	3.05	3.30		3.38
SEP	1.94	1.79	2.12	2.24	2.23	2.50	2.68	2.86	2.95	3.06	3.30		3.37
OCT	2.02	1.85	2.15	2.23	2.33	2.51	2.69	2.87	2.95	3.09	3.37		3.39
NOV	2.02	1.87	2.19	2.29	2.38	2.53	2.68	2.84	2.89	3.07	3.39		3.38
DEC	2.01	1.87	1.82	2.19	2.30	2.46	2.62	2.79	2.83	2.98	3.26		3.35
1952 JAN	1.77	1.90	2.06	2.06	2.18	2.34	2.51	2.68	2.70	2.87	3.18		3.31
FEB	1.90	2.01	1.96	1.92	2.07	2.26	2.46	2.66	2.67	2.85	3.15		3.32
MAR	1.87	2.01	2.02	2.02	2.17	2.34	2.51	2.68	2.68	2.88	3.22		3.29
APR	1.84	1.96	1.97	1.97	2.12	2.28	2.44	2.58	2.76	2.93	3.23		3.29
MAY	1.91	1.96	1.98	2.00	2.15	2.29	2.43	2.55	2.75	2.92	3.23		3.25
JUN	1.96	2.00	2.01	2.00	2.16	2.30	2.44	2.55	2.75	2.92	3.21		3.29
JUL	1.88	1.91	1.94	1.95	2.14	2.29	2.45	2.55	2.73	2.89	3.18		3.24
AUG	1.85	1.88	1.90	2.01	2.26	2.39	2.48	2.53	2.73	2.89	3.14		3.29

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
S=Kingdom of Norway. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 10-15	S 15-20	S 20-60	K 10-60
SEP	1.85	1.87	1.88	2.03	2.32	2.43	2.52	2.55	2.74	2.89	3.14		3.29
OCT	1.87	1.90	1.92	2.09	2.34	2.44	2.52	2.55	2.74	2.89	3.13		3.28
NOV	1.92	1.95	1.98	2.17	2.39	2.48	2.53	2.55	2.73	2.87	3.10		3.25
DEC	1.94	1.96	1.99	2.19	2.41	2.49	2.54	2.55	2.75	2.89	3.13		3.24
1953 JAN	1.89	1.89	1.92	2.17	2.44	2.48	2.54	2.55	2.74	2.89	3.13		3.25
FEB	1.99	2.01	2.04	2.24	2.49	2.60	2.74	2.83	2.89	2.96	3.12		3.26
MAR	1.99	1.97	1.97	2.23	2.48	2.49	2.53	2.53	2.74	2.89	3.14		3.26
APR	1.99	1.97	1.97	2.23	2.49	2.49	2.53	2.74	2.86	2.97	3.17		3.27
MAY	1.97	2.00	2.10	2.29	2.55	2.63	2.77	2.85	2.91	2.99	3.15		3.26
JUN	1.97	1.99	2.06	2.30	2.53	2.52	2.53	2.75	2.87	2.99	3.20		3.27
JUL	1.95	1.97	2.06	2.35	2.49	2.52	2.53	2.73	2.85	2.95	3.16		3.26
AUG	1.85	1.93	2.10	2.39	2.67	2.75	2.81	2.86	2.89	2.96	3.13		3.26
SEP	1.89	1.95	2.13	2.40	2.65	2.76	2.83	2.89	2.93	3.01	3.18		3.27
OCT	1.89	1.93	2.11	2.36	2.59	2.69	2.77	2.82	2.87	2.94	3.10		3.25
NOV	1.90	1.98	2.17	2.39	2.56	2.68	2.75	2.81	2.85	2.92	3.09		3.22
DEC	1.94	1.98	2.18	2.41	2.59	2.70	2.78	2.83	2.87	2.94	3.09		3.23
1954 JAN	1.92	1.95	2.19	2.48	2.61	2.71	2.79	2.84	2.88	2.94	3.10		3.21
FEB	1.93	1.99	2.24	2.49	2.56	2.68	2.75	2.80	2.84	2.91	3.05		3.18
MAR	1.92	2.00	2.27	2.49	2.54	2.67	2.75	2.81	2.85	2.91	3.05		3.17
APR	1.93	2.01	2.31	2.54	2.59	2.70	2.77	2.82	2.85	2.92	3.05		3.17
MAY	1.94	2.06	2.36	2.58	2.62	2.72	2.78	2.83	2.86	2.92	3.05		3.17
JUN	1.98	2.16	2.46	2.69	2.73	2.83	2.90	2.97	2.96	2.97	3.05		3.17
JUL	1.96	2.17	2.49	2.70	2.65	2.84	2.90	2.97	2.97	2.99	3.09		3.11
AUG	1.92	2.13	2.47	2.71	2.65	2.85	2.92	2.98	2.98	2.99	3.07		3.15
SEP	1.85	2.09	2.48	2.74	2.67	2.87	2.93	2.99	3.00	3.01	3.10		3.15
OCT	1.90	2.20	2.56	2.80	2.73	2.91	2.97	3.02	3.03	3.04	3.13		3.26
NOV	1.92	2.41	2.72	2.80	2.62	2.95	3.01	3.07	3.07	3.11	3.22		3.27
DEC	1.90	2.33	2.71	2.82	2.61	2.95	2.98	3.03	3.08	3.14	3.30		3.30
1955 JAN	1.96	2.58	3.00	3.11	3.05	3.04	3.05	3.06	3.26	3.30	3.40		3.39
FEB	2.27	3.10	3.43	3.42	3.41	3.73	3.84	3.97	3.98	3.90	3.90		3.81
MAR	2.49	3.39	4.02	4.01	3.87	4.00	3.99	3.98	3.97	3.91	3.92		3.85
APR	2.21	3.18	3.68	3.88	3.75	3.95	3.97	3.99	4.00	4.02	3.93		3.94
MAY	2.41	3.53	4.02	4.15	4.02	4.11	4.09	4.07	4.06	4.06	4.04		3.98
JUN	3.84	3.97	4.14	4.18	4.20	4.15	4.13	4.11	4.19	4.06	4.06		4.01
JUL	4.01	4.07	4.21	4.21	4.13	4.13	4.10	4.07	4.00	4.07	4.05		4.12
AUG	3.99	4.12	4.20	4.19	4.29	4.20	4.17	4.13	4.29	4.10	4.14		4.23
SEP	3.69	3.97	4.20	4.22	4.32	4.22	4.19	4.16	4.31	4.15	4.42		4.28
OCT	3.60	3.92	4.17	4.18	4.11	4.15	4.13	4.10	4.07	4.14	4.35		4.28
NOV	3.90	4.23	4.44	4.43	4.40	4.28	4.22	4.14	4.06	4.16			4.31
DEC	4.08	4.39	4.59	4.51	4.68	4.48	4.40	4.32	4.46	4.38	4.50		4.37
1956 JAN	3.68	4.03	4.18	4.09	4.31	4.28	4.27	4.29	4.36	4.45	4.58		4.39
FEB	3.40	3.87	4.05	4.05	4.18	4.19	4.19	4.22	4.28	4.41	4.50		4.38
MAR	3.01	4.03	4.34	4.24	4.36	4.31	4.28	4.39	4.30	4.34	4.35		4.58
APR	3.42	4.04	4.26	4.26	4.46	4.42	4.43	4.45	4.47	4.62	4.50		4.61
MAY	3.62	4.19	4.37	4.37	4.57	4.51	4.51	4.68	4.54	4.86	4.75		4.79
JUN	3.88	4.30	4.42	4.34	4.31	4.54	4.54	4.61	4.63	5.20	5.04		5.03

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
S=Kingdom of Norway. K=Private credit enterprises.

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 10-15	S 15-20	S 20-60	K 10-60
JUL	3.92	4.39	4.43	4.34	4.31	4.51	4.54	4.58	4.61	5.22			5.03
AUG	3.93	4.34	4.32	4.34	4.59	4.43	4.45	4.79	4.49	5.03	4.93		4.98
SEP	3.49	4.14	4.28	4.23	4.54	4.40	4.42	4.74	4.46	4.98	4.82		4.96
OCT	3.64	4.30	4.32	4.25	4.45	4.44	4.47	4.71	4.53	4.91	4.79		4.94
NOV	3.90	4.42	4.44	4.40	4.53	4.50	4.51	4.70	4.56	4.90	4.83		5.02
DEC	3.96	4.39	4.42	4.38	4.48	4.45	4.45	4.68	4.49	4.91	4.81		4.99
1957 JAN	3.88	4.15	4.18	4.16	4.30	4.33	4.36	4.57	4.43	4.77	4.72		4.93
FEB	3.85	4.14	4.15	4.14	4.31	4.34	4.38	4.57	4.45	4.68	4.67		4.97
MAR	3.75	4.21	4.22	4.20	4.36	4.37	4.40	4.56	4.45	4.63	4.60		4.97
APR	3.78	4.23	4.27	4.24	4.39	4.41	4.43	4.46	4.48	4.63	4.60		4.95
MAY	4.02	4.39	4.40	4.41	4.46	4.45	4.45	4.46	4.47	4.56	4.57		4.95
JUN	4.03	4.64	4.66	4.64	4.63	4.56	4.53	4.49	4.49	4.54	4.55		4.95
JUL	4.34	4.82	4.85	4.88	4.84	4.83	4.81	4.80	4.77	4.68	4.63		4.92
AUG	4.32	4.78	4.81	4.87	4.95	4.99	5.04	5.07	4.99	4.72	4.53		5.05
SEP	4.41	4.85	4.87	4.91	4.99	5.02	5.11	5.06	5.00	4.80	4.84		5.16
OCT	4.37	4.51	4.47	4.54	4.69	4.77	4.89	4.90	4.84	4.83	4.85		5.17
NOV	4.37	4.62	4.61	4.64	4.75	4.80	4.88	4.86	4.86	4.85	5.21		5.11
DEC	4.47	4.76	4.80	4.79	4.83	4.85	4.86	4.87	4.87	4.87	5.11		5.32
1958 JAN	4.70	4.73	4.90	5.04	4.88	4.87	4.86	4.85	4.84	4.80	4.77		5.27
FEB	4.50	4.75	4.86	4.98	4.92	4.95	4.97	4.96	4.93	4.77			5.26
MAR	4.61	4.87	4.90	5.08	5.00	5.04	5.08	5.07	5.01	4.77			5.31
APR	4.54	4.67	4.76	4.82	4.81	4.84	4.87	4.87	4.85	4.77	5.09		5.27
MAY	4.58	4.70	4.79	4.83	4.78	4.78	4.77	4.77	4.76	4.74	5.06		5.29
JUN	4.62	4.66	4.73	4.75	4.72	4.73	4.74	4.74	4.74	4.74	5.10		5.29
JUL	4.70	4.67	4.77	4.78	4.82	4.86	4.90	4.89	4.86	4.73	5.10		5.35
AUG	4.67	4.62	4.82	4.89	4.93	5.00	5.08	5.04	4.97	4.69	5.18		5.35
SEP	4.67	4.57	4.76	4.78	4.85	4.91	4.97	4.94	4.89	4.68	5.19		5.32
OCT	4.66	4.57	4.74	4.77	4.78	4.82	4.85	4.82	4.78	4.62	5.16		5.27
NOV	4.54	4.60	4.79	4.75	4.78	4.80	4.83	4.79	4.75	4.57	5.13		5.27
DEC	4.47	4.30	4.64	4.67	4.70	4.77	4.79	4.77	4.73	4.57	5.14		5.26
1959 JAN	4.34	4.30	4.60	4.66	4.72	4.79	4.84	4.81	4.76	4.63	5.12		5.25
FEB	4.35	4.32	4.63	4.68	4.72	4.79	4.82	4.78	4.73	4.55	5.11		5.25
MAR	4.32	4.39	4.67	4.68	4.72	4.77	4.80	4.76	4.72	4.56	5.12		5.26
APR	4.36	4.40	4.63	4.65	4.69	4.75	4.77	4.73	4.70	4.56	5.09		5.23
MAY	4.32	4.46	4.68	4.64	4.66	4.69	4.69	4.67	4.65	4.57	5.09		5.20
JUN	4.43	4.43	4.34	4.54	4.62	4.70	4.76	4.74	4.71	4.63	5.10		5.21
JUL	4.25	4.51	4.62	4.63	4.68	4.70	4.71	4.69	4.66	4.58	5.10		5.21
AUG	4.22	4.38	4.31	4.52	4.60	4.67	4.71	4.69	4.66	4.55	5.10		5.17
SEP	4.32	4.44	4.29	4.55	4.62	4.69	4.72	4.70	4.67	4.56	5.10		5.16
OCT	4.34	4.49	4.55	4.56	4.61	4.66	4.67	4.64	4.62	4.52	5.05		5.13
NOV	4.31	4.50	4.01	4.55	4.62	4.68	4.69	4.65	4.60	4.47	5.05		5.16
DEC	4.10	4.27	3.73	4.59	4.64	4.60	4.72	4.68	4.65	4.55	5.05		5.12

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 10	S 10-15	K 5	K 10	K 10-30	I 5	I 10
1960 JAN	4.19	4.19	4.44	4.55	4.61	4.59	4.64	4.61	5.51	5.28	5.27	5.83	
FEB	4.21	4.09	4.39	4.52	4.59	4.59	4.64	4.60	5.50	5.23	5.27	5.87	
MAR	4.29	3.99	4.47	4.59	4.65	4.61	4.63	4.58	5.31	5.23	5.27	5.66	
APR	4.33	4.47	4.43	4.55	4.61	4.62	4.60	4.53	5.27	5.18	5.27	5.60	
MAY	4.44	4.47	4.42	4.54	4.60	4.75	4.60	4.54	5.23	5.18	5.24	5.58	
JUN	4.50	4.47	4.41	4.57	4.63	4.79	4.66	4.62	5.21	5.18	5.23	5.62	
JUL	4.58	4.49	4.35	4.57	4.62	4.78	4.64	4.59	5.23	5.10	5.23	5.73	5.51
AUG	4.46	4.52	4.49	4.63	4.67	4.80	4.71	4.68	5.17	5.15	5.23	5.77	5.61
SEP	4.33	4.49	4.52	4.59	4.62	4.75	4.69	4.69	5.17	5.15	5.21	5.77	5.67
OCT	4.29	4.45	4.49	4.56	4.62	4.75	4.66	4.63	5.14	5.14	5.22	5.60	5.67
NOV	4.39	4.53	4.64	4.62	4.66	4.76	4.72	4.73	5.25	5.17	5.22	5.65	5.66
DEC	4.41	4.53	4.56	4.59	4.61	4.73	4.68	4.69	5.25	5.20	5.22	5.72	5.67
1961 JAN	4.32	4.38	4.48	4.49	4.57	4.65	4.63	4.59	5.27	5.14	5.22	5.69	5.67
FEB	4.29	4.39	4.42	4.50	4.56	4.63	4.61	4.56	5.27	5.15	5.21	5.65	5.64
MAR	4.34	4.43	4.47	4.49	4.54	4.56	4.63	4.61	5.24	5.17	5.19	5.62	5.52
APR	4.31	4.43	4.46	4.48	4.52	4.53	4.62	4.60	5.19	5.15	5.18	5.46	5.54
MAY	4.48	4.55	4.55	4.60	4.63	4.66	4.76	4.77	5.27	5.30	5.24	5.55	5.58
JUN	4.49	4.56	4.54	4.67	4.71	4.79	4.78	4.75	5.27	5.32	5.25	5.64	5.59
JUL	4.49	4.64	4.69	4.80	4.93	5.00	4.84	4.72	5.28	5.30	5.26	5.67	5.65
AUG	4.59	4.74	4.80	4.93	5.03	5.10	5.11	5.08	5.34	5.30	5.24	5.94	5.74
SEP	4.50	4.63	4.74	4.82	4.91	4.98	4.97	4.94	5.33	5.43	5.26	5.73	5.70
OCT	4.32	4.52	4.64	4.66	4.78	4.83	4.92	4.94	5.27	5.39	5.27	5.63	5.71
NOV	4.09	4.34	4.52	4.57	4.73	4.80	4.91	4.92	5.38	5.47	5.26	5.63	5.70
DEC	4.17	4.38	4.55	4.67	4.75	4.82	4.91	4.90	5.41	5.47	5.27	5.66	5.72
1962 JAN	4.09	4.35	4.53	4.66	4.72	4.78	4.85	4.85	5.30	5.43	5.26	5.60	5.67
FEB	4.11	4.33	4.51	4.61	4.66	4.71	4.80	4.80	5.31	5.38	5.27	5.58	5.64
MAR	4.14	4.31	4.49	4.58	4.65	4.72	4.79	4.77	5.41	5.43	5.31	5.65	5.72
APR	4.11	4.31	4.42	4.58	4.65	4.71	4.78	4.77	5.43	5.46	5.32	5.56	5.73
MAY	4.15	4.32	4.43	4.57	4.72	4.70	4.75	4.74	5.42	5.53	5.35	5.55	5.81
JUN	4.21	4.35	4.48	4.62	4.78	4.79	4.79	4.75	5.40	5.55	5.35	5.58	5.81
JUL	4.21	4.40	4.55	4.72	4.94	4.90	4.84	4.77	5.39	5.57	5.35	5.67	5.85
AUG	4.23	4.38	4.54	4.69	4.90	4.87	4.85	4.76	5.38	5.63	5.37	5.77	5.86
SEP	4.28	4.42	4.58	4.72	4.92	4.89	4.86	4.78	5.36	5.84	5.43	5.89	5.87
OCT	4.24	4.38	4.56	4.70	4.91	4.89	4.85	4.76	5.36	5.86	5.42	5.81	5.86
NOV	4.28	4.40	4.56	4.68	4.88	4.84	4.83	4.76	5.23	5.87	5.41	5.76	5.84
DEC	4.27	4.40	4.55	4.69	4.90	4.87	4.86	4.77	5.31	5.90	5.44	5.80	5.87
1963 JAN	4.18	4.32	4.47	4.59	4.73	4.76	4.73	4.65	5.23	5.86	5.37	5.65	5.73
FEB	4.31	4.34	4.40	4.53	4.68	4.70	4.67	4.59	5.16	5.81	5.37	5.62	5.71
MAR	4.20	4.24	4.33	4.45	4.62	4.63	4.58	4.51	5.08	5.77	5.32	5.66	5.64
APR	4.25	4.27	4.34	4.46	4.56	4.62	4.57	4.51	5.06	5.69	5.32	5.57	5.64
MAY	4.22	4.25	4.32	4.44	4.58	4.60	4.55	4.51	5.04	5.67	5.35	5.57	5.76
JUN	4.30	4.33	4.40	4.53	4.65	4.67	4.59	4.53	5.11	5.78	5.36	5.67	5.78
JUL	4.35	4.36	4.42	4.55	4.63	4.64	4.57	4.54	5.35	5.79	5.34	5.70	5.78
AUG	4.33	4.37	4.46	4.58	4.66	4.68	4.60	4.55	5.58	5.80	5.36	5.68	5.74
SEP	4.23	4.30	4.41	4.54	4.62	4.64	4.57	4.51	5.59	5.87	5.36	5.72	5.80
OCT	4.20	4.29	4.41	4.53	4.60	4.62	4.56	4.51	5.61	5.81	5.34	5.64	5.74

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 10	S 10-15	K 5	K 10	K 10-30	I 5	I 10
NOV	4.22	4.33	4.44	4.52	4.59	4.65	4.63	4.62	5.63	5.80	5.33	5.65	5.67
DEC	4.39	4.41	4.45	4.54	4.60	4.64	4.62	4.59	5.65	5.82	5.34	5.69	5.67
1964 JAN	4.37	4.42	4.45	4.56	4.60	4.64	4.61	4.56	5.66	5.79	5.32	5.72	5.66
FEB	4.36	4.42	4.45	4.56	4.58	4.65	4.60	4.55	5.70	5.77	5.33	5.65	5.62
MAR	4.55	4.45	4.45	4.59	4.70	4.65	4.62	4.56	5.67	5.78	5.34	5.69	5.63
APR	4.60	4.44	4.45	4.56	4.65	4.62	4.61	4.57	5.67	5.80	5.33	5.58	5.63
MAY	4.50	4.41	4.43	4.54	4.59	4.60	4.58	4.56	5.66	5.79	5.36	5.49	5.66
JUN	4.51	4.39	4.43	4.55	4.61	4.65	4.69	4.64	5.67	5.79	5.35	5.54	5.68
JUL	4.38	4.37	4.40	4.53	4.60	4.64	4.71	4.65	5.65	5.78	5.34	5.56	5.62
AUG	4.49	4.40	4.45	4.59	4.64	4.69	4.72	4.66	5.65	5.78	5.32	5.49	5.66
SEP	4.48	4.40	4.46	4.61	4.66	4.70	4.74	4.67	5.62	5.75	5.32	5.50	5.64
OCT	4.54	4.43	4.48	4.61	4.65	4.68	4.73	4.68	5.63	5.72	5.34	5.45	5.64
NOV	4.61	4.44	4.47	4.60	4.64	4.66	4.71	4.67	5.63	5.70	5.34	5.49	5.66
DEC	4.49	4.39	4.46	4.63	4.65	4.68	4.72	4.68	5.63	5.72	5.42	5.52	5.67
1965 JAN	4.38	4.37	4.45	4.62	4.65	4.68	4.72	4.67	5.63	5.70	5.35	5.48	5.68
FEB	4.40	4.38	4.47	4.66	4.68	4.71	4.73	4.67	5.63	5.68	5.33	5.52	5.63
MAR	4.40	4.40	4.47	4.68	4.66	4.71	4.75	4.68	5.65	5.71	5.32	5.55	5.77
APR	4.41	4.42	4.48	4.58	4.69	4.73	4.78	4.73	5.67	5.63	5.32	5.51	5.78
MAY	4.46	4.44	4.49	4.61	4.72	4.81	4.96	4.89	5.70	5.63	5.42	5.54	5.72
JUN	4.43	4.44	4.52	4.65	4.78	4.86	4.99	4.94	5.74	5.66	5.64	5.59	5.84
JUL	4.48	4.46	4.55	4.67	4.81	4.89	5.02	4.95	5.77	5.65	5.58	5.67	5.88
AUG	4.48	4.45	4.50	4.61	4.75	4.83	4.95	4.88	5.71	5.63	5.45	5.64	5.72
SEP	4.47	4.44	4.50	4.61	4.75	4.82	4.89	4.83	5.72	5.67	5.42	5.71	5.74
OCT	4.49	4.45	4.49	4.56	4.71	4.81	4.96	4.89	5.64	5.62	5.47	5.63	5.87
NOV	4.46	4.40	4.47	4.54	4.68	4.77	4.90	4.86	5.65	5.61	5.43	5.68	5.87
DEC	4.48	4.42	4.50	4.58	4.71	4.78	4.88	4.83	5.68	5.61	5.39	5.72	5.87
1966 JAN	4.26	4.21	4.48	4.56	4.69	4.73	4.76	4.72	5.71	5.88	5.36	5.77	5.76
FEB	4.58	4.41	4.43	4.54	4.65	4.70	4.74	4.66	5.69	5.84	5.39	5.78	5.85
MAR	4.45	4.37	4.44	4.55	4.67	4.71	4.77	4.73	5.66	5.69	5.41	5.79	5.85
APR	4.48	4.37	4.43	4.54	4.63	4.67	4.75	4.71	5.68	5.52	5.39	5.79	5.85
MAY	4.44	4.36	4.44	4.56	4.64	4.68	4.76	4.73	5.69	5.53	5.39	5.79	5.85
JUN	4.48	4.42	4.47	4.55	4.66	4.70	4.79	4.79	5.73	5.55	5.48	5.79	5.86
JUL	4.45	4.42	4.49	4.57	4.69	4.72	4.81	4.85	5.74	5.55	5.55	5.80	5.86
AUG	4.45	4.42	4.50	4.58	4.71	4.74	4.81	4.85	5.73	5.56	5.60	5.80	5.88
SEP	4.41	4.39	4.50	4.53	4.71	4.73	4.81	4.86	5.76	5.58	5.64	5.80	5.89
OCT	4.44	4.42	4.49	4.53	4.69	4.73	4.85	4.91	5.75	5.51	5.56	5.85	5.85
NOV	4.39	4.39	4.43	4.55	4.66	4.73	4.83	4.86	5.77	5.52	5.54	5.86	5.86
DEC	4.47	4.44	4.48	4.59	4.72	4.78	4.89	4.93	5.81	5.46	5.64	5.85	5.87
1967 JAN	4.49	4.44	4.46	4.60	4.74	4.85	4.93	4.94	5.89	5.47	5.71	5.86	5.97
FEB	4.51	4.46	4.45	4.63	4.82	4.94	5.01	4.98	5.84	5.49	5.77	5.83	6.02
MAR	4.52	4.46	4.47	4.74	4.83	4.94	4.98	4.98	5.75	5.50	5.92	5.87	6.05
APR	4.51	4.47	4.45	4.71	4.83	4.94	5.02	4.98	5.80	5.53	5.86	5.90	6.01
MAY	4.51	4.46	4.45	4.66	4.76	4.85	4.93	4.95	5.79	5.64	5.83	5.88	5.97
JUN	4.51	4.47	4.45	4.67	4.74	4.85	4.93	4.96	5.84	5.54	5.76	5.84	5.95
JUL	4.49	4.44	4.41	4.60	4.71	4.81	4.90	4.91	5.79	5.70	5.63	5.82	5.92
AUG	4.50	4.45	4.40	4.61	4.71	4.81	4.88	4.90	5.75	5.72	5.68	5.85	5.97

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 10	S 10-15	K 5	K 10	K 10-30	I 5	I 10
SEP	4.44	4.40	4.35	4.57	4.65	4.75	4.80	4.82	5.74	5.71	5.73	5.79	5.90
OCT	4.36	4.34	4.30	4.50	4.58	4.68	4.77	4.81	5.81	5.67	5.70	5.77	5.92
NOV	4.32	4.31	4.30	4.48	4.57	4.67	4.77	4.82	5.69	5.65	5.65	5.79	5.90
DEC	4.33	4.32	4.30	4.46	4.57	4.67	4.76	4.79	5.82	5.82	5.53	5.80	5.98
1968 JAN	4.35	4.34	4.32	4.49	4.59	4.69	4.79	4.84	5.71	5.77	5.53	5.80	5.90
FEB	4.38	4.35	4.32	4.52	4.63	4.74	4.82	4.86	5.77	5.80	5.54	5.79	5.91
MAR	4.37	4.33	4.31	4.52	4.64	4.76	4.85	4.86	5.81	5.82	5.45	5.80	5.90
APR	4.38	4.36	4.33	4.54	4.67	4.78	4.87	4.87	5.78	5.72	5.39	5.81	5.91
MAY	4.37	4.35	4.32	4.54	4.66	4.77	4.85	4.85	5.74	5.62	5.40	5.82	5.95
JUN	4.40	4.38	4.33	4.57	4.68	4.79	4.89	4.91	5.76	5.65	5.39	5.83	5.95
JUL	4.40	4.36	4.32	4.58	4.68	4.77	4.85	4.89	5.74	5.64	5.35	5.81	5.92
AUG	4.39	4.35	4.32	4.57	4.65	4.74	4.81	4.86	5.74	5.69	5.35	5.82	5.95
SEP	4.38	4.34	4.33	4.56	4.63	4.71	4.79	4.84	5.75	5.63	5.35	5.83	5.94
OCT	4.34	4.30	4.33	4.55	4.62	4.70	4.76	4.79	5.71	5.61	5.35	5.82	5.93
NOV	4.30	4.27	4.29	4.48	4.57	4.67	4.73	4.75	5.71	5.59	5.36	5.80	5.94
DEC	4.32	4.28	4.31	4.48	4.58	4.67	4.72	4.72	5.73	5.62	5.36	5.81	5.94
1969 JAN	4.30	4.28	4.31	4.50	4.59	4.72	4.72	4.73	5.73	5.62	5.36	5.80	5.96
FEB	4.33	4.29	4.33	4.51	4.60	4.72	4.72	4.73	5.78	5.65	5.36	5.81	5.97
MAR	4.34	4.31	4.33	4.53	4.63	4.75	4.75	4.76	5.81	5.64	5.38	5.84	5.98
APR	4.33	4.28	4.32	4.51	4.59	4.71	4.70	4.71	5.82	5.63	5.38	5.85	6.00
MAY	4.33	4.29	4.35	4.52	4.60	4.70	4.70	4.71	5.87	5.68	5.39	5.90	6.00
JUN	4.36	4.32	4.36	4.54	4.63	4.74	4.75	4.78	5.89	5.70	5.40	5.92	6.00
JUL	4.34	4.31	4.35	4.51	4.61	4.71	4.74	4.77	5.92	5.64	5.39	6.03	6.00
AUG	4.33	4.30	4.34	4.49	4.59	4.67	4.71	4.75	5.92	5.64	5.39	6.09	6.05
SEP	6.05	6.04	5.90	6.05	6.05	6.01	5.99	5.88	6.93	6.72	6.63	7.24	6.90
OCT	5.96	5.71	5.69	5.90	6.02	6.10	5.82	5.54	6.66	7.12	6.56	7.14	6.99
NOV	5.80	5.66	5.60	5.77	5.87	5.95	5.89	5.77	6.75	7.71	7.13	7.46	7.07
DEC	5.91	5.68	5.61	5.78	5.90	5.98	5.92	5.78	6.81	6.98	6.83	7.25	7.16
1970 JAN	5.88	5.68	5.59	5.74	5.91	5.97	5.92	5.82	6.81	6.73	6.50	6.78	6.81
FEB	6.06	5.86	5.73	5.87	5.99	6.01	5.94	5.83	6.85	6.66	6.53	6.81	6.86
MAR	6.10	5.89	5.75	5.91	6.03	6.05	5.99	5.89	6.89	6.75	6.53	6.76	6.85
APR	5.63	5.57	5.48	5.78	5.95	6.01	5.98	5.89	6.96	6.76	6.54	6.77	6.86
MAY	5.64	5.56	5.48	5.79	5.96	6.01	5.96	5.85	7.04	6.80	6.56	6.79	6.86
JUN	5.71	5.59	5.51	5.82	5.99	6.06	6.02	5.91	7.10	6.83	6.57	6.81	6.90
JUL	5.76	5.63	5.57	5.89	6.05	6.07	5.94	5.78	7.11	6.84	6.56	6.81	6.95
AUG	5.74	5.56	5.57	5.88	6.05	6.06	5.91	5.75	7.06	6.84	6.57	6.77	6.92
SEP	5.75	5.57	5.54	5.90	6.09	6.08	5.84	5.63	6.91	6.90	6.57	6.79	6.85
OCT	5.56	5.50	5.52	5.87	6.08	6.09	5.91	5.73	6.92	6.87	6.59	6.79	6.86
NOV	5.38	5.44	5.52	5.83	6.01	6.01	5.81	5.61	6.88	6.82	6.58	6.81	6.87
DEC	5.42	5.47	5.63	5.83	6.00	6.02	5.95	5.87	6.88	6.88	6.59	6.81	6.92
1971 JAN	5.46	5.48	5.44	5.79	5.94	5.95	5.88	5.81	6.88	6.91	6.60	6.79	6.92
FEB	5.51	5.51	5.46	5.81	5.95	5.93	5.86	5.76	6.86	6.92	6.60	6.83	6.89
MAR	5.56	5.53	5.66	5.85	5.99	5.96	5.87	5.76	6.89	6.90	6.60	6.80	6.94
APR	5.66	5.55	5.68	5.86	5.99	5.96	5.85	5.74	6.87	6.91	6.60	6.81	6.95
MAY	5.74	5.60	5.75	5.91	6.04	6.02	6.00	6.01	6.86	6.89	6.61	6.83	6.96
JUN	5.70	5.55	5.74	5.93	6.08	6.06	6.04	6.04	6.91	6.85	6.58	6.79	7.02

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer	S	S	S	S	S	S	S	S	K	K	K	I	I
Maturity	2	3	4	5	6	7	10	10-15	5	10	10-30	5	10
JUL	5.74	5.52	5.74	5.92	6.05	6.00	5.85	5.73	6.91	6.89	6.55	6.79	6.93
AUG	5.80	5.51	5.78	5.93	6.04	5.97	5.90	5.84	6.84	6.85	6.53	6.78	6.87
SEP	5.81	5.55	5.86	6.00	6.11	6.05	6.02	5.98	6.87	6.84	6.53	6.79	6.90
OCT	5.75	5.48	5.86	6.03	6.15	6.10	6.02	5.98	6.78	6.84	6.56	6.88	6.91
NOV	5.16	5.23	5.60	5.85	6.00	5.96	5.80	5.75	6.67	6.83	6.51	6.79	6.92
DEC	4.81	5.22	5.45	5.79	5.92	5.98	6.06	6.14	6.60	6.77	6.54	6.84	

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	K 5	K 10	K 10-30	I 5
1972 JAN	5.36	5.40	5.47	5.79	5.89	5.98	6.03	6.10	6.18	6.54	6.76	6.61	6.92
FEB	4.93	5.26	5.46	5.79	5.85	5.93	5.97	6.04	6.14	6.42	6.71	6.62	6.90
MAR	4.92	5.28	5.48	5.81	5.88	5.93	5.97	6.04	6.13	6.42	6.60	6.62	6.76
APR	4.90	5.30	5.48	5.81	5.87	5.93	5.97	6.04	6.14	6.36	6.58	6.62	6.72
MAY	4.92	5.33	5.50	5.83	5.90	5.89	5.92	5.98	6.07	6.37	6.58	6.60	6.59
JUN	4.86	5.35	5.48	5.84	5.91	5.89	5.92	5.98	6.07	6.30	6.55	6.55	6.48
JUL	4.90	5.33	5.43	5.80	5.85	5.83	5.87	5.93	6.02	6.31	6.53	6.46	6.41
AUG	5.12	5.40	5.46	5.77	5.88	5.86	5.90	5.96	6.05	6.29	6.53	6.45	6.42
SEP	5.23	5.41	5.48	5.81	5.91	5.88	5.92	5.98	6.06	6.29	6.47	6.48	6.44
OCT	5.30	5.41	5.47	5.79	5.90	5.87	5.90	5.95	6.01	6.23	6.46	6.40	6.36
NOV	5.11	5.33	5.44	5.78	5.92	5.86	5.87	5.91	5.98	6.23	6.47	6.43	6.38
DEC	5.10	5.32	5.41	5.69	5.85	5.82	5.84	5.88	5.95	6.21	6.43	6.44	6.35
1973 JAN	5.18	5.33	5.44	5.68	5.80	5.82	5.83	5.88	5.94	6.18	6.37	6.41	6.33
FEB	5.21	5.34	5.47	5.74	5.84	5.88	5.93	6.03	6.12	6.20	6.37	6.53	6.36
MAR	5.32	5.40	5.54	5.78	5.90	5.96	6.03	6.12	6.19	6.18	6.37	6.54	6.33
APR	5.47	5.52	5.65	5.84	5.98	6.04	6.12	6.20	6.26	6.20	6.37	6.52	6.36
MAY	5.45	5.47	5.57	5.72	5.84	5.93	6.01	6.10	6.19	6.21	6.37	6.55	6.37
JUN	5.51	5.52	5.68	5.86	6.01	6.05	6.10	6.18	6.23	6.21	6.37	6.56	6.34
JUL	5.53	5.48	5.67	5.85	6.01	6.04	6.09	6.17	6.23	6.22	6.37	6.54	6.35
AUG	5.44	5.44	5.67	5.82	5.91	6.00	6.06	6.14	6.21	6.22	6.38	6.51	6.36
SEP	5.43	5.40	5.67	5.83	5.92	6.00	6.05	6.12	6.19	6.23	6.37	6.51	6.36
OCT	5.47	5.46	5.73	5.90	6.00	6.06	6.11	6.18	6.23	6.19	6.37	6.51	6.37
NOV	5.47	5.47	5.74	5.92	6.01	6.04	6.11	6.17	6.23	6.20	6.37	6.52	6.39
DEC	5.37	5.44	5.76	5.92	5.99	6.03	6.08	6.14	6.22	6.21	6.37	6.52	6.37
1974 JAN	5.36	5.46	5.69	5.77	5.91	5.97	6.03	6.11	6.21	6.16	6.37	6.52	6.38
FEB	5.39	5.49	5.72	5.78	5.91	5.97	6.02	6.12	6.26	6.17	6.37	6.53	6.39
MAR	5.28	5.49	5.70	5.77	5.89	5.92	5.97	6.05	6.21	6.18	6.37	6.53	6.46
APR	6.81	6.95	7.34	7.45	7.39	7.39	7.46	7.51	7.60	7.46	7.51	7.65	7.72
MAY	6.61	6.91	7.17	7.32	7.36	7.41	7.47	7.51	7.59	7.45	7.53	7.66	7.72
JUN	6.83	7.02	7.28	7.43	7.42	7.49	7.55	7.59	7.68	7.49	7.54	7.60	7.75
JUL	6.85	7.04	7.25	7.41	7.37	7.41	7.46	7.53	7.67	7.50	7.63	7.85	7.75
AUG	6.78	7.00	7.23	7.39	7.33	7.40	7.42	7.48	7.66	7.54	7.59	7.87	7.76
SEP	6.52	6.90	7.23	7.45	7.35	7.37	7.38	7.46	7.69	7.57	7.69	7.71	7.82
OCT	6.30	6.57	6.83	7.07	7.08	7.12	7.15	7.25	7.44	7.55	7.63	7.77	7.89
NOV	6.29	6.59	6.84	7.05	7.09	7.12	7.14	7.24	7.46	7.54	7.62	7.80	7.91
DEC	6.34	6.69	6.96	7.15	7.13	7.25	7.33	7.41	7.51	7.53	7.64	7.80	7.80
1975 JAN	6.35	6.73	6.99	7.11	7.13	7.26	7.36	7.44	7.55	7.56	7.62	8.26	7.82
FEB	6.36	6.69	6.88	6.93	6.98	7.11	7.20	7.33	7.53	7.57	7.63	8.30	7.84
MAR	6.45	6.75	6.91	6.95	7.00	7.14	7.21	7.34	7.52	7.60	7.67	8.30	7.86
APR	6.73	7.03	7.22	7.30	7.27	7.38	7.45	7.48	7.62	7.61	7.65	8.36	7.86
MAY	6.77	6.99	7.16	7.23	7.23	7.33	7.40	7.46	7.62	7.59	7.65	8.34	7.88
JUN	6.85	7.00	7.15	7.19	7.23	7.33	7.41	7.46	7.58	7.60	7.67	8.38	7.88
JUL	6.96	7.07	7.19	7.22	7.26	7.35	7.44	7.48	7.60	7.67	7.68	8.46	7.87
AUG	7.07	7.13	7.22	7.21	7.24	7.35	7.42	7.48	7.61	7.70	7.71	8.52	7.89
SEP	7.08	7.11	7.15	7.23	7.23	7.35	7.42	7.47	7.61	7.71	7.72	8.54	7.89
OCT	7.12	7.15	7.24	7.30	7.31	7.43	7.51	7.52	7.60	7.65	7.67	8.49	7.84

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	K 5	K 10	K 10-30	I 5
NOV	7.22	7.16	7.23	7.30	7.31	7.43	7.50	7.51	7.62	7.63	7.68	8.51	7.87
DEC	6.71	6.96	7.16	7.24	7.31	7.43	7.50	7.51	7.55	7.60	7.68	8.48	7.83
1976 JAN	6.71	7.00	7.18	7.19	7.34	7.49	7.60	7.56	7.54	7.60	7.60	8.46	7.82
FEB	6.78	7.03	7.14	7.14	7.30	7.45	7.55	7.54	7.56	7.65	7.62	8.40	7.83
MAR	6.87	7.14	7.16	7.23	7.35	7.50	7.59	7.58	7.56	7.67	7.64	8.37	7.84
APR	6.83	7.18	7.19	7.26	7.37	7.50	7.60	7.58	7.56	7.64	7.64	8.39	7.84
MAY	6.92	7.23	7.21	7.30	7.40	7.53	7.63	7.60	7.56	7.67	7.66	8.43	7.85
JUN	6.86	7.02	7.05	7.18	7.29	7.41	7.51	7.49	7.48	7.63	7.65	8.34	7.83
JUL	6.99	7.08	7.07	7.19	7.29	7.44	7.54	7.50	7.49	7.64	7.67	8.34	7.83
AUG	6.87	7.09	7.05	7.09	7.24	7.39	7.49	7.48	7.50	7.66	7.71	8.45	7.85
SEP	6.99	6.95	7.01	7.10	7.21	7.37	7.47	7.47	7.50	7.68	7.76	8.44	7.86
OCT	6.95	6.93	7.07	7.15	7.24	7.41	7.52	7.49	7.50	7.67	7.74	8.46	7.80
NOV	6.87	6.88	7.02	7.10	7.20	7.34	7.45	7.45	7.48	7.68	7.75	8.48	7.79
DEC	6.86	6.83	6.98	7.06	7.15	7.33	7.45	7.44	7.47	7.67	7.75	8.46	7.77
1977 JAN	7.00	6.87	6.93	7.04	7.23	7.38	7.52	7.45	7.48	7.67	7.74	8.40	7.77
FEB	7.08	6.92	6.92	7.05	7.25	7.37	7.48	7.46	7.49	7.69	7.75	8.39	7.79
MAR	7.15	6.96	6.91	7.06	7.26	7.38	7.51	7.49	7.49	7.69	7.75	8.30	7.81
APR	7.19	6.96	6.91	7.07	7.25	7.39	7.51	7.49	7.50	7.69	7.75	8.27	7.81
MAY	7.10	6.91	6.89	7.06	7.26	7.39	7.51	7.51	7.50	7.69	7.76	8.29	7.80
JUN	7.04	7.06	7.03	7.21	7.41	7.54	7.65	7.58	7.49	7.69	7.76	8.30	7.82
JUL	7.05	7.06	7.01	7.21	7.39	7.56	7.67	7.59	7.50	7.70	7.77	8.29	7.83
AUG	7.09	7.09	7.02	7.22	7.41	7.54	7.65	7.59	7.52	7.69	7.77	8.27	7.84
SEP	6.79	6.96	6.95	7.14	7.33	7.47	7.58	7.53	7.48	7.68	7.74	8.11	7.79
OCT	6.82	6.98	6.96	7.16	7.36	7.50	7.61	7.54	7.48	7.67	7.73	8.11	7.78
NOV	6.79	6.90	6.95	7.10	7.33	7.47	7.58	7.52	7.48	7.65	7.72	8.12	7.79
DEC	7.50	7.78	7.88	7.99	8.16	8.29	8.39	8.67	9.02	8.74	8.85	9.39	8.77
1978 JAN	7.57	7.82	7.90	8.02	8.19	8.32	8.42	8.68	9.00	8.73	8.83	9.28	8.79
FEB	7.59	7.83	7.87	7.99	8.17	8.28	8.32	8.67	9.02	8.73	8.78	9.15	8.82
MAR	7.60	7.78	7.77	7.85	8.07	8.21	8.28	8.66	9.02	8.72	8.79	9.12	8.81
APR	7.63	7.79	7.76	7.83	8.04	8.20	8.68	8.67	9.02	8.70	8.81	9.14	8.80
MAY	7.57	7.76	7.73	7.79	7.98	8.16	8.50	8.65	9.03	8.70	8.83	9.17	8.81
JUN	7.60	7.76	7.73	7.79	7.99	8.16	8.49	8.64	9.00	8.71	8.84	9.19	8.84
JUL	7.68	7.77	7.70	7.79	7.99	8.15	8.49	8.66	9.02	8.68	8.83	9.17	8.83
AUG	7.70	7.76	7.70	7.90	7.97	8.10	8.45	8.66	9.05	8.67	8.77	9.12	8.86
SEP	7.79	7.79	7.71	7.94	8.01	8.15	8.44	8.65	8.99	8.68	8.80	9.08	8.87
OCT	7.64	7.72	7.66	7.86	7.99	8.15	8.45	8.66	8.99	8.60	8.76	8.99	8.78
NOV	7.64	7.73	7.68	7.88	7.99	8.16	8.42	8.67	8.99	8.57	8.73	8.87	8.79
DEC	7.64	7.70	7.67	7.84	7.96	8.12	8.34	8.58	8.89	8.52	8.71	8.84	8.75
1979 JAN	7.70	7.68	7.66	7.83	7.90	8.01	8.03	8.52	8.91	8.53	8.76	8.83	8.76
FEB	7.66	7.62	7.66	7.83	7.89	7.99	8.03	8.52	8.93	8.54	8.74	8.75	8.78
MAR	7.64	7.67	7.70	7.87	7.94	8.03	8.06	8.55	8.93	8.55	8.74	8.72	8.79
APR	7.67	7.69	7.71	7.88	7.96	8.04	8.07	8.56	8.94	8.54	8.73	8.74	8.74
MAY	7.59	7.61	7.69	7.84	7.91	8.02	8.06	8.56	8.94	8.52	8.73	8.77	8.74
JUN	7.71	7.70	7.72	7.89	7.98	8.08	8.34	8.59	8.93	8.51	8.75	8.78	8.77
JUL	7.77	7.72	7.73	7.90	8.00	8.10	8.37	8.62	8.96	8.49	8.66	8.77	8.78
AUG	7.73	7.66	7.72	7.87	7.97	8.07	8.37	8.63	8.98	8.50	8.66	8.74	8.80

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 10	S 10-15	K 5	K 10	K 10-30	I 5
SEP	7.88	7.77	7.79	7.97	8.05	8.12	8.35	8.63	8.93	8.51	8.65	8.73	8.79
OCT	7.91	7.81	7.84	7.99	8.07	8.13	8.35	8.63	8.93	8.50	8.64	8.72	8.77
NOV	7.85	7.76	7.81	7.96	8.05	8.12	8.35	8.65	8.94	8.51	8.68	8.75	8.76
DEC	9.82	9.78	9.76	9.85	9.96	10.10	10.34	10.60	10.91	10.72	10.78	10.84	11.00

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
1980 JAN	9.92	9.80	9.79	9.89	10.12	10.38	10.47	10.64	10.58	10.77	10.86	10.83	11.01
FEB	9.86	9.82	9.81	9.95	10.11	10.44	10.53	10.69	10.67	10.79	10.86	10.85	11.03
MAR	9.93	9.80	9.83	10.00	10.14	10.42	10.57	10.72	10.79	10.85	10.89	10.82	11.06
APR	10.01	9.79	9.83	9.95	10.14	10.39	10.54	10.70	10.85	10.86	10.87	10.84	11.05
MAY	9.94	9.85	9.88	9.99	10.15	10.41	10.56	10.71	10.92	10.86	10.88	10.89	11.02
JUN	10.04	9.90	9.90	10.00	10.33	10.45	10.60	10.75	11.06	10.90	10.91	10.93	11.08
JUL	9.96	9.83	9.75	9.93	10.34	10.45	10.61	10.78	11.13	10.92	10.92	11.05	11.11
AUG	10.29	10.02	10.30	10.33	10.66	10.76	10.86	10.95	11.93	11.59	11.79	11.37	11.43
SEP	10.39	10.41	10.24	10.41	10.58	10.73	10.83	10.95	11.68	11.81	11.86	11.71	11.94
OCT	9.81	9.84	9.84	10.07	10.42	10.60	10.78	10.93	11.39	11.03	11.09	11.18	11.49
NOV	9.91	9.88	9.85	10.05	10.43	10.62	10.80	10.95	10.99	11.00	11.08	11.23	11.40
DEC	10.03	9.92	9.88	10.11	10.50	10.54	10.70	10.84	11.13	11.02	11.09	11.20	11.44
1981 JAN	10.51	10.56	10.68	10.82	10.82	10.91	11.40	11.53	12.89	12.31	12.38	12.44	12.87
FEB	10.68	10.60	10.72	10.87	10.88	10.96	11.47	11.61	13.09	12.24	12.22	12.40	12.59
MAR	10.78	10.70	10.80	10.98	10.94	11.01	11.52	11.60	12.68	12.28	12.31	12.41	12.53
APR	10.87	10.79	10.87	11.15	11.00	11.24	12.19	12.25	12.82	12.26	12.25	12.40	12.49
MAY	11.50	11.67	11.74	11.90	11.94	12.03	12.88	12.93	14.08	13.68	13.65	13.51	13.75
JUN	11.91	11.91	11.95	11.99	12.00	12.05	12.80	12.96	14.33	13.66	13.62	13.91	13.80
JUL	12.07	11.99	12.00	12.03	12.01	12.58	12.86	13.02	14.27	13.66	13.57	13.89	13.85
AUG	12.19	12.04	12.01	12.02	11.96	12.62	12.92	13.07	14.45	13.61	13.52	13.93	13.88
SEP	12.39	12.14	12.14	12.16	12.08	12.75	13.04	13.18	14.40	13.61	13.51	13.80	13.89
OCT	12.41	12.16	12.26	12.25	12.28	12.86	13.15	13.25	14.32	13.55	13.43	13.86	13.91
NOV	12.45	12.13	12.31	12.51	12.33	13.05	13.25	13.24	14.38	13.59	13.53	14.02	13.80
DEC	12.16	12.16	12.14	12.51	12.80	13.41	13.77	14.00	13.77	13.53	13.55	13.86	13.50
1982 JAN	12.88	12.87	12.70	12.95	12.92	12.73	12.69	14.02	14.71	14.36	14.27	14.03	14.52
FEB	13.11	13.00	12.94	13.10	13.13	13.08	13.12	14.19	15.15	14.60	14.44	15.01	14.63
MAR	12.92	12.93	12.90	13.06	12.98	13.06	13.10	13.73	15.07	14.59	14.43	15.07	14.62
APR	13.13	13.05	13.01	13.20	13.14	13.23	13.28	13.84	15.25	14.53	14.38	15.12	14.70
MAY	13.33	13.17	13.19	13.31	13.08	13.66	13.83	14.00	15.52	14.58	14.44	14.71	14.67
JUN	13.41	13.25	13.30	13.34	13.21	13.69	13.87	14.05	15.32	14.56	14.44	14.74	14.71
JUL	13.60	13.33	13.27	13.36	13.32	13.31	13.56	13.60	15.47	14.63	14.48	14.70	14.69
AUG	13.77	13.43	13.42	13.47	13.41	13.39	13.59	13.65	15.31	14.70	14.53	14.76	14.71
SEP	13.64	13.35	13.28	13.35	13.17	13.10	13.34	13.39	15.35	14.74	14.56	14.64	14.74
OCT	14.23	13.74	13.65	13.78	13.83	13.86	14.09	14.07	15.23	14.82	14.64	14.40	14.82
NOV	13.58	13.41	13.40	13.59	13.50	13.46	13.63	13.68	15.00	14.77	14.59	14.33	14.75
DEC	13.21	13.31	13.44	13.56	13.60	13.68	13.80	13.82	14.26	14.42	14.39	14.20	14.73
1983 JAN	13.44	13.43	13.56	13.65	13.68	13.72	13.80	13.85	14.42	14.50	14.44	14.16	14.70
FEB	13.40	13.34	13.36	13.46	13.47	13.49	13.62	13.68	14.65	14.59	14.46	14.16	14.71
MAR	13.22	13.13	13.12	13.25	13.26	13.29	13.47	13.58	14.61	14.60	14.45	14.14	14.67
APR	13.27	13.10	13.07	13.24	13.27	13.36	13.30	13.32	14.65	14.52	14.38	13.96	14.67
MAY	13.25	13.08	13.07	13.23	13.26	13.37	13.26	13.24	14.76	14.53	14.37	13.97	14.66
JUN	13.08	12.94	12.92	12.96	13.06	13.15	13.09	13.09	14.62	14.53	14.31	13.88	14.64
JUL	13.03	12.90	12.91	12.94	12.97	13.13	13.00	13.01	14.12	14.19	14.02	13.78	14.50
AUG	13.05	12.90	12.89	12.94	12.95	12.96	12.98	12.99	14.17	14.27	14.03	13.75	14.53
SEP	13.11	12.91	12.87	12.93	12.95	12.97	12.98	12.99	14.21	14.27	14.01	13.74	14.54
OCT	12.89	12.85	12.93	13.04	13.04	13.05	13.02	13.01	13.82	13.96	13.83	13.66	14.22

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
NOV	12.78	12.81	12.83	12.94	12.84	12.84	12.82	12.81	13.83	13.74	13.59	13.53	14.17
DEC	12.82	12.78	12.74	12.74	12.82	12.86	12.83	12.82	13.74	13.53	13.39	13.44	13.80
1984 JAN	13.00	12.83	12.75	12.76	12.81	12.83	12.82	12.81	13.59	13.49	13.30	13.35	13.68
FEB	12.59	12.59	12.62	12.65	12.67	12.70	12.69	12.68	13.59	13.52	13.30	13.35	13.70
MAR	12.58	12.55	12.58	12.59	12.66	12.69	12.68	12.67	13.59	13.53	13.30	13.38	13.71
APR	12.58	12.45	12.54	12.58	12.60	12.62	12.62	12.61	13.71	13.53	13.31	13.33	13.71
MAY	12.83	12.67	12.72	12.82	12.64	12.52	12.48	12.46	13.47	13.33	13.24	13.23	13.68
JUN	12.62	12.44	12.38	12.47	12.50	12.52	12.50	12.48	13.52	13.36	13.25	13.21	13.72
JUL	12.61	12.50	12.49	12.54	12.52	12.47	12.46	12.45	13.53	13.34	13.22	13.21	13.71
AUG	12.61	12.67	12.58	12.53	12.50	12.47	12.44	12.42	13.47	13.33	13.18	13.25	13.60
SEP	12.51	12.58	12.47	12.43	12.49	12.51	12.49	12.46	13.41	13.35	13.19	13.16	13.62
OCT	12.55	12.51	12.45	12.49	12.54	12.56	12.53	12.50	13.48	13.29	13.15	13.16	13.57
NOV	12.78	12.71	12.57	12.59	12.59	12.58	12.55	12.52	13.18	13.29	13.18	13.21	13.58
DEC	12.62	12.57	12.53	12.55	12.55	12.55	12.53	12.50	13.13	13.24	13.14	13.15	13.54
1985 JAN	12.70	12.60	12.49	12.52	12.59	12.61	12.57	12.53	13.29	13.21	13.13	13.15	13.55
FEB	12.76	12.66	12.55	12.62	12.76	12.82	12.74	12.65	13.33	13.22	13.16	13.40	13.43
MAR	13.22	13.20	13.08	13.04	13.03	12.99	12.93	12.87	13.51	13.40	13.33	13.40	13.63
APR	13.23	13.17	13.10	13.08	13.03	12.99	12.91	12.85	13.56	13.47	13.37	13.65	13.64
MAY	13.24	13.21	13.13	13.10	13.04	12.99	12.91	12.85	13.72	13.49	13.43	13.76	13.65
JUN	13.09	13.04	12.99	12.98	13.06	13.07	13.01	12.94	13.92	13.67	13.59	13.97	13.79
JUL	13.07	13.06	12.97	12.94	13.05	13.08	13.01	12.94	14.04	13.75	13.68	14.12	13.85
AUG	13.05	13.03	12.95	12.92	13.04	13.07	13.00	12.94	14.12	13.79	13.73	14.08	13.86
SEP	12.93	12.92	12.89	12.90	13.02	13.07	13.00	12.93	14.21	13.81	13.75	14.16	13.91
OCT	12.83	12.81	12.87	12.89	13.01	13.05	12.97	12.90	14.25	13.83	13.73	14.22	13.98
NOV	12.79	12.77	12.82	12.87	13.01	13.08	12.98	12.90	14.25	13.90	13.78	14.03	14.01
DEC	13.47	13.49	13.60	13.59	13.62	13.59	13.54	13.49	14.83	14.45	14.34	14.49	14.66
1986 JAN	13.35	13.34	13.46	13.55	13.56	13.57	13.50	13.44	14.94	14.78	14.60	14.73	15.07
FEB	13.60	13.54	13.62	13.58	13.56	13.54	13.45	13.36	15.08	14.88	14.90	14.64	15.04
MAR	13.57	13.63	13.59	13.53	13.48	13.45	13.37	13.28	15.12	14.88	14.96	14.71	15.10
APR	13.48	13.64	13.55	13.42	13.15	13.00	12.92	12.85	15.14	14.83	14.72	14.48	15.11
MAY	13.76	13.71	13.52	13.46	13.38	13.31	13.18	13.06	15.25	14.87	14.66	14.51	15.05
JUN	13.82	13.80	13.60	13.54	13.45	13.40	13.27	13.14	15.29	14.91	14.67	14.50	15.07
JUL	13.75	13.63	13.63	13.58	13.48	13.40	13.28	13.17	15.36	14.86	14.52	14.52	15.07
AUG	13.77	13.59	13.60	13.55	13.46	13.40	13.26	13.15	15.47	14.91	14.57	14.52	15.08
SEP	13.63	13.41	13.41	13.36	13.23	13.13	12.99	12.86	15.52	14.90	14.48	14.50	15.12
OCT	13.57	13.40	13.45	13.40	13.32	13.24	13.07	12.95	15.56	14.91	14.52	14.60	15.20
NOV	13.95	13.74	13.54	13.48	13.42	13.34	13.16	13.02	15.86	15.02	14.62	15.02	15.35
DEC	14.20	14.04	13.89	13.81	13.63	13.52	13.42	13.37	16.67	15.68	15.25	14.69	15.70
1987 JAN	14.27	13.94	13.73	13.66	13.53	13.44	13.35	13.26	16.66	15.73	15.20	15.01	15.74
FEB	14.25	13.87	13.70	13.64	13.53	13.40	13.27	13.14	16.53	15.49	15.01	14.93	15.71
MAR	14.00	13.80	13.68	13.62	13.52	13.40	13.27	13.12	16.43	15.50	15.01	15.20	15.75
APR	14.11	13.85	13.70	13.63	13.50	13.36	13.22	13.10	16.33	15.49	14.94	15.22	15.74
MAY	13.99	13.87	13.71	13.66	13.55	13.40	13.25	13.14	16.31	15.49	14.88	15.21	15.78
JUN	13.93	13.91	13.73	13.67	13.56	13.41	13.26	13.14	16.33	15.51	14.81	15.01	15.77
JUL	14.05	13.83	13.67	13.63	13.52	13.39	13.25	13.14	16.34	15.46	14.72	14.93	15.79
AUG	13.76	13.69	13.61	13.52	13.33	13.19	13.05	12.89	15.94	15.29	14.61	14.71	15.77

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
SEP	13.31	13.25	13.20	13.10	12.88	12.78	12.67	12.51	15.40	14.78	14.17	14.48	15.51
OCT	13.62	13.58	13.54	13.48	13.28	13.11	12.96	12.80	15.14	14.51	14.12	14.34	15.53
NOV	13.78	13.67	13.62	13.58	13.47	13.33	13.17	13.01	15.53	14.82	14.55	14.90	15.54
DEC	13.97	13.77	13.72	13.67	13.51	13.40	13.21	13.03	15.56	15.05	14.65	14.55	15.38
1988 JAN	13.94	13.73	13.68	13.65	13.52	13.41	13.24	13.09	15.74	15.10	14.71	14.73	15.71
FEB	13.95	13.70	13.64	13.57	13.42	13.32	13.13	12.97	15.72	15.09	14.67	14.73	15.75
MAR	13.88	13.68	13.61	13.52	13.34	13.26	13.12	13.02	15.62	15.08	14.67	14.80	15.74
APR	13.90	13.70	13.61	13.52	13.29	13.21	13.09	13.01	15.62	15.09	14.72	14.71	15.82
MAY	13.08	13.11	13.08	13.06	12.92	12.86	12.73	12.62	15.48	15.07	14.70	14.87	15.91
JUN	12.87	13.01	12.92	12.85	12.75	12.69	12.54	12.43	15.02	14.73	14.33	14.29	15.89
JUL	12.90	12.96	12.94	12.93	12.86	12.76	12.67	12.59	14.71	14.39	14.04	14.00	15.15
AUG	13.00	13.07	13.06	13.03	13.04	12.98	12.81	12.69	15.14	14.98	14.56	14.22	15.12
SEP	13.02	13.00	12.96	12.92	12.99	12.95	12.84	12.79	15.57	15.07	14.40	14.23	15.67
OCT	12.67	12.76	12.75	12.72	12.64	12.56	12.43	12.36	15.49	14.95	14.60	14.38	15.98
NOV	12.69	12.67	12.60	12.51	12.40	12.35	12.23	12.12	15.52	14.92	14.57	14.35	15.63
DEC	12.26	12.18	12.10	12.01	11.81	11.74	11.66	11.59	15.18	14.81	14.48	14.27	15.04
1989 JAN	11.23	11.19	11.16	11.11	11.03	11.01	10.98	10.97	13.40	13.23	13.42	14.62	14.92
FEB	10.86	10.82	10.84	10.85	10.83	10.81	10.78		13.87	13.68	13.76	14.28	14.89
MAR	10.89	10.84	10.83	10.85	10.87	10.83	10.79		13.00	13.36	13.33	14.40	13.75
APR	10.94	10.86	10.78	10.73	10.68	10.62	10.56		12.78	13.04	12.98	13.96	13.35
MAY	10.77	10.71	10.66	10.66	10.67	10.65	10.63		12.65	12.80	12.39	14.08	13.32
JUN	10.89	10.80	10.73	10.75	10.81	10.83	10.85		12.34	12.45	12.09	12.19	13.24
JUL	10.78	10.79	10.78	10.82	10.87	10.89	10.91		12.51	12.19	11.92	11.43	13.27
AUG	10.76	10.73	10.71	10.79	10.86	10.88	10.89		12.19	12.28	12.07		13.21
SEP	10.67	10.67	10.62	10.59	10.57	10.56	10.57		12.12	11.82	11.68		13.20
OCT	10.75	10.75	10.75	10.76	10.76	10.75	10.73		11.69	11.69	11.76		11.44
NOV	11.30	11.22	11.20	11.21	11.20	11.17	11.15		12.36	12.04	11.83	12.31	11.85
DEC	11.21	11.06	11.01	10.98	10.93	10.90	10.89		12.12	11.92	11.83	12.25	11.66
1990 JAN	11.06	10.86	10.78	10.72	10.67	10.64	10.62		11.77	11.74	11.97	11.61	11.55
FEB	10.92	10.73	10.65	10.63	10.62	10.59			11.63	11.74	11.71	11.79	11.18
MAR	11.13	10.96	10.91	10.90	10.88	10.85			11.96	11.94	11.74	11.73	11.48
APR	11.18	11.14	11.09	11.04	11.04	11.01			12.27	12.25	12.84		11.80
MAY	11.01	10.85	10.81	10.79	10.76	10.72			11.91	11.37			11.48
JUN	10.98	10.91	10.83	10.76	10.70	10.66			11.93	11.50			11.48
JUL	10.79	10.77	10.74	10.70	10.63	10.61			11.71	11.11			11.43
AUG	10.67	10.68	10.67	10.65	10.61	10.62			11.61	11.18			11.55
SEP	10.70	10.72	10.68	10.65	10.63	10.65			11.73	11.32			11.57
OCT	10.69	10.68	10.65	10.62	10.62	10.64			11.75	11.34			11.62
NOV	10.64	10.73	10.69	10.65	10.65	10.63			11.77	11.31			11.61
DEC	10.63	10.70	10.66	10.62	10.60	10.62			11.82	11.33			11.68
1991 JAN	10.59	10.58	10.59	10.59	10.55	10.56			11.90	11.54			11.87
FEB	10.45	10.48	10.46	10.45	10.39	10.39			11.61	11.34			11.64
MAR	10.38	10.36	10.30	10.24	10.38	10.42			11.63	11.39			11.36
APR	10.00	9.95	9.91	9.88	9.98	9.99			11.12	10.93			11.05
MAY	9.91	9.81	9.72	9.66	9.73	9.72			10.88	10.76			10.74
JUN	9.98	9.86	9.76	9.72	9.78	9.77			11.11	11.06			10.85

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
JUL	9.85	9.80	9.75	9.75	9.77	9.74			11.01	10.97			10.73
AUG	9.76	9.72	9.67	9.70	9.76	9.75			10.99	10.92			10.64
SEP	9.88	9.82	9.77	9.80	9.88	9.88			11.26	11.08			10.71
OCT	9.91	9.88	9.81	9.83	9.91	9.92			11.29	11.17			10.69
NOV	9.93	9.82	9.73	9.75	9.83	9.81			12.22	12.01			10.80
DEC	9.92	9.83	9.75	9.79	9.81	9.77			11.61	11.48	11.11	10.97	10.90
1992 JAN	9.71	9.63	9.45	9.50	9.45	9.40			11.41	11.59	10.87	10.63	10.68
FEB	9.73	9.59	9.31	9.44	9.42				11.41	11.58	10.77	10.49	10.66
MAR	9.76	9.66	9.46	9.49	9.51				11.12	11.00	10.70	10.46	10.66
APR	9.98	9.75	9.52	9.49	9.52				11.13	11.01	10.70	10.46	10.63
MAY	9.87	9.64	9.45	9.46	9.48				11.12	10.62	10.31	10.26	10.57
JUN	9.98	9.78	9.62	9.59	9.60				11.01	10.63	10.42	10.23	10.61
JUL	10.31	10.13	10.01	9.93	9.85				11.26	10.88	10.70	10.55	10.75
AUG	10.66	10.27	10.36	10.30	10.21				12.41	11.52	11.31	11.28	11.37
SEP	11.25	10.78	10.84	10.77	10.62				14.23	12.65	12.25	12.10	
OCT	10.29	9.77	9.94	9.94	10.09				12.22	11.63	11.57	11.65	11.97
NOV	11.15	10.09	10.21	10.11	9.88	9.72	9.62	9.51	13.22	12.12	11.92	12.11	12.07
DEC	9.80	9.09	9.32	9.32	9.27	9.18	9.13	9.08	11.64	11.15	11.18	11.41	11.64
1993 JAN	9.27	9.00	9.27	9.26	9.09	8.96	8.86	8.78	10.70	10.39	10.37	10.47	10.63
FEB	8.29	8.00	8.32	8.27	8.13	8.08	8.02	7.99	9.44	9.20	9.24	9.37	10.70
MAR	7.85	7.54	7.68	7.73	7.72	7.69	7.66	7.65	8.72	8.60	8.65	8.78	8.98
APR	7.09	7.01	7.14	7.08	7.16	7.20	7.25	7.27	7.89	7.80	7.95	8.18	8.55
MAY	6.90	6.83	6.88	6.90	6.99	7.03	7.07		7.41	7.38	7.57	7.78	7.97
JUN	6.22	6.26	6.35	6.31	6.39	6.45	6.50		6.71	6.79	7.04		7.54
JUL	6.27	6.37	6.47	6.38	6.43	6.48	6.54		6.79	6.83	7.06		7.54
AUG	5.79	5.96	6.07	5.98	6.05	6.08	6.11		6.28	6.33	6.58		7.20
SEP	5.95	5.96	6.04	5.98	6.07	6.10	6.13		6.46	6.44	6.64	6.82	6.99
OCT	5.36	5.44	5.46	5.44	5.63	5.71	5.78		5.99	5.97	6.17	6.36	6.53
NOV	5.19	5.30	5.36	5.35	5.57	5.65	5.73	5.75	5.71	5.83	6.10	6.30	6.35
DEC	5.25	5.30	5.28	5.26	5.43	5.50	5.56	5.58	5.74	5.73	5.95	6.14	6.16
1994 JAN	4.97	5.17	5.17	5.07	5.30	5.38	5.46	5.50	5.38	5.49	5.73	5.95	6.01
FEB	4.93	5.11	5.20	5.23	5.45	5.54	5.61	5.65	5.30	5.61	5.87	6.11	5.98
MAR	5.61	5.78	5.93	6.02	6.27	6.38	6.47	6.48	6.09	6.66	6.96	7.23	7.00
APR	5.41	5.73	6.04	6.32	6.65	6.80	6.92	6.96	6.04	6.98	7.38	7.87	7.18
MAY	6.01	6.53	7.04	7.41	7.69	7.81	7.91	7.95	6.64	8.07	8.42	8.98	7.14
JUN	6.50	6.92	7.31	7.57	7.80	7.90	7.98	8.00	7.18	8.22	8.49	8.61	8.98
JUL	6.48	6.84	7.17	7.39	7.61	7.70	7.75	7.76	7.25	8.16	8.43	8.62	8.39
AUG	7.06	7.41	7.74	7.93	8.12	8.20	8.25	8.28	7.86	8.76	8.97	9.19	9.19
SEP	7.88	8.22	8.55	8.69	8.86	8.94	9.00	9.04	8.67	9.54	9.77	9.95	9.80
OCT	7.59	7.93	8.27	8.40	8.57	8.65	8.69	8.71	8.21	9.07	9.29	9.47	9.48
NOV	7.06	7.44	7.81	7.94	8.10	8.18	8.19	8.19	7.70	8.62	8.80	8.91	9.16
DEC	6.83	7.25	7.67	7.77	7.91	7.99	8.00	8.01	7.36	8.31	8.50	8.60	8.60
1995 JAN	6.77	7.18	7.57	7.68	7.89	7.98	8.02	8.06	7.28	8.23	8.47	8.65	8.49
FEB	6.33	6.84	7.30	7.45	7.71	7.83	7.90	7.93	6.85	7.99	8.31	8.53	8.36
MAR	6.34	6.89	7.24	7.42	7.71	7.83	7.92	7.97	6.82	7.94	8.28	8.55	8.29
APR	6.05	6.50	6.88	7.06	7.39	7.52	7.61	7.66	6.50	7.53	7.92	8.20	7.87

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
MAY	6.06	6.37	6.66	6.87	7.18	7.25	7.32	7.34	6.53	7.41	7.79	8.02	7.77
JUN	6.21	6.60	6.98	7.22	7.58	7.65	7.73	7.75	6.66	7.73	8.12		7.84
JUL	6.10	6.47	6.78	7.00	7.36	7.44	7.53	7.55	6.54	7.51	7.91		7.75
AUG	5.77	6.13	6.42	6.67	7.08	7.19	7.29	7.31	6.19	7.13	7.55		7.39
SEP	5.75	6.05	6.33	6.56	6.93	7.04	7.13		6.14	7.02	7.40		7.41
OCT	5.60	5.87	6.10	6.32	6.68	6.80	6.91		5.93	6.71	7.11		7.08
NOV	5.33	5.53	5.72	5.91	6.24	6.38	6.44		5.68	6.32	6.69		6.66
DEC	5.30	5.43	5.61	5.80	6.13	6.27	6.36		5.59	6.26	6.62		6.59
1996 JAN	5.41	5.61	5.78	5.94	6.24	6.37	6.48	6.57	5.74	6.40	6.74		6.68
FEB	5.26	5.46	5.73	6.00	6.46	6.63	6.76	6.88	5.57	6.46	6.98		6.64
MAR	4.91	5.26	5.58	5.88	6.35	6.53	6.66	6.78	5.23	6.29	6.84		6.60
APR	4.85	5.17	5.47	5.76	6.20	6.39	6.54	6.68	5.12	6.11	6.66	7.14	6.41
MAY	5.13	5.44	5.76	6.06	6.51	6.69	6.83	6.96	5.43	6.42	6.95	7.41	6.48
JUN	5.39	5.73	6.00	6.26	6.65	6.80	6.92	7.02	5.71	6.69	7.12	7.51	6.83
JUL	5.56	5.83	6.06	6.29	6.64	6.79	6.91	7.02	5.89	6.74	7.14	7.53	6.85
AUG	5.71	5.97	6.19	6.41	6.75	6.90	7.00	7.11	6.03	6.85	7.23	7.58	7.11
SEP	5.57	5.81	6.02	6.22	6.53	6.65	6.75	6.84	5.88	6.66	7.00	7.32	6.91
OCT	5.40	5.65	5.87	6.10	6.44	6.59	6.70	6.81	5.68	6.49	6.89	7.26	6.78
NOV	4.63	4.91	5.18	5.43	5.83	6.00	6.15	6.29	4.93	5.83	6.26	6.74	6.26
DEC	4.54	4.82	5.08	5.32	5.75	5.94	6.09	6.24	4.81	5.74	6.17	6.67	6.09
1997 JAN	3.93	4.23	4.52	4.81	5.33	5.54	5.71	5.88	4.14	5.14	5.66	6.20	5.38
FEB	3.86	4.15	4.43	4.68	5.14	5.33	5.49	5.63	4.14	5.03	5.50	5.97	5.20
MAR	4.16	4.51	4.84	5.14	5.61	5.80	5.96	6.09	4.41	5.48	5.97	6.40	5.59
APR	4.15	4.49	4.82	5.13	5.64	5.84	6.00	6.12	4.37	5.47	5.99	6.43	5.83
MAY	4.18	4.52	4.84	5.14	5.63	5.81	5.98	6.08	4.42	5.47	5.97	6.41	5.64
JUN	4.28	4.56	4.83	5.10	5.54	5.71	5.87	5.96	4.49	5.42	5.88	6.33	5.49
JUL	4.73	4.94	5.14	5.32	5.61	5.74	5.86		4.97	5.64	5.98	6.33	5.90
AUG	4.74	5.00	5.23	5.42	5.76	5.88	6.01		5.00	5.75	6.12	6.47	6.00
SEP	4.47	4.71	4.95	5.18	5.52	5.63	5.75		4.75	5.52	5.89	6.21	5.82
OCT	4.76	4.98	5.18	5.35	5.61	5.70	5.79		5.00	5.64	5.94	6.23	5.84
NOV	4.66	4.88	5.05	5.19	5.42	5.50	5.59		4.92	5.50	5.78	6.04	5.87
DEC	4.73	4.91	5.06	5.16	5.34	5.42	5.50		4.98	5.50	5.72	5.92	5.70
1998 JAN	4.57	4.72	4.86	4.98	5.16	5.25	5.35	5.47	4.79	5.32	5.55	5.76	5.53
FEB	4.55	4.75	4.88	4.97	5.12	5.20	5.31	5.43	4.86	5.35	5.55	5.72	5.50
MAR	4.54	4.73	4.87	4.97	5.14	5.22	5.33	5.45	4.86	5.43	5.64		5.59
APR	4.81	5.01	5.12	5.20	5.33	5.41	5.51	5.63	5.11	5.62	5.82	6.01	5.77
MAY	5.19	5.29	5.36	5.40	5.46	5.48	5.48	5.47	5.48	5.84	5.98	6.11	5.95
JUN	5.35	5.43	5.50	5.52	5.54	5.54	5.53	5.51	5.70	6.00	6.10		6.03
JUL	5.40	5.33	5.34	5.34	5.32	5.31	5.28	5.25	5.75	5.92	5.99		6.12
AUG	6.57	6.21	6.17	6.12	6.01	5.96	5.88	5.80	7.05	6.79	6.80	6.77	6.28
SEP	6.24	5.86	5.69	5.56	5.40	5.36	5.30	5.22	6.76	6.33	6.33	6.31	6.59
OCT	6.05	5.67	5.56	5.54	5.52	5.52	5.49	5.45	6.57	6.30	6.40	6.49	6.63
NOV	5.96	5.58	5.41	5.33	5.28	5.27	5.25	5.21	6.50	6.10	6.11	6.17	6.38
DEC	6.08	5.77	5.64	5.53	5.40	5.35	5.30	5.24	6.65	6.30	6.28	6.29	6.53
1999 JAN	5.03	4.76	4.70	4.65	4.63	4.65	4.67	4.68	5.74	5.52	5.58	5.61	6.17
FEB	5.24	5.02	4.96	4.92	4.91	4.92	4.91	4.89	6.05	5.87	5.91	5.97	5.94

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
MAR	4.94	4.84	4.82	4.82	4.86	4.88	4.86	4.84	5.76	5.77	5.87	5.95	5.99
APR	4.83	4.70	4.66	4.64	4.66	4.68	4.70	4.71	5.63	5.56	5.64	5.78	5.82
MAY	5.19	5.16	5.14	5.13	5.14	5.14	5.14	5.13	5.96	6.01	6.10	6.13	6.07
JUN	5.48	5.52	5.55	5.57	5.62	5.64	5.65	5.65	6.16	6.40	6.52	6.63	6.56
JUL	5.69	5.69	5.74	5.79	5.88	5.90	5.92	5.93	6.28	6.60	6.72	6.93	6.71
AUG	5.70	5.70	5.71	5.74	5.84	5.87	5.89	5.90	6.37	6.65	6.79	6.94	6.91
SEP	5.73	5.85	5.86	5.91	6.06	6.12	6.16	6.18	6.40	6.75	6.95	7.18	6.83
OCT	5.87	5.91	5.91	5.93	6.05	6.11	6.15	6.17	6.50	6.75	6.90	6.97	7.02
NOV	5.83	5.84	5.87	5.91	6.05	6.10	6.13		6.32	6.59	6.79	6.88	6.75
DEC	5.94	5.94	5.97	6.02	6.12	6.15	6.17		6.51	6.76	6.89	7.04	6.94
2000 JAN	6.11	6.17	6.20	6.23	6.32	6.36	6.39		6.62	6.88	7.03	7.17	7.16
FEB	6.27	6.30	6.31	6.31	6.33	6.34	6.34		6.79	7.07	7.17	7.28	7.21
MAR	6.47	6.42	6.33	6.26	6.18	6.16	6.14		7.03	7.14	7.16	7.13	7.37
APR	6.67	6.57	6.48	6.41	6.30	6.26	6.22		7.23	7.32	7.33	7.33	7.48
MAY	6.66	6.56	6.45	6.37	6.26	6.23	6.19		7.25	7.28	7.26	7.26	7.63
JUN	7.10	6.93	6.71	6.56	6.35	6.27	6.21	6.16	7.67	7.49	7.40		7.63
JUL	7.19	6.97	6.74	6.56	6.33	6.26	6.23	6.20	7.69	7.47	7.37		7.73
AUG	7.22	7.01	6.80	6.65	6.45	6.39	6.35	6.32	7.64	7.40	7.36		7.70
SEP	7.22	6.97	6.74	6.59	6.42	6.36	6.34	6.31	7.68	7.53	7.52		7.95
OCT	7.14	6.93	6.74	6.62	6.47	6.41	6.39	6.37	7.84	7.56	7.51		8.05
NOV	6.70	6.47	6.29	6.22	6.14	6.11	6.10	6.09	7.31	7.05	7.08		7.32
DEC	6.67	6.49	6.32	6.21	6.08	6.04	6.01	5.98	7.21	6.99	7.06		7.39
2001 JAN	6.55	6.36	6.19	6.13	6.04	5.99	5.97	5.95	7.09	6.93	6.95		7.38
FEB	6.67	6.48	6.30	6.20	6.06	6.00	5.98	5.97	7.22	6.99	7.00		7.37
MAR	6.89	6.65	6.47	6.35	6.20	6.13	6.10	6.08	7.28	7.04	7.07	7.07	7.26
APR	6.96	6.75	6.62	6.55	6.47	6.42	6.40	6.38	7.39	7.17	7.22	7.28	7.49
MAY	7.19	7.04	6.94	6.88	6.77	6.73	6.71	6.69	7.66	7.54	7.55	7.49	7.92
JUN	7.16	6.99	6.88	6.82	6.74	6.72	6.69	6.68	7.57	7.42	7.43	7.42	8.00
JUL	7.04	6.84	6.71	6.64	6.57	6.55	6.55	6.54	7.43	7.30	7.33	7.32	
AUG	6.82	6.63	6.53	6.47	6.44	6.42	6.42	6.42	7.14	7.13	7.20	7.19	7.68
SEP	6.34	6.20	6.19	6.21	6.25	6.26	6.28	6.30	6.74	6.88	7.02	7.05	7.72
OCT	6.08	5.87	5.83	5.82	5.84	5.85	5.86	5.87	6.51	6.48	6.57	6.53	7.41
NOV	6.04	5.84	5.86	5.88	5.91	5.91	5.92		6.55	6.60	6.67	6.69	7.20
DEC	5.84	5.91	5.99	6.09	6.22	6.26	6.30		6.33	6.73	6.91	6.98	7.34
2002 JAN	6.33	6.34	6.35	6.36	6.34	6.33	6.32		6.81	6.98	7.03	7.02	7.68
FEB	6.61	6.59	6.50	6.46	6.43	6.43	6.43		7.03	7.03	7.08	7.07	7.87
MAR	6.59	6.57	6.57	6.57	6.61	6.63	6.66		7.04	7.10	7.19	7.33	7.61
APR	6.77	6.71	6.71	6.71	6.72	6.71	6.71		7.24	7.27	7.30	7.29	8.05
MAY	7.17	7.11	7.04	7.00	6.99	7.02	6.99	6.91	7.58	7.52	7.47	7.41	8.22
JUN	6.93	6.87	6.79	6.72	6.64	6.63	6.61	6.59	7.35	7.21	7.16	7.16	8.18
JUL	6.85	6.72	6.63	6.54	6.45	6.46	6.47	6.48	7.30	7.07	7.00		7.76
AUG	6.55	6.42	6.34	6.28	6.21	6.21	6.21	6.20	7.03	6.83	6.77	6.77	7.51
SEP	6.27	6.13	6.05	6.02	5.99	5.99	5.99	5.99	6.79	6.58	6.56	6.71	7.63
OCT	6.15	6.10	6.09	6.11	6.16	6.18	6.19	6.19	6.72	6.65	6.70	6.82	7.94
NOV	6.03	6.01	6.00	6.01	6.08	6.11	6.12	6.14	6.68	6.62	6.63	6.74	7.44
DEC	5.36	5.40	5.47	5.55	5.68	5.73	5.76	5.79	6.03	6.23	6.30	6.43	7.09

Table A3. Norwegian bond yields by maturity (average life)

Annualized yield computed from end-of-month quotations of domestic bonds at Oslo Børs
 S=Kingdom of Norway. K=Private credit enterprises. I=Industrial companies

Issuer Maturity	S 2	S 3	S 4	S 5	S 7	S 8	S 9	S 10	K 2	K 5	K 7	K 10	I 5
2003 JAN	5.14	5.13	5.14	5.18	5.32	5.39	5.44	5.48	5.60	5.80	5.87	6.04	6.63
FEB	4.89	4.89	4.90	4.96	5.08	5.14	5.20	5.24	5.26	5.49	5.58	5.65	6.15
MAR	5.04	5.06	5.09	5.12	5.19	5.23	5.26	5.29	5.40	5.77	5.84	5.97	6.46
APR	4.72	4.78	4.85	4.94	5.12	5.20	5.25	5.30	5.10	5.55	5.67	5.86	6.59
MAY	4.14	4.14	4.19	4.29	4.49	4.57	4.64	4.69	4.45	4.91	5.02		5.53
JUN	3.54	3.74	3.92	4.11	4.43	4.53	4.62	4.68	3.82	4.67	4.84		5.08
JUL	3.57	3.93	4.20	4.40	4.74	4.86	4.95	5.01	3.99	4.95	5.19		5.20
AUG	3.51	3.88	4.16	4.40	4.73	4.85	4.93	4.98	3.93	4.98	5.21		5.58
SEP	3.29	3.66	3.94	4.16	4.47	4.58	4.66	4.71	3.62	4.67	4.90		5.27
OCT	3.42	3.87	4.14	4.37	4.72	4.83	4.91	4.95	3.78	4.85	5.08		5.29
NOV	3.43	3.85	4.12	4.37	4.73	4.84	4.91		3.74	4.86	5.11		5.27
DEC	2.77	3.27	3.56	3.86	4.30	4.43	4.52		3.10	4.37	4.73		5.03

Table A4. Yields on most actively traded maturities of long-term government bonds 1822 - 2003.

Averages of most representative quotations abroad through December 1914; thereafter Oslo Bourse.
 Data for 1843 and 1844 are interpolated and marked by †.
 Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1822			6.41	6.40	6.54	6.46	6.44	6.34	6.31	6.19	6.09	6.35	6.35*
1823	6.33	6.36	6.33	6.52	6.52	6.43	6.31	6.28	6.22	6.18	6.18	6.11	6.31
1824	5.74	5.45	5.08	5.15	5.21	5.28	5.42	5.34	5.41	5.29	5.32	5.20	5.32
1825	5.17	5.24	5.20	4.89	4.92	4.89	4.87	4.95	4.95	5.20	5.50	5.87	5.14
1826	5.91	5.71	6.12	5.84	5.88	5.61	5.48	5.52	5.52	5.36	5.28	5.28	5.63
1827	5.01	5.01	5.06	5.12	5.07	4.94	4.72	4.58	4.41	4.42	4.46	4.37	4.77
1828	4.38	4.28	4.42	4.43	4.33	4.38	4.36	4.39	4.40	4.46	4.49	4.46	4.40
1829	4.42	4.41	4.34	4.37	4.44	4.51	4.47	4.48	4.44	4.27	4.21	4.06	4.37
1830	4.06	4.06	4.04	4.04	3.99	3.99	3.97	3.97	4.15	4.15	4.15	4.34	4.08
1831	4.25	4.22	4.25	4.27	4.27	4.25	4.09	4.11	4.08	4.09	4.08	4.13	4.17
1832	4.06	4.06	4.09	4.09	4.06	4.06	4.11	4.26	4.31	4.18	4.16	4.23	4.14
1833	4.18	4.13	4.09	4.09	4.06	4.06	4.11	4.09	4.06	4.06	4.06	4.06	4.09
1834	4.06	4.01	4.01	3.99	4.01	4.15	4.06	4.06	4.06	4.03	3.95	3.92	4.03
1835	3.89	3.85	3.84	3.84	3.80	3.84	3.87	3.87	3.87	3.95	3.95	3.87	3.87
1836	3.87	3.84	3.84	3.84	3.84	3.84	3.87	3.83	3.79	3.76	3.79	3.77	3.87
1837	3.86	3.82	3.82	3.82	3.75	3.79	3.81	3.85	3.83	3.82	3.81	3.79	3.81
1838	3.77	3.76	3.77	3.77	3.79	3.77	3.77	3.76	3.79	3.78	3.78	3.78	3.77
1839	3.78	3.72	3.72	3.72	3.77	3.79	3.85	3.84	3.84	3.84	3.84	4.06	3.82
1840	3.83	3.72	3.72	3.71	3.71	3.77	3.76	3.76	3.76	3.82	3.88	3.75	3.77
1841	3.75	3.62	3.62	3.68	3.67	3.67	3.67	3.66	3.73	3.79	3.78	3.72	3.70
1842	3.78	3.78	3.78	3.92	4.07	4.06					4.07	4.06	3.94*
1843													4.00†
1844													4.00†
1845											4.06	4.06	4.06*
1846	4.06	4.06	4.06	4.06	4.11	4.06	4.06	4.11	4.06	4.26	4.25	4.06	4.10
1847	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06	4.06
1848	4.06	4.06	4.17							4.56	4.51	4.51	4.31*
1849	4.42	4.33	4.33	4.28	4.22	4.15	4.10	4.13	4.13	4.10	4.11	4.15	4.20
1850	4.15	4.11	4.13	4.08	4.08	4.08	4.06	4.06	4.06	4.06	4.06	4.06	4.08
1851	3.85	3.87	3.86	4.04	4.06	4.06	4.06	4.11	4.11	4.11	4.20	4.28	4.05
1852	4.25	4.27	4.27	4.25	4.27	4.25	4.15	4.18	4.13	4.15	4.16	4.16	4.21
1853	4.06	4.04	4.04	4.01	4.04	4.06	4.06	4.06	4.09	4.28	4.18	4.23	4.10
1854	4.18	4.81	4.68	4.36	4.29	4.36	4.26	4.24	4.29	4.31	4.24	4.29	4.36
1855	4.26	4.24	4.19	4.14	4.16	4.11	4.06	4.09	4.06	4.09	4.24	4.30	4.16
1856	4.30	4.27	4.30	4.35	4.49	4.50	4.44	4.33	4.42	4.41	4.42	4.42	4.39
1857	4.33	4.42	4.42	4.28	4.31	4.31	4.45	4.66	4.49	4.66	5.16	5.01	4.54
1858	4.58	4.67	4.74	4.64	4.56	4.62	4.67	4.68	4.71	4.73	4.73	4.77	4.68
1859	4.73	4.72	4.66	4.68	4.81	4.87	4.63	4.63	4.59	4.63	4.66	4.62	4.69
1860	4.52	4.51	4.48	4.52	4.51	4.51	4.47	4.50	4.50	4.45	4.47	4.47	4.49
1861	4.47	4.46	4.46	4.46	4.48	4.48	4.47	4.50	4.46	4.44	4.45	4.54	4.47
1862	4.53	4.47	4.48	4.47	4.48	4.57	4.45	4.43	4.41	4.51	4.51	4.50	4.48
1863	4.46	4.48	4.48	4.55	4.53	4.55	4.50	4.57	4.60	4.65	4.69	4.97	4.59
1864	4.84	4.80	4.86	4.91	4.93	4.93	4.91	4.96	4.97	5.10	4.99	5.05	4.94
1865	5.08	5.08	5.11	5.10	5.10	5.12	5.10	5.10	5.11	5.23	5.21	5.22	5.13
1866	5.21	5.22	5.24	5.27	5.36	5.61	5.25	5.30	5.28	5.34	5.32	5.32	5.31
1867	5.28	5.29	5.29	5.36	5.27	5.25	5.10	5.15	5.21	5.22	5.16	5.17	5.23

Table A4. Yields on most actively traded maturities of long-term government bonds 1822 - 2003.

Averages of most representative quotations abroad through December 1914; thereafter Oslo Bourse.

Data for 1843 and 1844 are interpolated and marked by †.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1868	5.13	5.13	5.14	5.12	5.11	5.10	5.05	5.08	5.05	5.06	5.06	5.07	5.09
1869	5.09	5.09	5.09	5.10	5.36	5.40	5.26	5.28	5.37	5.37	5.31	5.28	5.25
1870	5.21	5.24	5.32	5.35	5.33	5.33	5.88	5.67	5.47	5.24	5.27	5.32	5.39
1871	5.17	5.19	5.19	5.20	5.19	5.07	4.91	4.85	4.82	4.82	4.82	4.69	4.99
1872	4.62	4.68	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.63
1873	4.62	4.66	4.73	4.78	4.77	4.77	4.69	4.69	4.73	4.66	4.74	4.70	4.71
1874	4.62	4.59	4.55	4.55	4.55	4.63	4.59	4.60	4.60	4.62	4.59	4.59	4.59
1875	4.61	4.61	4.61	4.61	4.61	4.61	4.62	4.61	4.63	4.65	4.66	4.63	4.62
1876	4.71	4.71	4.71	4.75	4.74	4.75	4.75	4.74	4.75	4.76	4.75	4.78	4.74
1877	4.77	4.75	4.75	4.80	4.81	4.78	4.76	4.78	4.79	4.77	4.78	4.80	4.78
1878	4.81	4.81	4.80	4.83	4.84	4.84	4.79	4.82	4.82	4.87	4.84	4.87	4.83
1879	4.81	4.80	4.72	4.62	4.57	4.58	4.51	4.53	4.54	4.54	4.54	4.48	4.60
1880	4.36	4.31	4.41	4.38	4.36	4.30	4.27	4.27	4.30	4.29	4.29	4.27	4.32
1881	4.19	4.18	4.18	4.16	4.08	4.05	4.04	4.08	4.08	4.08	4.03	4.07	4.10
1882	4.10	4.08	4.10	4.07	4.07	4.05	4.07	4.09	4.12	4.14	4.15	4.17	4.10
1883	4.18	4.11	4.09	4.07	4.10	4.08	4.09	4.09	4.12	4.12	4.15	4.13	4.11
1884	4.11	4.10	4.09	4.09	4.06	4.08	4.08	4.07	4.05	4.04	4.03	4.01	4.07
1885	4.02	4.02	4.00	4.06	4.00	3.96	3.96	3.96	3.98	3.96	3.98	3.99	3.99
1886	3.95	3.92	3.93	3.88	3.87	3.83	3.80	3.83	3.85	3.84	3.84	3.89	3.87
1887	3.92	3.86	3.82	3.76	3.73	3.72	3.73	3.74	3.75	3.74	3.73	3.72	3.77
1888	3.70	3.69	3.67	3.65	3.63	3.63	3.50	3.51	3.44	3.51	3.50	3.52	3.58
1889	3.50	3.51	3.52	3.48	3.37	3.42	3.39	3.41	3.42	3.44	3.45	3.44	3.45
1890	3.43	3.44	3.42	3.43	3.42	3.42	3.42	3.43	3.44	3.48	3.52	3.52	3.45
1891	3.46	3.49	3.49	3.54	3.61	3.61	3.59	3.56	3.57	3.66	3.70	3.67	3.58
1892	3.62	3.65	3.66	3.65	3.57	3.51	3.46	3.48	3.51	3.50	3.51	3.51	3.55
1893	3.42	3.42	3.46	3.47	3.48	3.49	3.53	3.60	3.65	3.64	3.61	3.58	3.53
1894	3.48	3.50	3.48	3.47	3.49	3.45	3.45	3.42	3.35	3.35	3.25	3.22	3.41
1895	3.17	3.14	3.12	3.24	3.21	3.18	3.15	3.14	3.16	3.18	3.16	3.20	3.17
1896	3.16	3.12	3.10	3.08	3.06	3.06	3.04	3.03	3.05	3.07	3.11	3.12	3.08
1897	3.09	3.09	3.10	3.09	3.07	3.04	3.05	3.04	3.04	3.05	3.05	3.09	3.07
1898	3.08	3.09	3.11	3.14	3.16	3.10	3.12	3.14	3.18	3.17	3.18	3.23	3.14
1899	3.23	3.25	3.29	3.34	3.44	3.48	3.47	3.49	3.52	3.58	3.55	3.62	3.44
1900	3.63	3.60	3.61	3.67	3.72	3.73	3.74	3.75	3.75	3.76	3.73	3.72	3.70
1901	3.65	3.63	3.58	3.53	3.60	3.61	3.52	3.51	3.52	3.55	3.51	3.49	3.56
1902	3.43	3.38	3.43	3.41	3.39	3.34	3.24	3.27	3.30	3.30	3.31	3.31	3.34
1903	3.27	3.28	3.28	3.29	3.27	3.27	3.27	3.30	3.32	3.35	3.41	3.43	3.31
1904	3.43	3.49	3.49	3.53	3.64	3.56	3.56	3.54	3.48	3.54	3.53	3.56	3.53
1905	3.54	3.49	3.53	3.54	3.54	3.66	3.67	3.70	3.66	3.67	3.65	3.62	3.60
1906	3.60	3.59	3.57	3.58	3.53	3.53	3.49	3.47	3.49	3.56	3.58	3.56	3.55
1907	3.54	3.59	3.65	3.66	3.67	3.71	3.70	3.69	3.75	3.76	3.77	3.82	3.69
1908	3.76	3.77	3.77	3.79	3.77	3.78	3.79	3.77	3.78	3.71	3.70	3.70	3.76
1909	3.69	3.66	3.63	3.62	3.62	3.65	3.61	3.61	3.61	3.60	3.60	3.61	3.63
1910	3.61	3.63	3.63	3.64	3.66	3.68	3.74	3.73	3.74	3.72	3.77	3.76	3.69
1911	3.75	3.74	3.75	3.74	3.73	3.75	3.81	3.81	3.87	3.89	3.87	3.87	3.80
1912	3.93	3.91	3.95	3.95	3.98	4.02	4.04	4.01	4.06	4.12	4.14	4.13	4.02
1913	4.18	4.17	4.22	4.23	4.32	4.33	4.27	4.20	4.15	4.12	4.16	4.20	4.21

Table A4. Yields on most actively traded maturities of long-term government bonds 1822 - 2003.

Averages of most representative quotations abroad through December 1914; thereafter Oslo Bourse.

Data for 1843 and 1844 are interpolated and marked by †.

Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1914	4.15	4.14	4.16	4.24	4.20	4.21	4.25	4.67		4.58	4.32	4.33	4.29*
1915	5.05	5.05	5.05	5.05	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.09	5.06
1916	5.18	5.33	5.40	5.36	5.24	5.06	5.12	5.06	5.06	5.07	5.06	5.06	5.17
1917	5.06	5.09	5.12	5.12	5.08	5.09	5.11	5.09	5.08	5.15	5.19	5.21	5.12
1918	5.30	5.36	5.45	5.45	5.49	5.69	5.76	5.68	5.70	5.69	5.69	5.70	5.58
1919	5.62	5.77	5.78	5.80	5.74	5.81	5.69	5.65	5.66	5.76	6.08	5.98	5.78
1920	6.01	6.18	6.28	6.28	6.42	6.65	7.50	7.53	7.19	7.23	7.11	6.84	6.77
1921	6.50	6.32	6.51	6.34	6.22	6.15	5.56	5.57	5.65	5.98	5.68	5.72	6.02
1922	5.60	5.41	5.12	4.75	4.77	4.85	4.99	4.71	5.20	5.05	5.05	5.07	5.05
1923	5.06	5.03	5.06	5.09	5.19	5.20	5.42	5.54	5.48	5.82	5.75	5.57	5.35
1924	5.67	5.68	5.61	5.53	5.77	5.96	6.01	5.99	5.97	6.10	6.09	5.85	5.85
1925	5.92	5.99	6.04	5.94	5.86	5.44	5.50	5.29	5.42	5.48	5.65	5.67	5.68
1926	5.73	5.58	5.50	5.52	5.57	5.49	5.33	5.19	5.04	4.88	5.07	5.13	5.34
1927	5.16	5.05	5.10	5.08	5.15	5.18	5.16	5.21	5.34	5.49	5.55	5.58	5.25
1928	5.50	5.39	5.32	5.24	5.22	5.23	5.20	5.17	5.17	5.18	5.26	5.22	5.26
1929	5.20	5.28	5.37	5.39	5.29	5.38	5.43	5.45	5.48	5.47	5.38	5.24	5.36
1930	5.20	5.18	5.13	5.15	5.21	5.17	5.05	5.09	5.04	4.77	4.75	4.83	5.05
1931	4.73	4.71	4.71	4.68	4.62	4.65	4.76	4.68	5.41	5.15	5.31	5.44	4.90
1932	5.25	5.07	5.09	5.10	5.00	4.94	4.89	4.82	4.76	4.70	4.73	4.73	4.92
1933	4.70	4.72	4.70	4.69	4.60	4.65	4.69	4.57	4.57	4.91	5.06	5.02	4.74
1934	4.93	4.97	4.97	4.82	4.78	4.71	4.63	4.62	4.66	4.65	4.52	4.45	4.73
1935	4.36	4.26	4.18	4.18	4.19	4.17	4.16	4.30	4.34	4.34	4.26	4.34	4.26
1936	4.18	4.29	4.29	4.33	4.39	4.56	4.72	4.65	4.66	4.23	4.50	4.54	4.44
1937	4.44	4.40	4.44	4.46	4.45	4.39	4.37	4.12	4.07	3.98	3.97	4.05	4.26
1938	3.91	3.84	3.89	3.93	3.90	3.88	3.89	3.73	3.76	3.62	3.69	3.73	3.81
1939	3.67	3.70	3.80	4.09	4.09	4.18	4.08	4.31	4.86	4.99	4.94	5.33	4.34
1940	5.62	5.77	5.20	5.13	6.17	5.14	4.91	4.71	4.58	4.21	4.24	4.28	5.00
1941	4.19	4.15	3.90	3.70	3.54	3.59	3.56	3.57	3.57	3.47	3.44	3.53	3.68
1942	3.49	3.40	3.40	3.47	3.48	3.53	3.51	3.52	3.53	3.51	3.52	3.57	3.49
1943	3.53	3.53	3.53	3.54	3.53	3.54	3.55	3.54	3.54	3.54	3.54	3.53	3.54
1944	3.50	3.48	3.45	3.53	3.52	3.53	3.53	3.53	3.52	3.50	3.48	3.49	3.51
1945	3.52	3.48	3.46	3.48	3.46	3.42	3.36	3.30	3.34	3.35	3.36	3.38	3.41
1946	3.02	2.88	2.52	2.52	2.52	2.52	2.50	2.51	2.52	2.50	2.50	2.51	2.58
1947	2.50	2.48	2.49	2.48	2.48	2.48	2.48	2.53	2.54	2.55	2.54	2.53	2.51
1948	2.53	2.52	2.50	2.48	2.45	2.48	2.47	2.47	2.46	2.47	2.48	2.48	2.48
1949	2.47	2.50	2.53	2.52	2.54	2.61	2.54	2.53	2.56	2.47	2.47	2.50	2.52
1950	2.50	2.50	2.52	2.56	2.62	2.68	2.88	2.84	2.85	2.86	2.98	3.06	2.74
1951	2.90	2.91	2.93	3.04	3.17	3.26	3.26	3.30	3.30	3.36	3.39	3.25	3.17
1952	3.18	3.14	3.22	3.23	3.22	3.21	3.18	3.14	3.14	3.13	3.10	3.13	3.17
1953	3.12	3.12	3.14	3.17	3.15	3.19	3.15	3.13	3.18	3.10	3.09	3.09	3.14
1954	3.10	3.05	3.05	3.05	3.05	3.05	3.09	3.07	3.10	3.13	3.22	3.30	3.10
1955	3.40	3.90	3.92	3.96	4.05	4.06	4.06	4.12	4.24	4.23	4.16	4.37	4.04
1956	4.51	4.45	4.35	4.58	4.80	5.11	5.22	4.97	4.88	4.83	4.86	4.84	4.78
1957	4.74	4.67	4.61	4.61	4.56	4.55	4.65	4.64	4.82	4.85	4.97	4.95	4.72
1958	4.79	4.77	4.77	4.83	4.80	4.80	4.80	4.78	4.77	4.72	4.67	4.67	4.76
1959	4.79	4.65	4.66	4.66	4.66	4.78	4.67	4.65	4.66	4.61	4.57	4.64	4.67

Table A4. Yields on most actively traded maturities of long-term government bonds 1822 - 2003.

Averages of most representative quotations abroad through December 1914; thereafter Oslo Bourse.
 Data for 1843 and 1844 are interpolated and marked by †.
 Annual averages based on less than 12 monthly observations are marked by *.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVR
1960	4.65	4.65	4.63	4.59	4.60	4.67	4.65	4.70	4.73	4.68	4.77	4.71	4.67
1961	4.64	4.61	4.67	4.66	4.80	4.78	4.76	5.07	4.93	4.93	4.91	4.90	4.81
1962	4.86	4.81	4.77	4.78	4.74	4.74	4.77	4.76	4.78	4.75	4.75	4.76	4.77
1963	4.65	4.61	4.54	4.54	4.54	4.56	4.57	4.58	4.54	4.55	4.69	4.62	4.58
1964	4.60	4.59	4.60	4.61	4.62	4.68	4.69	4.70	4.71	4.72	4.71	4.71	4.66
1965	4.70	4.70	4.71	4.75	4.91	4.95	4.97	4.90	4.86	4.91	4.89	4.87	4.84
1966	4.78	4.77	4.75	4.73	4.75	4.81	4.88	4.90	4.91	4.96	4.91	4.99	4.84
1967	5.00	5.02	5.02	5.02	4.99	4.98	4.95	4.94	4.88	4.88	4.90	4.87	4.96
1968	4.91	4.92	4.92	4.93	4.91	5.08	5.08	5.06	5.05	5.03	4.98	4.94	4.98
1969	4.79	4.79	4.82	4.79	4.80	4.84	4.87	4.85	6.03	5.70	5.91	5.94	5.18
1970	5.93	5.81	5.87	5.93	5.89	5.95	5.83	5.80	5.73	5.82	5.73	6.00	5.86
1971	5.91	5.84	5.83	5.82	6.04	6.08	5.82	5.92	6.01	5.99	5.80	6.09	5.93
1972	6.11	6.10	6.10	6.09	6.05	6.05	6.01	6.04	6.04	6.00	5.99	5.98	6.05
1973	5.96	6.16	6.18	6.23	6.19	6.22	6.22	6.21	6.20	6.22	6.22	6.22	6.19
1974	6.22	6.25	6.23	7.54	7.54	7.60	7.60	7.59	7.61	7.48	7.49	7.52	7.22
1975	7.57	7.52	7.52	7.62	7.62	7.58	7.60	7.61	7.60	7.60	7.61	7.55	7.58
1976	7.54	7.55	7.56	7.56	7.56	7.47	7.48	7.49	7.50	7.50	7.47	7.47	7.51
1977	7.48	7.49	7.49	7.49	7.50	7.49	7.50	7.51	7.47	7.47	7.48	9.01	7.62
1978	9.00	9.02	9.02	9.02	9.03	9.00	9.02	9.04	8.98	8.99	8.99	8.89	9.00
1979	8.91	8.93	8.93	8.93	8.94	8.93	8.95	8.97	8.93	8.93	8.93	10.91	9.10
1980	10.64	10.69	10.72	10.70	10.71	10.75	10.78	10.95	10.95	10.93	10.95	10.84	10.80
1981	11.53	11.61	11.60	12.25	12.93	12.96	13.02	13.07	13.18	13.25	13.24	14.00	12.72
1982	14.02	14.19	13.73	13.84	14.00	14.05	13.60	13.65	13.39	14.07	13.68	13.82	13.84
1983	13.85	13.68	13.58	13.32	13.24	13.09	13.01	12.99	12.99	13.01	12.81	12.82	13.20
1984	12.81	12.68	12.67	12.61	12.46	12.48	12.45	12.42	12.46	12.50	12.52	12.50	12.55
1985	12.53	12.65	12.87	12.85	12.85	12.94	12.94	12.94	12.93	12.90	12.90	13.49	12.90
1986	13.44	13.36	13.28	12.85	13.06	13.14	13.17	13.15	12.86	12.95	13.02	13.37	13.14
1987	13.26	13.14	13.12	13.10	13.14	13.14	13.14	12.89	12.51	12.80	13.01	13.03	13.02
1988	13.09	12.97	13.02	13.01	12.62	12.43	12.59	12.69	12.79	12.36	12.12	11.59	12.61
1989	10.97	10.78	10.79	10.56	10.63	10.85	10.91	10.89	10.57	10.73	11.15	10.89	10.81
1990	10.62	10.59	10.85	11.01	10.72	10.66	10.61	10.62	10.65	10.64	10.63	10.62	10.69
1991	10.56	10.39	10.42	9.99	9.72	9.77	9.74	9.75	9.88	9.92	9.81	9.77	9.98
1992	9.40	9.42	9.51	9.52	9.48	9.60	9.85	10.21	10.62	10.09	9.51	9.08	9.69
1993	8.78	7.99	7.65	7.27	7.07	6.50	6.54	6.11	6.13	5.78	5.75	5.58	6.76
1994	5.50	5.65	6.48	6.96	7.95	8.00	7.76	8.28	9.04	8.71	8.19	8.01	7.55
1995	8.06	7.93	7.97	7.66	7.34	7.75	7.55	7.31	7.13	6.91	6.44	6.36	7.37
1996	6.57	6.88	6.78	6.68	6.96	7.02	7.02	7.11	6.84	6.81	6.29	6.24	6.77
1997	5.88	5.63	6.09	6.12	6.08	5.96	5.86	6.01	5.75	5.79	5.59	5.50	5.85
1998	5.47	5.43	5.45	5.63	5.47	5.51	5.25	5.80	5.22	5.45	5.21	5.24	5.43
1999	4.68	4.89	4.84	4.71	5.13	5.65	5.93	5.90	6.18	6.17	6.13	6.17	5.53
2000	6.39	6.34	6.14	6.22	6.19	6.16	6.20	6.32	6.31	6.37	6.09	5.98	6.23
2001	5.95	5.97	6.08	6.38	6.69	6.68	6.54	6.42	6.30	5.87	5.92	6.30	6.26
2002	6.32	6.43	6.66	6.71	6.91	6.59	6.48	6.20	5.99	6.19	6.14	5.79	6.37
2003	5.48	5.24	5.29	5.30	4.69	4.68	5.01	4.98	4.71	4.95	4.91	4.52	4.98

Chapter 5 – Monetary aggregates in Norway 1819–2003

Jan Tore Klovland¹

1. Introduction

This chapter presents data on the stock of money and other monetary aggregates, including the key items on the central bank's balance sheet and bank deposits held at commercial and savings banks.

The construction of these time series utilizes information from existing statistical sources published by Statistics Norway as well as a variety of other sources: central bank balance sheet data published in the annual reports of Norges Bank, in contemporary newspapers and unpublished material located at Riksarkivet (National Archives of Norway) as well as in Norges Bank's own archives; further sources include a number of documents published in Norwegian Parliamentary Papers throughout the period, individual commercial and savings banks' jubilee books, contemporary newspapers² and financial periodicals, savings banks' balance sheets prior to 1869 archived at Riksarkivet and commercial bank accounts before 1900 deposited with Statsarkivet in Trondheim, some specialized studies of banking and credit markets³, and, finally, balance sheet data of individual banks obtained through private communication. The key balance sheet items of Norges Bank at year-ends can be found in statistical sources, but monthly data for the period from 1850 to 1914 have not been readily available previously. Historical time series on the stock of money and its components for the period extending back to 1819 have not appeared in published form until now, although earlier vintages of the broad money stock estimates have been used in some econometric studies and tabulated in appendices.⁴ The data series derived here are tabulated in the appendix. Table A1 gives end-of-year data for the period from 1819 to 1914. Monthly data beginning in 1850 are shown in Table A2. All series refer to end-of-month. Annual averages of the most important aggregates over the whole 185-year period can be found in Table A3. Details on the construction of these data series will be found in the text below.

¹We are indebted to Kari Helgesen at Statsarkivet in Trondheim for providing material on commercial banks accounts.

²For the period until 1860 most national and regional newspapers available have been examined in search of savings bank accounts.

³The collection of balance sheet data of commercial banks up to 1900 contained in Matre (1992) is particularly useful. For the period after 1900 Skånland (1967) is a key reference; some unpublished worksheets underlying this study were obtained from the author, which we acknowledge with gratitude.

⁴Most of the time series presented here are revised versions of data which first appeared in Klovland (1984a,b). These sources also contain far more detailed data and descriptions of sources and definitions. Norwegian money stock data originating from this source have been analyzed in Bordo and Jonung (1987) and is part of their international data set, which have been widely used in econometric studies of the demand for money and velocity behaviour.

The best publicly available general source of monetary data for the years before 1940 has been *Historical Statistics 1948*,⁵ which contains much useful aggregate material on balance sheet items of commercial and savings banks as well as Norges Bank. But the student of banking history will soon discover that there are significant gaps in the banking statistics, as regular annual savings banks statistics only started with the year 1869,⁶ and reasonably complete commercial bank statistics did not appear until 1900. Information on the main components of banks' balance sheets for selected years can be traced in various sources even for the periods of general statistical 'blackout', however. Much effort has been required to collect this information and supplement it with the sources referred to above. The data presented here reflect ongoing research, and may be slightly revised as more information on individual commercial and savings banks are retrieved. But we do believe that the data presented here provide a reasonably accurate set of annual estimates of the deposits of all banks throughout the period since the first savings bank was established in 1822.

The massive bank failures in the 1920s represent a complicating factor in this connection, causing severe problems for the compilation and interpretation of monetary aggregates. The problem is most acute in the years 1921 to 1924, as the published specialized banking statistics⁷ did not separate the failed banks (those being in receivership, operating under the 'public administration act'), from banks in normal operation.⁸ It is obvious that no useful money stock series should comprise deposits that were frozen in the failed banks, and every effort should be made to adjust for these factors.

This problem can be seen as a consequence of a more general issue facing the use of historical financial statistics for economic research. The items collected and published by the statistical authorities are often defined on a formal or legal basis, which in particular cases may be badly suited for analytical purposes. There are numerous pitfalls in the published monetary statistics of this period for the unprepared researcher. The 1948 edition of *Historical Statistics* is a good source of monetary data for this period, but even this volume is a minefield if the data series are used uncritically.

2. The years 1819 - 1850

The central bank of Norway, Norges Bank, was established in 1816, but regular banking activities, such as note issuance and lending, did not commence until 1818. During a transition period the

⁵Published as *Statistiske oversikter 1948*, Statistics Norway, Oslo, 1949. Subsequent versions of the Statistics Norway publications *Historical Statistics* have appeared in 1968, 1978 and 1994, updating the main data series to post-WWII years.

⁶*Historical Statistics 1948* gives very incomplete information on this point, as it fails to include any data from the first edition of the savings bank statistics '*Tabeller vedkommende Norges sparebanker i aarene 1870, 1871 og 1872*', published by the Department of Finance in 1876. Later editions of *Historical Statistics* do not give annual data for savings banks in this period.

⁷Statistics Norway published separate volumes of annual statistics relating to savings banks (*NOS Norges sparebanker*) and commercial banks (*NOS Private aksjebanker*), which were merged into one volume in 1931. We refer to these issues as the annual banking statistics.

⁸Those students of banking history consulting the apparently complete banking data in *Historical Statistics 1948* only, and not the primary banking statistics sources, may fail to appreciate the consistency problems caused by the banking crisis, as there is no information of such problems in the former source.

currency circulation consisted mainly of the notes issued by the domestic branch of the Danish-Norwegian Rigsbank; in addition, coins and notes issued by the public Loan and Discount Agencies circulated, and there were even some private note issues.⁹ The first notes were issued by Norges Bank in January 1818 in exchange for Rigsbank notes. The redemption of the old notes proceeded slowly and was not completed until July 1820, although the amounts outstanding were presumably small after 1819.¹⁰

Norges Bank was the dominant bank in the first part of the 19th century and was in fact the only bank in Norway until the first savings bank, Christiania Sparebank, was founded in 1822. The first commercial bank, Christiania Bank og Kreditkasse, was not established until 1848. We begin our annual monetary time series in 1819, which is the first year in which Norges Bank was in 'normal' operation. Table A1 of the appendix contains the key monetary aggregates as of-end-year for the period 1819 to 1914. The main items on the balance sheet of Norges Bank listed there include foreign assets, which was tantamount to the silver stock in this period, mortgage loans, other loans (chiefly discounted bills), currency notes in circulation and total demand deposits, including Treasury deposits, which are also specified separately. For the period to 1848 there are time series for domestic coin in circulation and savings bank deposits as well. We now comment briefly on the definition and characteristics of these items along with some comments on the nature of banking and the monetary system of this period.

It had been decided by the Storting that Norway should be on a silver standard. In order to obtain the necessary reserves of silver specie a silver tax was levied on the inhabitants. Enforcing payment of the silver tax proved to be a long drawn-out process, hence the slowly rising silver stock in the 1820s may in part be due to the efforts of tax collectors rather than monetary policy. Norges Bank was unable to exchange its currency notes for silver at the predetermined rate until 1842, but silver could be exchanged at a rate that was regulated with some lags according to the market rate.¹¹

It is a somewhat peculiar feature of the lending activity of a central bank to have most of its portfolio of domestic assets invested in mortgage loans. As will be seen from Table A1 this was in fact the case here; not until 1865 did the amount of discounted bills surpass mortgage loans. This feature reflects no doubt the fact that there was a fundamental need for mortgage finance in Norway that could not be adequately met by other institutions, at least not until the establishment of Kongeriket Norges Hypotekbank in 1852. Market interest rates on mortgage loans had an upper limit set by law, which did not encourage the extension of such loans by savings banks. It may also be the case that the trade bill market was too limited to meet the investment needs of Norges Bank, and being a private limited company, one of its concerns was to ensure a reasonable dividend to its shareholders.

⁹The most comprehensive treatment of the the central bank's activities in this period is given by Rygg (1918).

¹⁰Rygg (1918, pp. 161-162).

¹¹See Rygg (1918) and Keilhau (1952) for the general background and Chapter 7 of this volume for exchange rate data.

The mortgage loans decreased slowly from the 1850s, but remained of some importance for most of the century. This implies that there was a fairly limited scope for undertaking modern central banking activities along the lines advocated by Bagehot (1873), perhaps more so in Norway than in other countries because of the structural peculiarities of the domestic asset portfolio. An illustration of this constraint may be observed around the commercial crisis of 1848. The silver stock was reduced by 32 per cent between 1845 and 1848 reflecting a severe monetary stringency, but Norges Bank was unable to alleviate the crisis by increasing its discount loans.

On the liability side of the balance sheet of Norges Bank currency notes and demand deposits were the main items. Demand deposits were small until 1842, which was only to be expected because a fee was required to deposit money with the bank. This was changed in 1842 and the demand deposit balances increased rapidly thereafter.¹² We do not have exact data on the distribution of depositors in this period, but we do know from the balance sheets of savings banks, and beginning in 1848, from commercial banks, that excess reserves were in some cases held as deposits with the central bank. As to savings banks, this applied in particular to banks located in towns where Norges Bank had a branch office. In the case of savings banks located in rural areas, excess liquidity was ordinarily held in cash only, or deposited with larger savings and commercial banks in periods of subdued loan demand. Public funds and local and central administrative bodies probably accounted for a substantial share of the deposits in this period. As can be seen from Table A1 Treasury deposits were initially rather small, but increased markedly from 1845.¹³

The most difficult item of the money supply to quantify in this period is the amount of domestic coin in circulation before 1874. After this year there is sufficient information in publicly available sources to form an annual time series of coin.¹⁴ Some estimates for earlier years were made in various parliamentary reports, the first one in 1865, but there are some difficulties in reconciling the information contained in these reports.¹⁵ We do have a presumably well-founded estimate for 1874, but for earlier years only crude estimates based on the information on the coinage of the various denominations presented by mint director Langberg (1867) have been made. The estimates must be considered as tentative only because we have little information on the exact date at which the minted coin was put into circulation, the withdrawal of old coin issues or the actual loss rate.¹⁶ The fact that

¹²See *Norwegian Parliamentary Papers (Stortingsforhandlinger)* Ot. prp. 8 (1888).

¹³Data on Treasury deposits in this period (including balances held by the Ministry of Finance and the Ministry of Justice 1820 - 1843) were derived from Norges Bank's own archives. There is some uncertainty whether these cover all government deposits, but most likely they are complete.

¹⁴Coin in circulation consists of silver and bronze coin (excluding gold coin, which never circulated for transaction purposes). Data after 1895 are net of Treasury and Norges Bank's holdings of coin. The main sources are Norwegian Parliamentary Papers (annual issues of St. prp. 1 and St. dok. 57 (1900-1901) as well as the annual reports of Norges Bank).

¹⁵The documents published in *Norwegian Parliamentary Papers* concerned are: Ot. prp. 21 (1865), Ot. prp. 1 (1873), Ot. prp. 1 (1873) and Ot. prp. 14 (1875). The benchmark estimate for the year 1874 presented here basically reflects the 1875 document.

¹⁶The estimates were derived by accumulating the annual output figures from 1814 and assuming different withdrawal/loss ratios until the iterations produced a figure that was close to the 1874 benchmark. I am indebted to Øyvind Eitrheim for helpful discussions of this issue and for making the coin estimates prior to 1874.

a portion of the old Danish-Norwegian coin was legal tender in Norway is a further complicating factor. Foreign coin was also circulating among the public; a sample taken by the banker Thomas Heftye in 1873 showed that 17 per cent was of Danish origin and 4 per cent of Swedish origin.¹⁷

Finally, we turn to the estimates of deposits at savings bank deposits, which for this period have been little more than white spots on the map until now. The first savings bank was established in Christiania (Oslo) in 1822, followed by Bergen, Drammen and Trondhjem in 1823, Kristiansand in 1825, Arendal in 1826 and Stavanger in 1834.¹⁸ However, nearly complete data on the deposits of existing banks were collected every fifth year beginning in 1840 by the authorities and published in *Amtmændenes femaarsberetninger*. We thus have reliable benchmark estimates for 1840 and every fifth year thereafter. For the 1860s data on individual savings banks can be found in archived sources (see below). Regularly published and complete returns covering all savings banks only started in the early 1870s, with data extending back to 1869.

We have estimated total savings bank deposits each year up to 1869 by attempting to retrieve the balance sheets of all individual savings banks, using a variety of sources.¹⁹ The data base is believed to be complete for the years 1822 to 1834, but thereafter some gaps exist, although the deposits of these banks represent a relatively small fraction of the totals in the benchmark years. The savings banks for which we do have deposit figures in 1852 accounted for 98.5 per cent of total deposits in the nearest benchmark year, 1850. The corresponding figure for 1858, which is probably the most critical year as to data coverage, is 97 per cent as compared to the 1860 benchmark. In the worst cases the missing deposit figures of individual banks could be linearly interpolated between the quinquennial benchmark years, but often figures for some intervening years were known. The interpolations required for these banks presumably lead to a smoothing of the deposit estimates, which may slightly affect aggregate growth rates in the recession periods of 1848 and 1857 (see Table 1 below). From 1860 and onwards a nearly complete set of original savings bank accounts can be found in Riksarkivet in Oslo. The individual deposit figures were collected and aggregated to total savings bank deposits.²⁰ Our estimates are slightly higher than the previously published data that exist for selected years in *Historical Statistics 1948* and similar sources, mainly because of the addition of a few uncharted savings banks that were incompletely covered by the official savings bank statistics.²¹

¹⁷Rygg (1954, p. 56).

¹⁸Savings banks were also founded in Skien in 1823 as well as in Moss and Tønsberg in 1826. These banks suspended business after a few years but were reestablished in 1835, 1843 and 1847, respectively, see Rønning (1972).

¹⁹Before 1860 information from contemporary newspapers and jubilee reports published by a large number of savings banks constitute the main sources. These sources do not give a complete coverage, however. The jubilee reports often lack annual balance sheet information, in a number of cases because the early archives have been lost. The annual accounts of many savings banks can be found in local newspapers, but for the smallest banks these are often hard to find. Microfilmed copies of some of the newspapers do not exist because very incomplete paper editions have survived to the modern age.

²⁰For the 1860s these are archived under Finansdepartementet, ekspedisjonskontor C, catalogue number 3A25233, items 59, 60 and 61. A few banks are missing from the archived accounts, most notably Laurvig Sparebank, but information on these banks can partly be retrieved from jubilee reports. Some incomplete data on aggregate deposits and total balances in the 1860s can be found in Broch (1876) and in *Norwegian Parliamentary Papers* Dok. 1 (1878).

²¹This concerns in particular two banks: Stavanger Sparekasse, founded in 1850, and excluded in the official estimates

Table A1 contains two aggregate money stock series, the monetary base (M0) and the broad money stock (M2). The monetary base concept is conventionally reserved for the liquid claims on the central bank held by the private sector, including all banks. It is defined as total currency in circulation (notes and coin) plus total demand deposits at Norges Bank, excluding Treasury deposits.²² M2 is defined as total currency in circulation less currency held by banks (an item not shown separately) plus savings and commercial bank deposits.²³

Figure 1 shows the level of the note circulation, M0 and M2. The gap between M2 and the note circulation is made up of savings bank deposits (and a small amount of commercial bank deposits beginning 1848). The expansion in M0 and M2 proceeded fairly smoothly in this period until 1847 and 1848, respectively, when there is a significant fall in both aggregates. In contrast to M0 and M2 the note circulation is stagnating in the 1840s. The expansion of the banking sector and, in particular, the more favourable terms relating to demand deposits in Norges Bank as from 1842, enabled the public to economize on their cash holdings and may in part explain why the note circulation ceased to grow.

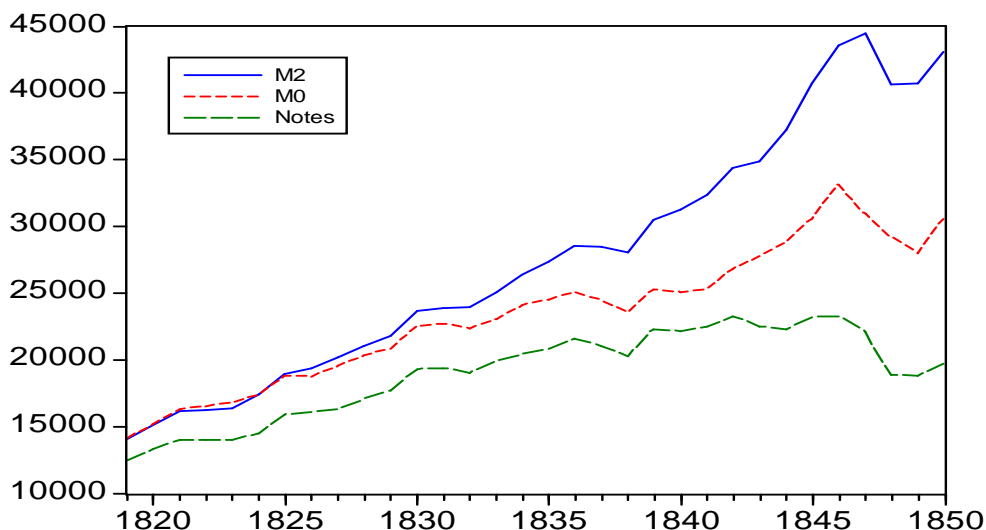


Figure 1: Monetary aggregates 1819-1850

Such considerations indicate that there are pitfalls in relying solely on the note circulation as a general monetary indicator in the 1840s. On the other hand one may question the ‘moneyness’ of

until 1878, and Bergens Skillingsbank, which was never included as a savings bank, but entered the banking statistics when it was transformed to a commercial bank in 1919. The uncharted banks differed little from the charted banks with respect to banking activities.

²²Formally, coin in circulation was a liability of the Treasury and did not figure in the balance sheet of Norges Bank until January 1962.

²³See the next section for more details on the M2 definition.

savings bank deposits, which make up a growing share of the broad money stock M2. The bulk of deposits held with savings banks, and to a large extent also the time deposits of commercial banks, in this period formally required a 3 months' notice for withdrawal, but could in practice often be withdrawn on demand, at least up to a certain limit.²⁴

A more general issue concerns the role of savings banks as financial intermediaries and depository institutions. In Norway savings banks' deposits were larger than those of commercial banks until 1914. The savings banks were often established primary as thrift institutions, in particular intended for the small savings of the poor people, but they soon developed into ordinary banking institutions.²⁵ The contemporary local newspapers sometimes printed a list of the depositor groups, and it was commonly observed that the bulk of deposits belonged to the wealthy part of the population - businessmen, landed proprietors, farmers and civil servants - as well as a variety of public institutions and local government.²⁶ The assets of savings banks were largely invested in loans to private individuals, chiefly in the form of endorsed bills and, less frequently until the end of the nineteenth century, mortgage loans. Less than 10 per cent were held in currency, securities and deposits with other banks (including Norges Bank). In his statistical review of the Norwegian economy in the late 1840s Tvethe (1848, p. 202) noted (translated from Norwegian) that 'savings banks largely carry on a business similar to that of private bankers since few or none exist; and this is the main reason for the extensive scale of their operations'.²⁷ This characterization became increasingly true over time, but it did not apply equally across all savings banks. Many banks maintained upper limits on the amount that could be deposited in a single account.²⁸ On the other hand, some banks were actively acquiring deposits in order to develop into (relatively) large banks, such as the fast-growing Akers Sparebank, founded in 1844. Bergens Sparebank grew fast in the 1850s and 1860s, when it managed to compete successfully with the newly founded commercial banks, but reverted to a 'thrift-inspired' policy in the late 1860s under a new management. In some sense it may be true that savings banks were more similar to commercial banks on the asset side than with respect to the liability side of the balance sheet.²⁹

Annual growth rates of the main monetary aggregates are shown in Table 1. The annual fluctuation in the currency circulation and the monetary base (M0) appear to be closely linked to business cycle developments. We note in particular a general decline in monetary aggregates in 1837-1838 and 1847-1848. With the exception of 1827, in all years prior to 1848 savings banks expanded rapidly,

²⁴This practice seems to have been maintained as a general rule right up to the present time, see for example the comment on rules for withdrawal of bank deposits in *Farmand* May 2, 1891. Only exceptional circumstances, such as the outbreak of WWI, seem to have modified this, cf. Rygg (1954, p. 359).

²⁵This is documented in more detail in Rønning (1972).

²⁶This is documented in many savings banks' jubilee reports, see for example Vogt (1922, pp. 64-66). Tvethe (1848, p. 202) claimed that the bulk of savings banks' deposits did not belong to poor people but rather to the more wealthy classes.

²⁷The same text was published in *Morgenbladet* November 16, 1849.

²⁸Bergens Sparebank followed a very strict policy in this respect, but this seems to have led to a proliferation of the number deposit accounts, see Fossen (1998).

²⁹See Schreiner (1943) and Fossen (1998) for the early history of Akers and Bergens Sparebank, respectively.

as evidenced by growth rates mostly being between 10 and 20 per cent per year, The 1848 recession marks a significant break, however. Deposits fell by 5.9 per cent in 1848, and a further decline of one per cent took place in 1849. The interrupted growth path of savings deposits can be seen as a lagged response to the decline in the monetary base, which started in 1847. The foreign reserve component started to decline already in 1846, however, so foreign monetary impulses must have played a key role in this case. The episode sheds some interesting light on the statement by Tvethe (1848) referred to above - the savings banks were founded as local thrift institutions, but increasingly developed into financial intermediaries, and by the late 1840s they were subjected to the full force of the business cycles coming from abroad.

Table 1. Annual growth rates of monetary aggregates 1820 - 1850.

Year	NB foreign reserves	NB domestic credit	Total currency	M0	SB deposits	M2
1820	-3.0	24.1	7.0	7.2	0.0	7.0
1821	3.7	32.7	6.7	7.1	0.0	6.7
1822	-2.2	8.0	0.6	1.6	0.0	0.7
1823	0.1	14.2	0.1	1.4	197.9	0.8
1824	6.9	13.3	5.4	3.9	78.3	6.2
1825	8.2	24.5	7.6	7.5	52.6	8.4
1826	-1.3	12.8	0.8	-0.0	43.2	2.0
1827	1.0	6.0	4.3	4.3	2.8	4.2
1828	7.0	6.5	2.9	3.5	32.0	4.1
1829	1.3	2.2	2.6	2.5	22.5	3.6
1830	9.6	0.3	7.5	7.6	20.8	8.3
1831	1.9	3.6	0.1	0.9	13.0	1.0
1832	2.0	1.4	-1.4	-1.6	19.4	0.2
1833	0.5	-0.6	3.4	3.2	15.9	4.6
1834	11.3	3.3	3.8	4.4	17.0	5.1
1835	1.7	5.0	1.9	1.8	17.1	3.7
1836	-0.1	3.1	3.2	2.2	10.6	4.1
1837	-0.5	4.7	-3.0	-2.6	16.1	-0.2
1838	-9.6	3.8	-3.9	-3.6	10.7	-1.4
1839	9.9	4.2	7.6	7.2	12.2	8.4
1840	-0.2	1.3	-0.9	-1.1	15.3	2.3
1841	-3.7	-1.9	0.9	1.0	12.4	3.4
1842	4.3	3.3	3.4	5.8	14.8	6.1
1843	-6.5	7.6	-3.6	3.5	15.1	1.4
1844	-1.1	1.0	3.5	3.8	13.9	6.6
1845	9.9	6.5	6.3	5.9	14.4	8.9
1846	-8.1	5.1	3.1	8.1	14.1	6.8
1847	-20.0	-1.7	-1.8	-6.8	8.4	1.9
1848	-10.1	-4.6	-11.2	-5.8	-5.9	-8.9
1849	5.7	-6.1	0.2	-4.2	-1.0	0.2
1850	4.7	5.6	5.4	8.7	5.6	5.6

NOTES: Annual growth rates are computed as continuously compounded rates (100 times logarithmic differences) between December figures from Table A1 of the appendix. NB = Norges Bank, SB = savings banks

3. The years 1850-1914

The first commercial bank, Christiania Kreditkasse, was established in 1848, followed by Bergens Privatbank in 1855 and Den norske Creditbank in 1857.³⁰ Data on commercial bank deposits will be found in Table A1. The expansion in commercial bank deposits was rapid, but in 1870 they were still only half the size of savings bank deposits. It was not until WWI that commercial banks surpassed the savings banks. Annual banking statistics covering the whole of commercial banks' balance sheet start with the year 1900. However, some key annual balance sheet components of commercial banks (excluding some minor banks) were published by Statistics Norway for the years 1877 and 1878, and annually beginning 1880. Aggregate figures can be found for previous years but it is not clear how comprehensive these estimates are.³¹ We have therefore tried to reconstruct individual balance sheet data on deposits in all commercial banks for the period up to 1900, drawing on the data published by Statistics Norway,³² jubilee reports of various banks, information from bank archives and the compilation of balance sheets in Matre (1992).³³ This effort has resulted in a fairly complete reconstruction of total annual deposit figures, which basically only necessitates the interpolation of the deposits of a few minor banks in some years.

Together with the continued expansion of the savings banks the rapidly expanding commercial bank deposits from the mid 1850s soon became the dominant component of the broad money supply. The composition of M2 is shown in Table 2, in which the deposits at commercial banks are split into demand and time deposits.³⁴ Only commercial banks offered demand deposit accounts (*foliokonto*) in this period, but some medium sized and small commercial banks do not seem to have introduced such accounts at all until after 1900. Savings banks were in fact not permitted to supply deposits on these terms until 1914. Total demand deposits were small throughout the period, hovering around 2 - 3 per cent of total M2. On this background, the usefulness of a M1 series of the money stock, comprising only currency and demand deposits, is questionable for the period before WWI.

To obtain data for currency held by the public, which is the component added to bank deposits to arrive at M1 and M2, estimates of currency held by banks must be made. For commercial banks prior to 1900 estimates of vault cash were made from a sample of commercial banks's balance sheets which were available. Estimates for all commercial banks were then made by assuming the same ratio of cash to total deposits for all banks. Beginning 1900 data for the total of currency

³⁰A review of commercial banking in this period is provided by Hoffstad (1928).

³¹See for example *Statistical Yearbook of Norway*, vol. 1, 1881.

³²These can be found in annual issues of *Statistical Yearbook of Norway* (*Statistisk Aarbog*, data for 1877-1878 and 1880-1899) and the monthly journal *Statistiske meddelelser* (data beginning with 1881), both published by Statistics Norway.

³³Exact deposit figures were obtained from the archives of Bergens Privatbank (private information) and for Privatbanken i Trondhjem and Nordenfjeldske Kreditbank from Statsarkivet in Trondheim. These data do not seem to have been previously known for all years prior to 1877. Our estimates also deviate from those presented in Matre (1992) due to the inclusion of information from the balance sheets of individual commercial banks published in *Statistiske meddelelser*, which seem to have been overlooked in Matre (1992). Some additional data relating to small banks have also been obtained.

³⁴For some banks we only have figures on total deposits in the years before 1900, but the inaccuracy involved regarding the estimated level of demand deposits is quite small, however.

and demand deposits at Norges Bank are available from the annual banking statistics, but there is no information on each item separately. The figures for the latter item, taken from the worksheets underlying Skånland (1967), were subtracted to arrive at a time series of currency only. In the case of savings banks vault cash can be found in the annual statistics beginning 1880. Before this it was assumed to be 1.3 per cent of deposits, as data from the 1880s and fragmentary evidence from individual bank accounts in earlier years indicated this was a reasonable assumption.

Table 2. The percentage composition of the broad money stock, 1848 -1913

End of year	Currency held by the public	Demand deposits at CB	M1	Time deposits at SB	Time deposits at CB	M2
1848	60.4	0.0	60.4	39.3	0.3	100
1855	50.1	0.1	50.2	47.9	1.9	100
1860	33.5	2.4	35.9	48.4	15.7	100
1870	20.6	2.2	22.8	54.0	23.2	100
1880	14.3	2.8	17.1	53.8	29.0	100
1890	12.9	2.1	15.0	53.9	31.2	100
1900	9.9	2.5	12.4	49.1	38.5	100
1910	7.9	1.7	9.7	49.3	41.1	100
1913	8.0	2.1	10.1	47.0	42.9	100

NOTES: CB = commercial banks, SB = savings banks

The annual growth rates of the key monetary aggregates are given in Table 3. Again there is a pervasive connection with well-known business cycle events. The inflationary episodes of 1853-1854, the early 1870s and the late 1890s are easily identified. So are also the contractions in 1857, 1866 and 1877-1878. The strong influence of foreign monetary impulses through the foreign source component of the monetary base is particularly evident in these episodes. We also note that the mid 1880s were a period of slow growth in bank deposits, which is not surprising in view of the fairly extensive banking difficulties of the period.³⁵

³⁵Several important commercial and savings banks located along the western coast of the South of Norway failed in the middle and late 1880s, see Rygg (1954, pp. 162-197).

Table 3. Annual growth rates of monetary aggregates 1850 - 1914.

Year	NB foreign reserves	NB domestic credit	Total currency	M0	SB deposits	CB deposits	Total deposits	M2
1850	4.7	5.6	5.4	8.7	5.5	22.0	5.8	5.5
1851	4.5	6.7	2.6	2.1	11.5	33.5	12.0	6.4
1852	-6.0	-2.0	1.2	0.6	12.1	15.2	12.1	5.9
1853	54.6	4.6	20.4	22.2	16.8	1.9	16.4	18.7
1854	20.2	4.7	10.1	12.0	22.0	32.4	22.3	15.5
1855	-7.0	-0.0	1.8	-2.6	12.5	61.8	14.1	7.6
1856	-11.7	-2.0	-3.6	-7.9	7.9	86.9	12.7	4.8
1857	-32.1	7.0	-6.6	-0.6	-5.0	24.3	-2.1	-4.2
1858	35.0	-1.0	-2.3	-0.1	4.0	85.1	17.1	8.5
1859	-23.7	-7.0	-7.9	-9.9	8.5	9.6	8.8	2.4
1860	8.5	-3.8	4.0	0.5	7.1	34.3	13.8	10.1
1861	-8.4	0.8	-2.6	-4.9	6.7	11.1	7.9	4.5
1862	7.9	5.1	5.6	7.6	10.1	29.2	15.8	12.7
1863	1.2	1.5	-2.0	-1.6	12.1	9.3	11.2	7.3
1864	5.0	-9.5	-2.7	-7.5	8.0	-14.2	1.5	0.5
1865	26.8	7.3	9.3	15.5	7.2	28.8	13.5	12.4
1866	-26.3	2.4	-2.7	-7.6	4.1	-16.1	-1.8	-2.2
1867	14.8	-0.7	3.0	7.1	4.9	20.2	9.3	7.7
1868	-28.0	0.7	-7.4	-8.9	2.9	2.0	2.6	0.2
1869	11.5	-2.5	2.2	2.5	1.5	11.7	4.7	4.2
1870	9.3	0.1	3.0	3.7	4.9	3.4	4.4	4.1
1871	47.6	-6.4	15.1	19.3	6.2	24.5	12.4	12.9
1872	12.3	2.3	10.5	7.9	7.3	11.3	8.7	9.3
1873	13.8	10.6	18.1	14.1	15.1	8.6	12.7	13.8
1874	0.8	-2.5	-3.1	-4.0	13.6	9.3	12.1	8.8
1875	-32.6	9.3	-18.9	-14.6	2.2	-11.3	-2.3	-5.5
1876	25.5	-6.2	5.4	7.1	4.7	12.8	7.4	6.9
1877	-40.7	8.2	-7.6	-10.2	2.2	-2.9	0.5	-1.1
1878	-12.2	-6.9	-13.1	-10.7	-0.6	1.9	0.2	-1.7
1879	31.6	0.7	3.7	15.3	-1.9	5.7	0.7	0.9
1880	24.7	-10.7	14.2	6.6	3.9	15.3	7.9	8.5
1881	-11.2	-0.3	-2.5	-6.2	3.3	5.3	4.1	3.7
1882	9.3	-7.0	6.7	3.0	5.4	12.3	8.1	7.2
1883	5.9	1.9	1.3	4.9	4.4	1.4	3.3	3.7
1884	-1.7	-7.2	-4.2	-6.8	4.7	1.7	3.5	2.2
1885	-18.4	12.6	-4.1	-2.1	1.4	1.7	1.5	0.7
1886	5.4	-0.1	4.2	1.2	0.6	-2.5	-0.5	0.1
1887	28.5	-25.6	2.7	9.8	0.1	4.4	1.8	1.3
1888	11.1	-6.6	7.6	5.1	3.4	3.2	3.3	4.6
1889	5.3	11.0	12.1	6.9	6.2	8.7	7.1	7.3
1890	-16.6	24.9	0.6	-0.4	4.0	1.6	3.1	2.7
1891	-8.3	12.4	-3.7	-1.0	1.3	-3.9	-0.6	-1.3
1892	7.9	-16.2	-4.4	-5.2	2.3	7.1	4.1	3.0
1893	-7.5	8.5	4.2	-1.7	3.2	3.2	3.2	3.1
1894	1.4	-1.7	1.3	4.3	4.7	6.9	5.6	5.1
1895	9.6	5.5	6.3	7.8	3.7	9.8	6.1	6.6
1896	-6.2	3.9	3.3	-1.6	4.1	2.0	3.3	3.1
1897	24.4	-3.4	11.6	14.2	7.0	15.9	10.6	11.0
1898	-1.8	13.7	7.3	6.8	7.6	12.9	9.9	9.5

Table 3. Annual growth rates of monetary aggregates 1850 - 1914.

Year	NB foreign reserves	NB domestic credit	Total currency	M0	SB deposits	CB deposits	Total deposits	M2
1899	-7.4	24.2	-0.9	0.5	6.0	7.0	6.4	5.6
1900	-8.4	-5.0	4.0	1.6	6.2	15.1	10.2	9.6
1901	16.5	-5.9	-3.8	-1.3	5.0	10.0	7.3	6.5
1902	-8.3	6.1	-0.1	0.5	3.8	-1.0	1.6	1.3
1903	-11.2	4.3	-1.7	-2.9	4.4	3.1	3.8	3.4
1904	11.7	-6.5	-1.2	1.9	4.5	-1.1	2.0	1.7
1905	8.8	3.1	8.0	7.6	2.5	4.6	3.4	3.8
1906	18.0	-11.5	5.3	3.2	8.4	11.9	9.9	9.5
1907	9.6	-4.1	6.0	6.1	6.3	9.3	7.7	7.5
1908	-0.9	5.7	-0.4	-1.1	5.0	4.8	4.9	4.6
1909	5.9	5.5	6.3	5.5	5.2	8.8	6.9	6.7
1910	0.1	11.7	8.0	6.8	6.0	4.9	5.5	5.8
1911	2.0	14.2	8.9	9.6	6.1	6.7	6.4	6.6
1912	3.8	8.5	6.6	6.4	5.2	10.9	7.9	7.8
1913	16.5	10.4	7.7	8.4	6.7	9.9	8.2	8.2
1914	-13.9	47.5	20.2	23.7	4.9	6.3	5.6	6.9

NOTES: Annual growth rates are computed as continuously compounded rates (100 times logarithmic differences) between December figures from Table A1 of the appendix. NB = Norges Bank, SB = savings banks, CB = commercial banks

Table A2 of the appendix contains monthly data on the key balance sheet components of Norges Bank, beginning in 1850. All monthly data are end-of-month figures. In the early years the foreign metallic assets of Norges Bank consisted of its stock of silver. In 1873 a decision was made to adopt a gold standard. Already in November 1869 did Norges Bank commence the conversion of the silver stock into gold, a process which was largely completed by the end of 1873.³⁶ Most of the international reserves were held as precious metals in the vaults of Norges Bank, but a varying fraction was held abroad. There is much evidence that the bank regarded the deposits held with bankers abroad as tantamount to silver or gold, referring to those assets as 'the part of the silver/gold stock held abroad'.³⁷ This policy was maintained throughout the gold standard era and beyond. Its rationale was to reduce the need for silver and gold shipments, thus saving transaction costs and earning interest on foreign deposit accounts.³⁸ In 1885 a mutual agreement regarding net balances between the central banks of Norway, Sweden and Denmark was signed which abolished the need for shipping gold between Oslo, Stockholm and Copenhagen.³⁹ In line with the practice adopted

³⁶Rygg (1954, p. 56).

³⁷These funds were deposited with prominent bankers abroad. The names of these bankers can be inferred from the ledgers containing the monthly balances of Norges Bank held at Riksarkivet. In February 1852 about 17 per cent of the silver stock was held with the houses of Donner, Heine and others in Hamburg as well as Suhr in Copenhagen. From 1857 it was decided that up to one third of the silver stock could be held abroad. Later the number of foreign deposit banks increased greatly, including banks located in all financial centres, see Rygg (1954, p 86-87).

³⁸Rygg (1954, pp. 76-77).

³⁹Sweden withdrew from the agreement with Norway in 1905.

by Norges Bank at the time we also include net balances on these accounts as part of the gold stock. Beginning 1887 foreign bills were separated from the gold stock in the monthly balances. The amounts held in such bills were initially small, but increased towards WWI, peaking at 10.7 million NOK in March 1914. In 1892 a change in the Act of Parliament relating to the Norges Bank permitted that a fraction of foreign reserves be invested in foreign government bonds. The first placement was made in January 1893. The bond portfolio was held below 4 million NOK until September 1901, thereafter it rose to a level of around 10 million in 1907, which was maintained until the war. In Table A2 the silver and gold stock held in the vaults of Norges Bank is shown separately. Total foreign international reserves also comprises the holdings of foreign bank deposits and foreign securities in the form of bills and bonds. The figures on the non-metallic part of the reserves (which can be computed as the difference between total reserves and the stock of precious metals) show clearly that silver or gold was not the only foreign asset of Norges Bank during the gold standard era. In some years prior to WWI foreign securities and bank deposits accounted for more than 50 per cent of total international reserves. In some sense the monetary regime is more correctly referred to as a gold-exchange standard, which became the international standard after WWI.

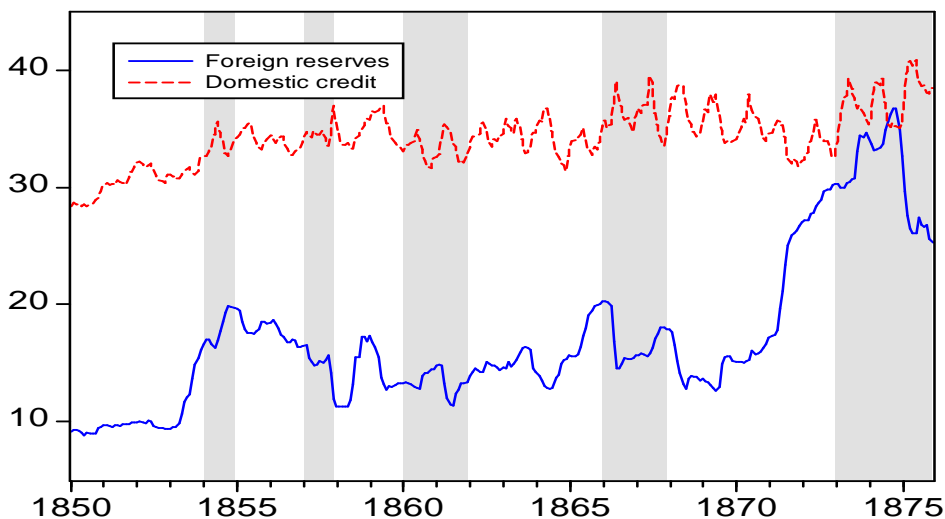


Figure 2: Foreign and domestic assets of Norges Bank January 1850 - December 1875. Shaded areas designate UK recession periods.

Monthly figures for the domestic assets of Norges Bank can also be found in Table A2. The domestic credit component of Norges Bank comprises all types of domestic loans, bills, bonds denominated in domestic currency, deposits with banks and various minor items, such as claims on bankrupt estates. Figures 2 and 3 show the monthly values of total foreign reserves and domestic credit of Norges Bank, plotted against a background of business cycle recessions. In the first graph, covering

the period to the early 1870s, recession periods in the UK are shaded. Beginning 1870 a similar business cycle chronology is available for Norway.⁴⁰ These graphs illustrate clearly how monetary policy gradually evolved during these years after 1850. The 1860s and 1870 are characterized by a rather stationary level of domestic credit over the cycles, as the Bank had locked up a large share of its domestic assets in long-term mortgage loans. The foreign reserve component, however, exhibits relative large fluctuations. We see the huge expansion during the Crimean War period, the steep contractions during the great commercial crises of 1857 and 1866, as well as the permanent rise in foreign reserves in the early 1870s. These fluctuations are mirrored in the currency and monetary base figures, and even in the annual deposit figures (see Table A1). Although this was a period of strong growth in both savings and commercial bank deposits, the M2 money stock actually fell in 1857 and 1866. Similar relationships can be observed in 1877 and 1878 - the contractionary impulses from abroad operating through the foreign reserve component of the monetary base was accompanied by a reduction in the broad money supply.

In the last half of the 1880s we see more evidence of domestic monetary policy being used to counteract the effects of capital flows. The fall in domestic credit in 1887-1889 may have been partly unintentional, there was less demand for bills to be discounted as high shipping freight incomes and large government loans abroad glutted the domestic market. The steep increase in domestic credit in the spring of 1899, however, reflects a deliberate action taken by Norges Bank to alleviate the pressure on commercial banks in Oslo. This is a well-known episode of banking history in Norway.⁴¹ Even if both the foreign and domestic components of the monetary base are generally increasing towards 1914, we often see that these two components move inversely in the short run.

The monthly data on demand deposits at Norges Bank 1850-1914 reproduced in Table A2 are total demand deposits, including those held by the Treasury in this period. We do not have complete monthly data on Treasury deposits for this period before June 1903. We do know the amount held at the end of the March, June, September and December for most of the period, however, and these are used in the estimates of the monetary base described below. Mostly, these amounts were fairly small before the mid-1890s, reflecting the ordinary transactions balances of the government, being most often below 2 million NOK. However, during certain periods of monetary stringency they seemed to increase markedly. Such periods include in particular the autumn of 1858 and winter of 1859, as well as a period of one year from the summer of 1899 to the summer of 1900.⁴² Relatively large Treasury deposits were also recorded in 1851-1852 and in 1878-1879, possibly stemming from the inflow of funds from government bond issues abroad.

Conventionally, the monetary base is defined as total currency (notes and coin in circulation), in-

⁴⁰The dating of the turning points is taken from Klovland (1989, 1998).

⁴¹See Hoffstad (1928) and Rygg (1954, pp. 248-276).

⁴²These are unpublished data obtained from the ledgers of Norges Bank. We also have information on Treasury deposits at special interest-bearing terms in 1863-1865 and 1878 and deposits held in two separate accounts in 1899-1900.

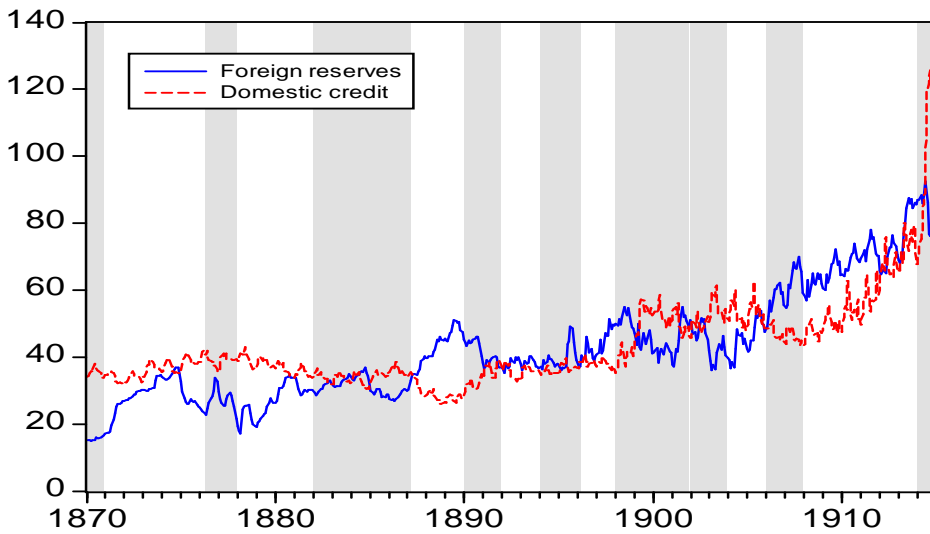


Figure 3: Foreign and domestic assets of Norges Bank January 1874 - December 1913. Shaded areas designate recession periods in Norway.

cluding vault cash of private banks, and demand deposits at the central bank, excluding Treasury deposits.⁴³ Because of the data problems connected with the Treasury deposits at Norges Bank we have compiled two versions of the monetary base for this period: one conventional *excluding* Treasury deposits, labelled M0, and an alternative series labelled M0S, which *includes* those deposits.⁴⁴ A further rationale for considering M0S arises from the fact that an increase in Treasury deposits actually eased the money market because of the particular procedures used by Norges Bank to allocate loanable funds to their branches up and down the country. The rules governing the maximum allowable note circulation was linked to the stock of gold, but the bank had to apply more specific rules regarding the lending activity which was decentralized at the branch level. Each branch was given a limit corresponding to a fixed amount plus the amount of demand deposits at the branch office. Thus, an increase in deposits, from whatever source, implied that more bills could be discounted in case of a tight money market.

⁴³Estimates of coin in circulation were interpolated along a straight line between the end-of-year figures shown in Table A1.

⁴⁴The amount of Treasury deposits are not shown separately in the monthly data, but can be computed as the difference between M0S and M0. End-of-year figures on Treasury deposits are printed in Table A1.

4. The years 1914 - 1939

At the outbreak of the First World War Norway left the gold standard. From then and until the convertibility of currency notes for gold was resumed at the prewar parity in May 1928 a number of dramatic episodes relating to the conduct of monetary policy were to take place. The appreciation of the exchange rate and the vast monetary expansion during the WWI were followed by the currency depreciation, which brought the international exchange value of the krone to approximately one half of the prewar gold parity in 1924. An extremely malicious banking crisis started in 1923. In September 1931 Norway left the gold standard and basically adhered to the sterling block in terms of exchange rate policy in the 1930s. A discussion of these matters are beyond the scope of the present chapter, which focuses more narrowly on the measurement of the key central bank assets and liabilities and the money stock.⁴⁵

On the asset side of the central bank's balance sheet we focus on main the aggregates - international reserve assets and domestic credit. International reserves are defined as foreign bank deposits, foreign securities as well as the gold stock in the bank's vault. The domestic credit of Norges Bank comprises all domestic (NOK-denominated) financial assets, primarily discounted bills and other lending to banks. In addition, domestic bonds and various other domestic loans and claims are included.

Most of the components of international reserves and domestic credit can be found in the published monthly accounts of Norges Bank. Some problems are connected with the exact distribution of the bond portfolio between bonds denominated in domestic and foreign currency prior to May 1927 (except December figures, which are known), but the amounts involved are relatively small, and the estimates made here are believed to be approximately correct. Beginning in January 1932 data availability dictates a change in definition, as bonds with foreign issuers rather than those denominated in foreign currencies are included in the foreign reserves.⁴⁶

A more serious problem is the massive currency interventions taking place in the years 1926 to 1928. An agreement was made between the Treasury and Norges Bank to intervene in the foreign exchange market in order to stem the appreciation pressure against the Norwegian krone. The arrangement was approved by the Storting in a secret session in June 1926. Technically, the interventions were undertaken by an intervention fund (*Valutakonsortiet*), which obtained credit from Norges Bank. In the published monthly balances these funds are therefore recorded as domestic lending, although

⁴⁵The most detailed account of the monetary history of the interwar period is Rygg (1950), see also Keilhau (1952) and Hanisch (1978, 1979) for a survey of the monetary regimes and economic policy. An introduction to the banking crisis is found in Engebretsen (1939) and Hoffstad (1928). Klovland (1998) contains an econometric study of the effects of monetary policy in the interwar years.

⁴⁶Ideally, it can be argued that the correct principle is the one using the currency of denomination of the bonds, rather than the nationality of the issuers. Some of the bonds issued by domestic sectors were denominated in foreign currency and were included in international reserves prior to 1932. The amounts involved are small after this date, so in practice it does not matter much.

they were in fact immediately transformed into foreign currency holdings. A full report of the amounts involved were given after the operations had been completed, published in the annual report of Norges Bank of 1927. These balances were added to international reserves and deducted from domestic credit for the period between June 1926 and February 1928.⁴⁷

Table 4. Annual growth rates of monetary aggregates 1914 - 1939.

Year	NB foreign reserves	NB domestic credit	Total currency	M0	SB deposits	CB deposits	Total deposits	M2
1914	5.9	24.7	13.5	16.4	10.6	7.2	9.0	9.4
1915	38.4	-7.4	16.2	20.0	7.9	19.8	13.9	13.8
1916	49.5	29.6	37.4	47.5	21.8	47.6	35.8	35.6
1917	4.9	84.4	29.1	40.2	26.9	45.0	37.7	36.9
1918	-8.0	27.9	24.6	14.8	21.0	33.8	29.0	28.9
1919	17.1	1.4	15.1	8.0	19.2	8.0	12.1	12.3
1920	-7.1	16.2	4.7	8.4	10.8	7.5	8.7	8.5
1921	-11.7	5.7	-5.3	-3.8	11.2	-1.8	3.5	2.8
1922	1.3	0.3	-7.9	-0.9	8.7	-6.1	0.4	-0.3
1923	-9.9	4.1	2.2	-1.5	4.2	-37.7	-16.0	-13.7
1924	2.3	-10.3	-4.2	-10.0	1.3	-22.3	-8.8	-6.6
1925	16.1	-22.7	-3.7	-2.2	0.5	-17.3	-5.9	-5.1
1926	38.7	-21.8	-10.9	10.6	-1.1	-14.6	-5.5	-5.5
1927	-3.1	-22.0	-3.7	-10.3	-2.9	-8.9	-4.7	-5.9
1928	-49.0	30.4	-2.4	-12.9	-5.6	-13.1	-7.8	-9.0
1929	5.6	-7.3	-1.9	-8.2	-2.6	7.5	0.3	-0.3
1930	2.8	-12.9	-0.3	-4.4	-1.4	2.7	-0.1	-0.3
1931	-2.4	-8.9	-3.5	-1.8	-1.9	0.1	-1.2	-1.5
1932	-15.6	26.0	4.2	7.9	-3.1	-13.8	-6.4	-5.3
1933	4.0	-10.0	-1.7	-5.0	-0.9	-4.2	-1.8	-1.9
1934	-13.2	13.9	5.1	3.9	-4.6	-7.1	-5.3	-4.3
1935	30.2	-21.2	2.0	2.1	-0.6	6.7	1.5	1.4
1936	27.3	0.3	14.3	9.8	-2.8	1.1	-1.6	0.2
1937	24.1	-12.4	9.6	10.4	-2.3	7.5	0.8	1.9
1938	22.0	-58.5	6.7	14.2	4.2	11.7	6.7	6.6
1939	-17.0	53.7	9.3	10.0	1.7	-1.4	0.7	1.9

NOTES: The annual growth rates are computed as annual averages of the continuously compounded 12 month growth rates of the monthly data in Table A2 of the appendix. NB = Norges Bank, SB = savings banks, CB = commercial banks

Table 4 gives the annual growth rates of the main monetary statistics in this period. Figure 4 shows the monthly values of total international reserves, the gold stock and domestic credit from Norges Bank from 1914 to 1939. The huge expansion of the monetary base started during the early years of WWI, but it was not only a war phenomenon - it continued until September 1920. It is also worth noting that initially, i.e. until mid-1916, the primary source of the monetary expansion was foreign assets, as Norges Bank undertook unsterilized interventions in order to stem the rising value of the

⁴⁷See also Rygg (1950, pp. 257-274) for an account of this episode.

krone. Later on, it was the domestic credit component that was the main source of the base money expansion.⁴⁸ The gold stock remained fairly constant until the second half of the 1930s, when it was increased somewhat, particularly towards the end of the decade. The contraction of domestic credit beginning in 1924 and the temporary large increase in foreign reserves in 1925 and 1926 stand out in the graph as highly visible landmarks of the monetary policy that eventually resulted in the restoration of the gold standard in 1928.

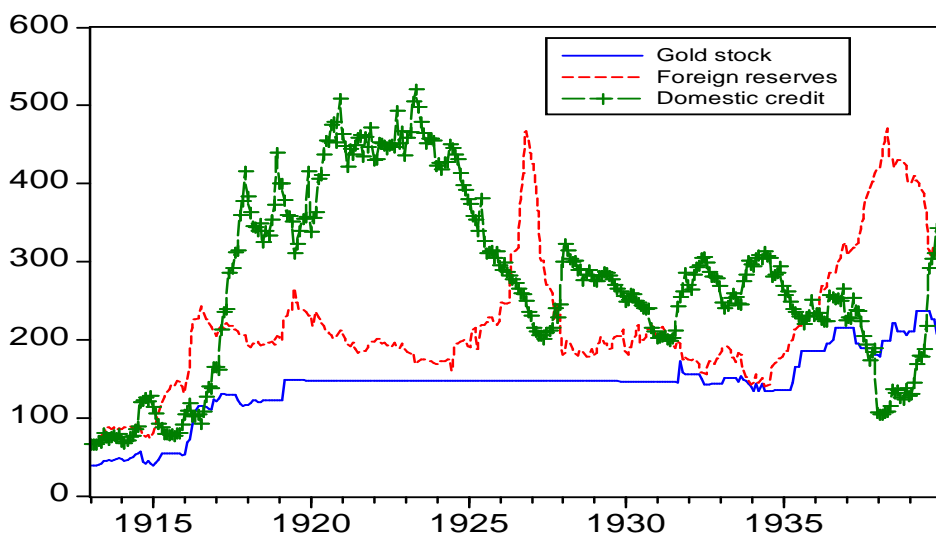


Figure 4: The gold stock, foreign reserves and domestic assets of Norges Bank January 1913 - December 1939

There are two major problems with the construction of money stock figures in the interwar years: the banking crisis and the major revision of the principles underlying the annual banking statistics in 1925. Both factors necessitate a thorough reworking of the published banking statistics figures in order to produce reasonably consistent estimates of the money stock. A further problem is the lack of consistency between the monthly banking statistics and the annual banking statistics, which also requires special attention.

The new principles introduced into the banking statistics in 1925 affected most items on the balance sheets of commercial banks, leading to notable differences in the reported values between the old and new definitions. In particular it affected the definition of demand and time deposits. Total deposits of commercial banks at the end of 1924 were 2158 million NOK according to the new definitions, against 2065 in the originally published 1924 figures based on the old classifications, which is 4.3 per cent lower. It was noted that some of the apparent increase in the new statistics was due to the fact

⁴⁸See Klovland (1995).

that prior to 1925 some deposits were recorded as balances due to 'sundry creditors'.⁴⁹ However, there was another feature that may have counterbalanced the underestimation of deposits in the old statistics. It had been known for some time that a fraction of interbank deposits had been included with the deposit figures. This was estimated to inflate total deposits by roughly 3 to 4 percent.⁵⁰ On this background no level corrections were applied to the deposit figures before 1923, assuming that these factors may have been roughly of the same order of magnitude. The new end-of-year figures were used for 1924 and an upward adjustment was applied to December 1923 figures because the problem of wrongly classified interbank deposits was thought to be lower in 1923 than in previous years.⁵¹

Beginning 1913 monthly data of the main balance sheet items of a sample of banks were published, which enables us to give monthly estimates of the money stock. The commercial banks providing monthly returns accounted for 98 per cent of the total assets of the commercial banks. Before 1925 deposit classifications differed somewhat, however. The monthly returns of savings banks beginning 1919 represented 81 per cent of the capital of all savings banks, but here there were fewer problems of reconciliation.⁵² Using December figures from the annual statistics as benchmarks, monthly figures were estimated by first interpolating an adjustment factor computed as the ratio of, say, time deposits according to the annual banking statistics, to the corresponding item in the monthly statistics. In the next step the data from the monthly statistics were multiplied by the monthly straight-line interpolations of this 'blow-up' factor. This procedure was applied to each item of commercial and savings banks separately for all years until 1952, when Statistics Norway began publishing monthly data representing all banks.

In March 1923 a wave of bank failures set in. During the months of March, April and May 18 commercial banks were placed under public administration in accordance with the new Act of Parliament which was effective from March 24, 1923. According to this a bank could continue its business under public administration, but payment of previously incurred liabilities, including deposits, were suspended. In the period between March 1923 and July 1928, when the permission to acquire status as a bank under public administration was repealed, 47 commercial banks and 20 savings banks were placed under public administration. Out of these 67 banks only 6 commercial banks and 20 savings banks restored their status as free banks, while the other ones were forced to liquidate. Among the failed banks were the largest commercial bank in 1920, Centralbanken for Norge, as well as 4 other commercial banks which were among the 8 largest banks at the time of payment suspension.

Because the deposits of banks operating under public administration were frozen, such deposits should no longer be included in the estimates of the money stock. Only the December figures are

⁴⁹See 'Private aktiebanker i 1925', published in *Statistiske meddelelser 1926*, pp. 455-469, Statistics Norway.

⁵⁰NOS Private aktiebanker 1923, p. 5*.

⁵¹'Private aktiebanker' i 1925, p. 459, published in *Statistiske meddelelser 1926*, Statistics Norway.

⁵²Before 1918 only data from the 8 largest savings banks were published.

exactly known from the banking statistics. Using information on the time of suspension and the proximate deposit liabilities of individual banks, a monthly series of frozen deposits was estimated and deducted from the total monthly deposit figures.⁵³

When a bank was placed under public administration it was allowed to open new deposit accounts for their customers. The amounts held in such accounts could be freely withdrawn at any time by the depositors according to normal terms applying to bank deposits. These accounts were segregated from the other liabilities of the banks, enjoying priority in case of subsequent liquidation; hence, such deposits were in many cases considered as safer than deposits with banks that (still) were in free operation. The information on the amounts held in such accounts is very incomplete, but rough estimates have been made by piecing together balance sheet data from individual banks and a few benchmark figures from official sources. To give an idea of the order of magnitude of the items involved in the adjustment of commercial bank figures, the estimated 1536 million NOK of commercial bank deposits as of March 1925 was derived as follows: total deposits of all commercial banks 2147 million, less total deposits held with banks under public administration, which was 748 million, to which must be added back 137 million of freely available deposits at the same banks.⁵⁴

Figure 5 shows the estimated values of the total non-frozen or 'free' deposits of the commercial and savings banks from 1913 to 1939. The scale of the rise and fall of commercial bank deposits is formidable. These deposits declined from a peak in December 1920 of 3113 million NOK to a level below 1000 million in 1928 and even further to 766 million in July 1934. The expansion of deposits at savings banks was slower but more sustainable, peaking in December 1925 at 2544 million NOK.

A summary of the WWI and interwar development on the monetary sector can be seen in Figure 6, in which M0, M1 and M2 are shown (note that M0 and M1 are plotted with a different scale on the right hand side). The vast monetary expansion of WWI continued in its immediate aftermath, but was then followed by a long period of monetary contraction. The falling trend was broken in the mid-1930s in the case of the narrow monetary aggregates, but it was only in the last few years of the decade that M2 recovered significantly.⁵⁵

⁵³Useful information was obtained from documents underlying the case against the prime minister, Abraham Berge, for his decision to deposit a relatively large amount of Treasury money in an impaired bank (Den norske Handelsbank) in 1924, see *Riksrettsaken mot statsminister Berge m.fl. 1926-1927, dokumentasjonshefter I-VI*, Oslo, 1927.

⁵⁴The estimate of 137 million in free accounts in March 1925 is taken from Norwegian Parliamentary Papers *St. innst. O. XVIII (1925)*. The corresponding December figures for 1926, 1927 and 1928 are known from the annual commercial bank statistics, being 162, 149 and 34 million, respectively. Such accounts were also offered by savings banks placed under public administration, but here the amounts were assumed to be very small (known to be 0.75 million in March 1925) and not taken into account in these calculations.

⁵⁵The sharp, but short-lived, rise in M0 in the middle 1926 is due to the inflow of foreign deposits in anticipation of the currency appreciation of the Norwegian krone.

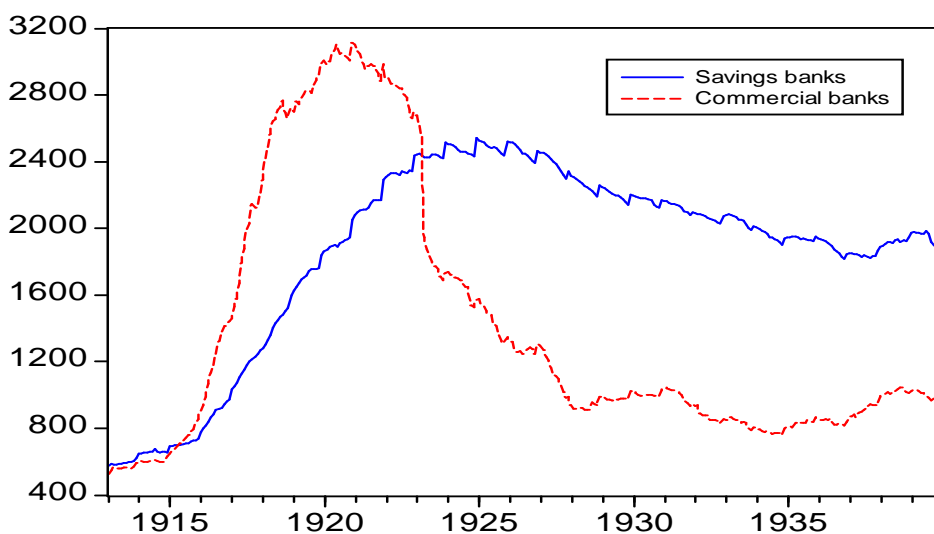


Figure 5: Bank deposits at savings banks and commercial banks January 1913 - December 1939

5. The years after 1939

The most important monthly data series are presented in Table A2 for the period after 1939. These are Norges Bank's international reserves and domestic credit, total currency circulation, M0, M1 and M2. The distinction between demand and time deposits became even less clear in the 1980s, and several changes in deposit categories make the M1 aggregate less useful for economic analysis, leaving M2 as the main monetary aggregate for this period. M1 is therefore discontinued after 1980 in this table.

We now give some brief comments on the data series, pointing out differences in definitions compared to previous periods and a few observations on possible pitfalls in the interpretation of the data.

International reserves of Norges Bank

The item labelled international reserves comprises all liquid foreign assets held by Norges Bank, including gold, foreign bank deposits,⁵⁶ foreign securities, net clearing balances and liquid claims on the International Monetary Fund.⁵⁷ It is basically a measure of gross reserves, as demand de-

⁵⁶Foreign currency deposits held with domestic banks January 1985 to May 1987 are included.

⁵⁷Claims on IMF include the holdings of SDR, the reserve position in the IMF (Norway's quota minus the Fund's holding of Norwegian kroner) and loans to the IMF.

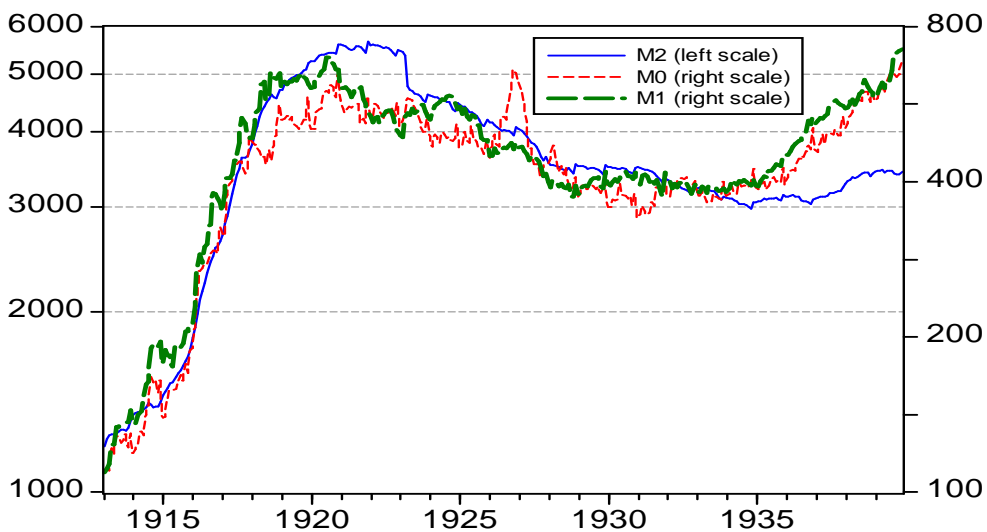


Figure 6: Money stock data January 1913 - December 1939. Logarithmic scale.

posits with Norges Bank held by foreign banks are not deducted.⁵⁸ The figures reflect the valuation principles applied in the accounts of Norges Bank, which may entail some distortions in the case of foreign securities and other assets, which are typically revalued at year-ends.⁵⁹

In April 1940 Norges Bank's gold stock accompanied the king and the government in their flight abroad. The accounts of Norges Bank are incomplete during the war and its immediate aftermath, so international reserve figures are not available between April 1940 and November 1945.

In May 1996 the government's petroleum fund was established. The monthly balances are included in Table A2. The fund is invested in foreign bank deposits, bonds and shares. Although formally separated from international reserves, and differing from Norges Bank's international reserves as it comprises stock market investments, this item must clearly be taken into consideration when the balance of payments development is analyzed.

⁵⁸ An exception is made for assets and liabilities relating to clearing arrangements with foreign countries, which are included on a net basis. Debt to the European Payments Union, which was transferred to the government at the end of June 1959, is not included.

⁵⁹ From 2000 market values are used in the case of gold and foreign securities in the monthly balances and repurchase agreements are included in the stock of foreign bonds. This principle is applied to the foreign reserve estimates beginning October 1999.

Domestic credit of Norges Bank

In line with the principles followed in the previous periods the domestic credit extended by Norges Bank comprises all loans to domestic sectors as well as securities issued by public and private domestic sectors. From 1973 a small amount of deposits at commercial and savings banks and the postal giro system due to Norges Bank are included as part of the domestic credit series.

The German occupation forces financed much of their war expenses in Norway by drawing on Norges Bank. In the accounts of Norges Bank this item was labelled the 'occupation account'; in Table A2 it is referred to as 'war credit NB'. Whereas Norges Bank's ordinary lending activities dwindled towards an insignificant amount during the war years, the occupation account swelled enormously. In May 1945 it peaked at 8343 million NOK, which was more than 18 times higher than the total domestic credit extended by the central bank on the eve of the war. The huge injection of liquidity into the Norwegian economy profoundly affected the functioning of the monetary system for many years after the war, as the banking system held large excess reserves in the form of government securities and demand deposits at Norges Bank. After the war part of the claim was written off this account at various dates and it was finally written off in full in 1982. These operations affected only the balance sheet of Norges Bank and had no important financial implications. In Table A2 figures relating to this item will be found through 1947.

Total currency

The currency circulation consists of notes and divisionary notes issued by Norges Bank and divisionary coin in circulation (net of Treasury and Norges Bank's holdings).

Monetary base M0

The monetary base series is composed of total currency in circulation and demand deposits at Norges Bank, excluding amounts due to the Treasury and various public sectors, whose exact specification varies a bit due to data availability. In continuation of the prewar data, before October 1941 only government deposits are excluded. After this date balances due to foreign sectors, other central government sectors than the Treasury, social security administration, state banks and tax-free funds have been excluded as far as data permit. Before 1978 there are some problems with obtaining exact estimates of the deposits due to state enterprises and postal giro, which are in principle included. A fair approximation is achieved by utilizing data published in *NOS Credit market statistics*, and otherwise assuming that these deposits were equal to an estimated fraction of deposits due to 'other public accounts', for which monthly data were published.⁶⁰ Beginning 1992 the M0 series in Table

⁶⁰The data on deposits due to state enterprises and the postal giro system are available quarterly from December 1952 through 1960. Thereafter monthly data exist for postal giro deposits (except 1972-1974, quarterly 1975-1977) but only half-yearly or at year-ends for state enterprises.

A2 corresponds to the present estimates of M0 provided monthly by Norges Bank on their website.⁶¹ Data after December 2003 can thus be linked to the historical data series presented here.

We thus have continuous monthly data on international reserves, domestic credit extended by the central bank data and the monetary base over the 154 years beginning in 1850. These data series are well-defined and present only minor measurement problems, as exemplified above. But potential users of the M0 series should be aware of some features which make them somewhat less useful for analytical purposes, particularly in more recent decades. The M0 data have not been adjusted for varying primary reserve requirements, which significantly affect commercial and savings banks' holdings of demand deposits at the central bank. In the 1980s this applies also to other financial intermediaries. Primary reserve requirements were introduced on a low scale in the 1950s, but it was of most importance from the late 1960s until they were finally abolished in 1987. Even after this date it may be observed that the M0 series is quite volatile, in part reflecting the fact that large amounts may be transferred to tax collectors and from various government accounts to the banking sector at or near the end of the month. In part it also reflects the fact that bank liquidity varies quite much and, since demand deposits and fixed-term deposits (F-deposits) at Norges Bank pay nearly the equivalent of market rates of interest, much of the excess liquidity shows up as demand deposits at Norges Bank. It is therefore an open issue how useful the M0 series is for analytical purposes.

The M1 and M2 definitions of the money stock

The definitions are in principle the same as in previous periods. M2 comprises currency held by the public as well as demand and time deposits held by domestic sectors, which include private individuals, businesses, local government and non-bank financial institutions (such as insurance companies). Deposits subject to specific restrictions with respect to withdrawal, such as deposits with tax-free allowances, are excluded. M1 is similarly defined, but includes only demand deposits.

A novel feature of this period is the establishment of a postal giro system in May 1943, which offered demand deposits, and a Postal Savings Bank in January 1950, which initially only offered time deposits. The M2 definition is as far as possible made consistent with the present definition of M2 constructed by Norges Bank. The M2 data from 1960 are a newly revised M2 series constructed by Norges Bank, using the definitions adopted in 2002.⁶² The M2 definition comprises bank deposits in NOK and foreign currency held by residents, but excludes deposits due to foreign sectors. The use of these data introduces a break in the series after December 1959, as the Norges Bank M2 figure for January 1960 is 1.9 per cent lower than the M2 consistent with the definition of previous years.

⁶¹There is a minor discrepancy between the pre-1992 data and the official M0 series essentially due to the fact that tax-free funds are included in the latter. In December 1991 this component amounted to 300 million, or less than one percent of M0.

⁶²In contrast to the previous M2 stock published by Norges Bank the new series does not include unutilized bank overdrafts. For more details regarding the present definition of M2 see Norges Bank's website.

6. Some concluding remarks

The collection of monetary statistics has provided the basis for some pathbreaking studies in monetary history.⁶³ Such a history has not yet been written for Norway, but the statistical part of the work, the compilation of the main data series, are now completed. Monetary aggregates have never been particularly in focus with respect to monetary policy in Norway, but historians and economists have nevertheless been paid some attention to the role of money. Previous research on the econometric modelling of Norwegian money stock data has shown that the behaviour of the monetary aggregates is broadly similar to the empirical evidence from other countries, and reasonably stable demand functions for money have been established for most of the period considered here.⁶⁴ Although belief in the causal role of money in the transmission mechanism may have faded in recent years, many other important aspects of monetary behaviour, such as issues related to the information content of money for aggregate demand, are as yet still largely unexplored.⁶⁵

Academic interest in the stock of money may have its ebbs and flows, but historical time series on its components, particularly bank deposits, will always be of interest to a broader public. Annual time series of deposits at savings banks and commercial banks are now available for the whole history of private banking in Norway, extending back to the establishment of the first savings bank in 1822 and the first commercial bank in 1848, with monthly data beginning in 1913. Monthly balance sheet figures for the central bank begin in 1850, providing more than 150 years of continuous time series of the items that are considered to be most useful for analytical purposes. The analysis of these data has not been the purpose of the present contribution; it is basically intended as an invitation to go ahead with this task.

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⁶³The most prominent contributions have no doubt been made by Friedman and Schwartz (1963, 1970, 1982) for the United States. Capie and Webber (1985) presented detailed monetary data for the United Kingdom from 1870, and for several other countries monetary history monographs have been written.

⁶⁴See Klovland (1982, 1983, 1990), Bårdsen (1992) and Eitheim (1998).

⁶⁵Nelson (2003) presents a review of such issues.

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A. Technical appendix: The data

Table A1. Monetary aggregates end-of-year 1819 - 1914.

NOK 1000

NB=Norges Bank. TR=Treasury. SB=savings banks. CB=commercial banks.

Year	NB foreign assets	NB mortg loans	NB other loans	NB total notes	TR total coin	NB depo- sits	NB gov dep	M0	SB depo- sits	CB depo- sits	M2
1819	7529	3994	487	12460	1630	20	0	14110	0	0	14090
1820	7303	5213	492	13304	1803	58	8	15157	0	0	15107
1821	7576	7409	499	13978	2176	138	20	16272	0	0	16154
1822	7411	8052	514	14034	2210	311	28	16527	17	0	16261
1823	7415	9126	743	14035	2229	501	12	16753	123	0	16385
1824	7941	10210	1065	14474	2691	276	28	17413	269	0	17431
1825	8618	12990	1421	15876	2637	267	12	18768	455	0	18962
1826	8506	14672	1708	16073	2584	125	20	18762	701	0	19349
1827	8590	15662	1729	16325	3149	122	4	19592	721	0	20186
1828	9212	16821	1729	17051	2998	262	12	20299	993	0	21029
1829	9334	17229	1738	17669	2898	267	12	20822	1243	0	21794
1830	10277	17318	1698	19305	2855	317	12	22465	1531	0	23671
1831	10473	17974	1732	19346	2831	504	8	22673	1743	0	23897
1832	10682	18276	1710	18993	2871	469	12	22321	2116	0	23952
1833	10736	18047	1829	19903	2716	450	28	23041	2481	0	25068
1834	12021	18542	2003	20409	3077	611	28	24069	2941	0	26389
1835	12230	19044	2560	20847	3078	619	32	24512	3491	0	27371
1836	12217	19440	2846	21575	3118	406	40	25059	3882	0	28525
1837	12152	20387	2979	21024	2937	484	36	24409	4558	0	28460
1838	11043	21092	3174	20280	2767	527	36	23538	5075	0	28056
1839	12188	21333	3979	22249	2617	474	40	25300	5731	0	30522
1840	12161	21722	3912	22143	2507	436	52	25034	6680	0	31243
1841	11717	21422	3723	22484	2390	448	40	25282	7561	0	32337
1842	12227	22012	3972	23283	2451	1155	88	26801	8767	0	34387
1843	11461	24156	3871	22505	2309	3076	136	27754	10198	0	34879
1844	11336	23585	4736	22288	3401	3452	320	28821	11724	0	37261
1845	12514	24867	5363	23163	4189	5231	2016	30567	13540	0	40716
1846	11537	26148	5654	23290	4911	5898	956	33143	15587	0	43585
1847	9441	25848	5417	22096	5611	4038	780	30965	16954	0	44441
1848	8535	25188	4658	18891	5879	5559	1116	29213	15988	105	40643
1849	9035	24284	3785	18830	5999	4240	1060	28009	15828	284	40731
1850	9467	23734	5950	19729	6473	5280	940	30543	16734	354	43066
1851	9901	23566	8178	20735	6170	6609	2312	31202	18772	495	45917
1852	9327	22880	8239	21083	6141	4704	524	31404	21178	576	48687
1853	16094	22229	10340	27188	6190	6592	776	39194	25048	587	58674
1854	19697	21941	12182	30710	6201	7879	580	44209	31217	812	68510
1855	18364	21415	12698	30961	6625	5695	212	43069	35388	1506	73955
1856	16343	20827	12602	29221	7031	4560	1024	39788	38288	3590	77564
1857	11858	20283	15583	26678	7264	6032	424	39550	36421	4576	74345
1858	16836	19774	15744	26323	6843	10008	3652	39522	37920	10714	80932
1859	13278	19494	13626	24207	6446	6002	856	35798	41301	11790	82900
1860	14461	19500	12391	25847	6072	4385	312	35992	44342	16613	91690
1861	13290	19123	13014	25194	5894	3794	616	34266	47406	18561	95912
1862	14380	18443	15368	26955	5932	4484	408	36962	52446	24846	108918

Table A1. Monetary aggregates end-of-year 1819 - 1914.

NOK 1000
 NB=Norges Bank. TR=Treasury. SB=savings banks. CB=commercial banks.

Year	NB foreign assets	NB mortg loans	NB other loans	NB total notes	TR total coin	NB depo- sits	NB gov dep	M0	SB depo- sits	CB depo- sits	M2
1863	14559	17472	16863	26643	5596	4640	488	36392	59184	27272	117128
1864	15312	16380	14839	25597	5792	3610	1220	33778	64138	23661	117668
1865	20021	16780	16806	28524	5930	6700	1712	39443	68943	31552	133162
1866	15393	16509	17889	27945	5586	4338	1316	36552	71845	26864	130239
1867	17852	16607	17556	29094	5442	5320	596	39261	75417	32883	140630
1868	13492	16693	17707	26437	5634	4314	456	35929	77652	33535	140959
1869	15137	16455	17080	27162	5606	4524	456	36836	78807	37715	147031
1870	16608	16341	17222	28388	5381	4875	432	38212	82729	39026	153251
1871	26740	16443	15045	33982	5279	7474	408	46327	88027	49842	174325
1872	30245	15684	16524	38516	5081	7060	536	50121	94647	55806	191398
1873	34711	14567	21254	47179	5050	5823	360	57692	110062	60813	219612
1874	34996	13885	21048	45870	4757	6131	1340	55418	126071	66751	239842
1875	25262	13737	24603	37229	4700	7405	1456	47878	128850	59599	227019
1876	32587	13817	22211	39669	4600	9672	2560	51381	135088	67770	243132
1877	21701	13614	25512	36309	4700	5662	278	46393	138112	65856	240518
1878	19215	13165	23355	30968	5000	6223	523	41668	137225	67117	236517
1879	26350	13341	23443	32720	4600	12304	1074	48550	134633	71054	238680
1880	33721	12918	20125	38714	4300	10403	1542	51875	139925	82773	259912
1881	30134	12215	20718	37654	4300	7760	944	48770	144596	87308	269599
1882	33067	11649	19057	40579	4300	5614	242	50251	152669	98772	289798
1883	35065	11272	20020	40956	4500	7799	480	52775	159607	100202	300636
1884	34481	10451	18653	38984	4600	6908	1191	49301	167285	101874	307414
1885	28675	9727	23275	37147	4700	6696	287	48256	169587	103626	309601
1886	30256	8413	24561	38841	4800	5651	459	48833	170660	101065	310056
1887	40245	7425	18106	40036	4800	9979	934	53881	170902	105641	314200
1888	44962	6539	17353	43588	4800	8878	567	56699	176818	109087	328995
1889	47410	7282	19392	49418	5200	8093	1955	60756	188078	118945	353990
1890	40147	8238	25979	49671	5300	6893	1330	60534	195788	120884	363503
1891	36945	8168	30580	47586	5400	9432	2509	59909	198449	116220	358972
1892	39996	7787	25173	45115	5600	8571	2406	56880	202996	124827	370007
1893	37101	7683	28204	47200	5700	6530	3500	55930	209516	128945	381749
1894	37621	8020	27270	47785	5800	6698	1900	58383	219653	138188	401755
1895	41420	7710	29585	50970	6100	9345	3300	63115	227956	152388	429331
1896	38912	7240	31553	52484	6500	6440	3300	62124	237479	155516	442901
1897	49683	6697	30812	59312	6900	8893	3500	71605	254752	182357	494162
1898	48805	6378	36642	63416	7800	9300	3900	76616	274989	207518	543227
1899	45332	7262	47523	62452	8100	17651	11200	77003	291849	222500	574299
1900	41696	7407	44709	65612	7800	6121	1300	78233	310535	258794	632010
1901	49168	8858	40260	62587	8100	8432	1900	77219	326614	285923	674524
1902	45238	9970	42239	62916	7700	8660	1700	77576	339381	283014	683612
1903	40427	16304	38175	61394	8000	7364	1389	75369	354491	291983	707037
1904	45450	17089	33983	60171	8400	10061	1847	76785	370979	288703	719084
1905	49639	17251	35425	65665	8600	9981	1386	82860	380368	302294	747196
1906	59412	15071	31865	68935	9400	10423	3196	85562	413518	340558	822004
1907	65427	13729	31310	73483	9700	9481	1732	90932	440424	373635	886017
1908	64814	13111	34577	72813	10000	8463	1327	89949	463112	392159	928003

Table A1. Monetary aggregates end-of-year 1819 - 1914.

NOK 1000

NB=Norges Bank. TR=Treasury. SB=savings banks. CB=commercial banks.

Year	NB foreign assets	NB mortg loans	NB other loans	NB total notes	TR total coin	NB depo- sits	NB gov dep	M0	SB depo- sits	CB depo- sits	M2
1909	68738	12089	38275	77494	10700	8027	1212	95009	487842	428405	992768
1910	68826	11910	44730	84282	11300	7863	1725	101720	518169	449953	1051602
1911	70207	11712	53595	92873	11600	9348	1807	112014	550855	481117	1123157
1912	72948	13109	57971	99276	12300	10422	2562	119436	580153	536290	1214296
1913	86056	13572	65319	107612	12900	12582	3187	129907	620051	592212	1318169
1914	74890	14029	112813	134182	13300	21140	3926	164696	651396	630866	1412639

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1850												
Vault silver NB	7.5	7.5	7.5	7.5	7.5	7.2	7.4	7.3	7.3	7.3	7.8	7.7
Int. reserves NB	9.1	9.2	9.2	9.2	9.1	8.8	9.0	9.0	9.0	8.9	9.5	9.5
Dom. credit NB	28.4	28.7	28.5	28.5	28.4	28.5	28.4	28.5	28.6	28.9	29.1	29.7
Deposits NB	4.5	4.4	4.4	4.5	4.6	4.2	4.7	4.7	4.7	4.7	5.3	5.3
Note circulation	19.0	19.4	19.6	19.4	19.1	19.5	18.8	19.2	18.9	19.0	19.1	19.7
Total currency	25.0	25.5	25.8	25.6	25.3	25.8	25.0	25.5	25.3	25.4	25.6	26.2
M0S	29.5	29.9	30.2	30.1	29.9	29.9	29.7	30.2	29.9	30.1	30.9	31.5
M0	28.4	28.8	29.0	29.2	29.3	29.6	29.5	29.9	29.6	29.6	30.2	30.5
1851												
Vault silver NB	7.9	7.9	7.9	7.8	7.9	7.9	7.8	7.9	7.9	7.9	8.1	8.1
Int. reserves NB	9.6	9.6	9.6	9.5	9.7	9.6	9.6	9.7	9.7	9.7	9.9	9.9
Dom. credit NB	30.1	30.4	30.2	30.3	30.2	30.6	30.4	30.4	30.3	30.9	31.3	31.7
Deposits NB	5.5	5.1	5.7	5.5	5.7	5.2	5.6	5.7	5.8	5.8	6.5	6.6
Note circulation	20.1	20.7	20.3	20.4	20.3	21.1	20.4	20.1	20.1	20.5	20.4	20.7
Total currency	26.5	27.2	26.7	26.8	26.6	27.4	26.7	26.4	26.4	26.7	26.6	26.9
M0S	32.0	32.3	32.4	32.3	32.4	32.6	32.3	32.1	32.2	32.6	33.1	33.5
M0	31.0	31.2	31.3	31.2	31.1	31.3	30.9	30.6	30.5	30.7	31.0	31.2
1852												
Vault silver NB	8.1	8.1	8.1	8.1	8.3	8.2	8.0	7.9	7.8	7.8	7.8	7.8
Int. reserves NB	9.9	9.9	9.9	9.9	10.0	10.0	9.6	9.5	9.4	9.4	9.3	9.3
Dom. credit NB	32.2	32.2	32.0	31.8	31.9	32.0	31.5	31.0	30.7	30.5	30.4	31.1
Deposits NB	6.8	6.8	7.3	7.3	7.8	6.7	6.4	5.5	5.3	5.1	5.2	4.7
Note circulation	20.8	21.1	20.7	20.3	20.1	21.2	20.5	20.8	20.6	20.5	20.0	21.1
Total currency	27.0	27.3	26.9	26.5	26.3	27.4	26.7	26.9	26.7	26.6	26.1	27.2
M0S	33.8	34.1	34.2	33.8	34.1	34.1	33.1	32.4	32.0	31.7	31.3	31.9
M0	31.5	31.7	31.7	31.8	32.6	33.1	32.1	31.6	31.1	31.0	30.7	31.4
1853												
Vault silver NB	7.8	7.9	7.9	8.0	7.9	8.1	8.4	8.7	9.7	10.0	10.1	9.8
Int. reserves NB	9.3	9.5	9.5	9.8	10.6	11.6	12.0	12.3	13.7	14.8	15.4	16.1
Dom. credit NB	31.1	30.9	30.7	30.8	31.1	31.4	31.6	31.7	31.4	31.1	31.4	32.6
Deposits NB	4.3	3.9	4.0	4.2	4.8	4.4	5.4	5.6	5.5	5.8	6.3	6.6
Note circulation	21.4	21.6	21.9	22.0	22.4	24.2	23.8	23.7	24.9	25.4	25.5	27.2
Total currency	27.5	27.8	28.0	28.2	28.6	30.4	29.9	29.9	31.0	31.5	31.7	33.4
M0S	31.8	31.7	32.0	32.4	33.4	34.8	35.3	35.5	36.5	37.3	38.0	40.0
M0	31.3	31.3	31.6	32.1	33.1	34.5	35.0	35.3	36.3	36.9	37.4	39.2
1854												
Vault silver NB	9.8	9.8	9.6	9.4	9.0	9.0	9.2	9.3	9.2	9.1	8.8	8.8
Int. reserves NB	16.6	17.0	17.0	16.6	16.3	16.9	17.7	18.5	19.3	19.9	19.8	19.7
Dom. credit NB	32.7	32.7	33.1	33.5	34.5	35.6	34.7	33.9	32.9	32.7	33.2	34.1
Deposits NB	6.6	6.5	6.3	6.7	7.0	6.4	7.2	7.3	7.0	7.6	8.2	7.9
Note circulation	27.7	28.4	29.1	28.9	29.1	31.4	30.3	30.3	30.3	29.9	29.6	30.7
Total currency	33.9	34.6	35.3	35.1	35.3	37.6	36.5	36.5	36.5	36.1	35.8	36.9
M0S	40.6	41.0	41.6	41.7	42.3	44.0	43.7	43.8	43.5	43.7	44.0	44.8
M0	39.8	40.3	40.8	40.9	41.5	43.2	43.0	43.1	42.9	43.1	43.4	44.2
1855												
Vault silver NB	8.9	8.9	8.8	9.1	8.8	8.8	8.6	8.6	8.8	8.9	9.1	8.9
Int. reserves NB	19.6	19.5	18.5	17.9	17.6	17.5	17.4	17.7	17.9	18.5	18.5	18.4
Dom. credit NB	34.3	34.5	34.8	35.1	35.4	35.5	34.6	33.8	33.4	33.3	33.6	34.1
Deposits NB	7.9	7.6	7.8	7.6	7.2	6.2	5.6	5.5	5.3	5.2	6.0	5.7

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Note circulation	30.7	31.1	30.6	30.4	30.8	31.8	31.1	30.7	30.6	30.9	30.7	31.0
Total currency	36.9	37.4	36.9	36.8	37.2	38.2	37.5	37.2	37.2	37.5	37.3	37.6
M0S	44.8	45.0	44.7	44.3	44.4	44.5	43.1	42.8	42.5	42.7	43.4	43.3
M0	44.2	44.4	44.2	43.9	44.2	44.4	43.0	42.5	42.1	42.4	43.1	43.1
1856												
Vault silver NB	8.9	9.3	9.3	10.4	11.4	11.4	11.4	11.2	11.7	11.7	11.9	12.0
Int. reserves NB	18.4	18.7	18.4	18.0	17.4	17.2	16.7	16.8	17.0	16.9	16.3	16.3
Dom. credit NB	34.5	34.3	33.8	34.0	34.4	34.4	33.3	33.0	32.8	33.1	33.2	33.4
Deposits NB	6.0	5.5	5.6	5.4	5.4	4.7	4.4	4.6	3.9	4.4	4.9	4.6
Note circulation	31.0	31.7	31.4	31.5	31.0	31.6	30.2	30.0	30.4	30.0	29.0	29.2
Total currency	37.6	38.4	38.2	38.2	37.8	38.5	37.1	36.9	37.3	37.0	36.0	36.3
M0S	43.6	43.9	43.8	43.6	43.2	43.2	41.5	41.5	41.2	41.4	40.9	40.8
M0	43.2	43.4	43.1	42.9	42.6	42.6	41.0	41.1	40.8	40.8	40.1	39.8
1857												
Vault silver NB	12.3	12.4	12.3	12.2	12.1	12.2	12.2	12.2	11.6	11.7	11.7	8.4
Int. reserves NB	16.4	16.5	15.4	15.1	14.8	14.8	15.2	15.0	15.2	15.6	14.1	11.9
Dom. credit NB	33.9	34.8	34.4	34.3	34.8	34.5	34.5	34.8	34.2	33.6	34.1	37.0
Deposits NB	4.5	5.4	5.2	5.1	5.7	4.3	5.4	5.8	4.8	4.9	5.1	6.0
Note circulation	29.6	30.0	29.3	28.9	28.4	29.6	28.6	28.4	28.7	28.3	27.1	26.7
Total currency	36.7	37.0	36.4	36.1	35.6	36.7	35.8	35.6	35.9	35.5	34.3	33.9
M0S	41.2	42.5	41.5	41.2	41.2	41.0	41.2	41.4	40.8	40.4	39.4	40.0
M0	40.0	41.1	40.0	39.8	40.0	40.0	40.2	40.4	39.9	39.7	38.9	39.5
1858												
Vault silver NB	8.2	8.2	8.2	8.5	8.3	8.0	8.0	9.0	10.4	12.0	11.9	11.9
Int. reserves NB	11.2	11.3	11.2	11.2	11.2	11.9	13.1	15.5	15.5	17.2	17.2	16.8
Dom. credit NB	35.7	34.6	33.6	33.7	33.8	33.6	33.3	34.1	34.4	35.0	35.3	35.9
Deposits NB	5.4	4.9	4.5	4.2	5.0	4.5	5.4	8.3	7.7	9.7	10.8	10.0
Note circulation	25.2	24.6	24.8	25.2	24.3	25.2	25.1	25.3	26.2	26.2	25.4	26.3
Total currency	32.4	31.8	32.0	32.3	31.4	32.3	32.1	32.3	33.2	33.2	32.3	33.2
M0S	37.8	36.7	36.5	36.5	36.4	36.8	37.5	40.6	40.9	42.9	43.1	43.2
M0	37.5	36.4	36.3	36.3	36.2	36.6	37.0	39.6	39.5	40.8	40.2	39.5
1859												
Vault silver NB	12.6	12.6	12.6	12.4	12.3	12.1	11.4	11.2	10.0	9.9	9.9	10.0
Int. reserves NB	17.3	16.8	16.4	15.5	13.7	13.1	12.7	13.0	13.0	13.1	13.2	13.3
Dom. credit NB	35.8	36.6	36.5	36.6	36.8	37.0	35.5	35.3	34.2	33.8	33.6	33.5
Deposits NB	10.1	9.5	8.5	8.5	8.2	7.4	6.6	6.5	5.6	5.8	6.3	6.0
Note circulation	26.7	27.7	28.7	27.8	26.6	26.9	25.5	25.7	25.4	24.9	24.1	24.2
Total currency	33.5	34.5	35.4	34.5	33.2	33.6	32.2	32.3	32.0	31.4	30.6	30.7
M0S	43.6	44.0	43.9	43.0	41.4	40.9	38.8	38.8	37.6	37.2	36.9	36.7
M0	40.1	40.5	40.6	40.3	39.3	39.4	37.5	37.7	36.5	36.2	36.0	35.8
1860												
Vault silver NB	10.3	10.3	10.4	10.2	10.0	10.0	9.8	10.1	10.0	9.9	9.9	9.9
Int. reserves NB	13.3	13.3	13.3	13.1	12.9	12.9	12.8	13.9	14.1	14.1	14.4	14.5
Dom. credit NB	33.3	33.8	34.0	34.2	34.3	35.3	34.5	33.6	32.6	32.3	32.0	32.5
Deposits NB	5.4	5.3	5.2	5.0	5.5	5.1	5.3	5.4	4.4	4.1	4.9	4.4
Note circulation	24.6	25.6	26.2	26.4	25.7	27.0	25.6	25.9	25.9	25.8	25.0	25.8
Total currency	31.0	32.0	32.6	32.7	32.0	33.3	31.8	32.0	32.1	31.9	31.1	31.9
M0S	36.4	37.3	37.7	37.7	37.5	38.3	37.1	37.5	36.5	36.1	35.9	36.3
M0	35.4	36.2	36.4	36.6	36.6	37.7	36.4	36.7	35.7	35.4	35.5	36.0
1861												

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Vault silver NB	10.2	10.2	10.2	9.4	9.2	8.7	8.5	8.7	8.8	8.6	8.8	8.8
Int. reserves NB	14.8	14.8	14.7	13.3	12.0	11.4	11.4	12.4	12.7	13.2	13.3	13.3
Dom. credit NB	32.6	32.8	34.2	35.4	35.1	34.7	33.6	33.4	32.2	32.3	32.0	32.6
Deposits NB	4.3	4.2	4.7	4.7	5.0	3.1	3.4	4.2	2.8	3.8	4.1	3.8
Note circulation	26.3	27.1	28.2	27.8	25.9	26.7	25.1	25.1	25.5	25.0	24.5	25.2
Total currency	32.4	33.1	34.2	33.8	31.9	32.7	31.0	31.1	31.4	30.9	30.4	31.1
M0S	36.7	37.3	38.9	38.5	36.9	35.9	34.5	35.3	34.2	34.8	34.4	34.9
M0	36.0	36.3	37.6	37.5	36.3	35.6	34.3	35.1	34.2	34.5	34.0	34.3
1862												
Vault silver NB	9.0	9.0	9.0	9.6	10.0	10.1	10.2	10.2	10.1	10.1	10.1	10.2
Int. reserves NB	13.9	14.2	14.5	14.4	14.2	14.2	15.1	14.9	14.8	14.7	14.6	14.4
Dom. credit NB	33.4	34.4	34.3	34.3	34.6	35.5	34.9	33.8	33.4	34.0	33.9	34.2
Deposits NB	3.9	3.5	3.8	4.0	4.4	3.8	5.1	4.4	3.3	3.8	5.2	4.5
Note circulation	26.4	28.7	28.6	28.2	28.0	29.5	28.4	27.6	28.1	28.0	26.2	27.0
Total currency	32.3	34.6	34.5	34.1	33.9	35.4	34.3	33.5	34.1	33.9	32.1	32.9
M0S	36.2	38.1	38.3	38.1	38.3	39.2	39.3	38.0	37.3	37.7	37.2	37.4
M0	35.5	37.5	37.6	37.4	37.5	38.4	38.7	37.4	36.9	37.3	36.8	37.0
1863												
Vault silver NB	10.4	10.4	10.4	10.3	10.6	11.1	11.7	12.2	12.3	12.3	12.2	11.8
Int. reserves NB	14.6	14.5	15.1	14.7	14.9	15.2	15.9	16.3	16.4	16.3	16.1	14.6
Dom. credit NB	34.6	35.9	35.2	35.1	34.6	35.9	35.3	34.1	32.9	33.0	33.4	34.6
Deposits NB	4.5	4.5	4.2	4.7	5.0	4.8	5.9	4.5	3.6	3.6	5.0	4.6
Note circulation	27.5	29.2	29.6	28.5	27.6	29.6	28.4	28.3	28.2	27.8	26.9	26.6
Total currency	33.4	35.1	35.4	34.4	33.4	35.4	34.1	34.0	33.9	33.4	32.5	32.2
M0S	37.9	39.6	39.6	39.0	38.5	40.2	40.0	38.5	37.5	37.0	37.5	36.9
M0	37.4	39.0	38.9	38.3	37.7	39.3	39.3	38.1	37.4	36.8	37.2	36.4
1864												
Vault silver NB	12.2	12.2	12.0	11.7	11.6	11.6	11.5	11.9	12.0	12.2	12.2	12.3
Int. reserves NB	14.2	13.9	13.5	13.0	12.8	12.7	12.8	13.7	14.0	15.0	15.2	15.3
Dom. credit NB	34.7	35.8	35.6	36.5	36.7	35.9	34.8	33.2	32.6	32.2	31.8	31.5
Deposits NB	4.2	4.7	4.4	4.4	4.8	3.2	2.9	2.9	2.3	2.5	4.0	3.6
Note circulation	26.7	28.0	27.7	27.6	27.6	28.7	27.7	27.1	27.2	26.9	25.6	25.6
Total currency	32.3	33.6	33.3	33.2	33.2	34.4	33.4	32.9	32.9	32.6	31.4	31.4
M0S	36.5	38.3	37.7	37.6	38.0	37.6	36.3	35.7	35.2	35.1	35.4	35.0
M0	35.5	36.6	35.5	35.7	36.4	36.2	35.1	34.8	34.5	34.2	34.4	33.8
1865												
Vault silver NB	12.6	12.6	12.6	12.7	13.3	14.1	14.7	15.7	16.2	16.5	16.6	16.6
Int. reserves NB	15.6	15.5	15.6	15.7	16.3	17.3	17.9	19.0	19.5	19.9	20.0	20.0
Dom. credit NB	32.7	34.0	34.1	34.0	34.5	35.1	34.3	33.4	32.8	33.5	33.2	33.9
Deposits NB	3.7	4.2	4.6	4.3	5.7	5.0	5.2	6.0	5.2	5.6	6.3	6.7
Note circulation	26.7	28.8	28.6	28.4	28.4	30.4	29.7	29.3	29.9	29.8	28.7	28.5
Total currency	32.5	34.6	34.4	34.3	34.2	36.2	35.6	35.2	35.8	35.7	34.6	34.5
M0S	36.2	38.8	39.0	38.6	39.9	41.2	40.8	41.2	41.0	41.3	41.0	41.2
M0	34.7	37.1	37.1	36.5	37.7	38.9	38.6	39.0	39.0	39.4	39.1	39.4
1866												
Vault silver NB	16.8	16.8	16.8	16.5	14.6	12.3	12.1	12.5	12.9	12.8	12.8	12.7
Int. reserves NB	20.2	20.3	20.2	19.8	16.8	14.5	14.5	14.9	15.4	15.3	15.3	15.4
Dom. credit NB	35.2	35.7	35.1	35.4	37.0	39.1	37.5	36.9	35.8	35.9	35.2	34.7
Deposits NB	5.8	4.3	4.3	3.9	4.3	2.8	3.8	4.0	2.8	4.0	4.5	4.3
Note circulation	30.6	32.8	32.9	32.6	31.3	32.4	29.7	29.3	30.0	29.2	27.7	27.9

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total currency	36.5	38.7	38.7	38.4	37.1	38.1	35.4	35.0	35.7	34.8	33.3	33.5
M0S	42.3	43.0	43.0	42.4	41.4	40.9	39.2	39.1	38.5	38.8	37.7	37.9
M0	40.6	41.3	41.3	40.9	40.3	40.1	38.4	38.4	37.9	37.9	36.7	36.6
1867												
Vault silver NB	12.9	12.9	13.0	12.9	12.7	12.9	13.4	14.1	14.5	15.0	15.0	14.8
Int. reserves NB	15.6	15.6	15.8	15.7	15.6	15.8	16.3	17.0	17.5	18.0	18.0	17.9
Dom. credit NB	36.1	36.8	36.4	37.0	37.0	39.5	39.0	36.4	35.3	34.3	33.6	34.5
Deposits NB	4.2	4.3	4.3	5.0	6.0	6.3	7.1	5.7	4.9	4.3	5.0	5.3
Note circulation	29.6	31.6	31.3	31.1	29.8	31.9	31.2	30.6	30.6	30.4	29.1	29.1
Total currency	35.2	37.2	36.8	36.6	35.4	37.4	36.7	36.1	36.1	35.9	34.6	34.5
M0S	39.4	41.5	41.1	41.7	41.4	43.7	43.7	41.9	41.1	40.2	39.6	39.9
M0	38.1	40.1	39.9	40.6	40.5	43.0	43.1	41.3	40.5	39.6	39.0	39.3
1868												
Vault silver NB	15.1	15.1	14.3	13.1	12.3	11.5	11.0	11.8	12.0	12.0	12.0	11.9
Int. reserves NB	17.9	17.6	16.5	15.2	14.1	13.2	12.8	13.7	13.9	13.8	13.8	13.5
Dom. credit NB	36.1	37.7	37.5	38.7	38.8	38.6	37.2	35.9	35.4	34.7	34.4	34.7
Deposits NB	6.1	6.0	5.2	6.3	6.7	4.5	4.5	5.0	4.1	3.5	4.2	4.3
Note circulation	30.3	32.9	32.2	30.9	29.4	30.5	28.6	27.7	28.1	28.0	26.7	26.4
Total currency	35.7	38.4	37.7	36.4	34.9	36.0	34.2	33.3	33.7	33.6	32.4	32.1
M0S	41.9	44.4	43.0	42.7	41.6	40.5	38.7	38.3	37.9	37.0	36.5	36.4
M0	40.9	43.0	41.2	41.0	40.1	39.1	37.5	37.3	37.1	36.4	36.0	35.9
1869												
Vault silver NB	12.1	12.1	12.1	11.9	11.6	11.2	11.4	12.6	12.6	12.5	12.5	12.0
Int. reserves NB	13.6	13.4	13.3	13.1	12.9	12.6	12.9	14.9	15.5	15.5	15.6	15.1
Dom. credit NB	35.5	36.6	36.4	37.9	37.3	38.0	36.4	34.9	33.8	34.0	33.8	34.0
Deposits NB	4.9	5.2	4.5	6.0	6.2	4.0	4.7	4.7	3.5	4.0	4.8	4.5
Note circulation	26.7	28.4	28.9	28.3	27.3	29.7	27.8	28.2	28.8	28.2	27.1	27.2
Total currency	32.3	34.0	34.5	33.9	32.9	35.3	33.4	33.8	34.4	33.8	32.7	32.8
M0S	37.2	39.2	39.0	39.9	39.1	39.4	38.1	38.4	37.9	37.8	37.5	37.3
M0	36.5	38.1	37.7	38.7	38.1	38.6	37.2	37.5	36.9	37.0	36.8	36.8
1870												
Vault silver NB	12.0	12.0	12.0	11.9	12.0	12.0	12.5	12.3	12.3	12.4	12.4	12.4
Int. reserves NB	15.1	15.1	15.0	15.0	15.2	15.2	16.0	15.8	15.8	16.0	16.2	16.6
Dom. credit NB	34.2	34.5	35.2	35.9	35.6	38.0	36.6	36.1	35.9	35.1	34.5	33.9
Deposits NB	5.2	5.0	4.2	4.1	4.5	4.5	5.2	5.7	5.6	5.3	5.4	4.9
Note circulation	26.8	28.1	29.5	30.2	29.6	31.9	30.6	29.2	29.1	28.8	28.1	28.4
Total currency	32.4	33.7	35.1	35.8	35.1	37.4	36.1	34.7	34.5	34.2	33.5	33.8
M0S	37.5	38.7	39.3	39.9	39.6	41.9	41.3	40.4	40.2	39.5	38.9	38.6
M0	36.9	37.9	38.4	39.1	38.8	41.1	40.5	39.6	39.4	38.8	38.4	38.2
1871												
Vault silver NB	12.7	12.8	12.8	12.7	13.2	13.7	15.6	16.3	17.2	17.7	18.0	18.0
Int. reserves NB	17.1	17.3	17.4	17.8	19.7	21.2	23.4	25.1	25.9	26.1	26.3	26.7
Dom. credit NB	34.6	34.7	35.2	35.7	35.5	35.3	34.3	32.7	32.0	32.4	32.2	31.8
Deposits NB	6.1	6.3	5.8	5.8	7.6	6.5	8.5	9.0	8.3	7.7	7.8	7.5
Note circulation	28.3	29.4	30.3	31.2	30.8	33.2	31.8	31.8	32.5	33.7	33.4	34.0
Total currency	33.6	34.7	35.6	36.6	36.2	38.5	37.2	37.1	37.8	39.0	38.7	39.3
M0S	39.7	41.1	41.4	42.3	43.8	45.1	45.7	46.1	46.1	46.7	46.5	46.7
M0	38.9	39.9	39.8	41.0	42.8	44.4	44.9	45.2	45.1	45.9	45.9	46.3
1872												
Vault silver NB	18.0	18.0	18.2	19.2	19.4	19.4	19.4	19.5	20.1	20.1	20.1	20.7

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Int. reserves NB	27.0	27.2	27.2	27.8	27.8	28.4	28.7	28.9	29.7	29.8	29.8	30.2
Dom. credit NB	32.3	32.3	33.0	33.9	34.4	35.8	35.1	34.1	34.0	34.0	33.6	32.5
Deposits NB	9.1	7.9	7.3	7.7	9.1	7.0	8.7	8.1	7.5	7.6	8.4	7.1
Note circulation	32.9	33.1	36.3	37.4	36.5	40.4	38.2	38.1	39.2	39.2	37.8	38.5
Total currency	38.2	38.4	41.6	42.6	41.7	45.6	43.3	43.3	44.4	44.3	42.9	43.6
M0S	47.2	46.3	48.9	50.3	50.8	52.6	52.1	51.4	51.9	51.9	51.3	50.7
M0	46.4	44.9	47.1	48.6	49.2	51.2	50.9	50.4	51.2	51.2	50.7	50.1
1873												
Vault gold NB	21.1	21.1	20.8	20.6	20.4	20.1	20.8	20.7	21.2	22.5	22.3	22.2
Int. reserves NB	30.3	30.3	30.0	30.0	30.4	30.4	30.7	30.8	33.1	34.4	34.3	34.7
Dom. credit NB	32.7	34.0	35.6	37.7	37.8	39.3	38.4	37.6	36.7	37.0	36.3	36.0
Deposits NB	7.7	7.3	6.0	6.0	7.0	5.5	6.4	6.3	6.4	6.6	6.7	5.8
Note circulation	37.7	40.1	42.9	45.1	44.2	47.3	45.7	44.8	46.3	47.6	46.6	47.2
Total currency	42.8	45.2	48.0	50.1	49.3	52.4	50.8	49.9	51.3	52.7	51.6	52.2
M0S	50.5	52.5	54.0	56.1	56.3	57.9	57.2	56.2	57.7	59.3	58.3	58.1
M0	49.8	51.8	53.2	55.4	55.8	57.5	56.7	55.6	57.0	58.7	57.9	57.7
1874												
Vault gold NB	21.6	18.7	18.2	18.2	19.2	19.2	20.3	20.9	21.6	22.0	22.0	20.9
Int. reserves NB	34.2	33.7	33.2	33.2	33.4	33.7	34.9	35.6	36.2	36.8	36.8	35.0
Dom. credit NB	35.4	35.7	38.4	39.0	38.7	39.3	37.3	35.6	35.2	35.4	35.2	35.1
Deposits NB	7.0	6.1	5.4	5.1	7.2	4.6	6.3	6.5	5.8	6.1	7.7	6.1
Note circulation	44.6	46.1	49.4	50.1	48.0	51.1	48.7	47.4	48.2	48.6	46.5	45.9
Total currency	49.6	51.1	54.4	55.0	52.9	56.0	53.5	52.3	53.0	53.4	51.3	50.6
M0S	56.6	57.2	59.8	60.2	60.1	60.5	59.9	58.8	58.8	59.5	59.0	56.8
M0	56.0	56.4	58.8	59.1	59.0	59.4	58.8	57.9	58.1	58.6	57.8	55.4
1875												
Vault gold NB	20.9	20.8	19.9	18.2	16.9	17.0	18.4	18.2	17.1	16.5	15.3	14.8
Int. reserves NB	32.7	29.7	27.6	26.5	26.1	26.1	27.4	26.8	26.6	26.8	25.6	25.3
Dom. credit NB	35.4	37.6	40.0	40.8	40.4	40.9	39.2	38.7	38.8	38.1	38.0	38.5
Deposits NB	7.1	7.4	6.6	5.5	6.5	5.5	7.7	6.7	5.7	5.0	6.1	7.4
Note circulation	42.7	42.6	43.8	44.5	42.5	44.0	41.3	40.9	42.1	41.6	39.1	37.2
Total currency	47.4	47.4	48.5	49.2	47.2	48.7	46.0	45.6	46.8	46.3	43.8	41.9
M0S	54.5	54.8	55.1	54.7	53.7	54.2	53.7	52.3	52.5	51.2	49.9	49.3
M0	53.1	53.3	53.5	53.5	52.9	53.8	53.2	51.8	51.9	50.4	48.8	47.9
1876												
Vault gold NB	14.3	14.1	13.7	13.0	13.0	14.9	16.4	17.8	18.1	19.3	23.4	22.5
Int. reserves NB	24.9	24.5	23.8	23.2	22.8	24.7	26.3	27.8	28.3	29.8	33.9	32.6
Dom. credit NB	38.5	38.6	41.5	41.9	40.7	41.8	39.1	38.7	38.5	37.6	37.5	36.3
Deposits NB	9.1	9.4	8.0	6.7	6.9	6.7	7.3	7.0	5.5	5.6	11.3	9.7
Note circulation	34.9	35.7	39.2	40.1	38.2	41.3	39.5	40.7	42.4	42.8	41.0	39.7
Total currency	39.6	40.4	43.9	44.8	42.8	45.9	44.2	45.4	47.1	47.4	45.6	44.3
M0S	48.7	49.8	51.9	51.5	49.7	52.6	51.5	52.4	52.6	53.0	56.9	53.9
M0	46.8	47.3	49.0	49.4	48.4	52.1	51.1	52.1	52.4	52.0	55.1	51.4
1877												
Vault gold NB	20.4	18.3	17.2	16.2	16.9	18.5	19.5	20.3	19.7	18.3	17.2	14.8
Int. reserves NB	29.6	27.4	26.2	25.4	25.5	27.4	28.4	29.4	28.6	27.0	25.1	21.7
Dom. credit NB	35.4	35.8	40.3	41.1	39.9	41.0	39.1	39.5	39.5	39.2	39.0	39.4
Deposits NB	8.3	6.9	5.9	4.2	5.1	5.6	6.6	7.5	6.6	5.6	6.5	5.7
Note circulation	37.2	37.6	42.2	44.2	42.1	44.3	42.5	42.7	42.8	41.6	38.5	36.3
Total currency	41.8	42.2	46.8	48.9	46.8	49.0	47.2	47.4	47.4	46.3	43.2	41.0

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0S	50.1	49.1	52.7	53.0	51.8	54.6	53.8	54.9	54.1	51.9	49.7	46.7
M0	48.2	48.0	52.3	52.6	51.3	54.1	53.0	53.9	52.8	51.0	49.1	46.4
1878												
Vault gold NB	13.7	12.7	12.1	15.5	18.2	18.2	17.8	17.9	16.0	14.7	13.3	13.2
Int. reserves NB	19.4	18.0	17.2	24.2	25.2	25.5	25.4	25.6	23.2	21.2	19.8	19.2
Dom. credit NB	38.9	39.0	41.1	40.7	40.5	43.1	40.7	39.2	38.0	37.2	36.3	36.8
Deposits NB	6.3	6.1	4.6	9.3	11.1	12.3	11.1	10.0	6.6	5.4	5.4	6.2
Note circulation	33.1	33.1	35.7	37.7	36.6	38.2	36.8	36.5	37.1	34.3	31.9	31.0
Total currency	37.8	37.9	40.4	42.5	41.4	43.0	41.7	41.4	42.1	39.3	36.8	36.0
M0S	44.1	44.0	45.0	51.8	52.5	55.3	52.7	51.4	48.7	44.7	42.3	42.2
M0	43.8	43.6	44.5	49.8	49.1	50.4	49.2	49.2	47.9	44.0	41.7	41.7
1879												
Vault gold NB	12.9	14.1	14.5	15.0	15.0	15.2	15.0	16.5	18.4	19.3	18.9	18.0
Int. reserves NB	19.2	20.4	20.9	21.6	22.4	22.9	23.2	25.2	26.4	27.6	27.0	26.4
Dom. credit NB	36.6	38.0	40.0	40.1	38.8	40.1	39.2	39.0	37.6	37.0	37.3	37.6
Deposits NB	7.9	10.4	9.9	9.6	10.5	10.2	11.0	12.3	11.3	12.1	12.6	12.3
Note circulation	28.9	30.1	33.1	34.2	32.6	34.6	33.1	33.3	34.1	33.7	32.6	32.7
Total currency	33.9	35.0	38.0	39.0	37.4	39.4	37.9	38.1	38.8	38.4	37.3	37.3
M0S	41.8	45.4	47.9	48.7	48.0	49.6	48.9	50.3	50.1	50.4	49.9	49.6
M0	40.5	43.2	44.8	46.1	46.0	48.2	47.3	48.6	48.2	48.8	48.5	48.6
1880												
Vault gold NB	17.7	17.8	19.3	20.8	20.5	20.8	21.6	23.5	24.3	24.9	23.9	23.4
Int. reserves NB	26.4	26.8	28.8	30.6	30.6	31.3	32.4	33.8	34.2	34.7	33.7	33.7
Dom. credit NB	36.5	37.4	38.9	38.4	37.1	38.2	37.0	35.8	35.6	34.8	34.0	34.3
Deposits NB	13.3	13.3	13.0	12.6	13.7	12.8	14.1	14.7	13.3	11.8	11.5	10.4
Note circulation	30.6	33.0	36.7	38.3	35.8	38.4	37.0	36.4	38.1	38.7	37.6	38.7
Total currency	35.1	37.6	41.2	42.8	40.3	42.9	41.4	40.8	42.4	43.0	41.9	43.0
M0S	48.5	50.8	54.1	55.4	54.0	55.6	55.5	55.5	55.7	54.9	53.4	53.4
M0	47.2	49.5	52.6	53.8	52.3	53.9	54.0	54.2	54.6	53.6	52.0	51.9
1881												
Vault gold NB	23.4	23.3	22.7	21.5	19.5	19.6	20.3	20.7	20.3	21.0	21.1	21.4
Int. reserves NB	33.9	33.7	32.1	30.5	28.5	28.8	29.7	30.2	29.7	30.2	30.2	30.1
Dom. credit NB	33.9	35.0	34.7	36.0	36.8	38.2	37.1	35.8	35.9	34.2	34.5	34.2
Deposits NB	12.8	13.3	10.7	9.1	9.0	8.0	9.2	10.0	7.8	7.4	8.1	7.8
Note circulation	36.0	36.6	38.1	39.2	38.2	40.7	39.3	37.7	39.4	39.6	38.1	37.7
Total currency	40.3	40.9	42.4	43.5	42.5	45.0	43.6	42.0	43.7	43.9	42.4	42.0
M0S	53.1	54.2	53.0	52.6	51.4	53.0	52.7	52.0	51.5	51.3	50.5	49.7
M0	51.5	52.6	51.5	50.8	49.6	50.9	51.0	50.6	50.4	50.2	49.5	48.8
1882												
Vault gold NB	21.6	21.2	20.5	20.8	21.4	21.8	21.8	22.6	22.7	22.3	22.4	22.6
Int. reserves NB	30.1	29.4	28.6	29.0	29.8	30.4	30.6	31.5	31.8	32.2	32.8	33.1
Dom. credit NB	33.9	34.3	35.8	36.6	34.7	35.6	34.6	33.8	33.6	33.6	32.2	32.2
Deposits NB	9.6	9.5	6.6	5.9	6.1	5.3	5.5	6.0	5.3	5.2	5.6	5.6
Note circulation	35.7	36.1	39.9	41.6	39.7	42.4	41.2	40.8	41.4	42.0	40.5	40.6
Total currency	40.0	40.4	44.2	45.9	44.0	46.7	45.5	45.1	45.7	46.3	44.8	44.9
M0S	49.6	49.9	50.7	51.8	50.1	52.1	51.0	51.1	50.9	51.5	50.4	50.5
M0	48.7	49.1	50.0	51.3	49.9	52.0	50.9	51.0	50.7	51.3	50.2	50.3
1883												
Vault gold NB	21.4	21.6	21.3	21.5	21.4	21.2	21.9	22.5	22.7	22.8	22.4	23.3
Int. reserves NB	32.0	31.4	31.1	31.4	31.4	31.4	32.3	33.0	33.3	33.5	33.7	35.1

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dom. credit NB	32.0	32.0	33.6	34.6	34.0	35.7	34.4	34.3	34.3	33.3	32.7	32.9
Deposits NB	6.4	7.3	6.6	6.0	7.6	6.7	6.5	7.3	6.6	6.3	6.7	7.8
Note circulation	38.4	37.9	40.0	41.7	39.6	42.2	41.8	41.4	42.1	41.7	40.4	41.0
Total currency	42.8	42.2	44.4	46.1	43.9	46.6	46.2	45.9	46.6	46.2	44.9	45.5
M0S	49.2	49.6	51.0	52.1	51.5	53.2	52.7	53.2	53.1	52.5	51.6	53.3
M0	48.5	48.4	49.3	50.6	50.2	52.0	51.6	52.2	52.4	51.9	51.1	52.8
1884												
Vault gold NB	22.7	22.5	22.3	23.1	23.2	23.3	23.3	23.5	23.2	24.3	23.4	23.4
Int. reserves NB	34.5	33.3	33.0	33.9	34.3	34.6	35.5	35.7	35.6	36.9	35.3	34.5
Dom. credit NB	32.2	32.5	35.2	35.8	34.7	35.4	34.1	32.7	31.6	31.3	30.4	30.6
Deposits NB	9.6	8.1	6.9	7.7	8.2	7.7	8.4	8.3	6.2	7.9	6.9	6.9
Note circulation	38.0	39.4	43.0	43.5	42.0	43.8	42.4	41.3	42.1	41.5	39.0	39.0
Total currency	42.5	43.9	47.6	48.0	46.6	48.4	47.0	45.9	46.7	46.0	43.6	43.6
M0S	52.1	52.0	54.5	55.7	54.8	56.0	55.3	54.2	52.9	53.9	50.5	50.5
M0	51.3	50.9	52.9	54.4	53.6	54.9	54.5	53.7	52.7	53.4	49.6	49.3
1885												
Vault gold NB	21.8	20.0	19.8	19.4	20.1	20.6	20.2	19.6	18.2	19.1	18.9	19.4
Int. reserves NB	32.3	29.9	29.4	28.9	29.7	30.6	30.4	29.8	28.0	28.4	28.1	28.7
Dom. credit NB	30.6	31.5	34.1	34.5	35.2	36.0	34.4	34.9	35.1	35.0	34.1	34.5
Deposits NB	6.9	6.4	5.6	5.7	7.5	5.0	7.4	7.9	5.7	5.5	5.9	6.7
Note circulation	36.8	36.2	39.4	39.2	38.8	42.8	39.3	37.8	38.5	38.9	37.0	37.1
Total currency	41.4	40.8	44.0	43.9	43.4	47.5	44.0	42.5	43.2	43.6	41.7	41.8
M0S	48.2	47.2	49.6	49.5	50.9	52.5	51.4	50.4	48.9	49.1	47.6	48.5
M0	47.3	46.5	49.2	49.2	50.6	52.2	50.9	49.7	48.0	48.4	47.2	48.3
1886												
Vault gold NB	19.5	18.4	18.1	18.1	17.9	18.3	18.4	19.2	19.7	20.1	20.6	20.2
Int. reserves NB	28.7	27.5	27.3	27.3	26.9	27.6	27.9	28.6	29.2	29.8	30.3	30.3
Dom. credit NB	34.0	35.6	37.0	37.2	36.3	38.5	36.7	35.7	34.6	35.7	34.5	34.6
Deposits NB	8.6	8.5	7.6	7.6	7.9	7.7	7.2	7.8	6.4	7.4	7.3	5.7
Note circulation	34.6	35.4	38.0	38.1	36.5	39.3	38.5	37.3	38.3	38.6	38.0	38.8
Total currency	39.3	40.2	42.7	42.8	41.3	44.0	43.3	42.1	43.1	43.4	42.8	43.6
M0S	47.9	48.7	50.3	50.4	49.2	51.7	50.5	49.9	49.5	50.8	50.1	49.3
M0	47.5	48.1	49.6	49.9	48.8	51.6	50.4	49.8	49.4	50.5	49.8	48.8
1887												
Vault gold NB	19.9	20.2	23.0	24.6	24.8	24.7	24.2	25.0	25.5	27.5	27.8	28.0
Int. reserves NB	30.0	30.2	33.0	34.7	34.9	35.0	34.8	35.8	36.4	38.7	39.2	40.2
Dom. credit NB	34.6	34.1	35.4	35.0	33.8	33.7	33.2	31.7	30.7	29.2	28.6	28.3
Deposits NB	8.5	9.3	10.3	11.7	12.0	8.8	8.9	8.9	7.7	9.5	10.2	10.0
Note circulation	36.4	36.2	39.2	38.9	37.7	40.6	39.7	39.2	40.0	40.3	38.7	40.0
Total currency	41.2	41.0	44.0	43.7	42.5	45.4	44.5	44.0	44.8	45.1	43.5	44.8
M0S	49.7	50.3	54.3	55.4	54.5	54.3	53.4	52.9	52.5	54.5	53.7	54.8
M0	48.7	48.8	52.4	53.9	53.3	53.4	52.8	52.5	52.4	54.2	53.0	53.9
1888												
Vault gold NB	26.8	26.6	26.7	27.0	27.0	28.1	28.4	31.1	30.3	31.0	30.0	29.9
Int. reserves NB	39.7	39.7	40.1	40.3	40.2	41.7	42.2	45.1	44.8	46.0	45.2	45.0
Dom. credit NB	28.4	28.8	29.8	30.1	29.5	30.6	28.3	27.1	27.1	26.9	26.1	26.2
Deposits NB	12.0	12.0	11.3	11.3	11.2	9.0	8.8	10.0	9.0	11.0	10.1	8.9
Note circulation	37.7	38.0	40.7	41.2	40.4	45.1	43.3	43.7	44.0	43.6	42.7	43.6
Total currency	42.5	42.8	45.5	46.0	45.2	49.9	48.1	48.5	48.8	48.4	47.5	48.4
M0S	54.4	54.9	56.7	57.2	56.4	58.9	57.0	58.5	57.9	59.4	57.6	57.3

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	53.3	53.6	55.3	56.2	55.6	58.5	56.5	58.0	57.3	58.8	57.0	56.7
1889												
Vault gold NB	28.7	28.7	28.7	29.2	29.7	30.5	31.6	31.6	31.9	31.8	31.8	31.6
Int. reserves NB	45.6	45.0	44.8	47.2	47.3	49.5	51.0	50.8	50.2	50.4	48.0	47.4
Dom. credit NB	26.5	26.4	28.0	28.7	28.4	28.1	26.9	26.3	27.8	28.8	28.9	27.8
Deposits NB	11.6	11.3	10.0	10.4	10.5	8.3	10.9	10.7	9.3	11.2	10.9	8.1
Note circulation	41.4	41.2	44.5	47.1	46.9	50.7	48.5	47.6	50.0	49.1	47.2	49.4
Total currency	46.2	46.1	49.4	52.1	51.9	55.7	53.5	52.6	55.1	54.2	52.3	54.6
M0S	57.9	57.4	59.4	62.5	62.4	64.0	64.4	63.4	64.4	65.5	63.3	62.7
M0	57.2	56.6	58.5	61.3	61.0	62.3	62.9	62.0	63.3	64.0	61.6	60.8
1890												
Vault gold NB	30.9	30.4	29.3	31.0	30.3	30.5	31.3	31.4	32.0	31.8	29.9	27.0
Int. reserves NB	45.3	44.4	43.2	44.9	44.2	44.3	45.1	45.4	46.0	46.2	44.0	40.1
Dom. credit NB	28.5	29.6	31.9	32.3	31.9	33.5	31.3	30.2	30.4	30.8	32.1	34.9
Deposits NB	10.4	9.9	6.9	8.1	7.7	5.6	8.1	8.1	6.3	9.1	8.9	6.9
Note circulation	45.5	46.3	50.7	51.8	50.8	54.6	50.7	49.5	52.2	49.9	49.0	49.7
Total currency	50.7	51.5	55.9	57.0	56.0	59.9	55.9	54.8	57.5	55.1	54.3	55.0
M0S	61.1	61.5	62.8	65.1	63.7	65.5	64.0	62.9	63.8	64.2	63.2	61.9
M0	59.4	60.0	61.6	64.0	62.8	64.7	63.3	62.3	63.3	63.4	62.1	60.5
1891												
Vault gold NB	25.7	24.4	24.8	26.7	25.9	26.5	27.2	27.3	27.5	27.2	25.3	24.8
Int. reserves NB	38.2	36.7	37.1	39.1	38.2	39.0	39.7	40.0	40.2	39.9	37.1	36.9
Dom. credit NB	33.7	34.2	36.7	37.5	37.3	38.3	35.3	33.8	33.8	36.5	38.6	39.1
Deposits NB	8.6	7.9	7.2	8.7	8.6	6.7	6.8	6.6	6.0	8.7	9.6	9.4
Note circulation	44.7	44.8	48.7	49.9	48.8	52.3	49.8	48.7	49.2	49.0	47.2	47.6
Total currency	50.0	50.1	54.0	55.2	54.1	57.6	55.1	54.0	54.6	54.4	52.6	53.0
M0S	58.6	58.0	61.2	63.9	62.7	64.4	61.9	60.7	60.7	63.1	62.2	62.4
M0	57.1	56.4	59.4	62.1	61.0	62.6	60.5	59.6	59.9	61.8	60.2	59.9
1892												
Vault gold NB	24.5	24.1	23.6	25.5	24.1	25.0	27.6	26.6	26.0	27.5	26.5	26.9
Int. reserves NB	36.8	36.4	35.3	37.7	36.6	37.0	39.6	38.7	38.3	40.0	39.0	40.0
Dom. credit NB	37.3	36.1	37.9	38.7	37.5	37.9	36.1	34.2	33.6	33.3	32.7	33.5
Deposits NB	11.5	11.8	10.1	11.9	10.5	7.3	8.0	6.3	5.3	7.5	7.2	8.6
Note circulation	43.3	42.3	44.7	45.9	45.0	48.8	48.3	47.4	47.1	46.3	45.1	45.1
Total currency	48.7	47.8	50.1	51.4	50.4	54.3	53.8	53.0	52.6	51.9	50.7	50.7
M0S	60.2	59.5	60.2	63.3	60.9	61.6	61.8	59.3	57.9	59.4	57.9	59.3
M0	57.9	57.4	58.3	61.7	59.6	60.6	60.8	58.3	57.0	57.9	56.0	56.9
1893												
Vault gold NB	25.1	23.0	23.5	24.9	24.3	24.4	26.3	26.2	25.1	24.5	23.0	22.7
Int. reserves NB	38.0	36.0	37.1	38.7	37.9	38.2	40.1	40.1	39.2	38.6	37.1	37.1
Dom. credit NB	33.0	34.0	37.0	37.4	36.4	37.2	36.9	35.9	35.9	36.1	35.8	35.9
Deposits NB	10.0	9.6	9.0	10.4	9.9	7.3	10.2	9.3	7.9	8.8	7.7	6.5
Note circulation	41.5	41.7	46.4	47.0	45.6	49.1	47.6	47.9	48.3	47.0	46.0	47.2
Total currency	47.1	47.3	52.0	52.6	51.2	54.8	53.3	53.5	54.0	52.7	51.7	52.9
M0S	57.1	56.9	61.1	63.0	61.1	62.0	63.5	62.8	61.9	61.5	59.4	59.4
M0	54.9	54.9	59.3	61.4	59.9	61.0	60.0	59.3	58.4	58.0	55.9	55.9
1894												
Vault gold NB	23.5	24.0	22.6	22.5	22.3	23.0	24.7	23.6	23.4	22.7	21.9	22.4
Int. reserves NB	36.6	37.3	36.2	39.2	38.0	38.4	40.4	39.4	39.4	38.4	37.0	37.6
Dom. credit NB	35.9	34.8	35.6	36.0	35.7	37.4	36.0	35.1	35.0	35.9	35.2	35.3

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Deposits NB	10.0	9.0	7.2	8.0	8.5	6.2	8.7	8.5	6.1	7.5	7.8	6.7
Note circulation	43.3	44.5	46.5	49.0	47.0	51.2	48.9	48.0	50.0	48.5	46.2	47.8
Total currency	49.0	50.2	52.2	54.7	52.8	56.9	54.7	53.7	55.7	54.3	52.0	53.6
M0S	59.0	59.2	59.4	62.7	61.2	63.2	63.4	62.2	61.9	61.8	59.8	60.3
M0	54.8	53.8	56.3	59.7	58.3	60.5	60.8	59.8	59.6	59.7	57.8	58.4
1895												
Vault gold NB	22.9	22.2	21.1	21.9	21.8	22.0	27.2	27.7	30.0	29.5	26.4	24.5
Int. reserves NB	38.1	37.0	36.0	36.9	36.5	37.1	44.0	44.7	49.1	48.5	44.3	41.4
Dom. credit NB	35.2	35.6	38.3	38.1	37.7	39.6	36.8	35.4	35.9	36.6	36.5	37.3
Deposits NB	10.7	9.2	8.4	7.0	8.0	5.9	10.6	10.5	14.1	13.9	11.8	9.3
Note circulation	44.5	45.5	48.4	50.3	48.6	52.9	52.2	51.3	52.8	52.9	50.8	51.0
Total currency	50.3	51.4	54.3	56.2	54.5	58.8	58.2	57.3	58.9	59.0	56.9	57.1
M0S	61.1	60.5	62.7	63.1	62.5	64.7	68.8	67.8	73.0	72.9	68.7	66.4
M0	59.1	58.4	60.4	60.7	60.0	62.1	63.8	60.8	66.0	66.9	63.7	63.1
1896												
Vault gold NB	23.8	22.2	22.1	25.3	23.9	24.4	29.9	28.1	26.4	27.5	25.0	22.9
Int. reserves NB	39.0	37.0	37.2	40.5	39.1	40.1	46.1	44.2	41.4	42.4	39.7	38.9
Dom. credit NB	36.8	36.6	38.6	38.7	38.5	40.9	38.6	37.2	38.1	38.4	38.1	38.8
Deposits NB	11.2	8.6	6.5	8.3	8.1	6.4	11.9	9.8	8.1	9.0	7.6	6.4
Note circulation	46.7	47.3	51.5	53.4	51.9	56.9	54.7	53.5	53.1	53.2	51.7	52.5
Total currency	52.9	53.5	57.7	59.6	58.2	63.2	61.0	59.8	59.5	59.7	58.2	59.0
M0S	64.0	62.1	64.2	67.9	66.3	69.6	72.9	69.6	67.6	68.7	65.8	65.4
M0	60.8	58.9	61.0	64.8	63.2	66.6	66.5	65.1	64.2	63.7	61.1	62.1
1897												
Vault gold NB	25.0	26.0	26.5	30.1	25.8	26.4	31.1	30.3	29.8	31.7	30.0	32.0
Int. reserves NB	40.1	40.7	41.4	45.4	40.9	41.8	47.1	46.4	46.3	51.2	48.3	49.7
Dom. credit NB	37.6	37.2	38.6	38.2	38.4	40.4	38.7	38.0	38.1	37.4	36.1	37.5
Deposits NB	8.7	9.8	9.7	10.7	7.8	5.3	10.0	8.6	6.3	9.3	8.1	8.9
Note circulation	50.1	49.9	52.8	55.2	53.6	58.7	57.4	57.4	59.6	60.7	57.6	59.3
Total currency	56.6	56.5	59.4	61.8	60.2	65.4	64.1	64.1	66.4	67.5	64.4	66.2
M0S	65.3	66.3	69.1	72.5	68.1	70.8	74.2	72.7	72.6	76.8	72.6	75.1
M0	62.7	62.8	63.8	68.3	63.7	68.8	68.8	67.5	69.3	71.1	68.4	71.6
1898												
Vault gold NB	31.5	31.2	31.3	32.3	31.4	33.1	34.6	33.4	33.4	35.1	31.6	30.3
Int. reserves NB	49.3	50.1	49.3	51.4	49.7	51.9	55.0	53.7	52.4	54.8	50.5	48.8
Dom. credit NB	36.3	35.3	36.7	40.5	40.8	44.4	39.7	37.1	40.1	41.9	41.4	43.0
Deposits NB	11.2	12.0	10.1	11.4	11.1	11.2	10.9	9.3	7.7	11.4	9.9	9.3
Note circulation	55.3	55.2	58.1	62.6	61.1	67.1	65.5	63.3	65.3	66.6	63.1	63.4
Total currency	62.3	62.2	65.3	69.8	68.3	74.4	72.9	70.8	72.8	74.3	70.9	71.2
M0S	73.5	74.3	75.4	81.2	79.4	85.6	83.8	80.1	80.6	85.6	80.8	80.5
M0	67.8	68.0	69.5	75.6	72.4	81.0	78.7	74.9	77.6	79.3	74.3	76.6
1899												
Vault gold NB	30.2	29.7	27.1	33.0	27.9	25.8	31.7	30.2	28.6	30.0	30.9	28.6
Int. reserves NB	48.7	47.2	43.6	50.0	43.1	42.3	47.1	45.6	43.9	45.4	47.9	45.3
Dom. credit NB	40.4	42.1	47.0	46.6	48.7	57.2	56.9	53.7	55.4	54.6	52.9	54.8
Deposits NB	10.7	9.9	7.5	11.7	10.4	10.6	18.1	15.8	11.9	13.9	19.3	17.7
Note circulation	59.1	61.3	64.7	66.3	62.6	69.9	67.0	64.4	67.9	64.4	61.8	62.5
Total currency	66.9	69.1	72.6	74.2	70.5	77.8	75.0	72.4	75.9	72.5	69.9	70.6
M0S	77.6	79.0	80.1	86.0	80.9	88.4	93.1	88.2	87.8	86.3	89.2	88.2
M0	72.9	72.6	76.3	80.4	75.3	84.8	82.9	81.7	86.7	80.4	75.2	77.0

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1900												
Vault gold NB	26.1	26.6	27.6	28.7	24.9	25.6	25.9	24.0	25.2	25.5	25.5	24.3
Int. reserves NB	41.1	41.4	41.8	42.7	38.3	41.3	42.5	40.7	42.7	44.0	43.2	41.7
Dom. credit NB	52.4	52.9	53.5	53.1	54.0	58.7	53.9	51.3	51.5	49.9	48.5	52.1
Deposits NB	17.5	15.2	13.9	13.2	11.8	11.6	11.1	8.1	7.6	6.4	7.2	6.1
Note circulation	55.8	59.4	62.3	63.3	61.0	68.8	65.5	63.6	66.2	66.7	63.6	65.6
Total currency	63.8	67.5	70.4	71.3	68.9	76.7	73.4	71.5	74.0	74.6	71.5	73.4
M0S	81.3	82.7	84.3	84.5	80.7	88.3	84.5	79.6	81.6	81.0	78.6	79.5
M0	71.0	71.2	75.5	78.8	73.7	84.6	80.1	77.6	80.0	78.4	77.0	78.2
1901												
Vault gold NB	23.4	20.7	19.6	23.5	22.5	24.5	29.7	32.3	29.1	29.7	27.9	26.9
Int. reserves NB	41.4	37.8	37.2	42.4	41.7	44.9	50.9	55.0	51.8	52.4	50.7	49.2
Dom. credit NB	49.4	51.2	54.4	54.8	52.8	56.0	48.9	45.8	46.8	49.1	47.5	49.1
Deposits NB	8.8	6.1	5.4	9.4	8.3	6.9	10.2	11.1	6.6	10.6	10.5	8.4
Note circulation	56.8	58.4	61.2	62.9	60.9	68.4	63.6	63.6	65.2	63.8	60.6	62.6
Total currency	64.6	66.3	69.1	70.8	68.8	76.4	71.6	71.6	73.2	71.9	68.7	70.7
M0S	73.4	72.4	74.5	80.2	77.2	83.3	81.8	82.7	79.8	82.5	79.2	79.1
M0	69.4	70.7	73.5	77.5	74.9	82.1	80.0	81.0	78.8	77.3	76.2	77.2
1902												
Vault gold NB	28.3	27.3	23.9	25.0	23.4	22.8	25.5	27.0	26.5	26.8	22.8	22.0
Int. reserves NB	51.2	49.7	46.8	47.5	45.0	45.7	48.5	51.6	50.6	51.2	47.3	45.2
Dom. credit NB	45.7	45.8	51.2	50.0	48.8	53.6	50.6	47.2	48.5	48.9	50.2	52.2
Deposits NB	12.8	10.3	9.2	8.7	7.2	6.1	9.2	7.9	6.9	8.4	7.7	8.7
Note circulation	56.6	59.5	63.0	63.3	60.9	67.3	63.9	64.3	65.5	64.7	62.4	62.9
Total currency	64.7	67.5	71.0	71.2	68.8	75.2	71.8	72.1	73.3	72.5	70.1	70.6
M0S	77.5	77.8	80.2	79.9	76.0	81.2	81.0	80.0	80.2	80.9	77.9	79.3
M0	71.4	72.5	76.2	76.8	74.3	79.5	76.2	76.3	77.2	77.7	75.4	77.6
1903												
Vault gold NB	22.3	19.9	17.4	17.9	16.1	19.9	21.1	21.7	20.3	23.6	22.2	21.2
Int. reserves NB	41.8	38.9	36.0	37.6	36.3	41.3	42.6	43.9	42.2	46.2	43.1	40.4
Dom. credit NB	50.5	52.0	55.9	59.5	58.0	61.3	56.3	53.1	53.6	51.5	50.3	54.5
Deposits NB	9.3	9.5	8.1	9.9	8.5	7.8	9.1	7.8	5.5	6.4	7.1	7.4
Note circulation	56.4	56.4	58.7	61.9	60.5	67.4	63.6	63.1	64.0	64.8	59.8	61.4
Total currency	64.2	64.1	66.5	69.7	68.4	75.2	71.5	71.0	72.0	72.7	67.7	69.4
M0S	73.5	73.7	74.6	79.6	76.8	83.0	80.6	78.7	77.4	79.2	74.8	76.8
M0	71.1	69.3	70.1	73.3	72.9	80.0	75.6	75.3	76.1	76.1	72.6	75.4
1904												
Vault gold NB	22.1	20.4	18.1	19.9	18.9	22.3	25.6	24.6	23.0	23.9	21.9	24.4
Int. reserves NB	39.7	39.0	36.6	38.6	37.0	42.4	48.2	46.7	46.3	47.3	43.7	45.5
Dom. credit NB	51.3	50.9	54.2	57.0	55.2	60.0	54.2	50.4	51.4	51.7	48.7	51.1
Deposits NB	9.1	8.4	7.3	8.0	5.9	7.6	12.0	8.8	6.7	9.0	6.3	10.1
Note circulation	55.4	56.1	58.5	62.3	61.1	68.1	64.6	62.5	65.1	64.0	60.1	60.2
Total currency	63.5	64.2	66.6	70.4	69.2	76.3	72.8	70.7	73.4	72.3	68.5	68.6
M0S	72.6	72.6	74.0	78.4	75.1	83.9	84.8	79.6	80.2	81.3	74.8	78.6
M0	69.6	70.1	70.6	75.9	71.5	82.5	82.0	74.5	77.2	80.4	71.5	76.8
1905												
Vault gold NB	22.7	21.1	20.6	22.7	21.9	24.2	28.5	27.4	26.9	27.2	23.6	24.3
Int. reserves NB	42.6	41.5	42.1	45.0	45.1	48.7	52.5	51.6	53.5	53.8	50.0	49.6
Dom. credit NB	48.1	49.6	54.3	56.5	55.0	62.4	55.6	52.6	55.6	51.8	50.1	52.7
Deposits NB	8.6	9.1	9.2	10.8	9.5	8.3	10.2	7.8	6.9	8.0	7.6	10.0

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Note circulation	55.7	56.9	62.0	65.4	65.2	77.1	72.0	70.5	76.0	71.5	66.2	65.7
Total currency	64.1	65.3	70.5	73.8	73.7	85.6	80.5	79.0	84.5	80.1	74.8	74.3
M0S	72.7	74.4	79.7	84.6	83.1	93.9	90.8	86.8	91.5	88.1	82.4	84.2
M0	71.2	71.6	75.1	81.0	78.4	90.6	87.1	84.1	89.2	86.9	79.8	82.9
1906												
Vault gold NB	24.8	26.5	27.8	30.8	27.0	29.7	31.3	32.0	31.7	33.1	30.5	30.1
Int. reserves NB	47.4	49.1	52.2	56.9	53.5	57.9	60.4	60.3	61.5	62.1	58.8	59.4
Dom. credit NB	48.7	48.6	48.6	49.6	49.6	51.0	46.4	45.8	45.7	46.1	45.0	46.9
Deposits NB	9.3	10.0	8.6	12.3	9.4	6.7	9.4	10.2	8.0	10.6	9.2	10.4
Note circulation	59.9	62.2	66.5	68.5	67.8	76.5	71.7	70.0	73.3	71.5	68.5	68.9
Total currency	68.5	70.9	75.3	77.3	76.7	85.5	80.7	79.2	82.5	80.7	77.8	78.3
M0S	77.8	80.8	83.9	89.7	86.1	92.2	90.1	89.4	90.5	91.3	87.1	88.8
M0	76.0	76.3	80.6	85.3	79.4	88.5	86.6	85.4	87.9	88.0	83.3	85.6
1907												
Vault gold NB	30.4	29.1	30.1	33.0	31.5	32.7	34.5	31.2	31.4	35.1	32.9	30.9
Int. reserves NB	55.5	54.7	55.6	61.8	60.4	65.7	68.3	66.6	66.5	70.0	66.9	65.4
Dom. credit NB	44.7	43.8	48.8	49.0	47.6	49.1	46.9	45.0	45.4	45.2	43.5	45.0
Deposits NB	10.0	8.4	7.0	8.6	8.3	7.0	12.0	8.4	7.2	11.5	8.6	9.5
Note circulation	62.9	64.0	71.3	75.8	73.2	81.2	76.3	76.3	77.8	76.5	74.5	73.5
Total currency	72.3	73.5	80.8	85.3	82.8	90.7	85.9	85.9	87.4	86.1	84.1	83.2
M0S	82.4	81.8	87.8	93.9	91.1	97.7	97.9	94.3	94.6	97.6	92.8	92.7
M0	80.0	76.7	85.0	91.2	89.1	95.1	94.4	89.1	91.5	94.9	87.9	90.9
1908												
Vault gold NB	27.9	27.2	27.1	27.9	27.6	29.9	31.5	30.2	29.4	32.5	29.6	31.7
Int. reserves NB	59.1	58.0	56.9	62.9	58.0	61.7	65.0	62.2	61.7	65.1	63.3	64.8
Dom. credit NB	43.2	43.8	46.6	49.0	49.3	51.3	48.1	46.7	46.8	47.1	44.5	47.7
Deposits NB	8.1	7.0	6.0	11.1	7.6	4.7	9.9	7.4	5.0	7.9	7.6	8.5
Note circulation	66.4	68.2	70.8	74.1	72.8	81.1	75.8	73.9	75.9	76.1	72.3	72.8
Total currency	76.1	77.9	80.6	83.9	82.6	91.0	85.7	83.8	85.8	86.1	82.2	82.8
M0S	84.2	84.9	86.6	94.9	90.2	95.7	95.6	91.2	90.8	94.0	89.9	91.3
M0	79.9	82.1	84.0	90.5	85.6	93.3	89.6	86.6	89.0	93.3	86.3	89.9
1909												
Vault gold NB	28.9	27.7	27.6	28.8	29.6	30.8	32.6	31.8	31.3	34.4	30.3	33.4
Int. reserves NB	61.8	60.5	59.9	64.7	62.2	63.7	67.9	68.1	69.7	72.3	67.4	68.7
Dom. credit NB	47.2	48.1	51.0	53.1	52.7	55.6	50.6	48.3	48.7	50.9	47.3	50.8
Deposits NB	9.2	8.5	5.6	6.9	7.8	5.7	8.4	5.8	5.3	8.9	5.6	8.0
Note circulation	66.3	67.8	73.0	75.2	74.1	80.3	77.4	77.0	80.0	80.5	75.4	77.5
Total currency	76.4	77.9	83.2	85.4	84.4	90.7	87.8	87.5	90.5	91.1	86.0	88.2
M0S	85.6	86.4	88.8	92.3	92.2	96.4	96.2	93.3	95.8	100.0	91.6	96.2
M0	82.3	83.9	86.5	91.0	89.5	94.8	94.4	91.7	93.9	99.3	88.3	95.0
1910												
Vault gold NB	29.0	29.3	31.2	33.4	31.7	34.5	35.8	34.9	36.7	37.4	34.8	36.2
Int. reserves NB	64.3	64.8	64.2	66.3	65.8	65.9	69.6	70.9	71.1	74.0	69.4	68.8
Dom. credit NB	47.7	47.5	51.9	55.4	54.1	62.7	56.7	51.0	53.2	54.1	52.3	57.1
Deposits NB	7.7	7.2	6.6	8.7	7.7	7.4	9.3	6.2	4.5	7.9	5.8	7.9
Note circulation	70.3	73.0	77.3	80.3	79.6	88.1	84.0	82.5	86.6	86.5	82.2	84.3
Total currency	81.1	83.8	88.2	91.2	90.6	99.1	95.1	93.6	97.7	97.7	93.4	95.6
M0S	88.8	91.0	94.8	100.0	98.2	106.5	104.4	99.8	102.2	105.5	99.3	103.4
M0	87.6	89.3	92.0	97.9	95.1	103.9	101.4	97.0	100.7	104.4	95.2	101.7
1911												

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Vault gold NB	33.6	32.9	34.2	37.6	37.8	40.9	40.5	41.1	38.7	40.5	39.1	40.5
Int. reserves NB	68.4	69.3	70.8	72.0	68.6	72.3	74.9	78.2	75.3	75.9	70.8	70.2
Dom. credit NB	51.4	49.6	52.8	56.6	57.8	64.5	58.5	53.6	56.9	56.6	57.1	65.8
Deposits NB	9.2	9.0	8.1	10.0	6.3	7.5	8.4	6.8	5.0	7.6	5.9	9.3
Note circulation	76.4	77.7	83.5	86.9	88.0	97.1	92.1	91.8	93.9	91.4	88.4	92.9
Total currency	87.7	89.1	94.8	98.3	99.4	108.5	103.6	103.3	105.4	103.0	99.9	104.5
M0S	96.9	98.1	103.0	108.3	105.8	116.0	111.9	110.0	110.4	110.5	105.9	113.8
M0	95.0	94.2	98.9	105.8	100.9	112.1	108.7	106.3	107.6	108.6	102.6	112.0
1912												
Vault gold NB	39.8	36.2	36.0	38.0	37.8	37.2	40.1	38.8	38.9	40.4	41.1	40.4
Int. reserves NB	70.2	65.9	64.6	66.2	65.5	65.0	70.0	72.8	72.9	76.4	74.2	72.9
Dom. credit NB	58.7	60.1	65.6	68.1	65.8	75.8	69.4	64.7	64.9	63.9	63.9	71.5
Deposits NB	11.3	8.6	6.1	8.9	7.0	6.7	8.8	8.0	4.6	8.6	7.6	10.4
Note circulation	83.5	85.2	92.1	92.9	91.8	101.2	97.4	97.5	100.3	97.5	96.5	99.3
Total currency	95.2	96.9	103.9	104.8	103.7	113.1	109.4	109.6	112.4	109.7	108.7	111.6
M0S	106.4	105.6	110.0	113.7	110.7	119.8	118.2	117.5	117.0	118.3	116.3	122.0
M0	101.5	101.1	106.0	110.1	109.5	117.1	113.3	113.0	115.0	115.6	112.6	119.4
1913												
Vault gold NB	39.1	39.1	38.8	40.4	41.2	44.2	44.6	46.4	44.3	46.4	46.8	47.9
Int. reserves NB	70.6	69.0	68.0	71.5	77.0	80.0	84.5	87.5	85.9	87.2	84.4	86.1
Dom. credit NB	66.3	66.5	65.8	71.5	68.1	80.1	76.3	71.7	75.2	78.1	74.5	79.3
Deposits NB	9.4	9.2	5.6	8.0	6.4	5.0	7.7	6.3	7.6	11.4	7.9	12.6
Note circulation	92.8	94.3	96.1	102.6	103.5	112.7	109.5	108.7	109.0	108.7	106.1	107.6
Total currency	105.2	106.7	108.6	115.1	116.0	125.3	122.1	121.4	121.7	121.5	119.0	120.5
M0S	114.6	115.9	114.1	123.1	122.5	130.3	129.8	127.7	129.3	132.9	126.8	133.1
M0	110.4	111.3	110.2	121.6	118.1	128.7	128.5	125.0	126.5	129.6	122.0	129.9
Deposits CB	523.4	548.3	564.9	561.5	560.9	559.1	565.5	567.1	565.3	559.9	571.8	592.2
Deposits SB	576.5	585.6	583.4	584.3	584.8	584.5	590.1	594.3	597.6	598.3	602.0	620.1
M1	109.5	111.1	113.4	120.6	123.9	133.9	133.9	135.5	135.6	136.1	137.0	144.2
M2	1193.6	1227.5	1245.1	1249.7	1250.3	1256.4	1263.8	1271.0	1273.4	1268.5	1281.2	1318.2
1914												
Vault gold NB	47.6	45.3	45.5	47.8	49.0	52.7	53.8	56.6	43.6	40.9	44.5	41.7
Int. reserves NB	85.7	87.1	86.9	88.4	86.0	88.4	92.6	86.2	76.8	76.2	78.3	74.9
Dom. credit NB	69.3	67.7	70.7	75.3	77.4	85.7	89.0	119.4	121.8	125.8	120.6	127.7
Deposits NB	10.1	10.8	7.7	10.6	7.7	7.0	14.4	20.9	18.1	23.3	20.5	21.1
Note circulation	99.8	102.0	107.6	110.8	112.9	123.9	123.7	140.4	135.3	132.8	131.4	134.2
Total currency	112.7	115.0	120.6	123.8	126.0	137.0	136.9	153.5	148.5	146.1	144.7	147.5
M0S	122.8	125.7	128.3	134.5	133.7	144.0	151.3	174.4	166.7	169.4	165.2	168.6
M0	119.1	121.3	124.0	131.0	129.1	141.6	147.6	169.4	163.3	165.3	156.0	164.7
Deposits CB	598.7	602.5	600.1	598.4	602.0	600.6	609.7	601.4	598.1	601.0	599.0	630.9
Deposits SB	646.1	651.2	654.3	657.0	659.6	661.9	675.1	660.6	655.4	658.3	658.4	652.2
M1	136.3	135.3	141.0	143.9	150.2	162.3	164.1	190.6	192.5	190.0	191.8	196.3
M2	1345.2	1354.9	1363.6	1367.4	1377.0	1387.6	1408.9	1399.5	1387.9	1392.9	1389.4	1414.5
1915												
Vault gold NB	38.4	42.4	46.3	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	51.6
Int. reserves NB	80.5	87.3	105.4	117.9	127.2	133.2	136.4	141.7	140.2	146.9	144.5	140.6
Dom. credit NB	113.4	105.3	93.0	87.5	79.5	79.4	77.8	79.0	77.3	80.0	80.1	91.4
Deposits NB	22.2	18.5	15.4	20.0	26.8	20.9	25.4	31.2	23.0	24.8	24.1	26.5
Note circulation	124.0	128.9	139.2	141.5	135.1	146.8	143.8	144.6	149.3	156.2	152.7	162.2
Total currency	137.4	142.4	152.8	155.1	148.8	160.6	157.7	158.6	163.4	170.4	167.0	176.6

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0S	159.6	160.9	168.1	175.2	175.7	181.5	183.1	189.7	186.4	195.2	191.1	203.2
M0	152.9	153.8	165.1	171.2	171.3	172.3	177.5	182.6	178.7	191.8	184.6	203.0
Deposits CB	646.8	664.6	673.1	694.2	710.2	722.6	742.2	757.9	776.5	795.7	823.3	855.8
Deposits SB	691.0	693.9	698.3	700.4	701.1	704.1	711.8	711.1	719.7	725.5	729.0	740.0
M1	190.7	202.4	197.8	198.1	189.2	206.7	204.1	205.0	208.6	219.2	219.7	226.3
M2	1463.5	1488.1	1509.5	1533.2	1539.9	1571.9	1594.2	1610.8	1641.2	1673.0	1700.3	1748.1
1916												
Vault gold NB	53.5	68.1	72.1	91.8	108.0	114.8	114.8	114.8	113.9	111.2	110.1	123.2
Int. reserves NB	131.4	144.7	163.6	215.9	226.3	227.0	242.3	235.9	226.2	221.1	216.5	213.0
Dom. credit NB	104.0	108.9	119.1	102.2	101.7	104.4	92.3	107.7	127.6	140.0	138.1	165.3
Deposits NB	40.2	43.4	34.8	51.6	72.1	62.4	73.5	72.1	76.3	75.8	65.3	81.0
Note circulation	152.1	167.5	205.6	222.4	211.5	224.1	215.3	224.9	229.8	236.8	240.0	251.5
Total currency	166.7	182.2	220.5	237.4	226.7	239.4	230.7	240.5	245.5	252.7	256.0	267.7
M0S	206.9	225.6	255.3	289.0	298.8	301.8	304.2	312.6	321.9	328.4	321.3	348.7
M0	205.2	223.7	253.4	283.6	286.6	290.7	291.6	302.1	310.2	309.5	307.1	342.7
Deposits CB	906.5	938.2	991.0	1065.5	1134.1	1172.1	1242.7	1322.5	1356.7	1412.6	1412.1	1442.3
Deposits SB	778.5	799.8	817.6	841.5	865.2	884.2	910.1	919.6	925.1	945.9	959.2	974.2
M1	227.9	244.0	282.6	304.7	294.4	314.3	318.9	346.2	395.6	394.7	387.2	380.3
M2	1826.4	1898.7	2005.6	2109.0	2182.9	2255.1	2342.6	2444.8	2493.5	2578.7	2596.0	2640.8
1917												
Vault gold NB	121.2	125.1	131.2	130.1	130.0	129.9	129.8	129.7	122.6	117.8	114.9	116.4
Int. reserves NB	204.2	211.2	217.6	214.5	221.0	217.4	216.8	212.5	210.9	206.2	204.6	205.3
Dom. credit NB	165.8	161.6	212.7	235.9	239.7	285.4	291.7	311.5	314.1	359.1	377.4	415.3
Deposits NB	90.4	73.7	105.0	119.7	127.5	145.3	149.6	157.8	145.5	185.4	201.7	225.3
Note circulation	234.0	255.1	280.7	284.7	279.2	295.5	293.3	300.1	310.6	308.0	309.4	326.3
Total currency	250.3	271.6	297.3	301.4	296.1	312.6	310.5	317.4	328.1	325.6	327.1	344.2
M0S	340.7	345.2	402.3	421.1	423.6	457.9	460.1	475.2	473.7	511.1	528.8	569.5
M0	333.1	331.3	394.5	413.2	418.0	447.5	449.1	455.2	456.1	432.6	440.3	507.2
Deposits CB	1458.5	1530.8	1574.7	1671.6	1795.6	1876.0	1980.5	2026.8	2148.4	2121.7	2137.3	2201.7
Deposits SB	1033.8	1053.5	1072.1	1107.5	1131.2	1152.4	1177.7	1201.4	1211.9	1231.2	1247.4	1271.1
M1	366.1	397.7	423.7	423.3	429.9	456.4	459.9	492.6	548.8	536.8	507.5	504.5
M2	2706.1	2827.4	2913.2	3034.3	3171.3	3286.3	3416.6	3491.3	3633.2	3634.0	3665.0	3760.1
1918												
Vault gold NB	116.4	118.4	122.3	122.2	120.1	120.0	122.7	122.6	122.4	122.3	122.1	122.0
Int. reserves NB	195.2	190.5	194.9	197.2	196.2	192.4	193.3	195.3	196.5	198.0	193.5	204.0
Dom. credit NB	383.6	362.9	345.5	344.5	339.6	349.2	325.4	339.7	333.0	354.2	373.1	439.3
Deposits NB	204.1	168.4	125.6	116.3	112.3	94.4	73.5	77.4	53.2	65.2	80.9	127.1
Note circulation	308.0	320.9	349.5	358.3	356.6	371.2	371.0	383.6	401.0	411.8	410.2	436.2
Total currency	326.2	339.3	368.1	377.2	375.7	390.6	390.7	403.5	421.2	432.2	430.8	457.1
M0S	530.3	507.6	493.7	493.5	488.1	485.0	464.1	480.9	474.4	497.4	511.8	584.2
M0	496.3	489.7	486.9	477.4	464.7	465.9	451.7	480.9	459.0	489.6	511.8	584.2
Deposits CB	2293.5	2413.3	2466.8	2567.8	2644.3	2655.8	2712.4	2726.8	2769.4	2692.1	2660.3	2720.7
Deposits SB	1282.1	1302.7	1328.1	1359.3	1404.6	1429.8	1448.5	1470.8	1483.1	1505.6	1520.9	1598.7
M1	502.9	535.1	567.3	572.7	637.5	643.6	595.5	607.8	670.9	656.5	654.6	669.2
M2	3839.9	3992.2	4113.9	4249.9	4369.3	4429.7	4509.3	4555.7	4635.0	4592.6	4573.0	4727.2
1919												
Gold stock NB	121.9	121.8	148.8	148.7	148.6	148.4	148.3	148.3	148.1	148.0	147.9	147.7
Int. reserves NB	203.5	198.3	228.8	230.5	237.5	236.4	265.2	247.0	239.6	238.3	236.0	230.8
Dom. credit NB	399.9	400.5	379.3	359.3	358.9	351.7	311.1	322.3	339.7	355.1	357.2	415.3
Total currency	437.4	439.2	455.1	457.2	452.7	456.6	452.6	452.2	458.6	462.1	453.8	477.9

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	527.3	529.1	536.9	526.6	533.4	517.6	512.2	505.6	514.4	526.7	525.5	583.6
Deposits CB	2698.1	2763.6	2742.3	2785.9	2808.6	2826.1	2823.9	2812.6	2855.9	2891.1	2909.9	2972.3
Deposits SB	1625.4	1647.6	1671.2	1692.8	1707.5	1718.1	1746.2	1752.7	1752.7	1757.8	1760.9	1839.0
M1	606.4	625.6	616.7	624.5	626.0	633.9	627.7	641.4	648.9	642.3	633.0	617.8
M2	4702.5	4799.2	4810.8	4881.2	4913.5	4942.3	4975.0	4975.0	5010.8	5064.1	5077.6	5206.0
1920												
Gold stock NB	147.6	147.5	147.4	147.4	147.4	147.4	147.4	147.3	147.4	147.3	147.3	147.3
Int. reserves NB	229.0	217.2	235.2	228.1	225.2	218.0	210.8	208.7	206.4	202.7	202.3	212.0
Dom. credit NB	337.7	355.8	363.6	405.6	410.8	437.1	455.0	453.3	475.5	478.6	452.7	508.2
Total currency	437.2	436.2	474.0	468.9	455.2	465.1	482.8	491.2	502.9	503.4	490.0	517.1
M0	506.1	505.6	547.5	552.4	554.6	590.5	599.2	595.3	614.0	611.1	582.8	649.6
Deposits CB	3007.2	2984.5	3000.2	3049.1	3072.4	3101.1	3046.4	3054.2	3042.7	3026.1	3010.0	3112.5
Deposits SB	1859.2	1875.3	1888.2	1895.3	1901.4	1892.0	1909.5	1919.2	1925.8	1935.7	1946.8	2052.9
M1	607.6	610.1	637.7	642.0	654.0	660.2	697.6	696.1	695.9	676.8	658.8	659.9
M2	5256.3	5245.9	5307.3	5359.7	5380.0	5390.2	5391.7	5415.2	5423.5	5410.3	5394.7	5606.6
1921												
Gold stock NB	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3
Int. reserves NB	209.4	200.7	196.0	191.4	195.7	187.8	183.7	185.4	184.4	185.9	190.7	196.2
Dom. credit NB	463.7	448.3	421.9	444.9	436.9	449.4	459.2	462.3	434.3	459.6	446.2	472.2
Total currency	461.8	450.8	458.7	455.6	450.3	452.6	462.9	455.8	450.9	446.4	430.7	445.5
M0	574.5	555.4	545.3	559.4	556.0	558.5	562.6	565.3	521.6	530.7	519.2	586.1
Deposits CB	3100.8	3073.0	3046.8	2983.5	2955.5	2974.0	2985.2	2975.7	2963.1	2929.6	2886.4	2982.3
Deposits SB	2078.1	2094.2	2108.0	2113.3	2115.1	2122.4	2153.8	2167.1	2168.6	2170.3	2168.1	2294.3
M1	624.6	607.1	610.3	598.7	582.9	595.8	606.6	602.7	609.8	579.1	566.1	549.2
M2	5587.7	5569.4	5555.3	5507.1	5473.2	5496.0	5549.1	5547.1	5539.8	5484.8	5428.9	5648.0
1922												
Gold stock NB	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3
Int. reserves NB	197.0	201.1	199.7	194.9	196.0	192.7	192.2	191.1	196.1	190.9	189.6	195.1
Dom. credit NB	429.9	431.5	452.2	451.2	449.2	444.8	448.7	450.4	447.2	493.0	451.4	467.4
Total currency	414.5	411.4	420.5	421.1	410.9	420.8	418.5	421.4	420.6	420.6	409.1	422.5
M0	536.9	532.1	565.7	560.8	553.0	532.7	540.9	545.3	546.0	557.1	536.1	568.2
Deposits CB	2897.7	2903.7	2869.9	2866.8	2862.1	2837.3	2840.3	2800.5	2781.6	2713.1	2661.7	2696.7
Deposits SB	2311.0	2322.4	2331.5	2333.7	2333.7	2319.4	2341.8	2338.9	2330.4	2345.2	2342.4	2438.0
M1	535.9	520.0	532.0	533.8	522.0	538.7	547.0	549.1	550.1	535.2	512.2	500.3
M2	5576.3	5591.7	5580.3	5573.3	5552.0	5525.9	5546.3	5508.3	5483.5	5421.5	5359.9	5479.2
1923												
Gold stock NB	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3
Int. reserves NB	190.4	183.9	181.3	182.3	169.4	172.3	174.5	175.1	173.8	172.1	172.5	170.4
Dom. credit NB	435.8	458.8	465.2	504.8	520.2	498.1	479.2	465.0	451.1	457.0	457.8	454.7
Total currency	387.2	391.7	413.1	447.5	441.1	454.2	443.1	439.3	437.7	428.5	416.9	428.2
M0	513.0	524.9	543.8	579.5	578.3	576.6	556.5	543.2	521.9	500.1	500.4	543.2
Deposits CB	2679.9	2638.7	2561.7	1944.6	1873.7	1843.8	1799.1	1770.4	1752.9	1710.0	1686.9	1733.9
Deposits SB	2442.0	2449.2	2435.7	2425.0	2425.3	2427.6	2440.4	2440.3	2438.2	2426.9	2419.4	2513.9
M1	491.6	488.4	525.0	542.1	538.5	554.2	542.6	549.4	556.2	563.5	547.7	535.1
M2	5461.3	5429.6	5356.7	4761.3	4691.2	4677.2	4636.5	4611.3	4589.8	4522.7	4486.9	4616.4
1924												
Gold stock NB	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.3	147.2	147.2	147.2	147.2
Int. reserves NB	168.7	168.2	171.8	171.8	174.4	172.6	160.4	193.6	195.5	197.2	199.2	199.5
Dom. credit NB	422.9	426.7	418.3	427.6	428.0	450.0	445.9	437.4	431.7	413.6	397.9	392.2
Total currency	395.4	398.4	408.6	407.3	405.0	420.8	415.3	415.7	414.8	412.0	402.1	417.4

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	489.4	468.6	493.4	487.0	475.3	498.4	494.0	485.4	488.0	479.7	485.1	517.0
Deposits CB	1736.3	1720.1	1702.8	1704.2	1699.6	1686.8	1678.8	1648.4	1650.1	1537.2	1526.1	1568.6
Deposits SB	2506.0	2502.5	2499.2	2490.0	2472.4	2460.2	2459.4	2458.7	2449.7	2441.7	2430.0	2543.5
M1	528.1	538.2	560.8	567.0	571.5	578.6	575.4	584.0	587.3	583.0	571.6	552.8
M2	4595.3	4585.0	4573.8	4561.7	4538.4	4527.2	4517.6	4491.9	4479.1	4359.7	4325.3	4473.3
1925												
Gold stock NB	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2
Int. reserves NB	190.9	189.9	210.2	215.5	188.3	219.0	219.2	222.0	228.4	228.2	221.4	218.6
Dom. credit NB	380.3	374.4	358.3	353.6	338.8	380.5	326.6	310.8	312.6	313.8	305.0	313.3
Total currency	386.5	393.4	403.6	403.7	397.0	409.0	406.1	400.0	392.8	387.4	372.3	383.7
M0	466.5	469.8	500.6	478.9	475.4	511.5	486.9	477.4	467.3	468.0	452.4	479.1
Deposits CB	1574.8	1540.4	1535.5	1502.3	1479.6	1475.1	1436.1	1413.4	1375.8	1327.7	1306.9	1346.4
Deposits SB	2524.2	2521.5	2515.3	2496.2	2485.7	2483.4	2486.6	2481.1	2466.8	2449.8	2439.0	2519.0
M1	560.1	539.8	560.3	533.8	527.4	539.6	535.8	529.6	513.6	485.0	481.6	481.3
M2	4444.0	4406.4	4409.8	4354.3	4315.4	4310.7	4288.8	4254.2	4186.8	4119.6	4081.6	4196.9
1926												
Gold stock NB	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2
Int. reserves NB	223.5	247.8	246.4	246.7	247.0	311.6	314.2	318.3	379.9	413.8	466.7	454.5
Dom. credit NB	294.8	288.9	299.2	286.9	281.8	277.6	272.0	265.3	258.9	257.9	249.8	235.1
Total currency	355.2	350.1	369.7	363.1	354.8	362.2	357.0	351.7	345.6	344.8	338.3	354.3
M0	444.8	468.3	494.1	471.5	468.2	534.5	533.3	528.5	573.6	599.0	660.3	648.1
Deposits CB	1321.1	1321.0	1274.6	1257.1	1260.9	1248.6	1263.7	1272.3	1283.4	1273.8	1249.4	1303.5
Deposits SB	2514.8	2513.1	2502.5	2488.0	2471.0	2449.0	2445.7	2434.9	2422.6	2406.4	2391.1	2463.8
M1	448.8	449.7	463.6	454.6	454.2	460.9	466.3	463.8	469.3	475.1	461.6	476.4
M2	4149.9	4146.0	4107.9	4070.4	4047.9	4019.4	4033.5	4022.2	4015.4	3986.8	3938.7	4071.2
1927												
Gold stock NB	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2	147.2
Int. reserves NB	438.2	424.7	401.9	364.2	301.6	300.9	270.7	266.9	259.9	224.4	245.0	232.4
Dom. credit NB	231.4	215.2	210.1	206.0	205.9	201.6	209.9	211.4	215.7	240.8	228.8	245.6
Total currency	335.5	336.1	340.8	338.3	332.2	348.9	348.1	344.8	342.3	341.0	335.3	348.2
M0	625.8	601.9	571.5	522.8	461.9	464.3	431.7	433.1	426.0	410.7	426.5	434.8
Deposits CB	1295.1	1270.1	1228.3	1207.0	1165.0	1134.5	1110.3	1097.7	1056.6	1015.5	986.0	991.7
Deposits SB	2455.4	2454.1	2444.2	2433.4	2412.6	2397.7	2388.1	2367.0	2343.5	2317.5	2296.0	2339.6
M1	465.3	468.1	458.6	453.3	439.7	448.1	446.3	445.3	438.4	424.6	409.9	421.2
M2	4046.4	4019.2	3970.6	3935.0	3869.8	3839.5	3813.9	3775.2	3711.0	3639.2	3577.3	3637.4
1928												
Gold stock NB	147.2	147.2	147.2	147.2	147.1	147.0	147.0	146.9	146.9	146.9	146.9	146.9
Int. reserves NB	180.1	182.8	199.1	196.8	188.5	184.5	179.7	186.4	184.2	178.5	178.0	188.1
Dom. credit NB	300.1	322.2	313.9	303.1	299.5	301.5	289.5	290.8	276.5	283.1	289.8	281.6
Total currency	341.7	330.3	339.6	337.7	329.9	341.9	335.9	334.6	330.1	323.3	318.9	332.6
M0	433.5	443.4	469.1	443.8	418.1	429.2	413.2	427.9	397.2	385.6	391.6	408.0
Deposits CB	937.3	919.1	918.9	922.9	925.2	912.9	912.7	908.9	956.3	947.3	933.6	988.7
Deposits SB	2316.5	2308.0	2297.0	2280.9	2269.2	2253.7	2248.4	2237.4	2224.9	2206.8	2191.9	2260.3
M1	399.8	389.9	403.4	400.4	391.3	395.9	390.4	387.6	395.4	384.5	374.1	393.0
M2	3554.6	3523.8	3522.3	3507.9	3488.7	3472.7	3461.9	3445.6	3477.0	3446.6	3413.4	3535.5
1929												
Gold stock NB	146.9	146.9	146.8	146.8	146.8	146.8	146.8	146.8	146.8	146.7	146.7	146.7
Int. reserves NB	179.0	183.1	196.3	203.3	194.7	194.9	188.1	189.5	203.9	204.8	204.9	212.8
Dom. credit NB	275.7	275.1	282.4	281.8	286.8	285.3	281.8	277.9	269.9	265.4	262.1	256.4
Total currency	315.9	317.9	328.3	325.2	321.8	334.6	332.4	331.7	333.2	324.1	320.3	335.4

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	372.6	380.7	393.1	392.8	383.3	398.5	392.2	387.1	391.0	380.2	386.0	397.9
Deposits CB	979.8	983.1	975.3	972.9	969.5	973.7	975.6	979.2	979.7	977.7	972.3	1025.1
Deposits SB	2245.4	2239.1	2230.6	2220.5	2205.5	2198.2	2198.0	2185.7	2172.5	2156.7	2138.2	2205.1
M1	378.4	380.6	391.4	392.4	391.8	403.2	406.5	405.8	408.8	394.9	387.6	418.5
M2	3510.7	3508.3	3500.8	3488.7	3469.5	3478.5	3476.9	3466.9	3454.4	3430.2	3401.5	3522.7
1930												
Gold stock NB	146.6	146.6	146.6	146.6	146.6	146.6	146.6	146.5	146.5	146.4	146.4	146.4
Int. reserves NB	184.3	181.2	190.8	199.1	205.4	219.4	195.8	199.6	203.0	214.7	212.4	217.8
Dom. credit NB	248.5	251.2	258.9	258.6	250.3	247.6	244.0	240.9	239.1	240.9	215.9	210.2
Total currency	315.2	314.1	321.8	327.2	325.0	333.9	332.4	332.1	326.9	330.1	320.7	329.8
M0	357.9	357.8	368.8	367.9	370.0	395.7	377.3	375.9	370.9	375.6	359.7	378.8
Deposits CB	1014.9	1011.8	1001.9	997.2	988.9	994.5	1003.1	999.5	993.2	983.7	993.7	1027.9
Deposits SB	2194.9	2192.1	2188.3	2182.5	2181.0	2177.3	2176.1	2166.2	2143.7	2131.9	2123.4	2166.8
M1	395.7	392.4	398.9	404.4	400.5	405.7	413.0	419.0	410.3	409.3	405.4	416.6
M2	3497.6	3491.4	3482.1	3475.4	3465.9	3473.4	3482.5	3468.3	3433.2	3417.3	3409.9	3482.5
1931												
Gold stock NB	146.4	146.4	146.4	146.4	146.4	146.4	146.3	146.3	145.2	171.8	157.9	155.1
Int. reserves NB	202.0	201.1	216.0	210.4	204.0	199.6	197.3	188.8	198.6	195.1	174.2	178.7
Dom. credit NB	201.8	203.7	204.8	206.3	200.5	198.6	201.9	212.3	242.3	254.3	261.6	285.4
Total currency	307.8	304.6	313.3	313.3	308.5	313.4	313.2	311.9	320.1	312.6	306.4	352.8
M0	339.8	346.3	358.3	349.8	344.5	349.0	364.6	359.1	390.2	387.8	383.7	411.5
Deposits CB	1043.3	1038.2	1033.7	1030.8	1029.5	1019.4	1010.9	999.8	979.9	948.3	931.5	950.8
Deposits SB	2166.0	2165.3	2154.8	2146.1	2144.7	2140.0	2134.8	2124.0	2102.4	2093.9	2078.7	2093.9
M1	397.9	394.8	411.1	412.5	409.0	400.2	406.5	396.6	403.7	383.6	374.4	415.9
M2	3487.8	3479.9	3473.3	3461.7	3454.5	3441.0	3432.3	3407.8	3370.1	3327.3	3289.7	3347.1
1932												
Gold stock NB	155.2	155.2	155.3	155.3	155.3	149.8	142.4	142.4	142.4	144.3	144.3	144.2
Int. reserves NB	174.5	173.1	174.6	174.7	168.6	157.5	156.5	155.7	171.9	170.8	168.3	175.5
Dom. credit NB	269.9	264.1	283.6	292.8	295.3	305.3	306.0	299.2	287.0	280.5	280.5	278.4
Total currency	328.9	321.1	328.0	329.9	322.0	335.5	335.2	331.6	328.8	324.0	318.7	332.7
M0	376.5	373.9	389.2	397.5	398.4	406.1	405.6	404.2	408.2	388.7	388.1	402.1
Deposits CB	934.1	938.0	891.5	879.5	877.1	872.9	852.6	852.6	848.7	840.3	829.1	853.9
Deposits SB	2091.6	2085.0	2082.7	2078.9	2073.5	2063.6	2059.9	2052.5	2046.1	2034.3	2027.4	2074.6
M1	407.7	403.6	389.1	395.7	390.2	398.7	401.1	399.3	397.9	388.3	378.5	394.8
M2	3326.8	3317.4	3273.9	3262.5	3246.6	3241.9	3222.8	3210.7	3198.7	3172.2	3148.9	3223.2
1933												
Gold stock NB	144.2	144.2	150.8	150.8	150.8	150.8	150.8	146.4	153.3	148.6	147.6	143.4
Int. reserves NB	181.2	185.1	191.0	190.6	186.8	176.8	171.7	183.0	180.9	161.3	152.1	148.5
Dom. credit NB	268.4	247.5	240.0	243.8	254.0	258.9	254.3	246.1	245.3	275.0	283.1	301.1
Total currency	312.8	309.8	318.4	320.2	313.3	326.3	324.2	322.2	322.9	326.0	328.0	346.3
M0	382.5	373.2	383.7	375.5	365.2	370.2	366.5	378.4	373.4	370.7	369.3	400.0
Deposits CB	851.4	863.0	865.5	856.0	850.9	839.2	834.3	841.0	835.1	808.2	790.7	803.8
Deposits SB	2079.3	2082.4	2081.4	2075.9	2066.1	2054.1	2050.2	2044.9	2021.8	2001.5	1987.4	2011.9
M1	381.9	382.6	392.3	388.2	380.5	391.0	391.8	388.8	387.2	384.3	384.5	388.7
M2	3214.5	3228.2	3239.2	3224.0	3201.9	3192.4	3182.7	3180.4	3152.8	3108.4	3080.7	3121.0
1934												
Gold stock NB	140.2	134.7	143.7	134.8	143.8	134.8	134.8	134.8	134.8	134.8	134.9	134.9
Int. reserves NB	142.4	144.6	155.5	145.4	151.2	140.7	141.5	142.5	166.3	169.7	172.8	175.6
Dom. credit NB	296.7	293.5	305.2	308.7	303.5	313.4	306.8	304.6	280.8	283.8	285.2	294.3
Total currency	330.4	331.6	348.5	340.5	332.5	344.1	342.2	340.2	340.7	335.1	334.5	352.8

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	375.5	378.4	391.2	382.7	378.0	398.2	391.4	393.7	391.1	390.5	396.9	422.9
Deposits CB	795.9	793.6	782.5	779.4	785.5	773.6	766.1	769.5	771.1	765.4	759.0	799.3
Deposits SB	2004.2	1993.5	1987.0	1981.2	1966.6	1943.4	1944.8	1936.1	1928.5	1917.3	1901.7	1940.9
M1	382.1	388.8	403.0	401.7	395.3	401.3	399.3	403.3	399.8	395.8	393.5	406.6
M2	3101.1	3092.2	3092.4	3074.8	3057.6	3034.3	3026.3	3023.8	3014.5	2991.6	2970.3	3047.4
1935												
Gold stock NB	134.9	134.9	134.9	135.2	145.2	165.1	165.1	185.1	185.1	185.1	185.1	185.1
Int. reserves NB	178.4	181.5	186.1	196.9	200.1	213.2	217.2	217.6	221.5	228.7	229.2	231.6
Dom. credit NB	268.6	256.7	262.0	248.2	239.6	235.6	229.1	226.7	219.7	229.9	230.9	250.7
Total currency	331.9	330.7	341.7	340.8	340.9	351.3	349.8	350.4	351.1	349.3	351.3	368.9
M0	389.7	386.9	394.9	399.3	387.0	393.4	401.7	407.9	400.5	402.8	399.3	425.6
Deposits CB	803.3	810.0	805.4	831.4	826.0	834.9	832.4	835.6	850.7	837.5	836.4	864.2
Deposits SB	1944.5	1947.5	1948.7	1952.5	1944.7	1935.5	1941.6	1936.9	1929.7	1926.3	1922.0	1948.2
M1	392.9	392.1	401.7	410.3	406.1	420.9	419.9	424.9	432.6	431.5	429.1	442.4
M2	3048.4	3060.1	3066.5	3093.1	3084.1	3091.9	3094.2	3096.2	3101.6	3085.9	3077.3	3135.6
1936												
Gold stock NB	185.1	185.1	185.1	185.2	185.2	195.1	195.1	200.1	215.1	215.1	215.1	215.1
Int. reserves NB	232.3	236.1	241.5	268.6	264.1	267.9	285.3	285.1	285.7	297.1	304.5	321.2
Dom. credit NB	230.9	234.3	234.1	225.9	223.1	224.0	257.3	254.7	252.6	253.9	250.5	265.3
Total currency	359.8	366.8	377.1	384.0	386.4	396.8	403.3	408.3	411.9	431.2	428.6	451.4
M0	394.3	407.5	420.8	421.8	419.4	444.0	441.5	446.3	459.1	470.1	461.2	507.7
Deposits CB	850.8	851.8	849.8	854.9	851.7	856.7	823.1	823.4	829.2	823.5	818.6	840.0
Deposits SB	1942.4	1933.8	1926.5	1924.5	1913.9	1893.5	1874.6	1860.6	1850.3	1827.8	1818.2	1843.9
M1	440.6	450.9	457.9	467.7	473.1	479.3	482.3	490.3	496.2	525.1	516.5	532.1
M2	3122.1	3122.4	3123.3	3134.0	3122.3	3111.5	3072.7	3063.7	3058.9	3049.3	3030.7	3087.9
1937												
Gold stock NB	215.1	215.1	215.1	215.1	194.8	194.8	189.2	189.2	189.2	188.6	189.2	180.2
Int. reserves NB	323.4	308.2	314.8	317.9	318.8	323.6	342.2	354.7	378.4	389.8	402.3	413.3
Dom. credit NB	224.6	229.0	226.9	254.1	238.5	236.3	224.0	205.1	193.4	173.3	184.6	189.6
Total currency	423.8	421.4	431.9	433.8	425.5	437.3	446.7	445.3	446.9	448.6	445.8	473.5
M0	459.9	457.3	475.5	494.5	472.9	493.2	496.1	494.2	505.1	491.0	490.8	535.2
Deposits CB	854.6	870.5	880.9	868.0	892.3	903.0	911.5	922.2	942.5	939.8	940.4	939.3
Deposits SB	1849.3	1849.1	1842.9	1845.0	1836.9	1829.7	1836.5	1829.4	1824.3	1832.6	1832.8	1869.5
M1	519.1	524.7	531.6	530.1	537.0	540.9	559.4	569.3	575.1	568.6	564.2	561.6
M2	3093.5	3110.4	3119.0	3114.0	3121.6	3132.3	3161.4	3163.6	3176.4	3185.7	3183.9	3233.2
1938												
Gold stock NB	180.2	178.9	198.7	198.7	198.7	198.7	221.6	221.6	210.5	210.5	210.5	206.3
Int. reserves NB	417.5	419.7	433.5	453.9	470.5	433.6	431.8	421.0	429.7	429.8	427.3	423.1
Dom. credit NB	106.2	104.6	104.5	106.8	108.4	115.3	136.1	131.8	135.1	126.4	123.1	137.9
Total currency	445.2	441.7	453.2	467.1	459.6	469.5	480.5	477.4	495.5	481.2	473.7	503.2
M0	507.7	518.2	535.9	544.4	568.3	582.3	576.1	572.7	596.4	596.3	571.9	596.0
Deposits CB	987.0	1004.7	1003.8	1016.7	1006.2	1014.0	1015.0	1033.1	1046.7	1047.6	1017.7	1010.9
Deposits SB	1886.7	1897.8	1903.9	1916.7	1918.5	1914.5	1926.5	1931.6	1919.8	1927.9	1922.9	1946.5
M1	554.6	556.5	567.0	584.1	563.5	575.3	593.0	596.4	631.6	610.7	599.5	594.1
M2	3280.7	3307.3	3323.6	3361.7	3345.5	3357.2	3387.3	3404.2	3422.0	3415.6	3376.9	3409.0
1939												
Gold stock NB	210.5	210.5	210.5	236.4	236.4	236.4	236.4	236.4	236.5	226.6	226.6	206.7
Int. reserves NB	402.7	400.2	410.0	403.2	400.4	393.1	387.0	364.5	314.5	306.1	318.4	305.5
Dom. credit NB	128.4	130.2	145.0	168.7	179.1	178.7	188.0	217.1	292.2	303.5	310.8	343.1
Total currency	470.8	464.1	484.8	491.0	482.6	500.0	505.7	531.1	564.4	560.7	555.7	602.4

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	574.1	581.1	593.9	612.3	594.0	621.1	644.6	639.9	645.3	637.1	645.8	690.4
Deposits CB	1025.9	1035.5	1026.8	1025.4	1011.8	1012.2	988.9	983.9	966.3	980.8	997.3	984.3
Deposits SB	1974.3	1977.2	1971.0	1974.2	1966.9	1967.5	1985.8	1970.2	1916.7	1898.8	1885.5	1898.3
M1	582.4	585.5	609.2	623.2	607.9	631.1	628.5	655.8	705.0	707.1	718.0	723.5
M2	3428.9	3438.4	3446.9	3453.2	3419.5	3439.7	3443.1	3444.7	3409.0	3400.6	3399.8	3429.5
1940												
Int. reserves NB	288	284	287									
Dom. credit NB	443	437	447	514	527	476	403	333	251	210	196	175
War credit NB	0	0	0	0	0	250	381	580	797	1003	1246	1350
Total currency	548	565	582	709	778	809	808	842	874	931	956	999
M0	627	659	685	814	915	931	1002	1104	1108	1274	1449	1507
M1	790	805	842	962	1078	1163	1275	1374	1465	1588	1670	1729
M2	3490	3515	3580	3629	3654	3674	3716	3789	3851	3979	4072	4205
1941												
Dom. credit NB	171	163	149	146	135	130	124	122	124	122	119	116
War credit NB	1511	1658	1838	1959	2176	2345	2585	2716	2934	3175	3445	3574
Total currency	1002	1025	1058	1069	1123	1165	1215	1261	1297	1359	1413	1497
M0	1655	1780	1903	2082	2075	2101	2318	2441	2562	2469	2626	2277
M1	1768	1826	1934	2018	2113	2174	2277	2356	2421	2553	2650	2692
M2	4280	4363	4452	4542	4668	4737	4864	4953	5015	5170	5288	5352
1942												
Dom. credit NB	111	110	109	109	107	104	100	100	100	100	98	100
War credit NB	3350	3544	3724	3868	4051	4256	4478	4664	4889	4433	4657	4858
Total currency	1501	1532	1625	1656	1703	1749	1834	1882	1909	1982	2010	2121
M0	2234	2298	2357	2284	2476	2622	2696	2689	2789	2895	2804	2973
M1	2779	2885	2982	3009	3091	3181	3263	3356	3371	3508	3550	3630
M2	5479	5600	5706	5755	5868	5995	6117	6233	6263	6415	6475	6612
1943												
Dom. credit NB	97	95	96	97	95	116	91	92	91	91	91	90
War credit NB	4974	5125	5317	5529	5704	5277	5511	5701	5912	6125	6322	6534
Total currency	2080	2102	2133	2186	2213	2226	2343	2382	2396	2443	2456	2556
M0	2967	2939	2935	3016	3066	2956	3235	3449	3655	3776	3816	3909
M1	3607	3671	3780	3895	3933	3914	4054	4169	4202	4274	4347	4434
M2	6653	6759	6904	7045	7120	7123	7318	7461	7516	7620	7715	7845
1944												
Dom. credit NB	88	88	89	89	89	88	86	86	86	88	86	95
War credit NB	6738	6894	7081	7273	8466	7624	7822	6985	7170	7348	7546	7740
Total currency	2505	2497	2570	2594	2639	2708	2750	2806	2840	2848	2877	2999
M0	3906	3595	3580	3592	3690	3922	3831	3937	4120	4103	4168	4415
M1	4471	4367	4464	4533	4644	4796	4827	4905	4974	5047	5093	4994
M2	7938	8009	8162	8264	8421	8601	8672	8787	8902	9009	9074	8979
1945												
Int. reserves NB												452
Dom. credit NB	84	83	83	81	80	80	79	17	19	19	25	29
War credit NB	7916	8052	8191	8336	8343	8343	8163	8163	8163	8163	8163	8163
Total currency	2922	2915	2959	2987	2883	2573	2160	1531	976	1126	1283	1448
M0	4381	4097	4147	4234	4413	4174	3731	3095	2456	2430	2265	2491
M1	5256	5247	5305	5436	5376	5132	4875	4618	3245	3408	3517	3636
M2	9337	9368	9479	9649	9644	9545	9524	9437	8057	8130	8154	8267
1946												

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Int. reserves NB	499	520	547	547	549	535	589	529	544	615	546	1158
Dom. credit NB	20	22	30	34	64	42	35	31	23	27	64	165
War credit NB	8163	8163	8163	8163	8163	8163	8163	8108	8108	8108	8108	8108
Total currency	1406	1418	1492	1521	1563	1635	1656	1710	1734	1775	1794	1873
M0	2501	2673	2710	2829	2509	2587	2887	2854	2951	2922	2842	3117
M1	3655	3746	3889	4073	4099	4227	4338	4383	4417	4456	4383	4317
M2	8320	8424	8571	8772	8815	8970	9093	9134	9182	9223	9130	9014
1947												
Int. reserves NB	1174	1089	955	958	862	806	743	866	928	936	911	755
Dom. credit NB	146	135	134	125	202	195	181	160	146	141	157	167
War credit NB	8108	8108	8108	8108	8108	8108	8108	8103	8103	8103	8103	8094
Total currency	1804	1794	1829	1821	1816	1856	1879	1920	1894	1932	1940	2045
M0	2928	2988	3084	3194	3311	3393	3425	3670	3728	3711	3654	3834
M1	4411	4444	4569	4643	4710	4738	4818	5052	5083	5053	5060	4877
M2	9241	9323	9502	9592	9679	9707	9831	10092	10145	10111	10092	9928
1948												
Int. reserves NB	789	806	798	758	795	794	760	772	707	563	605	591
Dom. credit NB	148	106	176	171	174	170	137	114	94	97	105	126
Total currency	1946	1918	1920	1923	1918	1955	2014	2026	2023	2014	1999	2133
M0	3817	3886	3778	3803	3598	3629	3661	3650	3612	3483	3356	3296
M1	5110	5182	5143	5208	5251	5314	5303	5268	5337	5268	5221	4974
M2	10268	10380	10363	10448	10522	10609	10644	10646	10697	10622	10572	10381
1949												
Int. reserves NB	610	614	595	612	554	523	524	520	555	562	503	475
Dom. credit NB	111	127	136	127	135	129	119	88	87	93	96	130
Total currency	1991	1966	1986	1996	2002	2062	2125	2133	2134	2126	2112	2253
M0	3317	3287	3203	3194	3254	3252	3517	3815	3813	3827	3783	3893
M1	5081	5010	5030	5030	5069	5078	5100	5075	5098	5116	5061	4940
M2	10604	10593	10652	10672	10747	10781	10855	10871	10884	10894	10830	10736
1950												
Int. reserves NB	535	563	599	642	600	580	638	641	707	694	674	683
Dom. credit NB	124	84	83	85	87	84	82	79	78	81	81	90
Total currency	2112	2104	2171	2141	2103	2182	2213	2221	2189	2165	2180	2310
M0	3865	3924	3909	3882	3888	3956	3972	3945	3791	3647	3450	3383
M1	5074	5106	5111	5166	5137	5161	5152	5120	5099	5055	4990	4814
M2	10980	11064	11107	11173	11153	11222	11264	11241	11205	11148	11045	10864
1951												
Int. reserves NB	664	681	763	750	836	839	885	912	951	969	904	922
Dom. credit NB	87	89	93	96	104	105	95	93	90	87	85	94
Total currency	2175	2170	2196	2209	2196	2276	2316	2379	2382	2376	2407	2528
M0	3224	3167	3514	3529	3514	3689	3809	3931	3888	3879	3873	3928
M1	4934	4953	4923	5080	5156	5197	5252	5285	5681	5726	5645	5354
M2	11058	11096	11076	11254	11336	11437	11520	11603	12098	12170	12155	11974
1952												
Int. reserves NB	942	951	951	949	985	959	952	937	963	991	929	954
Dom. credit NB	93	90	95	102	107	100	94	92	89	86	88	103
Total currency	2615	2605	2645	2677	2661	2767	2821	2851	2841	2838	2846	3009
M0	4181	4142	4051	4066	4026	4256	4420	4085	3890	3936	3861	4037
M1	5579	5655	5622	5734	5767	5878	6027	5936	5886	5941	5857	5640
M2	12321	12447	12504	12683	12730	12868	13039	13009	12964	13037	12950	12781

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1953												
Int. reserves NB	946	943	945	914	895	887	931	940	981	955	908	843
Dom. credit NB	95	97	104	105	108	104	102	97	103	107	109	201
Total currency	2831	2803	2865	2847	2836	2956	3015	3007	2990	3010	3033	3225
M0	3921	3764	3695	3727	3658	3865	4049	3998	3904	3894	3889	4166
M1	5864	5818	5781	5874	5841	5965	6066	6024	6064	6122	6074	5837
M2	13118	13133	13188	13301	13287	13430	13606	13614	13659	13716	13662	13445
1954												
Int. reserves NB	826	817	869	886	968	1002	907	933	897	876	817	739
Dom. credit NB	102	99	98	97	101	93	86	78	76	75	74	92
Total currency	3047	3023	3047	3063	3035	3174	3219	3216	3197	3222	3233	3421
M0	4093	3893	3847	3902	3758	3876	4080	4122	3983	4075	3948	4139
M1	6041	6036	6025	6190	6218	6398	6409	6414	6394	6402	6337	6070
M2	13798	13846	13938	14127	14170	14366	14455	14501	14495	14497	14412	14175
1955												
Int. reserves NB	673	616	596	725	789	865	813	919	985	1003	982	987
Dom. credit NB	83	99	143	141	185	208	206	152	157	171	212	213
Total currency	3232	3186	3227	3198	3169	3267	3284	3268	3257	3262	3244	3409
M0	3922	3959	3975	3785	3755	3849	3908	3877	3800	3834	3909	4230
M1	6162	6170	6020	6014	5944	5922	5884	5903	5908	5926	5867	5988
M2	14432	14600	14528	14520	14450	14480	14480	14549	14530	14525	14467	14701
1956												
Int. reserves NB	965	962	950	950	960	978	935	974	1007	1036	1051	1065
Dom. credit NB	211	214	222	221	245	218	197	192	193	192	185	222
Total currency	3210	3181	3253	3200	3167	3324	3327	3233	3261	3270	3313	3613
M0	4063	3867	3802	3833	3824	4013	4129	4011	3881	3875	3992	4493
M1	5811	5849	5832	5861	5856	5907	6031	6030	5942	5949	5973	6097
M2	14615	14713	14765	14834	14826	14896	15097	15102	15094	15137	15133	15476
1957												
Int. reserves NB	1104	1029	1139	1139	1125	1100	1222	1099	1120	1098	1078	1127
Dom. credit NB	217	209	212	208	212	193	200	193	180	186	189	183
Total currency	3367	3328	3317	3340	3271	3394	3398	3361	3349	3388	3385	3583
M0	4361	4273	4259	4317	4167	4159	4385	4591	4347	4423	4136	4532
M1	6088	6169	6046	6362	6180	6375	6296	6364	6032	6297	6127	6262
M2	15551	15688	15566	15948	15755	15946	15917	16046	15653	15954	15775	16137
1958												
Int. reserves NB	1053	1081	1196	1209	1198	1182	1260	1185	1281	1393	1421	1525
Dom. credit NB	175	192	253	307	320	304	312	300	288	287	283	295
Total currency	3346	3309	3342	3341	3275	3396	3404	3395	3375	3411	3418	3628
M0	4296	4403	4372	4351	4126	4119	4286	4442	4304	4374	4149	4604
M1	6173	6198	5873	6081	6092	6352	6243	6336	6235	6382	6238	6601
M2	16125	16225	15872	16103	16106	16358	16265	16370	16091	16309	16158	16698
1959												
Int. reserves NB	1407	1407	1414	1433	1495	1495	1501	1479	1524	1543	1593	1701
Dom. credit NB	280	277	284	286	346	338	288	280	315	281	279	289
Total currency	3401	3397	3465	3483	3439	3547	3557	3553	3580	3603	3593	3793
M0	4267	4291	4302	4374	4171	4283	4298	4469	4451	4401	4252	4758
M1	6177	6258	6263	6486	6362	6676	6539	6740	6434	6696	6581	6946
M2	16378	16557	16567	16828	16708	16988	16916	17147	16879	17198	17042	17589
1960												

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Int. reserves NB	1632	1701	1748	1769	1880	1796	1753	1736	1801	1731	1836	1918
Dom. credit NB	295	294	338	290	310	276	269	272	269	255	250	260
Total currency	3578	3542	3574	3603	3554	3728	3730	3719	3755	3736	3766	3948
M0	4369	4367	4319	4360	4280	4413	4466	4653	4618	4656	4443	4958
M1	6516	6590	6379	6605	6427	6772	6648	6788	6685	6885	6919	7222
M2	17026	17208	17075	17360	17129	17512	17471	17653	17565	17884	17943	18444
1961												
Int. reserves NB	1776	1750	1806	1758	1896	1824	1857	1789	1833	1759	1807	1871
Dom. credit NB	256	240	304	270	282	341	385	333	293	287	311	306
Total currency	3719	3686	3751	3743	3684	3869	3873	3870	3927	3907	3935	4174
M0	4513	4405	4540	4420	4531	4479	4709	4483	4624	4531	4862	5172
M1	6725	6766	6612	6877	6692	6977	6852	6906	6834	7034	6903	7506
M2	18145	18356	18244	18549	18312	18626	18579	18634	18536	18743	18588	19471
1962												
Int. reserves NB	1656	1605	1613	1599	1587	1516	1588	1664	1656	1636	1762	1862
Dom. credit NB	305	306	328	338	349	410	405	363	322	305	353	310
Total currency	3952	3918	3969	3978	3965	4156	4164	4161	4210	4163	4199	4437
M0	4769	4680	4779	4739	4819	4807	4964	4861	4928	4885	5125	5350
M1	6942	6981	6742	7216	6990	7283	7217	7360	7252	7544	7345	7859
M2	19258	19395	19234	19804	19553	19846	19861	20041	19965	20329	20086	20926
1963												
Int. reserves NB	1766	1869	2033	2065	2246	2228	2284	2243	2167	2113	2106	2231
Dom. credit NB	284	296	375	350	441	378	405	346	356	314	377	339
Total currency	4204	4157	4186	4153	4152	4371	4367	4349	4421	4387	4423	4675
M0	5033	4921	4956	4963	5016	5102	5154	5027	5170	5035	5272	5739
M1	7301	7338	7170	7453	7286	7583	7473	7660	7570	7786	7687	8274
M2	20501	20622	20529	20831	20715	21034	20993	21247	21163	21461	21376	22260
1964												
Int. reserves NB	1998	1974	2057	2095	2370	2342	2414	2387	2422	2401	2361	2491
Dom. credit NB	297	335	395	418	441	475	480	387	413	336	424	402
Total currency	4442	4381	4450	4405	4419	4659	4701	4690	4753	4724	4745	4973
M0	5334	5275	5376	5394	5496	5598	5665	5463	5574	5376	5630	5975
M1	7780	7736	7729	7872	7830	8052	8078	8226	8262	8366	8265	8773
M2	21992	22074	22186	22463	22454	22663	22757	22938	23020	23346	23209	23975
1965												
Int. reserves NB	2121	2200	2530	2487	2632	2757	2756	2632	2596	2665	2769	3138
Dom. credit NB	374	443	515	537	555	568	553	482	460	395	441	298
Total currency	4755	4677	4701	4717	4742	5054	5019	5040	5106	5094	5092	5355
M0	5549	5536	5597	5566	5668	5944	6148	6008	5919	5788	6137	6511
M1	8551	8570	8416	8662	8523	9013	8949	9158	9041	9210	9192	9873
M2	23939	24167	24055	24300	24280	24846	24867	25209	25127	25392	25269	26445
1966												
Int. reserves NB	2593	2735	2994	3188	3149	3199	3303	3165	3165	3133	3196	3416
Dom. credit NB	315	451	505	423	514	500	577	548	505	504	590	434
Total currency	5095	5037	5088	5045	5081	5423	5416	5389	5516	5469	5481	5753
M0	5925	6084	6252	5979	6246	6157	6433	6315	6417	6380	6706	6920
M1	9387	9376	9014	9208	9267	9655	9436	9733	9802	10079	9848	10542
M2	26284	26520	26100	26376	26484	26881	26893	27387	27387	27683	27401	28632
1967												
Int. reserves NB	2938	3064	3368	3587	3758	3945	4019	4143	4050	3927	3926	4425

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dom. credit NB	529	540	542	669	709	690	613	561	593	511	728	555
Total currency	5470	5381	5427	5444	5450	5925	5844	5786	5951	5865	5872	6184
M0	6547	6605	6851	6965	7205	6961	7241	7003	6874	6541	6945	7086
M1	9831	10124	9831	9862	9826	10437	10125	10298	10372	10655	10643	11287
M2	28236	28736	28474	28664	28712	29477	29336	29769	29943	30321	30229	31171
1968												
Int. reserves NB	3861	3886	4241	4445	4398	4398	4514	4662	4390	4150	4064	4461
Dom. credit NB	521	679	676	605	815	1073	675	572	639	502	718	441
Total currency	5860	5763	5778	5747	5845	6427	6102	6098	6252	6214	6227	6538
M0	6794	6504	6903	6735	7047	7400	7358	7160	7235	6908	7204	7553
M1	10804	10623	10462	10935	10779	11289	11221	11471	11501	11828	11467	12913
M2	30839	30945	30840	31504	31371	31983	32126	32487	32734	33319	32935	34651
1969												
Int. reserves NB	3617	3751	3978	4008	4485	4643	4559	4602	4234	4255	4474	5072
Dom. credit NB	533	694	770	792	863	1081	1131	1031	1397	961	849	738
Total currency	6212	6124	6240	6156	6165	6661	6538	6559	6736	6615	6603	6947
M0	6993	7104	7069	6938	7248	7222	7570	7369	7654	7283	7529	8095
M1	12214	12320	12001	12429	12092	13013	12690	12899	13584	13406	13120	14157
M2	34576	34916	34651	35242	34898	35943	35686	36064	36780	36803	36366	37772
1970												
Int. reserves NB	4439	4861	4869	4869	4785	4732	4776	5204	5039	5217	5005	5792
Dom. credit NB	1162	1050	1113	1098	1032	1619	1040	1217	871	1241	1298	1383
Total currency	6682	6624	6689	6689	6759	7098	7164	7172	7300	7305	7340	7689
M0	7480	7485	7359	7316	7852	7874	7796	7676	8065	8042	8237	8253
M1	13627	13607	13609	13907	13974	15008	14688	14653	14948	15109	15343	15838
M2	37588	37843	38210	38769	39020	40225	40301	40488	41029	41465	41506	43193
1971												
Int. reserves NB	5448	5303	6229	6334	6630	6842	7256	8024	8002	7949	7891	7672
Dom. credit NB	1336	1703	1056	1494	1020	1459	1026	1113	1058	1073	1174	1122
Total currency	7434	7340	7294	7340	7501	7810	7822	7691	7714	8017	8071	8423
M0	8475	8012	8422	7881	8420	8507	8943	8471	8684	8693	9286	9294
M1	15869	15665	15414	15959	15672	16859	16480	16632	16230	16806	17042	17210
M2	44586	43969	43842	44727	44415	45786	45642	46139	45711	47001	47007	48209
1972												
Int. reserves NB	7955	7844	8035	8054	8116	8562	9244	9254	8984	8778	8794	8804
Dom. credit NB	951	1145	1215	1619	1807	1344	984	1129	1100	1527	1698	1946
Total currency	8106	7973	7995	8039	8085	8462	8457	8356	8642	8607	8598	9180
M0	9348	8547	8810	8470	9161	9277	9723	9116	9345	9118	9670	10024
M1	17147	17098	16763	17493	17073	18043	18061	17860	18087	18274	18408	19513
M2	48895	49320	49091	50058	49556	50771	51140	51293	51141	51757	51394	53885
1973												
Int. reserves NB	8831	8194	8185	8774	9369	9460	9693	9580	9441	9051	9410	8971
Dom. credit NB	1149	1477	1454	1986	1739	2175	1467	2029	2401	2456	2017	2568
Total currency	8725	8650	8611	8685	8786	9206	9116	9059	9408	9309	9350	9943
M0	9624	9323	9403	9397	10035	9951	10241	9850	10327	10005	10405	10833
M1	18896	19131	18640	19513	19018	20232	20036	19740	20188	20240	20263	21985
M2	54044	54927	54363	55983	55431	57356	57402	57363	57366	57720	57280	60345
1974												
Int. reserves NB	10009	10374	10185	9635	9425	9265	9349	9716	10647	12016	11748	9976
Dom. credit NB	1028	1823	2411	4157	4364	4831	3394	4042	2749	1760	2267	3167

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total currency	9548	9478	9449	9482	9622	10149	10056	10139	10579	10540	10638	11314
M0	10803	10377	10544	10424	10712	11167	11368	11215	12290	11621	12510	12291
M1	21411	21534	20824	21325	21108	22661	22307	22367	22835	23985	23583	24919
M2	60778	61703	60539	61664	60968	62917	62859	63346	63714	65402	64170	66994
1975												
Int. reserves NB	9461	8859	8898	9560	9850	10781	11929	11858	11320	11023	11419	12495
Dom. credit NB	2629	3464	3504	3492	2933	3153	1950	2089	4530	4091	5540	4025
Total currency	11018	10973	11058	10908	11031	11767	11580	11752	12114	12184	12254	12969
M0	12542	11931	12423	11955	13242	13134	13682	13006	13863	13204	14145	14603
M1	24035	24550	23835	24205	24056	26619	26033	26244	27179	27651	27273	28539
M2	67394	68568	67944	68282	68185	71646	71842	72797	73378	74884	73688	76748
1976												
Int. reserves NB	11661	12556	11774	12215	12364	12724	13165	12142	12180	11590	11811	11586
Dom. credit NB	4251	4780	6092	4852	4599	3527	3571	5493	5205	3980	6394	5870
Total currency	12713	12589	12445	12869	13074	13447	13510	13212	13904	14389	14095	14850
M0	14641	13805	13999	14343	14412	14771	14772	14600	15147	15813	15720	16335
M1	29584	29478	28828	29643	29309	31823	31423	30853	31331	33079	31966	33427
M2	78716	79285	78747	80615	80261	83439	84013	84282	84018	87040	85304	90209
1977												
Int. reserves NB	10167	11019	11081	12091	12968	14548	14263	14604	14763	14000	11085	11332
Dom. credit NB	6057	7084	6845	6528	9349	6668	7774	5733	5373	5679	10487	13409
Total currency	14540	14394	14389	14399	14497	15205	15083	15066	15871	16031	15870	16725
M0	16082	15659	15602	15750	15964	16613	16781	16427	17034	17330	16980	17783
M1	34747	33478	35475	34243	33449	36689	35942	35744	36275	37961	36524	38420
M2	92468	92516	94390	94501	93310	97888	98465	99654	99924	103426	100177	105782
1978												
Int. reserves NB	11432	10139	11956	13624	15429	16052	16502	15924	14774	13904	12761	14453
Dom. credit NB	12047	12941	10733	9859	10466	8218	4917	6175	8479	11880	10779	10436
Total currency	16193	15979	15430	15467	15480	16118	16056	16021	16887	17041	16875	17756
M0	18064	17311	16907	16453	16777	17392	17429	17190	19072	18429	18613	19125
M1	38935	36803	38024	36356	37049	39039	38919	38203	38316	40692	39760	41343
M2	107471	106319	107098	106870	107645	109625	110360	110859	111000	114029	112374	117791
1979												
Int. reserves NB	15840	16916	18665	18962	20220	19924	19812	20254	21276	22003	21932	20888
Dom. credit NB	9219	10396	8144	7910	9137	7700	6869	9072	8726	9643	11695	11297
Total currency	17154	16930	16837	16841	16743	17567	17359	17294	18492	17968	17817	18620
M0	19149	18204	17880	20073	18946	18957	19482	18701	20782	20278	19898	20988
M1	41495	39894	40510	40955	39566	43314	43096	42464	44865	44370	43567	44108
M2	119802	119537	119578	121602	119360	123918	124978	124977	127073	129168	127136	133402
1980												
Int. reserves NB	21053	21169	22657	23578	24481	24544	23550	23697	25207	31255	30979	31315
Dom. credit NB	6776	9687	9467	9388	6197	6113	9372	10054	10326	4894	6109	5804
Total currency	17982	17655	17627	17358	17638	18111	18069	18243	19335	19020	18914	19814
M0	19530	19263	19386	19302	19111	20299	20282	19596	21830	22116	20744	22789
M1	45004	42740	44458	43323	44716	46082	46441	46278	48007	49335	47340	46824
M2	135761	134492	135105	134879	135578	138819	139552	141093	142331	144798	142834	151274
1981												
Int. reserves NB	28037	26028	27787	31373	34401	33381	29284	31039	29374	34743	34336	36581
Dom. credit NB	7040	14489	9932	15043	10948	8501	7228	6011	9144	5885	9858	27294
Total currency	19206	18948	18635	18631	18912	19300	19564	19372	20346	20389	20167	21133

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
M0	21541	20723	21277	20402	20495	20403	20895	20675	23228	21726	22475	22686
M2	155471	154065	151830	154377	152212	156997	157895	158679	161717	162693	159439	168045
1982												
Int. reserves NB	35299	34256	35897	38325	42813	39516	39488	39798	40928	42592	43516	48751
Dom. credit NB	5377	8139	4837	13703	9408	6491	9177	7912	9098	13862	6772	9048
Total currency	20475	20084	19989	19999	20042	20455	20626	20230	21608	21637	21128	22008
M0	21924	22048	22632	21403	21549	22225	21726	22503	24554	23100	24565	24015
M2	172144	169795	172477	171055	170968	174431	175197	174075	177011	177497	173882	185472
1983												
Int. reserves NB	47097	45434	41893	45773	51839	46822	41641	43603	44283	47919	47963	51272
Dom. credit NB	13671	15420	15468	20842	14417	19008	15011	17110	17142	18297	15928	16898
Total currency	21213	21385	20944	20749	20766	21279	21241	20869	22376	22457	21902	23014
M0	23144	23627	22795	22567	22205	22523	22100	21782	24018	23520	24395	25026
M2	187258	188958	187401	185374	183686	189668	193250	190698	192311	194769	191288	203460
1984												
Int. reserves NB	52636	53541	51289	62521	59820	64571	62804	65281	66887	72742	76532	85534
Dom. credit NB	12765	16082	17698	12350	12683	11965	12470	13824	12934	14965	10154	10352
Total currency	22095	22026	21716	21653	21842	22364	22103	21824	23655	23345	23044	24534
M0	24774	23787	23143	23084	23848	23596	23977	23612	26274	24613	25254	28822
M2	206676	208670	209213	209581	206709	213603	215342	214939	222779	225137	223622	244765
1985												
Int. reserves NB	85793	92530	91965	103085	104380	105640	106392	109405	109951	111677	107483	113807
Dom. credit NB	9994	22711	18818	20921	22324	18310	22499	24074	14937	24783	24507	24209
Total currency	23656	23705	23552	23178	23280	24024	23856	23659	25160	26065	25409	27196
M0	25500	25657	25537	24534	25710	26218	25513	25119	27678	28360	27049	31079
M2	243068	243962	246798	240747	239656	247923	249870	251247	256820	259107	256587	278449
1986												
Int. reserves NB	111142	101820	104568	99195	100949	110489	110928	111555	111997	103481	98992	95874
Dom. credit NB	43697	49746	49400	80944	124203	109515	116768	89076	86476	107001	101783	118976
Total currency	25782	25415	25729	25264	25358	26276	25815	25709	27003	27953	27042	28980
M0	28548	27725	28313	27005	27663	29490	28410	27536	29332	29981	29588	30713
M2	274876	273973	272675	267831	264255	272867	268965	268808	268234	276545	271796	284127
1987												
Int. reserves NB	93730	92548	92134	95445	91185	92630	95557	98163	101457	104353	99855	91317
Dom. credit NB	109129	125995	104079	119458	117220	116711	97679	96982	76252	82059	78652	101666
Total currency	27400	27192	26596	26785	26793	27383	27273	26948	28449	29456	28597	30832
M0	30326	36508	30209	30492	31309	31814	32596	33605	31656	32764	34674	33244
M2	286128	293441	288895	291404	279809	294553	295701	297311	298528	315012	314589	328606
1988												
Int. reserves NB	89545	89561	92931	93513	98450	98455	96613	94688	95593	95636	86677	89279
Dom. credit NB	87835	101046	83857	100104	91286	95168	83001	96312	84731	90954	89030	98594
Total currency	29006	28266	28263	27723	27770	28733	28276	27642	28821	29889	28631	30938
M0	36456	34235	34259	31987	30947	31611	32494	30583	33154	36588	32837	32434
M2	345753	345788	346005	342753	334667	345927	337153	334148	337243	344642	327110	345081
1989												
Int. reserves NB	93386	94444	92759	94157	96497	94619	94237	94213	96577	94972	92100	93380
Dom. credit NB	81771	87243	80367	90254	80362	89331	80086	88247	75106	76529	73188	95197
Total currency	29054	28855	28522	28209	28239	29231	28663	28535	30083	29744	29489	31606
M0	36642	34010	39966	31837	37074	32083	32712	34923	36882	36405	33408	34206
M2	351401	353228	348937	351708	351902	361023	355362	362935	360431	368914	363739	374771

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1990												
Int. reserves NB	88314	82097	91217	78135	82508	86960	84690	88992	88893	90419	93626	92326
Dom. credit NB	81321	91330	85146	97807	96653	85487	84824	74596	78097	68913	74821	82044
Total currency	29345	29238	28646	28620	28538	29647	28878	28614	31084	29296	29588	32682
M0	32049	32100	33278	32277	32297	36413	29445	29338	32899	29917	31553	33768
M2	378619	385295	380828	378683	373155	389588	380355	384949	386322	387303	379245	395097
1991												
Int. reserves NB	91536	92404	94837	96976	95559	91278	98892	94903	89646	89831	86133	80412
Dom. credit NB	73710	77461	85972	82942	90882	84670	80166	72959	73643	65512	74568	76828
Total currency	30681	30380	30255	29390	29205	30335	29480	29438	32376	30481	30899	34291
M0	31187	31180	32391	29870	30908	31330	30095	31818	33963	31079	33031	35589
M2	401633	409044	403016	399183	390402	400340	394124	399207	428314	423440	420932	442720
1992												
Int. reserves NB	84501	89538	88882	93995	95818	99475	99668	95867	88098	107403	87304	84496
Dom. credit NB	75639	79228	74982	79683	81794	60433	55230	54846	63392	43769	77117	69111
Total currency	32167	31886	31057	30985	31157	32083	31467	31552	33888	31731	32018	34689
M0	33499	37493	33807	31647	32345	33636	32371	32727	37269	33609	32901	36992
M2	444715	455266	434777	437158	433506	441871	437692	447440	449458	455580	450987	479220
1993												
Int. reserves NB	100526	101796	110572	121169	136739	146733	149172	146798	142357	149104	152395	150023
Dom. credit NB	55267	47066	49178	45070	59417	46214	43107	43617	53777	42602	61585	48327
Total currency	33223	32809	31889	31711	32033	33707	32917	32979	34751	33517	34287	38003
M0	35121	36600	33730	33443	33111	35751	39052	34434	36696	36026	41554	39896
M2	475546	480224	466587	468447	461528	478119	468545	474503	473023	474736	465186	476016
1994												
Int. reserves NB	155167	158789	154241	154619	151766	146901	141695	143883	143074	143622	141057	141521
Dom. credit NB	30386	19738	22885	17820	22388	19676	19512	18397	19792	18248	31130	20153
Total currency	36679	36318	36134	35400	35567	38029	36987	36028	39034	36961	37228	40454
M0	43249	46233	44675	42717	42629	54439	44043	51432	46236	43128	41817	42347
M2	482051	486770	487599	484035	481976	501009	491414	495932	501091	498983	493135	501305
1995												
Int. reserves NB	145023	148881	151707	143967	134274	142175	141135	144132	145331	147997	148911	143696
Dom. credit NB	29483	13003	12963	20511	40352	14953	22785	15446	23055	17485	24060	29522
Total currency	38467	37863	37047	37019	36785	39853	38358	37542	40048	37971	38352	42069
M0	47476	50019	45023	41092	40789	44308	42477	40450	42854	43039	39771	43394
M2	503988	515151	509705	513986	509591	528514	522081	530264	529279	535226	525190	530257
1996												
Int. reserves NB	144613	145556	149339	158099	163148	170626	164445	165845	176138	196243	206338	170335
Petroleum fund	0	0	0	0	1981	1985	1996	2014	2023	2027	2035	47539
Dom. credit NB	27665	15169	18094	25865	38898	19115	23936	23398	14615	14314	18554	13723
Total currency	39314	38877	38920	38185	38311	40696	39089	38625	40980	38974	39512	43324
M0	44804	46983	41877	40964	41320	46622	43043	40914	45988	52573	41221	68124
M2	541069	558580	552857	548840	543275	559813	554722	549783	553690	562693	550951	564365
1997												
Int. reserves NB	196622	184429	185856	193891	200441	208369	214023	213814	212309	220223	226819	171368
Petroleum fund	46265	47354	46406	47800	48787	50582	51466	50618	49459	49983	50517	113313
Dom. credit NB	17157	18382	11818	12584	18266	11231	13376	13496	11699	12389	19917	19020
Total currency	40642	40224	40727	39704	39759	41314	40683	40411	41264	40883	41729	46014
M0	48978	49602	62228	43556	44687	71578	57137	59326	63091	54928	50922	60242
M2	564537	562407	555578	551641	551417	574086	571287	572610	583967	585723	575497	578538

Table A2. Monetary aggregates monthly 1850 - 2003

	NOK million											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1998												
Int. reserves NB	180535	184162	189037	192625	187283	182903	178165	185327	170817	166054	146797	142045
Petroleum fund	117050	118308	118310	117793	118432	132650	130772	134096	140272	148414	160116	167644
Dom. credit NB	17871	12425	11868	12789	17271	14561	15573	16788	13947	13534	35136	29587
Total currency	43229	42513	41704	41894	42371	42947	43044	42443	42485	42295	42628	46070
M0	52674	52891	61835	48226	45063	57180	47776	52737	61795	52570	53269	53840
M2	596285	601238	594132	587362	595932	606161	602891	599008	601356	601640	592042	605331
1999												
Int. reserves NB	138083	142332	139157	140121	155215	134383	140592	144833	138246	168048	176204	193589
Petroleum fund	163634	169359	165488	165989	167499	174312	178079	180405	194285	197521	203861	222277
Dom. credit NB	24378	12537	9932	21833	25097	12091	20358	12829	16784	17685	29128	37324
Total currency	43383	42720	42832	41910	42139	43152	43226	42242	42233	42000	42396	48020
M0	47448	53753	53602	51806	49215	54860	50536	46860	50000	51708	47746	81476
M2	623472	621083	620465	614307	614243	645813	650535	648202	645954	664690	649304	670116
2000												
Int. reserves NB	196064	212711	202106	222848	235520	191086	210020	224257	230258	227759	233895	245863
Petroleum fund	220422	225104	264125	270038	268796	304501	309118	317776	356736	361765	390294	386126
Dom. credit NB	23930	14042	12466	20827	23828	13405	14127	14298	14362	13632	28117	36679
Total currency	43682	42492	42178	42645	42601	43936	43269	42648	42390	41872	42678	46952
M0	52674	52191	55857	50808	53879	64891	62529	65888	78271	55028	49733	68700
M2	675887	682965	683541	682146	688074	714548	712375	714063	728225	721248	718654	731841
2001												
Int. reserves NB	229543	245705	246581	255084	247552	223075	223743	229445	246801	222877	211997	211537
Petroleum fund	397484	388005	424747	437873	472261	522675	515709	525394	546672	556317	615819	613317
Dom. credit NB	27726	14613	17320	65374	38427	28214	24132	13255	13565	13930	12641	27658
Total currency	43153	42381	42034	42107	42350	43608	42839	42026	41591	40969	42084	46633
M0	53750	50198	53196	56374	49395	56269	55769	66584	73832	59087	52934	68343
M2	749707	755937	752274	740669	756636	775691	773466	772082	775842	781679	773946	795367
2002												
Int. reserves NB	214753	214991	217013	203528	196249	184983	182675	188972	196165	225813	222331	224123
Petroleum fund	618939	619555	624941	628761	626026	605057	610245	622050	603203	618604	633019	608475
Dom. credit NB	14194	15014	13574	13170	22479	14380	14154	15436	15356	13882	13385	14951
Total currency	42613	41510	42002	40746	40785	41900	40945	40649	40188	40024	40783	44955
M0	80317	88511	92892	58870	49291	80384	88919	92967	94699	104888	80222	102660
M2	821024	812396	812872	800133	805708	844484	837085	826361	820703	844671	829165	855328
2003												
Int. reserves NB	225926	222062	241766	231186	244775	247981	258367	255698	247336	245450	237331	250941
Petroleum fund	629691	663211	681873	698053	713809	775144	777845	816365	802919	828934	824354	844587
Dom. credit NB	15672	15523	14992	17624	16496	16595	15934	27945	28207	28517	48411	36751
Total currency	41157	40236	39718	40151	41244	41253	41101	40724	40262	40816	41806	46249
M0	99430	104117	98300	61240	50828	82500	74676	81170	76754	57984	54781	74474
M2	866592	858767	854310	844521	850730	871028	870894	867170	855297	868920	856934	873139

Table A3. Monetary aggregates 1819 - 2003.

NOK million

Year	International reserves NB	Domestic credit NB	Total currency	M0	M2
1819	7.4	5.1	14.6	14.6	14.6
1820	7.4	6.8	15.6	15.7	15.6
1821	7.5	8.2	16.2	16.4	16.2
1822	7.4	9.2	16.3	16.6	16.3
1823	7.7	10.6	16.7	17.1	16.9
1824	8.3	12.8	17.8	18.1	18.2
1825	8.6	15.4	18.6	18.8	19.2
1826	8.5	16.9	19.1	19.2	19.8
1827	8.9	18.0	19.8	19.9	20.6
1828	9.3	18.8	20.3	20.6	21.4
1829	9.8	19.0	21.4	21.6	22.7
1830	10.4	19.4	22.2	22.6	23.8
1831	10.6	19.8	22.0	22.5	23.9
1832	10.7	19.9	22.2	22.7	24.5
1833	11.4	20.2	23.1	23.6	25.7
1834	12.1	21.1	23.7	24.3	26.9
1835	12.2	21.9	24.3	24.8	27.9
1836	12.2	22.8	24.3	24.7	28.5
1837	11.6	23.8	23.5	24.0	28.3
1838	11.6	24.8	24.0	24.4	29.3
1839	12.2	25.5	24.8	25.2	30.9
1840	11.9	25.4	24.8	25.2	31.8
1841	12.0	25.6	25.3	26.0	33.4
1842	11.8	27.0	25.3	27.3	34.6
1843	11.4	28.2	25.3	28.3	36.1
1844	11.9	29.3	26.5	29.7	39.0
1845	12.0	31.0	27.8	31.9	42.2
1846	10.5	31.5	28.0	32.1	44.0
1847	9.0	30.6	26.2	30.1	42.5
1848	8.8	29.0	24.8	28.6	40.7
1849	9.3	28.9	25.5	29.3	41.9
1850	9.1	28.7	25.5	29.5	44.5
1851	9.7	30.6	26.7	31.0	47.3
1852	9.7	31.4	26.8	31.7	53.7
1853	12.1	31.3	29.8	34.5	63.6
1854	17.9	33.6	35.8	42.2	71.2
1855	18.2	34.4	37.3	43.4	75.8
1856	17.3	33.7	37.4	41.8	76.0
1857	15.0	34.6	35.8	40.0	77.6
1858	13.6	34.4	32.4	38.0	81.9
1859	14.3	35.4	32.8	38.3	87.3
1860	13.5	33.5	32.0	36.2	93.8
1861	13.1	33.4	32.0	35.5	102.4
1862	14.5	34.2	33.8	37.3	113.0
1863	15.4	34.6	33.9	38.0	117.4
1864	13.8	34.3	32.9	35.2	125.4

Sources: For 1819-1849 we have reported averages of two consecutive end-of-year observations from Table A1. For 1850 to 2003 we report annual averages of monthly observations in Table A1. The exception is M2 where monthly observations start in 1913. NB = Norges Bank

Table A3. Monetary aggregates 1819 - 2003.

NOK million

Year	International reserves NB	Domestic credit NB	Total currency	M0	M2
1865	17.7	33.8	34.8	38.1	131.7
1866	16.9	36.1	36.3	39.2	135.4
1867	16.6	36.3	36.0	40.4	140.8
1868	14.7	36.6	34.9	38.8	144.0
1869	14.0	35.7	33.7	37.5	150.1
1870	15.6	35.4	34.7	38.9	163.8
1871	22.0	33.9	37.0	43.3	182.9
1872	28.5	33.8	42.5	49.3	205.5
1873	31.6	36.6	49.7	55.6	229.7
1874	34.7	36.7	52.8	57.9	233.4
1875	27.3	38.9	46.6	52.0	235.1
1876	26.9	39.2	44.3	50.6	241.8
1877	26.8	39.1	45.7	51.1	238.5
1878	22.0	39.3	40.0	46.2	237.6
1879	23.6	38.4	37.5	46.6	249.3
1880	31.4	36.5	41.0	52.5	264.8
1881	30.6	35.5	42.7	50.6	279.7
1882	30.8	34.2	44.5	50.5	295.2
1883	32.5	33.6	45.1	50.9	304.0
1884	34.8	33.0	45.8	52.6	308.5
1885	29.5	34.2	43.2	49.0	309.8
1886	28.4	35.9	42.4	49.5	312.1
1887	35.2	32.3	43.7	52.4	321.6
1888	42.5	28.2	46.8	56.4	341.5
1889	48.1	27.7	52.0	61.0	358.7
1890	44.4	31.5	55.3	62.3	361.2
1891	38.5	36.2	53.7	60.0	364.5
1892	38.0	35.7	51.3	58.5	375.9
1893	38.2	35.9	51.9	58.3	391.8
1894	38.2	35.6	53.3	58.3	415.5
1895	41.1	36.9	56.1	62.1	436.1
1896	40.5	38.3	58.5	63.2	468.5
1897	44.9	38.0	62.7	67.2	518.7
1898	51.4	39.8	69.6	74.6	558.8
1899	45.8	50.8	72.3	78.8	603.2
1900	41.8	52.7	71.4	77.2	653.3
1901	46.3	50.5	70.3	76.6	679.1
1902	48.4	49.4	70.7	75.9	695.3
1903	40.9	54.7	69.4	74.0	713.1
1904	42.6	53.0	69.7	75.2	733.1
1905	48.0	53.7	75.5	81.5	784.6
1906	56.6	47.7	77.8	83.6	854.0
1907	63.1	46.2	83.2	88.8	907.0
1908	61.6	47.0	83.2	87.5	960.4
1909	65.6	50.4	85.8	90.9	1 022.2
1910	67.9	53.6	92.2	97.2	1 087.4
1911	72.2	56.8	99.8	104.4	1 168.7

Sources: For 1819-1849 we have reported averages of two consecutive end-of-year observations from Table A1. For 1850 to 2003 we report annual averages of monthly observations in Table A1. The exception is M2 where monthly observations start in 1913. NB = Norges Bank

Table A3. Monetary aggregates 1819 - 2003.

NOK million

Year	International reserves NB	Domestic credit NB	Total currency	M0	M2
1912	69.7	66.0	106.6	111.2	1 266.2
1913	79.3	72.8	116.9	121.8	1 258.2
1914	84.0	95.9	134.4	144.3	1 382.4
1915	125.1	87.0	157.6	175.4	1 589.5
1916	205.3	117.6	230.5	283.9	2 281.2
1917	211.8	280.8	306.9	423.2	3 294.9
1918	195.6	357.5	392.7	488.2	4 382.3
1919	232.6	362.5	454.6	528.2	4 946.5
1920	216.3	427.8	477.0	575.7	5 381.8
1921	192.3	449.9	451.8	552.9	5 532.2
1922	194.7	451.4	417.7	547.9	5 516.5
1923	176.5	470.6	427.4	540.1	4 820.1
1924	181.1	424.4	409.4	488.4	4 502.4
1925	212.6	339.0	394.6	477.8	4 280.7
1926	322.5	272.4	353.9	535.4	4 050.8
1927	310.9	218.5	341.0	484.3	3 819.5
1928	185.6	296.0	333.0	421.7	3 487.5
1929	196.3	275.0	326.7	388.0	3 475.8
1930	202.0	242.2	325.8	371.4	3 465.0
1931	197.1	222.8	314.8	365.4	3 414.4
1932	168.5	286.9	328.0	394.9	3 237.1
1933	175.8	259.8	322.5	375.7	3 177.2
1934	154.0	298.0	339.4	390.9	3 043.9
1935	208.5	241.5	346.5	399.1	3 086.2
1936	274.1	242.2	400.5	441.1	3 091.6
1937	349.0	215.0	440.0	488.8	3 149.6
1938	432.6	119.7	470.7	563.9	3 365.9
1939	367.1	215.4	517.8	623.3	3 429.4
1940	286.3	367.7	783.4	1 006.2	3 762.7
1941		135.1	1 206.9	2 190.6	4 807.0
1942		104.0	1 792.0	2 592.9	6 043.1
1943		95.2	2 292.8	3 310.0	7 256.4
1944		88.2	2 719.4	3 904.8	8 568.3
1945		56.6	2 146.9	3 492.8	9 049.2
1946	598.2	46.4	1 631.3	2 781.8	8 887.2
1947	915.3	157.4	1 877.5	3 410.0	9 770.2
1948	728.2	134.7	1 982.3	3 630.7	10 512.5
1949	553.9	114.9	2 073.9	3 513.0	10 759.9
1950	629.7	86.5	2 174.2	3 801.0	11 122.1
1951	839.7	93.2	2 300.9	3 661.9	11 564.7
1952	955.3	95.0	2 764.7	4 079.1	12 777.8
1953	924.0	111.0	2 951.5	3 877.5	13 429.9
1954	878.1	89.3	3 158.1	3 976.3	14 231.7
1955	829.4	164.1	3 250.3	3 900.3	14 521.8
1956	986.1	209.3	3 279.3	3 981.9	14 974.0
1957	1 115.0	198.2	3 373.4	4 329.2	15 828.0
1958	1 248.7	276.2	3 386.7	4 318.8	16 223.3

Sources: For 1819-1849 we have reported averages of two consecutive end-of-year observations from Table A1. For 1850 to 2003 we report annual averages of monthly observations in Table A1. The exception is M2 where monthly observations start in 1913. NB = Norges Bank

Table A3. Monetary aggregates 1819 - 2003.

NOK million

Year	International reserves NB	Domestic credit NB	Total currency	M0	M2
1959	1 499.3	295.2	3 534.3	4 359.8	16 899.8
1960	1 775.1	281.5	3 686.1	4 491.8	17 522.5
1961	1 810.5	300.7	3 844.8	4 605.8	18 565.3
1962	1 645.3	341.1	4 106.0	4 892.2	19 858.2
1963	2 112.6	355.0	4 320.4	5 115.7	21 061.0
1964	2 276.0	400.2	4 611.8	5 513.0	22 756.4
1965	2 606.9	468.2	4 946.0	5 864.3	24 824.7
1966	3 103.0	488.9	5 316.1	6 317.8	27 002.3
1967	3 762.5	603.4	5 716.6	6 902.0	29 422.3
1968	4 289.2	659.7	6 070.9	7 066.8	32 144.5
1969	4 306.5	903.3	6 463.0	7 339.5	35 808.1
1970	4 965.7	1 177.0	7 042.6	7 786.3	39 969.8
1971	6 965.0	1 219.4	7 704.8	8 590.6	45 586.2
1972	8 535.3	1 372.0	8 375.0	9 217.4	50 691.8
1973	9 079.9	1 909.8	9 070.7	9 949.4	56 631.7
1974	10 195.4	2 999.3	10 082.8	11 276.8	62 921.2
1975	10 621.1	3 449.9	11 634.0	13 144.2	71 279.7
1976	12 147.3	4 884.5	13 424.8	14 863.1	82 994.1
1977	12 660.1	7 582.2	15 172.5	16 500.4	97 708.4
1978	13 912.5	9 744.2	16 275.3	17 730.2	110 120.1
1979	19 724.3	9 150.7	17 468.5	19 444.8	124 210.9
1980	25 290.4	7 848.9	18 313.8	20 354.0	139 709.7
1981	31 363.7	10 947.8	19 550.3	21 377.2	157 785.0
1982	40 098.3	8 652.0	20 690.1	22 687.0	174 500.3
1983	46 294.9	16 601.0	21 516.3	23 141.8	190 676.8
1984	64 513.2	13 186.8	22 516.8	24 565.3	216 753.0
1985	103 509.0	20 673.9	24 395.0	26 496.2	251 186.2
1986	105 082.5	89 798.8	26 360.5	28 692.0	272 079.3
1987	95 697.8	102 156.8	27 808.7	32 433.1	298 664.8
1988	93 411.8	91 826.5	28 663.2	33 132.1	340 522.5
1989	94 278.4	83 140.1	29 185.8	35 012.3	358 695.9
1990	87 348.1	83 419.9	29 514.7	32 111.2	383 286.6
1991	91 867.3	78 276.1	30 600.9	31 870.1	409 362.9
1992	92 920.4	67 935.3	32 056.7	34 024.7	447 305.8
1993	133 948.7	49 602.3	33 485.5	36 284.5	471 871.7
1994	148 027.9	21 677.1	37 068.3	45 245.4	492 108.3
1995	144 769.1	21 968.2	38 447.8	43 391.0	521 102.7
1996	167 560.4	21 112.2	39 567.3	46 202.8	553 386.5
1997	202 347.0	14 944.6	41 112.8	55 522.9	568 940.7
1998	175 479.2	17 612.5	42 801.9	53 321.3	598 614.8
1999	150 900.3	19 998.0	43 021.1	53 250.8	639 015.3
2000	219 365.6	19 142.8	43 111.9	59 204.1	704 463.9
2001	232 828.3	24 737.9	42 647.9	57 977.6	766 941.3
2002	205 966.3	14 997.9	41 425.0	84 551.7	825 827.5
2003	242 401.6	23 555.6	41 226.4	76 354.5	861 525.2

Sources: For 1819-1849 we have reported averages of two consecutive end-of-year observations from Table A1. For 1850 to 2003 we report annual averages of monthly observations in Table A1. The exception is M2 where monthly observations start in 1913. NB = Norges Bank

Chapter 6 – The gross domestic product for Norway 1830–2003

Ola H. Grytten

1. Introduction

The official national accounts for Norway stretches back to 1865. On the basis of empirical observations it is, however, possible to draw these figures back to 1830. The main sources for this operation are records from contemporary scholars, Statistics Norway and Professor Ingvar Wedervang's Historical Archive on Wages and Prices, kept at the Norwegian School of Economics and Business Administration in Bergen. On the basis of estimates of national production made by Anton Martin Schweigaard and Martin Braun Tvethe in 1840 and 1848 respectively, we are able to construct reliable benchmark figures for 1835 and 1845.¹ By interpolating with annual indicators of output and value added in some of the most important sectors of the economy at the time, i.e. agriculture, fishery, forestry, maritime services, public services and other industries, we arrive at annual GDP figures for Norway 1830-1865. The series are presented both in current and fixed prices, both in total and per capita figures. The present work also presents calculations of GDP by expenditure from 1830 onwards.

The new figures for the period 1830-1865 are finally spliced with Statistics Norway's historical national accounts in 1865 and with revised national accounts from 1970 onwards.

2. What has been done so far?

In 1840 Anton Martin Schweigaard published his book on the Statistics of Norway (Norges Statistik). The book contains a set of gross production values for the main sectors of the Norwegian economy around 1835.² His estimates included agriculture, forestry, fisheries, mining,

1 Schweigaard 1840 and Tvethe 1848.

2 Schweigaard 1840.

manufacturing and transports. Schweigaard deliberately omitted trade, house construction, and most services. In line with the conventional wisdom, these were not considered value-creating activities.

In 1848 Martin Braun Tvethe refined Schweigaard's analysis, in his book under the same title. Tvethe, a statistician, who worked in the statistical office of the central government, summarised gross production for the main sectors of the Norwegian economy for a normal year around 1845.³ Both Schweigaard's and Tvethe's figures are well documented. However, their theoretical understanding of productive sectors, non-productive sectors and value added diverge significantly from the approach taken in modern national accounts.

Anders Kiær constructed the first estimates of Norwegian national income in 1887.⁴ Thereafter, scholars published various estimates for the years 1898, 1906 and 1913-1924.⁵ These were mainly built on income statistics collected for taxation purposes, and they cannot be considered as national accounts as we understand them today.

In the early 1930s plans for the construction of a complete set of national accounts were formulated at the Department of Economics at the University of Oslo. This work, under the supervision of Ragnar Frisch, did not result in actual estimates. Nevertheless, valuable insight was obtained into theoretical and practical problems concerning national accounting, and fairly good statistics were compiled.⁶

Under the German occupation, Statistics Norway made computations of national income for Norway 1935-1943. In line with similar series for other countries these numbers in principle constituted a system for national accounting. The figures, basically drawn from tax returns, income data, employment figures and industrial censuses, were published in 1946.⁷ In the same year the work on regular national accounts for Norway started. Documentation on the theoretical principles and general methods for national accounting in Norway has been given later.⁸ However, documentation of the sources has never been given.

The first volume of national accounts for Norway was published in 1952.⁹ These accounts covered the periods 1930-1939 and 1946-1951. In February 1952, Statistics Norway, at

3 Tvethe 1848.

4 Kiær 1887, 193-205.

5 OEEC 1953, 11.

6 Grytten & Hodne 1997, 11.

7 NOS 1946.

8 Aukrust 1955.

9 NOS 1952.

the request by the Department of Finance, started a study of the main features of economic and social development since 1900. In planning this study it became clear that it would be advantageous to draw information from national accounting figures. Thus, Statistics Norway went on to construct accounts for the period 1900-1929. The results were published in 1953.¹⁰ Revisions and extensions of the national account series were published in 1961 and 1964.¹¹ The last phase of the project was concluded in 1965 and 1968, when final versions of the historical national accounts for Norway spanning almost one hundred years, 1865-1960, was published.¹² The work was part of an international project on economic growth. Thus, the series were built on international standards for national accounting, outlined in the United Nation's System of National Accounts from 1953 (SNA 1953). The major achievement of this final publication was that annual aggregates of the economy had been calculated as far back as 1865. Basically, the 1965 publication summarises, revises and updates the earlier publications on historical national accounts. For its time the publication brought Norway to the top of international historical national accounting.

The publication is very well documented theoretically, but not empirically. The maximum margin of error is set to three percent for the period starting in 1930. Around the century it is set to 7-8 percent, and in 1865 about 20 percent.¹³

In 1994 a set of preliminary GDP figures for the period 1835-1865 was published independently of Statistics Norway.¹⁴ This series was revised and prolonged back to 1830 in 2000.¹⁵ The series were based on Schweigaard's and Tvethe's work from 1840 and 1848. Thus, 1835 and 1845 are used as benchmark years. On the basis of a set of macro economic indicators annual GDP figures were interpolated between 1835, 1845 and 1865. The estimates provide a relevant indicator for the rate of economic growth in the period. However, the annual fluctuations are not as well empirically based as the benchmark year calculations. Hence, these figures need to be revised to be able to establish valid and reliable annual series of GDP 1830-1865.

10 NOS 1953.

11 NOS 1961 and NOS 1964.

12 NOS 1965.

13 Bjerke 1966, 21-22.

14 Hodne & Grytten 1994, 93-113.

15 Hodne & Grytten 2000, 85-96.

3. The System of Historical National Accounts

National accounts represent a closed system of macroeconomic bookkeeping, which summarises economic activities by means of three complementary approaches. These are the production-, the income- and the expenditure approach. National income is by definition equal in each of the three different approaches. Due to lack of perfect information, the calculations, however, will give some discrepancies.

Table 1 illustrates the three different approaches as agreed on in an ongoing Nordic historical national account project.¹⁶ In the present work we use the production approach to establish GDP and thereafter the expenditure approach to establish key macro economic indicators. National product, income and expenditure can be expressed in gross or net, national or domestic, market prices or factor costs. In this manner the system of national accounts reports the cyclical functioning of an economy, i.e. from production to income, from income to expenditure, and the return from expenditure to production again.

Table 2 gives the terms of expression for national accounts from the product, the income and the expenditure side. National accounts have significant limitations. In particular one is central to the present work.¹⁷ In principle the national accounts only consider activities as part of national income when they are traded in a market. The system is, however, not entirely consistent. Several exceptions are made. An important change during the last centuries concerns the increasing role of the market and the diminishing role of non-market activities. If the calculations were strictly limited to the market sector, the growth in output and productivity would be overestimated. Production of agricultural products for own consumption is therefore included in the United Nation's System of National Accounts from 1993 (SNA 1993).

Despite its shortcomings the system of national accounts provides a more complete picture of the total economy than any other economic measure. It reflects the economic past in a consistent quantitative way.

¹⁶ Hjerpe 1996, 9.

¹⁷ Smits 2000, 4-11.

Table 1. Approaches in national accounting.

Production account	Incomes account	Expenditure account
Value added a) in primary production b) in refined goods c) in services	Compensation to employees + Operating surplus + Consumption of fixed capital	Consumption a) Private consumption * in households * in organisations b) Public consumption + Gross fixed capital formation (Investments) a) in private sector b) in public sector + Change in stocks + Net exports
= Gross Domestic Product at factor costs + Indirect taxes - Subsidies	= National Income - Net incomes from abroad	
= Gross Domestic Product at market prices	= Gross Domestic Income	= Gross Domestic Expenditure

Table 2. Terms of expression in national accounting.

Gross	National	Market prices
- Depreciation	- Net primary income from abroad	- Indirect taxes + Subsidies
= Net	= Domestic	= Factor Costs

4. Approach

In the present work new estimates of the Norwegian GDP for the period 1830-1865 are calculated. These are spliced with Statistics Norway's GDP figures from 1865 onwards. Thus, annual GDP figures 1830-2003 are offered. These enable us to map economic growth and business cycles for a period covering more than 170 years. The figures are calculated from the production side. For the period 1830-1865 value added figures are calculated for the benchmark years 1835 and 1845. These are revisions of previous benchmark year calculations. Using these benchmark years, value added series for agriculture, and relevant indicators for fisheries, forestry, maritime services, public services and other industries, annual GDP figures are interpolated between the benchmark years and 1865.

5. Benchmark year calculations

Schweigaard and Tvethe have estimated the value of gross production by industry around 1835 and 1845 respectively. Using their figures we are able to establish valid and reliable estimates of gross national product for these years. Their estimates are minimum figures, in as much as they almost consistently use the most conservative estimates of volumes and prices. Additionally, in principle they did not consider services as production. Their method is an output rather than a value-added approach. Hence, their figures cannot be used in national accounts, as we understand them today.

Another important difference between our and Schweigaard's and Tvethe's work is their sectorial approach, while we, according to the present standards for national accounting, basically adopt a product approach. This means that a significant numbers of products produced on farms, e.g. cheese, butter, clothing, handicrafts etc. are not considered as part of agricultural production, but manufacturing industry. This also constitute an important difference between the approach taken here, and previous articles on historical national accounts 1830-1865.

On the basis of Schweigaard's and Tvethe's computations, along with other empirical sources and historical research, we are able to construct GDP for Norway 1835 and 1845 from the production side, and with a value added approach. Benchmark year figures for 1835 and 1845 provide bases for interpolations 1835-1845 and 1845-1865 and extrapolations backwards

from 1835 to 1830.

5.1 Agriculture

Schweigaard calculated the gross value of agricultural production in 1835 at 14.3 million speciedaler, while Tvethe offered a figure of 19.5 speciedaler for 1845.¹⁸ In Norwegian kroner these figures amounted to 57.2 and 78 million respectively. These were later revised to 23.2 and 27.4 million speciedaler, i.e. 92.8 and 109.6 million kroner in research carried out by Hodne and Grytten.¹⁹

These calculations represent gross figures for agriculture and satellite industries. In 2004 annual series of agriculture's contribution of Norwegian GDP 1830-1865 was published for the first time.²⁰ In this work contemporary sources were carefully evaluated, output, input and value added were calculated on the basis of the most valid and reliable sources of the time.

Arable output is calculated to 38.2, and livestock output to 35.5 million kroner in 1835. As for 1845 the figures are 44.5 and 41.2 million respectively. In sum we arrive at 73.7 and 85.8 million kroner. This is significantly lower than the previous estimates by Hodne and Grytten. A major reason is that the present figures do not include the production of hay. Another reason is that contrary to previous work we apply a product rather than a sectorial approach. According to the new calculations value added in Norwegian agriculture reached a total of 51.6 million in 1835 and 61.1 million in 1845. Arable production was higher than livestock production.²¹

5.2 Forestry

According to Schweigaard the value of forest production was three million speciedaler in 1835, while Tvethe has estimated the gross output value for 1845 to 3.75 speciedaler.²² The total included the value of timber exports, wood deliveries to the mines, and estimated value

18 Schweigaard 1840, 76-80 and Tvethe 1848, 50-55.

19 Hodne & Grytten 2000, 90.

20 Grytten 2004A, 47-76.

21 Grytten 2004A, 58.

22 Schweigaard 1840, 78-93 and Tvethe 1848, 74.

of firewood. Both Schweigaard and Tvethe are uncertain about prices and the value of both exports and domestic use. Camilla Brautaset, using British sources on imports from Norway, has calculated the value of the Norwegian exports of timber. She concludes that the export value was 10.9 million kroner in 1835 and 26.7 million kroner in 1845.²³ Production for domestic use must be added and inputs subtracted. According to Schweigaard the value of output of domestically used wood amounted to 1.112 million speciedaler. However, these figures are calculated on the basis of non-reliable prices. Excerpting prices taken from the Wedervang Archive at the Norwegian School of Economics and Business Administration in Bergen, we conclude that the total gross value of output of wood for domestic use should be set to two million speciedaler or eight million kroner.²⁴

To sum up, the total gross output value of forestry reach 18.9 million kroner in 1835. For 1845 the total amount would sum up to 34.7 million. Input is estimated to have been 25 percent of output in 1835 and 32 percent in 1845. Thus, we reach at value added figures of 14.2 and 23.1 million kroner respectively.

5.3 Fisheries

Camilla Brutaset has calculated that exports of fish amounted to 12.6 and 15.8 million kroner in 1835 and 1845.²⁵ Experts on the fisheries sector have concluded that about 20 percent of the catches were consumed domestically.²⁶ Since the exports of fish were somewhat lower in 1835 and 1845 than in the years around, this share in reality probably was a bit higher. This means that the gross value of the fisheries amounted to around 16 and 20 million kroner. This implies a slightly upward revision compared to Schweigaard's and Tvethe's figures, and a moderate downward revision compared to similar calculations carried out in 2000.²⁷ With an input share of 25 percent, we find that value added in Norwegian fisheries amounted to 12 and 15 million kroner in 1835 and 1845 respectively.

23 Brautaset 2003, 263.

24 W 137, W 139, W271, W 272 and W 273.

25 Brautaset 2003, 254.

26 Solhaug 1976, 697, 716 and 743-744.

27 Hodne & Grytten 2000, 87.

5.4 Mining

Schweigaard estimated the total gross output value of mining to have been 0.7 million speciedaler in 1835, while Tvethe a decade later concludes with about one million around 1845.²⁸ Compared to other sources there must have been some minor under reporting. Thus, we adjust the figures to 0.8 and 1.1 million speciedaler. We have to subtract inputs, which basically would be coal and equipment.

We also have to bear in mind that mining in that time was a very labour intensive industry. Thus, input to be deducted should be limited. We find input to have been around 12-18 percent.²⁹ We then arrive at value added figures of 0.7 speciedaler in 1835 and 0.9 speciedaler in 1845. Measured in kroner this amounts to 2.8 million and 3.6 million. Mining was still an important part of the Norwegian economy at that time.

5.5 Manufacturing and crafts

In 1887 Anders N. Kiær made estimates of the value of production in manufacturing, crafts and public construction around 1850. His estimates were more like value added than gross output figures. According to Kiær value added of this sector was 5.5 speciedaler or 22 million kroner in 1850.³⁰ Out of this a good four million speciedaler or 16 million kroner, were manufacturing and crafts, where crafts were the most important contributor. Assuming the same development between 1835 and 1850 as 1850 and 1865 we reach at value added figures for manufacturing and crafts in 1835 and 1845. These are set to three and 3.7 million speciedaler, which are the equivalents to 12 and 14.8 million kroner.

However, Kiær did not include manufacturing production on farms and within the fisheries in a satisfactory manner. Thus, one of the major manufacturing sectors at the time, food processing, is far from fully included. On the basis of the literature on fishing and agriculture, we submit an addition of seven million kroner in 1835 and nine million in 1845. Hence, we arrive at value added figures of 19 and 23.8 million kroner.

²⁸ Schweigaard 1840, 118, Tvethe 1848, 91.

²⁹ Hodne 1981, 44.

³⁰ Kiær 1887, 193-205.

5.6 Building and construction

According to Kiær, public construction accounted for almost 1.5 million speciedaler in 1850.³¹ His very wide definition of public construction implies that these numbers are somewhat high. However, Kiær did not give any precise numbers for private construction. Private roads for public use are to a large extent taken into account, while private building activity is not. Private road construction for private use is also omitted in Kiær's work. In line with the Swedish historical national accounts it should be reasonable to assume that private construction was of the same magnitude as public.³²

In consequence, building and construction must have summed up to around 3.0 million speciedaler in 1850. Public accounts leave us with a hint of the growth in building and construction between 1835 and 1850. This leaves us with a value added of 2.0 million speciedaler in 1835 and 2.5 million in 1845. Thus, we end up with eight and ten million kroner respectively.

5.7 Housing

Housing definitely was one of the largest sectors of the economy. Unfortunately, we do not have many sources of the size of this sector for early nineteenth century Norway. However, the Swedish historical national accounts again come to our help. According to these housing accounted for 14 percent of the total GDP in both 1835 and 1845.³³

Compared to the Norwegian historical national accounts stretching back to 1865, this seems somewhat high.³⁴ By setting a ten percent lower estimate of housing's contribution to Norwegian GDP per capita, we arrive at 19.0 million kroner in 1835 and 21.8 million in 1845.

31 Kiær 1887, 201-204.

32 Krantz 2001, 12-13.

33 Krantz 2001, 12-13.

34 Bjerke 1966, 53-55.

5.8 Maritime transport

Camilla Brautaset calculated gross production values for the Norwegian merchant fleet of 14.4 million kroner in 1835 and 15.1 million in 1845.³⁵ These figures are significantly higher than those given by Schweigaard and Tvethe, which obviously are far too low.

Maritime transport, despite high density of crew during the age of sail, was relatively capital intensive. Inputs were high, and to a large extent foreign. We do not precisely know the ratio of inputs to output. However, Anders Kiær examined the cost structure in the Norwegian maritime sector in the period. According to his work 50-60 percent of the gross output was produced in the sector itself.³⁶ This means that input accounted for slightly less than 50 percent. This share was probably increasing during the nineteenth century, as the ships became less labour intensive. Thus, we arrive at inputs of 40 percent of gross output in 1835 and 1845, implying value added figures for maritime transport of 8.6 and 9.1 million kroner.

5.9 Domestic transport and communication

It is difficult to find a sound empirical base on which to estimate domestic transport and communication. Coastal transport definitely had a lower value than ocean transport. On the other hand it must have been significant. The same applies to horse transport.

According to Schweigaard and Tvethe the gross output from a horse equalled the gross output from a cow.³⁷ Total gross output from cows have been estimated to 23 million kroner in 1835 and 29.3 million in 1845. The number of cows was six times higher than the number of horses in 1835 and 6.4 times higher in 1845.³⁸ This means gross output from horses of around 3.8 million in 1835 and 4.6 million in 1845. Inputs to horsepower transport are estimated to 20 percent of output. This leaves us with a value added of 3.1 million speciedaler in 1835 and 3.7 million in 1845.

The size of domestic water transport is more difficult to find. However, along the coast and by the rivers waterborne traffic was of great importance. Timber was transported down the rivers; along the coast people and goods were carried by a flotilla of locally built vessels. The

35 Brautaset 2003, 259.

36 Kiær 1871 and Hodne 1981, 139.

37 Schweigaard 1840, 72-78.

38 Grytten 2004A, 56-57.

waterway was the most important means of transport along the coastline. Thus, it seems reasonable to set the domestic water transport equal to that of horse transport. This is also in line with expert views.³⁹ Thus, we end up with value added figures for domestic transport of 6.2 and 7.4 million kroner.

5.10 Domestic trade

Schweigaard and Tvethe did not consider domestic trade as real production, but distribution. Neither distribution nor trade was reckoned as production. However, on the basis of Kiær, the value added of domestic trade is calculated to 12 million kroner in 1850.⁴⁰ This is probably a minimum estimate. Thus, we set the same figure for 1845 and assume the same volume of domestic trade per capita in 1835. Thus, we conclude with ten million kroner in 1835.

5.11 Private services

Census data of the labour force in private services has been given as 57.000 in 1835 and 63.000 in 1845. This tallies with the figures given in the population census from 1875.⁴¹ In addition, private services were often carried out on a part time basis. In accordance with the Swedish historical national accounts a number of 100.000 in the Norwegian private service labour force in 1835 and 110.000 in 1845 would be more correct.⁴²

Using Torill Lønningdal's research in the Wedervang Archive and public records by Statistics Norway, we find information on wages for domestic servants and other kinds of private services. Average wages hovered around 196 kroner in 1835 and 225 kroner in 1845, board and lodging included.⁴³ The numbers applies for both full and part timers in private services. Given that value added in private services equals wages, we then reach at total value added for private services of 19.6 and 24.8 million kroner in 1835 and 1845 respectively.

These numbers are well in line with calculations of the private sector's contribution to

39 Bjørnland 1981, 20.

40 Kiær 1887, 198.

41 NOS 1978, 36.

42 Krantz 2001, 12-18.

43 Lønningdal 1984, Hodne et al 1995, 61-75 and 238-248.

GDP made for Sweden, whose per capita figures tallies well with the Norwegian ones.⁴⁴

5.12 Public services

Public services were put on a new footing from 1837. In that year the king and the parliament introduced local self-government in the rural districts. Both county and municipal councils were set on foot. Therefore, to appraise the magnitude of public administration requires information on three levels: central, county and local.

Due to changes in accounting and statistics it is not easy to establish consistent figures for the time before 1880. However, relying on previous work by writers on Norwegian nineteenth century economic history, we are able to arrive at figures for 1835 and 1845. The estimates are built on work by Fritz Hodne, Helge Seip and Edgar Hovland.⁴⁵ Summing up we arrive at gross output of 3.3 million speciedaler in 1835 and 4.0 speciedaler in 1845. Value added is expressed as wages. Thus, we arrive at 1.7 and 2.0 million speciedaler, inclusive board and lodging. These amounts to 6.8 and 8.0 million kroner respectively.

5.13 Military services

Military services' contribution to GDP is also set equal to wages. On the basis of Hodne's work on the Norwegian public sector in the nineteenth century, we conclude that military services amounted to one third of other public services.⁴⁶ This is also in line with the calculations given by Juul Bjerke in connection with his work on historical national accounts for Norway.⁴⁷ We then reach almost 0.6 million speciedaler for 1835 and close to 0.7 million for 1845, i.e. 2.3 and 2.8 million kroner.

44 Krantz 2001, 12-14.

45 Hodne 1984, 306-307, Hovland 1987, 77 and Seip 1949, 33-34.

46 Hodne 1984, 306-309.

47 Bjerke 1966, 96-97.

6. GDP for Norway 1835 and 1845

Summing up our calculations of value added in 13 sectors, covering all industries in Norway in 1835 and 1845, we are now in a position to establish aggregated GDP figures for these two benchmark years. These are reported in table 3. All figures are in current prices. The speciedaler is converted to kroner at a ratio of 1:4, i.e., one speciedaler equals four kroner. This is the equivalent of the par gold values set by the Parliament in 1873 and confirmed in 1875.

Table 3. GDP for Norway in 1835 and 1845, in million kroner, current prices.

	1835		1845	
	Kroner	Percent	Kroner	Percent
Agriculture	51.6	28.7	61.1	27.5
Forestry	14.2	7.9	23.1	10.4
Fishing	12.0	6.7	15.0	6.7
Mining	2.8	1.6	3.6	1.6
Manufacturing and Crafts	19.0	10.6	23.8	10.7
Building and Construction	8.0	4.4	10.0	4.5
Housing	19.0	10.6	21.8	9.8
Maritime Transport	8.6	4.8	9.1	4.1
Domestic Transport	6.2	3.4	7.4	3.3
Domestic Trade	10.0	5.5	12.0	5.4
Private Services	19.6	10.9	24.8	11.1
Public Services	6.6	3.7	7.9	3.6
Military Services	2.2	1.2	2.8	1.3
Sum	179.8	100.0	222.4	100.0

7. Comparison of benchmark year figures

According to table 3 the primary sector, including agriculture, forestry, fisheries and mining, accounted for 45-46 percent in both 1835 and 1845. In the historical national accounts by Statistics Norway, the share was about 40 percent in 1865.⁴⁸ In the Swedish historical national accounts the primary sector accounted for around 40 percent in 1835 and 1845.⁴⁹ The difference between Norway and Sweden can be explained by the significant size of the Norwegian fisheries. In fact, it may come as a surprise that this industry did not make up more than close to seven percent of total value added. However, this is due to the fact that fish to a large extent was processed from an early stage, and thus, is accounted for in manufacturing industry.⁵⁰ Hence, the significance of this sector was higher than reflected in its direct share of GDP.

In the historical national accounts for Norway published by Statistics Norway, the secondary sector accounted for less than 20 percent of GDP in 1865, against 15-16 percent in 1835 and 1845.⁵¹ This seems reasonable, since the first wave of industrialisation swept over Norway from the middle of the 1840s to the middle of the 1860s.⁵² In the Swedish figures the primary sector represented 19 percent in 1835 and 1845.⁵³ However, mining is included in these numbers. By subtracting that industry, Sweden is left with a primary sector of about 16 percent in 1835 and 1845 – equal to the figures for Norway.

Transport and communication made up around eight percent of total GDP in 1835 and 1845, compared to five percent for Sweden, which had a significantly smaller merchant fleet.⁵⁴ Norwegian transport reached ten percent in 1865.⁵⁵ In view of the rapid growth of the Norwegian merchant fleet from 1850 onwards, this figure also seems reasonable.

Finally, the rest of the service sector, including housing, accounted for 31-32 percent in 1835 and 1845, close to both the Swedish figures and the 1865 figures from Statistics Norway.

48 Bjerke 1966, 53-55.

49 Krantz 2001, 12-13.

50 Solhaug 1994, 3.

51 Bjerke 1966, 55.

52 Bergh et al 1991, 142-146.

53 Krantz 2001, 12-13.

54 Krantz 2001, 12-13.

55 Bjerke 1966, 54-55.

8. Inter- and extrapolations

After having established benchmark year calculations for 1835 and 1845, we are now able to interpolate annual GDP figures 1835-1845 and 1845-1865. In addition we extrapolate annual GDP back to 1830.

We use six different indicators to interpolate 1835-1865 and extrapolate 1830-1835. The first series is value added for agriculture 1830-1865. Annual figures are calculated for output, input and value added of arable and livestock production.⁵⁶ These are drawn from valid and reliable sources from the nineteenth century. They are derived from both consumption and production figures. The main sources of volumes are the nation wide agricultural censuses, import data, consumption data and farm accounts.⁵⁷ The bulk of the price data is taken from the Wedervang Archive and public records kept by Statistics Norway.⁵⁸ The Wedervang Archive reports product prices regularly collected by public servants in all the counties of the country.

The second indicator used by us, is estimates of fish production 1830-1865. These are derived from Camilla Brautaset's work on Norwegian exports in the period.⁵⁹ On the basis of expert opinions, we conclude that about 20 percent of the value of fish exports went into domestic consumption.⁶⁰ In other words, using the annual export figures for fish, we obtain a measure for total production and interpolate between the benchmark years.

The third indicator is maritime services provided by the merchant fleet. In her work on Norwegian exports 1830-1865, Camilla Brautaset calculated the value of maritime services provided by foreign-going vessels. She calculated freight rates, distances and gross freight earnings. These serve as an indicator of the development in maritime services 1830-1865.⁶¹

The fourth indicator for inter- and extrapolations is export of wood and timber. The most common use of forestry products was exports. In her series of Norwegian exports 1830-1865, Camilla Brautaset also included wood and timber. Thus, we use her aggregated series as

56 Grytten 2004A, 73-76.

57 Department of Finance 1839, 4, Department of Finance 1843, Central Statistical Office 1867, NOS 1886, 56-57, NOS 1893, 54-55, NOS 1949, 72, NOS 1969, 138.

Hasund 1914, Hasund, 1932, 184 and Hovland, 1978, 331-346.

58 W 14, W 16, W 17, W 18, W 20, W 269, W 271, W 272, W 273, W 383, W 396 and NOS 1915, 3-5.

59 Brautaset 2003, 49-96.

60 Solhaug 1976, 692.

61 Brautaset 2003, 129-167.

an indication of the annual development in this sector.⁶²

The fifth indicator is state accounts. Fritz Hodne has assembled figures for administration, defence, national debt payments and investments from 1825 onwards. Here we use administration and defence expenditures as indicators of annual development in public services and military services.⁶³

Our sixth and last indicator is the stock of money, or more precisely in this context; notes and coin in circulation.⁶⁴ The stock of money usually reflects the development of GDP. This was particularly so in the period previous to World War II. The correlation between money stock and GDP in nominal terms was very high 1865-1913. The same is the case for the sum of the above indicators and the money stock 1839-1865.

However, due to changing velocity of money the development of the money stock has to be adjusted in order to fit into the overall trend of economic growth per capita. Thus, we first find the annual growth rates of GDP between the benchmark years, and trend adjusts the stock of notes and coins in circulation to a scale that gives the same rate of annual growth. By doing this, we obtain a representative indicator of annual fluctuations in GDP for the monetary sector not yet accounted for.

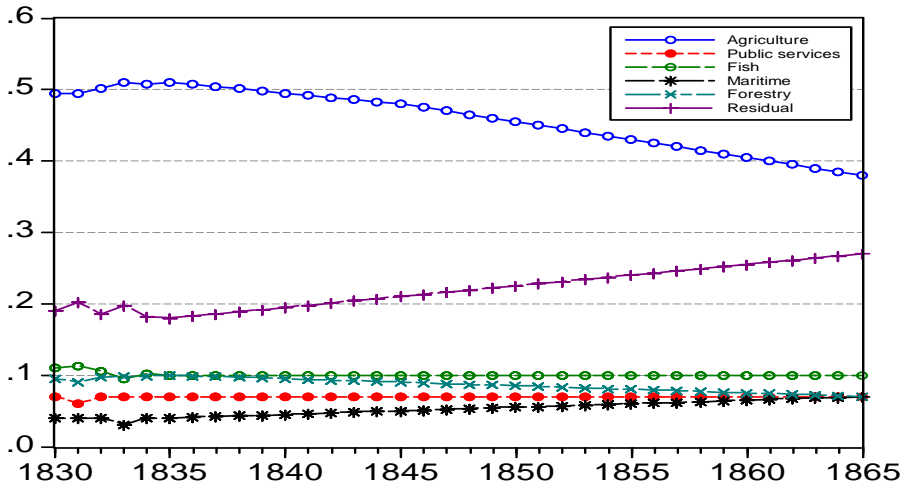
To be able to construct annual GDP figures we need to have reliable weights for each of our indicators. Of course it would have been ideal to use directly the weights reported in table 3. However, we do not have indicators for all the thirteen industries. Thus, our annual series will serve rather as indicators for larger sectors of the total economy. In view of their importance in the economy in the benchmark years, we have concluded with the weights reported in figure 1.

62 Brautaset 2003, 168-189.

63 Hodne 1984, 306-309.

64 Chapter 5 in this book.

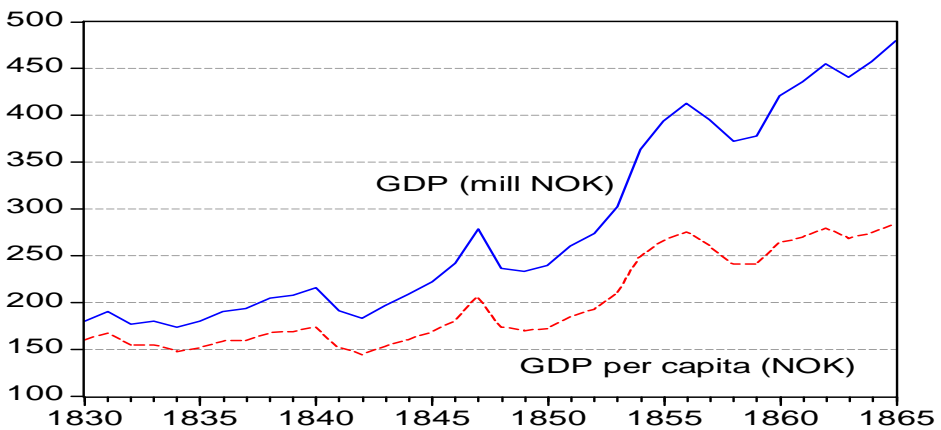
Figure 1. GDP inter- and extrapolation weights 1830-1865.



9. Annual GDP 1830-1865

By splicing the inter- and extrapolation series with the benchmark year calculations we finally reach annual GDP figures for Norway 1830-1865. These are reported in figure 2, both as total GDP and GDP per capita.

Figure 2. GDP for Norway 1830-1865 in mill NOK.



10. Fixed price calculations

To establish volume figures the series given in current prices have to be deflated. According to SNA 1993 we use Paasche price indices P_p to go from nominal to fixed price series.⁶⁵ Thus, we apply the equation below:

$$(1) \quad P_p = \frac{\sum p^t q^t}{\sum p^0 q^t}$$

Here p denotes prices, q volumes, 0 first year or base year and t the actual year under observation. We then obtain Laspeyres (L) volumes (Q_L), according to the international standards:

$$(2) \quad Q_L = \frac{\sum p^0 q^t}{\sum p^0 q^0}$$

According to SNA 1993 one should also use a double deflation technique, which implies that both output and input are deflated. In principle this system is adopted here, where e denotes value added in fixed prices, x output and h input.

$$(3) \quad e = \frac{\sum p^t x^t}{p^0 x^t} - \frac{\sum p^t h^t}{p^0 h^t}$$

Following the guidelines worked out in a project on common methodology in establishing Nordic historical national accounts, we use 1830 as the base year for the period 1818-1850 and 1861 for the period 1850-1874. These are representative base years towards the middle of the period they cover.⁶⁶

The price data in the deflator are taken from different sources. We use the input and output deflator from a recent publication on agriculture's contribution to GDP.⁶⁷ For fish, forestry and maritime services we use the deflators constructed by Camilla Brautaset.⁶⁸ For public services we use a deflator constructed for private consumption.⁶⁹ As for the residual, we use a weighted average of the other deflators.

65 NOS 1997, 15.

66 Grytten 2001, 42.

67 Grytten 2004A, 74.

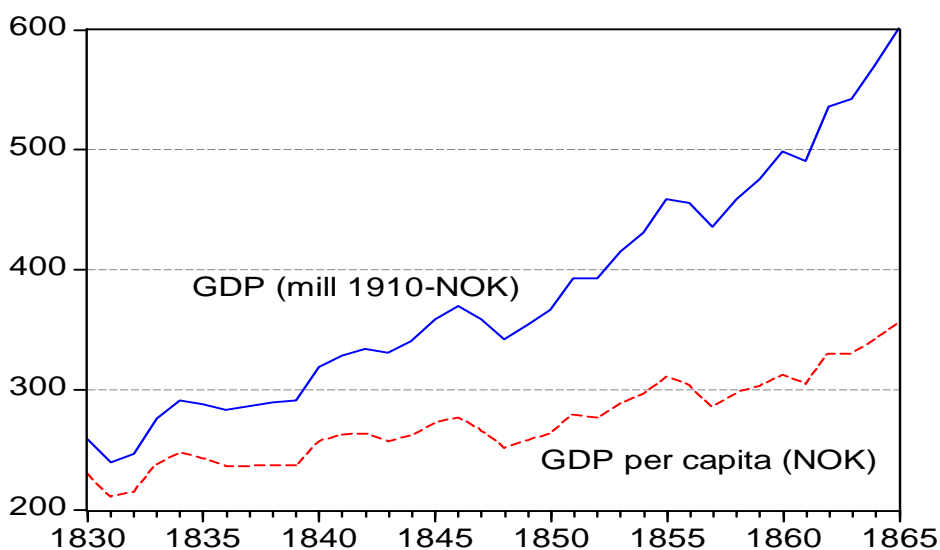
68 Brautaset 2003, 256, 261 and 264.

69 Grytten 2004B, 187-196.

On the basis of these deflators, fixed price series are constructed for each indicator. These are weighted according to a Paasche approach, with the same weights as in figure 1. The figures are summed to aggregated fixed price series. Finally, on the basis of the fixed and current price series an implicit deflator for GDP is constructed.

GDP 1830-1865 in fixed prices, with 1910 as reference year, is reported in figure 3. The graph reveals significant business cycles. However, there is a steady over-all trend of growth, in particular after 1848.

Figure 3 GDP for Norway 1830-1865 in mill 1910-NOK.



11. GDP by expenditures 1830-1865

On the basis of research by other scholars and sources not used for national accounting previously it is possible to establish GDP figures from the expenditure side. Except for the series of total exports these series are more preliminary than the aggregated GDP figures, but still serve as reliable indicators for the macro economic development in the period. On the other side, they are probably as reliable as their corresponding series 1865-1899.

11.1 Final consumption expenditures of households and NPISHs

Consumption expenditures of households and non-profit institutions serving households (NPISHs) are estimated here on the basis of new and detailed calculations of private consumption of agricultural products together with previous estimates of private consumption. Annual output of agricultural products 1830-1865 has newly been calculated. The consumption of agricultural products is in principle found by domestic output less exports plus imports in some benchmark years: 1835, 1840, 1845, 1850, 1855 and 1865. The data are taken from agricultural censuses and the foreign trade statistics.⁷⁰ The domestic output data for 1835 and 1845 are revised upwards in order to eliminate under reporting. Annual estimates of agricultural consumption are interpolated between the benchmark years on the basis of output and import figures.

According to consumption surveys agricultural products accounted for about 50 percent of total consumption 1830-1865.⁷¹ In addition we use previous series of private consumption estimated on the basis of the elasticity of private consumption to GDP 1865-1910.⁷² The elasticity is estimated by using the historical national account series by Statistics Norway for the period. This series of private consumption is given the remaining 50 percent as weight. The weighted sum of these two private consumption series gives an annual series of final consumption expenditures of households and NPISHs. The figures are given in volumes, and we present them as fixed price series here.

11.2 Final consumption expenditures of general government

The series containing consumption expenditures of general government is extrapolated backwards from 1865 by using Fritz Hodne's figures on public expenditures.⁷³ The data by Hodne was compiled in connection with his doctoral dissertation. His series are based on data from

70 Department of Finance 1839, 4, Department of Finance 1843, Central Statistical Office 1867, NOS 1886, 56-57, NOS 1893, 54-55, NOS 1949, 72, 190-192, NOS 1969, 138, Hasund 1914, Hasund 1932, 184 and Hovland, 1978, 331-346.

71 Grytten & Minde 1998, 42-58.

72 Hodne & Grytten 2000, 91-92.

73 Hodne 1984, 306-309. Annual series of public sectors contribution to GDP is under construction: Bjørsvik (2003), 125-136

departmental sources. Most of the sources are expenditure accounts made by the administration of the central government.

11.3 Total exports

Exports are taken from Camilla Brautaset's doctoral dissertation on the size of the Norwegian export sector 1830-1865. Her figures will serve as part of a "final" set of historical national accounts for Norway 1830-1865. Her data on volumes are taken from the official foreign trade statistics, which in some cases have been corrected by her.⁷⁴ Her price data were basically culled from the very rich export price data archives in Bergen and partly calculated on the basis of import price data from importing countries of Norwegian commodities.⁷⁵ She has also been able to establish reliable freight rates for the period. All in all, the work by Brautaset seems to include some of the most reliable historical national account series in the Nordic countries for the nineteenth century.

11.4 Total imports

Imports are extrapolated on the basis of public sources from Statistics Norway. The bureau has published fixed price calculations of exports with traditional goods back to 1851.⁷⁶ We have spliced these with the export series from 1865 onwards. For the period before 1851 we also use the foreign trade statistics. Statistics Norway has annual, though incomplete series of the most important exports and imports products back to 1828.⁷⁷ The figures are in volumes. We have taken 30 of the most common products and weighted them by their share of total imports in 1851. The weighted average then serves as an indicator of the development of imports 1830-1850. This series is spliced with the other series in 1851.

11.5 Gross fixed capital formation

Finally, an indicator for gross fixed capital formation has been found by a residual. In princi-

74 Brautaset 2003, 251-268.

75 W 397, W 370 and Wallem 1893, 202-203.

76 NOS 1969, 261 and NOS 1949, 162.

77 NOS 1949, 190-192.

ple GDP plus total imports less consumption expenditures of households and NPISHs less consumption expenditures of general government less total exports give gross fixed capital formation. We do not know the changes in stocks during the period. Thus, our numbers are more likely to reflect gross capital formation. The volume indicator for 1830-1865 is thereafter spliced with the figures from 1865 onwards. We then obtain a continuous volume series for gross (fixed) capital formation 1830-2003.

12. GDP 1865-1961

The existing GDP figures for Norway from 1865 onwards are calculated by Statistics Norway. For the period 1865-1961 they are taken from the historical national accounts published in 1965. These are constructed on the basis of the United Nation's System of National Accounts from 1953 (SNA 1953), with some modifications, however. One important modification is connected to the definition of gross capital formation. In the Norwegian System of National Accounts (NNA), repairs and maintenance are included, so is natural increase in standing forests. In the period in question, this implies that the inclusion of repairs and maintenance makes the Norwegian GDP artificially high compared to other countries. As for the inclusion of increase in standing forest, the effect was almost neutral, since the stock of standing forest was fairly constant in the period.

Adjusting for the differences between the SNA and NNA implies a downward adjustment of the Norwegian GDP of eight to nine percent 1930-1960.⁷⁸ We do not know the adjustment rates for the years prior to 1930. However, it must have been significantly lower for the period 1900-1930, and prior to 1900 probably non-existent. The level of repairs and maintenance has not been estimated for the years before 1930. When we splice the GDP-figures before 1970 with modern figures thereafter, they automatically become closer to SNA 1993. After this correction the Norwegian GDP figures for 1865-1970 become closer to international figures.⁷⁹ They also become more comparable over time. The methodological approach to these accounts are well documented, whereas there is a significant lack of references to sources. For the nineteenth century there is hardly any source references at all. However, another publication, *Trends in Norwegian Economy 1865-1960*, provide some information on

78 NOS 1965, 364-365.

79 Maddison 1995, 172-196.

sources and principles behind the nineteenth century historical national accounts, mainly on the basis of foreign trade data, which played a major role in the establishment of the accounts 1865-1899.⁸⁰

The historical national accounts are impressively detailed from 1930 onwards. They give definitions of the 19 main flows and 22 main sectors with principles of estimation. The number of production accounts, sub-accounts included, is 67 for 1930-1949. Thereafter, there are 88 accounts up to 1959, and then 129 for the last years.

Fixed price calculations were carried out with 1910 as base year for the period 1865-1929, 1938 for 1930-1939 and 1955 for 1946-1961. For the war years 1940-1945, we only have imprecise estimates of GDP for Norway.⁸¹

As already mentioned Juul Bjerke suggested that within the framework of the applied principles, standards, sources and definitions the maximum margins of error vary between plus minus three percent from 1930 onwards, 7-8 percent for 1900-1930 and 20 percent 1865-1899.⁸² This means that the accounts for 1930-1961 are astonishingly precise. Compared to most countries they are fairly precise for the period 1900-1930. Finally, for the period previous to 1900 they are not convincingly reliable when it comes to levels. However, they serve as a trustworthy indicator of economic development in the period, in as much as they truly mirror the short and long term fluctuations in GDP.

13. GDP 1962-1978

In 1968 the United Nation issued new guidelines for national accounting (SNA 1968). The first Norwegian national accounts constrained within this framework were published in 1973. In addition to changes in definitions and standards, improved computation methods were introduced. The revised series covered every year back to 1962 in detail, and back to 1949 with the main aggregated series.⁸³ In consequence, the figures from 1949 onwards were revised, and more in line with the international standards. Fixed price calculations were made with different base years, shifting about every tenth or fifth year.

80 Bjerke 1966.

81 NOS 1965, 52-55 and NOS 1953, 74-75.

82 Bjerke 1966, 21-22.

83 NOS 1994, 527-532.

The sources for these accounts are well documented, as we find them in the public statistics published by Statistics Norway. The data were collected from firms with the aim of constructing national accounts. Thus, the accounts for this period seem very reliable.

In the 1980s the national accounts system was further expanded with integrated quarterly accounts stretching back to 1978 and income accounts for institutional sectors stretching back to 1975. A labour accounting system was also developed with employment figures specified by industry, gender and job status going back to 1962.

14. GDP 1970-2003

Finally, Statistics Norway adopted the System of National Accounts from 1993 (SNA 1993), published by the United Nations, OECD, the EU-Commission, IMF and IBRD; and the European System of Accounts from 1995 (ESA 1995), published by Eurostat and the EU-Commission. As part of the European Economic Area (EEA) Norway is to follow ESA 1995 from 1999. The Norwegian version of this system is called ENS, which reflects SNA 1993 and ESA 1995 in detail. The coverage of the national accounts was extended to include more of domestic production. In other words, the emphasis was placed more on product, less on sector, and new definitions were adopted.

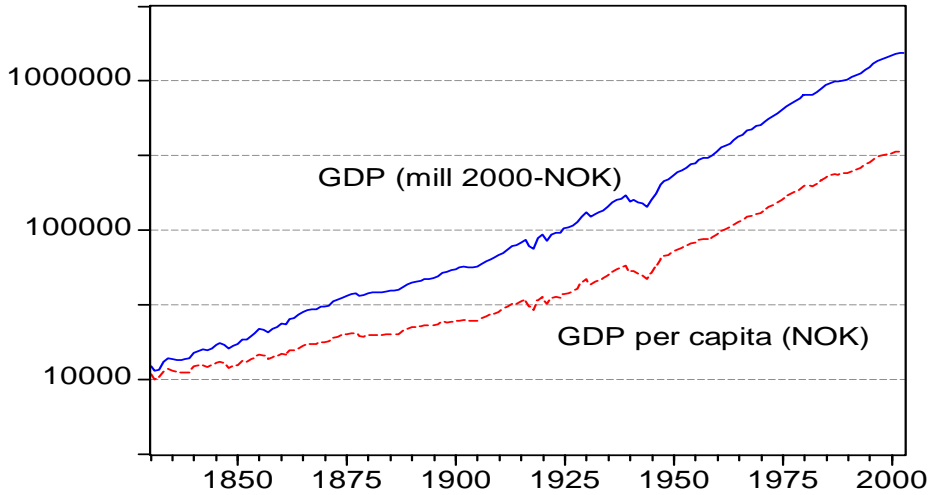
Instead of using fixed price calculations with base years every fifth year, t-1 calculations were adopted. In this respect Norway was a pioneer country. The t-1 revision implies that the base year is changed for every year, so that the previous year serves as base year for the current year. Thereafter, the annual figures are spliced together with one year chosen as a reference year. The first revised figures were published in 1995, and a main revision back to 1978 was published in 1997.⁸⁴ Main revisions have later been made back to 1970.⁸⁵ As result of the new standards, the Norwegian GDP was adjusted upwards significantly, with about ten percent at the most.

We finally establish a continuous set of GDP-figures for Norway for the entire period 1830-2003 by splicing the historical national accounts with the present national accounts. These are presented in fixed prices, with 1990 as reference year in figure 4.

84 NOS 1997.

85 www.ssb.no/emner/09/01/nr/

Figure 4. GDP for Norway in mill 2000-NOK.



15. Summary

The present article presents calculations of GDP for Norway 1830-1865. The figures are computed by a production side approach. They are given in current and in fixed prices. Thus, they reflect both annual fluctuations and the long-term trend in production. The article also presents preliminary figures of GDP by expenditures during the period.

The new estimates are spliced with the GDP figures calculated by Statistics Norway from 1865 onwards. Together they give a good indication of short- and long- term economic growth in Norway 1830-2003.

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Table 4: GDP for Norway 1830-1865.

	GDP (mill NOK)	GDP per capita (NOK)	Deflator	GDP (mill NOK)	GDP per capita (NOK)
	Current prices		1830=100	1830=prices	
1830	180	160	100.0	180	160
1831	190	167	113.4	167	147
1832	177	154	103.1	172	149
1833	180	154	93.3	193	166
1834	174	148	85.5	203	173
1835	180	151	89.5	201	169
1836	190	158	96.3	197	164
1837	194	159	97.0	200	164
1838	204	167	101.3	202	165
1839	208	168	102.3	203	165
1840	216	174	97.0	223	179
1841	191	152	83.3	229	182
1842	183	144	78.5	233	183
1843	196	153	85.3	230	179
1844	209	160	88.1	237	182
1845	222	169	88.8	250	190
1846	242	181	93.6	258	193
1847	278	206	111.2	250	185
1848	236	173	98.9	239	175
1849	233	169	94.5	247	179
1850	240	172	93.8	255	183
	Current prices		1861=100	1861=prices	
1850	240	172	73.6	326	234
1851	260	185	74.4	350	248
1852	274	192	78.4	350	245
1853	302	210	81.8	369	256
1854	363	249	94.8	383	263
1855	393	266	96.4	408	276
1856	413	275	101.8	406	270
1857	395	260	101.9	388	255
1858	373	241	91.5	407	264
1859	378	241	89.5	422	269
1860	421	264	94.8	444	278
1861	436	270	100.0	436	270
1862	455	279	95.4	477	293
1863	441	268	91.3	483	293
1864	457	274	90.2	507	304
1865	480	284	89.8	535	316

Sources, 1830-1865: Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A
1865-2003: Data from Statistics Norway.

Table 5. GDP for Norway by expenditure 1830-2003 in current prices (mill NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1830	169	8	13	35	45	180	160	1 123 733
1831	176	9	14	35	44	190	167	1 137 417
1832	168	8	12	36	47	177	154	1 150 463
1833	166	9	15	40	50	180	155	1 163 178
1834	164	9	12	37	48	174	148	1 174 762
1835	168	10	15	37	50	180	151	1 188 130
1836	171	10	19	41	51	190	158	1 202 404
1837	172	10	19	42	49	194	160	1 213 908
1838	168	13	22	42	41	204	167	1 224 163
1839	173	13	24	48	50	208	169	1 232 622
1840	184	14	21	50	53	216	174	1 241 140
1841	173	11	16	44	53	191	152	1 254 405
1842	168	12	17	41	55	183	144	1 270 597
1843	176	13	18	46	57	196	152	1 286 193
1844	179	14	22	60	66	209	161	1 301 772
1845	194	14	24	59	69	222	168	1 319 185
1846	206	15	25	64	68	242	181	1 336 728
1847	235	17	26	70	70	278	206	1 351 331
1848	211	15	21	53	64	236	173	1 363 384
1849	205	15	23	60	70	233	169	1 376 619
1850	210	15	25	59	69	240	172	1 391 941
1851	220	16	31	66	73	260	185	1 408 903
1852	233	16	34	66	75	274	192	1 425 472
1853	253	17	40	79	87	302	210	1 439 756
1854	295	18	56	100	106	363	249	1 457 020
1855	313	19	64	105	108	393	266	1 478 723
1856	335	19	63	109	113	413	275	1 500 611
1857	327	19	51	102	104	395	260	1 520 744
1858	315	20	48	85	95	373	242	1 543 194
1859	325	18	42	93	100	378	241	1 569 801
1860	345	20	50	108	102	421	264	1 596 089
1861	358	19	64	117	122	436	270	1 613 878
1862	375	20	66	116	122	455	280	1 626 986
1863	380	19	52	119	129	441	268	1 646 433
1864	392	18	54	123	130	457	274	1 668 254
1865	402	19	62	127	130	480	284	1 690 133
1866	411	20	66	126	131	492	288	1 707 272
1867	424	21	67	131	125	518	302	1 716 860
1868	438	21	68	131	134	524	304	1 725 088
1869	429	20	65	149	126	537	310	1 730 949
1870	436	21	66	158	139	542	312	1 736 909
1871	447	22	70	163	140	562	322	1 746 353
1872	504	22	96	200	182	640	364	1 756 929
1873	570	24	123	235	223	729	412	1 769 421
1874	626	26	145	237	244	790	442	1 786 640

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953), 1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 5. GDP for Norway by expenditure 1830-2003 in current prices (mill NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1875	628	29	140	203	229	771	426	1 807 803
1876	627	30	136	230	224	799	437	1 828 856
1877	657	32	136	216	244	797	430	1 851 572
1878	564	28	111	195	192	706	376	1 876 835
1879	530	30	98	185	181	662	348	1 902 126
1880	573	30	106	215	204	720	375	1 919 075
1881	596	31	108	220	216	739	384	1 922 948
1882	594	32	114	237	217	760	396	1 919 767
1883	600	32	113	227	222	750	391	1 919 317
1884	581	31	106	214	211	721	374	1 929 058
1885	551	32	97	193	194	679	349	1 943 917
1886	536	33	92	187	181	667	341	1 958 323
1887	519	34	94	192	180	659	335	1 969 807
1888	559	34	104	224	211	710	359	1 976 615
1889	601	36	126	263	256	770	388	1 984 295
1890	622	36	139	254	271	780	391	1 996 929
1891	667	37	138	243	283	802	399	2 012 504
1892	652	41	130	234	258	799	394	2 026 016
1893	656	43	132	238	260	809	397	2 037 797
1894	666	44	134	234	262	816	397	2 056 657
1895	683	48	140	240	279	832	399	2 083 088
1896	717	55	143	261	301	875	414	2 111 676
1897	737	58	162	289	327	919	429	2 141 721
1898	808	60	189	287	346	998	459	2 173 807
1899	857	69	220	301	382	1 065	483	2 204 084
1900	895	71	208	330	389	1 115	500	2 230 483
1901	889	73	194	303	358	1 101	488	2 254 911
1902	880	73	183	309	357	1 088	478	2 275 485
1903	881	71	172	314	357	1 081	473	2 287 768
1904	860	69	182	333	363	1 081	471	2 297 494
1905	888	70	174	356	383	1 105	479	2 308 572
1906	931	71	206	398	419	1 187	512	2 319 191
1907	992	74	243	400	444	1 265	543	2 328 962
1908	1 026	76	248	387	438	1 299	554	2 345 564
1909	1 044	80	228	411	447	1 316	556	2 367 494
1910	1 108	84	263	470	490	1 435	602	2 383 677
1911	1 172	88	317	519	566	1 530	637	2 400 796
1912	1 260	101	359	598	638	1 680	693	2 423 184
1913	1 355	108	384	688	678	1 857	759	2 446 874
1914	1 416	127	396	675	695	1 919	776	2 472 419
1915	1 785	157	513	1 189	1 050	2 594	1 039	2 497 766
1916	2 464	200	811	2 125	1 729	3 871	1 535	2 522 178
1917	3 194	290	1 086	1 976	2 057	4 489	1 760	2 550 543
1918	3 712	394	792	1 730	1 580	5 048	1 958	2 577 729
1919	4 574	464	2 218	1 899	2 960	6 195	2 380	2 602 869
1920	5 524	525	2 297	2 649	3 495	7 500	2 847	2 634 664

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kiær 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørmland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 5. GDP for Norway by expenditure 1830-2003 in current prices (mill NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1921	4 115	554	1 290	1 289	1 800	5 448	2 042	2 667 867
1922	3 755	520	961	1 348	1 604	4 980	1 848	2 694 840
1923	3 793	465	961	1 432	1 654	4 997	1 842	2 713 117
1924	4 250	448	1 020	1 742	1 884	5 576	2 043	2 728 766
1925	4 166	434	1 052	1 693	1 712	5 633	2 051	2 746 815
1926	3 416	397	797	1 403	1 367	4 646	1 681	2 763 106
1927	3 161	373	685	1 247	1 248	4 218	1 520	2 774 866
1928	3 147	350	793	1 217	1 286	4 221	1 516	2 784 674
1929	3 146	338	847	1 352	1 338	4 345	1 555	2 795 105
1930	3 050	330	1 005	1 300	1 308	4 377	1 559	2 807 439
1931	2 839	322	741	1 016	1 076	3 842	1 361	2 823 882
1932	2 778	307	649	1 026	898	3 862	1 359	2 841 528
1933	2 749	301	654	1 052	890	3 866	1 353	2 858 343
1934	2 865	307	771	1 102	977	4 068	1 415	2 874 206
1935	3 024	328	923	1 163	1 076	4 362	1 510	2 889 211
1936	3 256	356	1 081	1 347	1 190	4 850	1 670	2 903 519
1937	3 651	384	1 414	1 760	1 628	5 581	1 912	2 918 742
1938	3 797	418	1 473	1 682	1 543	5 827	1 985	2 935 803
1939	4 099	526	1 600	1 768	1 740	6 253	2 116	2 954 415
1940								2 973 067
1941								2 990 234
1942								3 008 883
1943								3 032 429
1944								3 060 211
1945								3 091 177
1946	6 739	1 286	3 347	2 651	3 245	10 778	3 447	3 126 883
1947	7 936	1 242	4 721	3 847	5 059	12 687	4 009	3 165 011
1948	8 264	1 256	5 078	4 485	5 179	13 904	4 344	3 201 012
1949	9 082	1 349	5 660	4 674	5 848	14 917	4 612	3 234 227
1950	9 934	1 467	5 815	6 035	6 826	16 425	5 030	3 265 125
1951	11 156	1 837	7 115	9 114	8 766	20 456	6 207	3 295 871
1952	12 411	2 266	7 832	9 062	9 007	22 564	6 781	3 327 728
1953	13 089	2 577	8 073	8 236	9 091	22 884	6 809	3 360 888
1954	14 019	2 746	9 140	8 842	9 941	24 806	7 308	3 394 246
1955	14 718	2 711	9 675	10 130	10 858	26 376	7 694	3 428 200
1956	15 733	3 067	10 695	12 306	12 054	29 747	8 595	3 460 782
1957	16 638	3 355	11 465	13 290	12 973	31 775	9 100	3 491 938
1958	17 238	3 540	12 044	11 981	12 884	31 919	9 060	3 522 994
1959	18 320	3 862	12 084	12 826	13 146	33 946	9 555	3 552 854
1960	19 562	4 249	9 573	13 651	14 252	33 058	9 231	3 581 239
1961	21 301	4 633	10 821	14 355	15 457	36 062	9 990	3 609 800
1962	22 929	5 431	11 333	14 941	15 923	38 843	10 674	3 638 918
1963	24 407	5 977	12 296	16 362	17 278	41 682	11 368	3 666 537
1964	26 498	6 634	12 779	18 805	18 872	45 837	12 407	3 694 339
1965	28 297	7 608	14 275	20 570	21 023	45 837	12 311	3 723 168
1966	30 327	8 438	15 634	22 256	23 084	50 563	13 473	3 753 012

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kiær 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørmland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 5. GDP for Norway by expenditure 1830-2003 in current prices (mill NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1967	32 916	9 615	17 703	25 017	26 122	54 568	14 419	3 784 539
1968	35 182	10 562	17 122	27 490	26 208	63 749	16 704	3 816 486
1969	39 218	11 674	16 866	29 368	27 858	69 418	18 041	3 847 707
1970	47 048	14 791	24 508	33 272	33 800	91 100	23 505	3 875 763
1971	52 806	17 348	30 194	35 647	38 211	101 825	26 089	3 903 039
1972	57 952	19 555	31 579	39 817	38 895	112 821	28 686	3 933 004
1973	64 389	22 351	37 445	48 417	48 854	127 974	32 312	3 960 613
1974	72 620	26 120	45 772	59 705	63 668	148 322	37 218	3 985 258
1975	85 086	31 530	57 527	61 797	71 661	169 896	42 396	4 007 313
1976	97 840	37 374	70 120	70 254	86 549	193 812	48 138	4 026 152
1977	112 991	42 587	79 282	75 425	95 429	218 484	54 037	4 043 205
1978	119 892	48 010	74 601	87 359	86 354	239 951	59 121	4 058 671
1979	131 481	51 771	78 910	105 147	98 739	264 802	65 022	4 072 517
1980	146 664	59 773	84 411	135 491	116 136	314 363	76 944	4 085 620
1981	165 794	69 220	96 620	155 411	128 883	358 176	87 366	4 099 702
1982	186 189	77 821	107 619	164 672	143 934	396 186	96 283	4 114 787
1983	205 619	86 318	121 815	184 515	149 169	439 023	106 341	4 128 432
1984	225 601	92 926	129 962	213 023	168 408	494 457	119 431	4 140 099
1985	261 243	101 211	134 922	235 046	194 104	547 286	131 796	4 152 516
1986	292 660	110 944	155 389	194 066	213 294	561 842	134 820	4 167 354
1987	312 868	127 327	170 915	199 787	213 185	613 157	146 446	4 186 905
1988	325 167	134 538	181 428	213 858	217 232	643 375	152 839	4 209 488
1989	338 778	142 703	175 057	262 658	237 459	686 034	162 302	4 226 901
1990	357 100	154 193	156 210	293 752	246 359	726 799	171 355	4 241 473
1991	378 939	167 619	152 206	308 046	246 367	769 782	180 627	4 261 732
1992	396 793	179 707	151 087	300 094	245 806	790 300	184 374	4 286 401
1993	416 228	187 473	164 126	315 960	261 669	830 416	192 583	4 311 991
1994	435 350	193 832	174 378	333 197	279 183	873 410	201 404	4 336 613
1995	462 262	202 144	186 548	355 948	297 498	937 445	215 051	4 359 184
1996	498 965	214 675	208 603	419 402	326 797	1 026 924	234 386	4 381 336
1997	527 135	227 490	245 695	460 864	368 701	1 111 349	252 284	4 405 157
1998	554 540	247 435	284 904	427 081	405 617	1 132 134	255 476	4 431 464
1999	584 272	263 730	271 828	486 232	393 755	1 233 039	276 348	4 461 913
2000	625 501	281 117	272 766	685 951	431 304	1 469 075	327 118	4 490 967
2001	651 339	314 795	278 937	697 297	436 812	1 526 233	338 130	4 513 751
2002	679 956	336 838	269 330	626 409	416 698	1 522 176	335 417	4 538 159
2003	721 909	353 251	261 301	646 435	433 497	1 563 689	342 550	4 564 855

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 6. GDP for Norway by expenditure 1830-2003 in fixed prices (mill 2000-NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1830	9 545	1 136	1 671	741	870	12 206	10 862	1 123 733
1831	9 405	949	1 510	734	840	11 354	9 982	1 137 417
1832	9 218	1 010	1 456	801	870	11 638	10 116	1 150 463
1833	9 873	1 136	1 725	903	932	13 057	11 225	1 163 178
1834	10 669	1 215	2 048	859	870	13 766	11 718	1 174 762
1835	10 996	1 215	1 994	881	790	13 625	11 467	1 188 130
1836	10 715	1 215	1 779	903	957	13 388	11 134	1 202 404
1837	10 575	1 239	1 886	977	1 092	13 530	11 146	1 213 908
1838	9 920	1 432	1 725	911	1 081	13 672	11 168	1 224 163
1839	10 295	1 511	1 833	1 022	1 202	13 766	11 168	1 232 622
1840	11 137	1 466	2 048	1 126	1 202	15 091	12 159	1 241 140
1841	12 306	1 590	2 263	1 044	1 194	15 517	12 370	1 254 405
1842	13 570	1 659	2 426	1 059	1 322	15 801	12 436	1 270 597
1843	13 149	1 625	2 263	1 007	1 262	15 611	12 137	1 286 193
1844	13 149	1 636	2 426	1 237	1 475	16 085	12 356	1 301 772
1845	13 991	1 636	2 587	1 185	1 329	16 983	12 874	1 319 185
1846	13 991	1 534	2 803	1 289	1 572	17 504	13 094	1 336 728
1847	13 336	1 545	2 447	1 385	1 341	16 983	12 568	1 351 331
1848	13 570	1 625	2 102	1 126	1 499	16 178	11 866	1 363 384
1849	13 289	1 590	2 263	1 296	1 582	16 746	12 165	1 376 619
1850	13 991	1 715	2 480	1 348	1 650	17 314	12 439	1 391 941
1851	14 833	1 738	2 803	1 511	1 625	18 591	13 196	1 408 903
1852	14 927	1 704	2 534	1 504	1 630	18 591	13 042	1 425 472
1853	15 536	1 670	2 749	1 793	1 835	19 633	13 636	1 439 756
1854	16 377	1 670	3 072	1 860	2 048	20 389	13 994	1 457 020
1855	16 565	1 670	3 234	2 045	2 291	21 714	14 684	1 478 723
1856	16 705	1 500	2 964	2 193	2 503	21 572	14 375	1 500 611
1857	16 658	1 579	2 587	2 082	2 369	20 626	13 563	1 520 744
1858	17 594	1 818	3 018	1 889	1 690	21 667	14 040	1 543 194
1859	18 249	1 749	3 288	2 208	2 096	22 471	14 315	1 569 801
1860	19 092	1 818	3 558	2 453	2 363	23 606	14 790	1 596 089
1861	18 623	1 601	3 234	2 607	2 946	23 180	14 363	1 613 878
1862	20 027	1 704	3 665	2 666	2 829	25 357	15 585	1 626 986
1863	21 010	1 875	3 827	2 918	2 989	25 687	15 602	1 646 433
1864	21 431	1 682	3 934	3 267	2 867	26 965	16 163	1 668 254
1865	22 273	1 704	4 096	3 311	3 358	28 431	16 822	1 690 133
1866	22 708	1 762	4 252	3 320	3 380	28 958	16 962	1 707 272
1867	22 803	1 762	4 252	3 572	3 295	29 672	17 283	1 716 860
1868	23 187	1 696	4 359	3 499	3 508	29 637	17 180	1 725 088
1869	23 512	1 762	4 301	3 873	3 449	30 779	17 782	1 730 949
1870	23 917	1 765	4 400	3 908	3 895	30 705	17 678	1 736 909
1871	24 298	1 907	4 631	3 898	3 942	31 244	17 891	1 746 353
1872	25 333	1 696	5 165	4 646	4 436	33 279	18 942	1 756 929
1873	26 597	1 696	5 864	4 573	5 058	34 064	19 252	1 769 421
1874	27 996	1 835	6 398	4 549	5 492	35 350	19 786	1 786 640

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953), 1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 6. GDP for Norway by expenditure 1830-2003 in fixed prices (mill 2000-NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1875	29 074	2 045	6 570	4 355	5 507	36 391	20 130	1 807 803
1876	29 357	2 119	6 670	4 744	5 560	37 421	20 461	1 828 856
1877	30 717	2 331	6 883	4 646	6 369	37 706	20 364	1 851 572
1878	29 319	2 186	6 077	4 467	5 560	36 385	19 386	1 876 835
1879	29 223	2 610	5 806	4 622	5 492	36 707	19 298	1 902 126
1880	29 549	2 398	6 291	5 240	5 901	37 885	19 741	1 919 075
1881	30 258	2 471	6 456	5 191	6 207	38 242	19 887	1 922 948
1882	30 104	2 471	6 670	5 273	6 369	38 171	19 883	1 919 767
1883	30 852	2 543	6 728	5 118	6 829	38 028	19 813	1 919 317
1884	31 139	2 683	6 514	5 419	6 889	38 706	20 065	1 929 058
1885	31 465	2 822	6 291	5 395	6 769	39 063	20 095	1 943 917
1886	31 139	2 962	6 136	5 541	6 582	39 278	20 057	1 958 323
1887	31 043	3 107	6 398	5 696	6 582	39 777	20 193	1 969 807
1888	32 691	3 107	7 048	6 192	7 451	41 634	21 063	1 976 615
1889	34 147	3 107	7 961	6 713	8 540	43 241	21 792	1 984 295
1890	35 316	3 174	8 174	6 843	8 847	44 419	22 244	1 996 929
1891	36 236	3 107	8 339	6 713	9 094	44 848	22 285	2 012 504
1892	36 198	3 458	8 174	6 868	8 753	45 705	22 559	2 026 016
1893	37 041	3 742	8 446	7 120	9 094	46 919	23 024	2 037 797
1894	38 536	3 882	8 718	6 746	9 656	47 205	22 952	2 056 657
1895	39 609	4 233	9 310	6 689	10 431	47 776	22 935	2 083 088
1896	41 448	4 802	9 145	7 063	11 367	49 133	23 267	2 111 676
1897	42 617	5 081	10 164	7 820	12 074	51 739	24 158	2 141 721
1898	43 690	4 942	11 194	7 242	12 330	52 168	23 998	2 173 807
1899	44 917	5 432	11 999	7 218	12 730	53 775	24 398	2 204 084
1900	45 185	5 366	11 087	7 413	12 168	54 453	24 413	2 230 483
1901	45 377	5 577	11 194	7 714	11 921	55 810	24 750	2 254 911
1902	45 798	5 717	10 378	8 414	12 108	56 667	24 903	2 275 485
1903	46 258	5 644	9 951	8 438	12 389	56 310	24 614	2 287 768
1904	45 147	5 505	10 543	8 861	12 389	56 417	24 556	2 297 494
1905	45 990	5 432	9 844	9 292	12 764	56 845	24 623	2 308 572
1906	46 776	5 366	11 194	10 017	13 386	59 202	25 527	2 319 191
1907	48 098	5 366	12 805	9 935	13 411	61 773	26 524	2 328 962
1908	49 305	5 432	13 019	10 334	13 564	63 737	27 173	2 345 564
1909	50 052	5 856	12 533	11 009	13 879	65 129	27 510	2 367 494
1910	51 892	5 929	14 252	11 734	15 216	67 807	28 446	2 383 677
1911	53 425	6 068	16 514	12 539	16 860	70 450	29 344	2 400 796
1912	54 747	6 637	18 290	13 434	17 788	73 913	30 502	2 423 184
1913	56 893	6 777	18 989	15 005	19 005	77 912	31 841	2 446 874
1914	58 024	7 836	18 882	14 679	18 750	79 519	32 162	2 472 419
1915	62 182	8 188	20 115	15 558	21 177	83 019	33 237	2 497 766
1916	69 675	8 327	22 542	15 680	24 438	86 232	34 190	2 522 178
1917	63 600	8 472	20 552	10 562	17 915	78 377	30 730	2 550 543
1918	59 327	9 314	18 776	9 162	12 142	75 234	29 186	2 577 729
1919	73 469	10 871	22 591	10 066	26 916	88 125	33 857	2 602 869
1920	74 274	10 374	25 125	13 581	24 685	93 909	35 644	2 634 664

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kiær 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørmland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 6. GDP for Norway by expenditure 1830-2003 in fixed prices (mill 2000-NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1921	63 351	12 633	18 242	11 408	16 272	84 804	31 787	2 667 867
1922	70 901	14 540	17 426	14 679	20 402	93 909	34 848	2 694 840
1923	72 951	13 269	19 581	15 680	21 858	96 444	35 547	2 713 117
1924	71 648	11 361	20 873	16 632	21 730	96 409	35 331	2 728 766
1925	73 009	11 434	22 377	18 276	21 858	102 336	37 256	2 746 815
1926	73 277	12 772	20 232	19 529	22 105	103 871	37 592	2 763 106
1927	76 516	13 620	20 766	21 124	24 191	107 799	38 848	2 774 866
1928	79 237	13 269	25 610	21 498	25 928	112 548	40 417	2 784 674
1929	83 682	13 481	28 620	25 070	28 006	123 189	44 073	2 795 105
1930	87 381	13 999	31 455	27 178	30 228	132 473	47 186	2 807 439
1931	85 081	14 780	28 251	23 923	28 951	122 118	43 245	2 823 882
1932	85 273	14 669	24 465	25 713	22 905	128 188	45 112	2 841 528
1933	86 614	14 613	24 562	27 096	23 416	131 401	45 971	2 858 343
1934	88 722	14 836	27 086	28 154	25 885	136 043	47 332	2 874 206
1935	92 363	15 282	31 357	29 131	28 440	142 828	49 435	2 889 211
1936	96 387	15 673	36 017	31 897	30 143	152 468	52 511	2 903 519
1937	101 178	15 896	41 163	34 989	37 040	159 253	54 562	2 918 742
1938	102 519	17 513	41 066	34 989	35 848	162 823	55 461	2 935 803
1939	108 651	20 414	43 493	36 454	39 084	170 679	57 771	2 954 415
1940						156 205	52 540	2 973 067
1941						159 992	53 505	2 990 234
1942						153 775	51 107	3 008 883
1943						150 708	49 699	3 032 429
1944						142 838	46 676	3 060 211
1945						160 063	51 781	3 091 177
1946	112 484	32 517	42 910	19 936	31 165	176 392	56 411	3 126 883
1947	123 215	31 011	57 084	26 934	41 212	200 316	63 291	3 165 011
1948	125 131	28 836	57 181	31 083	38 232	214 241	66 929	3 201 012
1949	131 263	30 732	61 162	33 769	44 022	219 955	68 009	3 234 227
1950	134 137	32 070	61 841	40 441	46 236	230 667	70 646	3 265 125
1951	134 329	36 309	61 938	44 835	48 706	243 164	73 778	3 295 871
1952	139 694	39 879	65 142	43 940	47 343	251 734	75 647	3 327 728
1953	145 251	44 676	71 452	46 707	50 579	261 732	77 876	3 360 888
1954	149 659	46 572	75 239	51 101	55 603	274 943	81 003	3 394 246
1955	154 258	44 620	79 219	54 518	59 605	281 013	81 971	3 428 200
1956	158 857	45 958	80 384	59 970	63 862	296 010	85 533	3 460 782
1957	162 498	47 743	83 976	62 492	64 714	304 937	87 326	3 491 938
1958	163 073	49 305	88 150	63 550	66 928	304 937	86 556	3 522 994
1959	169 779	51 815	86 694	69 490	69 737	317 791	89 447	3 552 854
1960	183 693	54 062	82 160	76 368	77 469	335 672	93 731	3 581 239
1961	194 363	57 551	92 338	81 798	85 312	356 711	98 817	3 609 800
1962	200 320	60 358	95 948	86 988	89 879	366 756	100 787	3 638 918
1963	207 166	64 329	99 597	94 088	95 305	380 782	103 853	3 666 537
1964	214 902	68 460	102 882	101 725	102 020	399 736	108 202	3 694 339
1965	220 147	74 836	109 857	107 333	111 261	420 964	113 066	3 723 168
1966	228 061	77 162	116 386	113 419	119 910	436 885	116 409	3 753 012

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kiær 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørmland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 6. GDP for Norway by expenditure 1830-2003 in fixed prices (mill 2000-NOK). GDP per capita is reported in NOK.

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP (mill NOK)	GDP per capita (NOK)	Middle population
1967	236 863	84 381	130 093	122 965	133 986	464 179	122 651	3 784 539
1968	245 488	87 951	126 119	132 391	136 940	474 603	124 356	3 816 486
1969	264 337	92 162	115 291	139 432	139 465	496 021	128 913	3 847 707
1970	264 337	97 937	132 445	139 551	158 376	505 877	130 523	3 875 763
1971	279 091	104 260	154 732	141 732	169 144	531 831	136 261	3 903 039
1972	286 739	108 708	150 223	161 047	167 741	558 918	142 110	3 933 004
1973	296 877	113 755	168 280	173 525	193 289	583 584	147 347	3 960 613
1974	305 679	117 588	178 639	174 908	201 752	608 049	152 575	3 985 258
1975	322 348	126 281	196 994	181 532	210 216	639 837	159 667	4 007 313
1976	341 650	133 826	216 664	203 769	237 576	677 351	168 238	4 026 152
1977	363 209	139 144	223 128	208 941	242 638	706 257	174 678	4 043 205
1978	357 159	144 613	198 420	229 892	204 123	730 889	180 081	4 058 671
1979	372 186	151 665	202 232	235 342	205 926	763 642	187 511	4 072 517
1980	379 639	159 926	197 616	246 258	211 459	801 438	196 161	4 085 620
1981	380 164	168 009	205 150	250 492	214 596	809 180	197 375	4 099 702
1982	384 152	171 118	206 689	250 792	225 676	810 868	197 062	4 114 787
1983	391 268	176 158	217 819	268 511	218 791	839 904	203 444	4 128 432
1984	403 671	177 911	219 895	289 661	231 449	889 515	214 854	4 140 099
1985	441 440	181 960	211 178	310 651	252 067	935 763	225 348	4 152 516
1986	463 366	185 674	227 326	317 610	281 719	969 447	232 629	4 167 354
1987	459 587	194 278	228 110	321 104	263 471	989 371	236 301	4 186 905
1988	450 257	194 716	224 002	341 545	257 261	988 945	234 932	4 209 488
1989	447 456	198 747	208 607	379 060	262 821	998 403	236 202	4 226 901
1990	450 639	209 378	186 053	411 714	269 446	1 019 224	240 300	4 241 473
1991	460 855	220 681	180 511	436 947	270 661	1 056 082	247 806	4 261 732
1992	470 781	233 031	178 554	457 621	274 911	1 090 933	254 510	4 286 401
1993	482 117	239 252	190 074	472 169	288 248	1 120 664	259 895	4 311 991
1994	498 104	242 809	200 121	511 988	304 946	1 179 569	272 002	4 336 613
1995	516 417	246 542	207 973	536 958	322 312	1 230 967	282 385	4 359 184
1996	549 964	254 116	229 440	591 989	350 646	1 295 644	295 719	4 381 336
1997	567 769	260 443	265 054	637 770	394 247	1 362 871	309 381	4 405 157
1998	582 832	268 987	299 701	641 520	427 592	1 398 708	315 631	4 431 464
1999	601 820	277 475	283 014	659 653	419 912	1 428 546	320 164	4 461 913
2000	625 501	281 117	272 766	685 951	431 304	1 469 075	327 118	4 490 967
2001	636 644	297 430	270 820	720 436	435 339	1 509 127	334 340	4 513 751
2002	659 641	306 510	261 676	721 023	445 313	1 529 905	337 120	4 538 159
2003	684 067	310 458	255 226	722 003	453 550	1 534 486	336 152	4 564 855

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørmland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A

1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),

1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 7. Implicit price deflators (2000=100).

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP
1830	1.93	0.81	0.66	4.67	5.03	1.54
1831	2.04	1.10	0.78	4.72	5.10	1.75
1832	1.99	0.92	0.69	4.45	5.25	1.59
1833	1.84	0.92	0.73	4.38	5.22	1.44
1834	1.68	0.86	0.49	4.26	5.37	1.32
1835	1.67	0.95	0.63	4.15	6.16	1.38
1836	1.74	0.95	0.90	4.49	5.18	1.48
1837	1.78	0.93	0.85	4.25	4.36	1.50
1838	1.85	1.05	1.08	4.56	3.69	1.56
1839	1.83	0.99	1.10	4.64	4.05	1.58
1840	1.80	1.10	0.86	4.39	4.29	1.49
1841	1.54	0.80	0.60	4.17	4.32	1.28
1842	1.35	0.84	0.59	3.83	4.05	1.21
1843	1.46	0.93	0.67	4.52	4.39	1.31
1844	1.49	0.99	0.76	4.80	4.35	1.36
1845	1.51	0.99	0.78	4.92	5.05	1.36
1846	1.61	1.13	0.75	4.91	4.21	1.44
1847	1.92	1.27	0.90	5.00	5.08	1.71
1848	1.70	1.07	0.84	4.65	4.15	1.52
1849	1.68	1.09	0.86	4.58	4.31	1.45
1850	1.64	1.01	0.85	4.33	4.07	1.45
1851	1.62	1.06	0.93	4.32	4.37	1.46
1852	1.70	1.09	1.13	4.34	4.48	1.54
1853	1.78	1.18	1.23	4.36	4.61	1.61
1854	1.97	1.25	1.54	5.32	5.04	1.86
1855	2.06	1.32	1.67	5.08	4.59	1.89
1856	2.19	1.46	1.79	4.92	4.39	2.00
1857	2.14	1.39	1.66	4.85	4.27	2.00
1858	1.95	1.27	1.34	4.45	5.47	1.80
1859	1.94	1.19	1.08	4.17	4.64	1.76
1860	1.97	1.27	1.18	4.35	4.20	1.86
1861	2.10	1.37	1.67	4.44	4.03	1.96
1862	2.04	1.36	1.52	4.30	4.20	1.87
1863	1.97	1.17	1.15	4.03	4.20	1.79
1864	2.00	1.24	1.16	3.72	4.41	1.77
1865	1.97	1.29	1.28	3.79	3.77	1.76
1866	1.98	1.31	1.31	3.75	3.77	1.77
1867	2.03	1.38	1.33	3.63	3.69	1.82
1868	2.06	1.43	1.32	3.70	3.72	1.85
1869	1.99	1.31	1.27	3.80	3.55	1.82
1870	1.99	1.38	1.26	4.00	3.47	1.84
1871	2.01	1.33	1.27	4.14	3.46	1.88
1872	2.17	1.50	1.57	4.26	3.99	2.01
1873	2.34	1.64	1.77	5.08	4.29	2.23
1874	2.44	1.64	1.91	5.15	4.32	2.33
1875	2.36	1.64	1.80	4.61	4.05	2.21

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A
1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953), 1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 7. Implicit price deflators (2000=100).

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP
1876	2.33	1.64	1.72	4.79	3.92	2.23
1877	2.34	1.59	1.67	4.60	3.73	2.21
1878	2.10	1.48	1.54	4.32	3.36	2.03
1879	1.98	1.33	1.42	3.96	3.21	1.88
1880	2.12	1.45	1.42	4.06	3.36	1.98
1881	2.15	1.45	1.41	4.19	3.39	2.02
1882	2.15	1.50	1.44	4.44	3.32	2.08
1883	2.12	1.45	1.42	4.39	3.16	2.06
1884	2.04	1.34	1.37	3.91	2.98	1.94
1885	1.91	1.31	1.30	3.54	2.79	1.81
1886	1.88	1.29	1.26	3.34	2.68	1.77
1887	1.83	1.27	1.24	3.33	2.66	1.73
1888	1.87	1.27	1.24	3.58	2.76	1.78
1889	1.92	1.34	1.33	3.87	2.92	1.86
1890	1.92	1.31	1.43	3.67	2.98	1.83
1891	2.01	1.38	1.40	3.58	3.03	1.87
1892	1.97	1.37	1.34	3.37	2.87	1.82
1893	1.93	1.33	1.32	3.31	2.78	1.80
1894	1.89	1.31	1.30	3.43	2.64	1.80
1895	1.88	1.31	1.27	3.55	2.60	1.82
1896	1.89	1.32	1.32	3.65	2.58	1.86
1897	1.89	1.32	1.34	3.65	2.64	1.85
1898	2.02	1.40	1.42	3.92	2.73	2.00
1899	2.08	1.47	1.55	4.12	2.92	2.07
1900	2.16	1.53	1.58	4.40	3.11	2.14
1901	2.14	1.51	1.46	3.88	2.92	2.06
1902	2.10	1.48	1.49	3.63	2.87	2.00
1903	2.08	1.45	1.46	3.68	2.80	2.00
1904	2.08	1.45	1.46	3.72	2.85	2.00
1905	2.11	1.49	1.49	3.79	2.92	2.03
1906	2.17	1.53	1.55	3.93	3.05	2.09
1907	2.25	1.59	1.60	3.98	3.22	2.14
1908	2.27	1.62	1.61	3.70	3.14	2.13
1909	2.28	1.58	1.53	3.69	3.13	2.11
1910	2.33	1.64	1.56	3.96	3.13	2.21
1911	2.40	1.68	1.62	4.09	3.27	2.27
1912	2.51	1.76	1.65	4.40	3.49	2.37
1913	2.60	1.84	1.70	4.53	3.47	2.49
1914	2.66	1.87	1.77	4.55	3.61	2.52
1915	3.13	2.22	2.15	7.56	4.82	3.26
1916	3.86	2.78	3.03	13.40	6.88	4.69
1917	5.48	3.96	4.45	18.50	11.17	5.98
1918	6.83	4.89	3.56	18.67	12.66	7.00
1919	6.80	4.93	8.28	18.66	10.70	7.34
1920	8.12	5.85	7.71	19.29	13.78	8.34
1921	7.09	5.07	5.96	11.17	10.76	6.71
1922	5.78	4.13	4.65	9.08	7.65	5.54

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A
1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),
1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 7. Implicit price deflators (2000=100).

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP
1923	5.68	4.05	4.14	9.03	7.36	5.41
1924	6.48	4.56	4.12	10.36	8.44	6.04
1925	6.23	4.39	3.96	9.16	7.62	5.75
1926	5.09	3.59	3.32	7.10	6.02	4.67
1927	4.51	3.17	2.78	5.84	5.02	4.08
1928	4.34	3.05	2.61	5.60	4.83	3.91
1929	4.11	2.90	2.50	5.33	4.65	3.68
1930	3.81	2.73	2.69	4.73	4.21	3.45
1931	3.64	2.52	2.21	4.20	3.62	3.28
1932	3.56	2.42	2.24	3.95	3.81	3.14
1933	3.47	2.38	2.24	3.84	3.70	3.07
1934	3.53	2.39	2.40	3.87	3.67	3.12
1935	3.58	2.48	2.48	3.95	3.68	3.19
1936	3.69	2.63	2.53	4.18	3.84	3.32
1937	3.94	2.79	2.90	4.97	4.28	3.66
1938	4.04	2.76	3.02	4.75	4.19	3.74
1939	4.12	2.98	3.10	4.80	4.33	3.82
1940						
1941						
1942						
1943						
1944						
1945						
1946	6.54	4.57	6.58	13.15	10.13	6.38
1947	7.03	4.63	6.97	14.12	11.94	6.61
1948	7.21	5.04	7.49	14.27	13.18	6.77
1949	7.56	5.07	7.80	13.69	12.93	7.08
1950	8.09	5.29	7.93	14.76	14.37	7.43
1951	9.07	5.85	9.68	20.10	17.51	8.78
1952	9.70	6.57	10.14	20.39	18.51	9.36
1953	9.84	6.67	9.53	17.44	17.49	9.13
1954	10.23	6.82	10.24	17.11	17.40	9.42
1955	10.42	7.02	10.30	18.37	17.73	9.80
1956	10.81	7.72	11.22	20.29	18.37	10.49
1957	11.18	8.12	11.51	21.03	19.51	10.88
1958	11.54	8.30	11.52	18.64	18.73	10.93
1959	11.78	8.62	11.75	18.25	18.34	11.15
1960	11.64	8.59	13.47	17.80	18.06	11.23
1961	11.98	8.80	13.55	17.48	17.78	11.52
1962	12.51	9.83	13.66	17.10	17.39	12.07
1963	12.88	10.15	14.27	17.32	17.80	12.48
1964	13.48	10.59	14.36	18.41	18.16	13.07
1965	14.05	11.11	15.02	19.08	18.55	12.41
1966	14.54	11.95	15.53	19.54	18.90	13.19
1967	15.19	12.45	15.73	20.26	19.14	13.40
1968	15.67	13.12	15.70	20.68	18.79	15.31
1969	16.22	13.84	16.91	20.97	19.61	15.95

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A
1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),
1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 7. Implicit price deflators (2000=100).

	Private consumption expenditures	Government consumption	Gross investments	Total exports	Total imports	GDP
1970	17.80	15.10	18.50	23.84	21.34	18.01
1971	18.92	16.64	19.51	25.15	22.59	19.15
1972	20.21	17.99	21.02	24.72	23.19	20.19
1973	21.69	19.65	22.25	27.90	25.28	21.93
1974	23.76	22.21	25.62	34.14	31.56	24.39
1975	26.40	24.97	29.20	34.04	34.09	26.55
1976	28.64	27.93	32.36	34.48	36.43	28.61
1977	31.11	30.61	35.53	36.10	39.33	30.94
1978	33.57	33.20	37.60	38.00	42.30	32.83
1979	35.33	34.14	39.02	44.68	47.95	34.68
1980	38.63	37.38	42.71	55.02	54.92	39.22
1981	43.61	41.20	47.10	62.04	60.06	44.26
1982	48.47	45.48	52.07	65.66	63.78	48.86
1983	52.55	49.00	55.92	68.72	68.18	52.27
1984	55.89	52.23	59.10	73.54	72.76	55.59
1985	59.18	55.62	63.89	75.66	77.00	58.49
1986	63.16	59.75	68.36	61.10	75.71	57.95
1987	68.08	65.54	74.93	62.22	80.91	61.97
1988	72.22	69.09	80.99	62.61	84.44	65.06
1989	75.71	71.80	83.92	69.29	90.35	68.71
1990	79.24	73.64	83.96	71.35	91.43	71.31
1991	82.23	75.96	84.32	70.50	91.02	72.89
1992	84.28	77.12	84.62	65.58	89.41	72.44
1993	86.33	78.36	86.35	66.92	90.78	74.10
1994	87.40	79.83	87.14	65.08	91.55	74.04
1995	89.51	81.99	89.70	66.29	92.30	76.16
1996	90.73	84.48	90.92	70.85	93.20	79.26
1997	92.84	87.35	92.70	72.26	93.52	81.54
1998	95.15	91.99	95.06	66.57	94.86	80.94
1999	97.08	95.05	96.05	73.71	93.77	86.31
2000	100.00	100.00	100.00	100.00	100.00	100.00
2001	102.31	105.84	103.00	96.79	100.34	101.13
2002	103.08	109.89	102.92	86.88	93.57	99.49
2003	105.53	113.78	102.38	89.53	95.58	101.90

Sources, 1830-1864 (adaption to SNA 1953), Population censuses 1835, 1845, 1855, 1865, Department of Finance 1839, 1843, 1852, Central Statistical Office 1867, Schweigaard 1840, Tvethe 1848, NOS 1886, Kier 1887, NOS 1893, NOS 1949, NOS 1965, Bjerke 1966, NOS 1969, NOS 1978, Solhaug 1976, Bjørnland 1978, Hodne 1981, Hodne 1984, Hodne & Grytten 1995, Hodne & Grytten 2000, Brautaset 2003, Grytten 2004 and Grytten 2004A
1865-2003: Data from Statistics Norway, 1865-1949 (SNA 1953),
1950-1959 (adaption to SNA 1968), 1960-1969 (SNA 1968), 1970-2003 (SNA 1993).

Table 8. GDP for Norway 1830-2003. Volume indices (2000=100).

Year	GDP	GDP per capita	Year	GDP	GDP per capita	Year	GDP	GDP per capita	Year	GDP	GDP per capita
1830	0.83	3.32	1880	2.58	6.03	1930	9.02	14.42	1980	54.55	59.97
1831	0.77	3.05	1881	2.60	6.08	1931	8.31	13.22	1981	55.08	60.34
1832	0.79	3.09	1882	2.60	6.08	1932	8.73	13.79	1982	55.20	60.24
1833	0.89	3.43	1883	2.59	6.06	1933	8.94	14.05	1983	57.17	62.19
1834	0.94	3.58	1884	2.63	6.13	1934	9.26	14.47	1984	60.55	65.68
1835	0.93	3.51	1885	2.66	6.14	1935	9.72	15.11	1985	63.70	68.89
1836	0.91	3.40	1886	2.67	6.13	1936	10.38	16.05	1986	65.99	71.11
1837	0.92	3.41	1887	2.71	6.17	1937	10.84	16.68	1987	67.35	72.24
1838	0.93	3.41	1888	2.83	6.44	1938	11.08	16.95	1988	67.32	71.82
1839	0.94	3.41	1889	2.94	6.66	1939	11.62	17.66	1989	67.96	72.21
1840	1.03	3.72	1890	3.02	6.80	1940	10.63	16.06	1990	69.38	73.46
1841	1.06	3.78	1891	3.05	6.81	1941	10.89	16.36	1991	71.89	75.75
1842	1.08	3.80	1892	3.11	6.90	1942	10.47	15.62	1992	74.26	77.80
1843	1.06	3.71	1893	3.19	7.04	1943	10.26	15.19	1993	76.28	79.45
1844	1.09	3.78	1894	3.21	7.02	1944	9.72	14.27	1994	80.29	83.15
1845	1.16	3.94	1895	3.25	7.01	1945	10.90	15.83	1995	83.79	86.33
1846	1.19	4.00	1896	3.34	7.11	1946	12.01	17.24	1996	88.19	90.40
1847	1.16	3.84	1897	3.52	7.39	1947	13.64	19.35	1997	92.77	94.58
1848	1.10	3.63	1898	3.55	7.34	1948	14.58	20.46	1998	95.21	96.49
1849	1.14	3.72	1899	3.66	7.46	1949	14.97	20.79	1999	97.24	97.87
1850	1.18	3.80	1900	3.71	7.46	1950	15.70	21.60	2000	100.00	100.00
1851	1.27	4.03	1901	3.80	7.57	1951	16.55	22.55	2001	102.73	102.21
1852	1.27	3.99	1902	3.86	7.61	1952	17.14	23.13	2002	104.14	103.06
1853	1.34	4.17	1903	3.83	7.52	1953	17.82	23.81	2003	104.45	102.76
1854	1.39	4.28	1904	3.84	7.51	1954	18.72	24.76			
1855	1.48	4.49	1905	3.87	7.53	1955	19.13	25.06			
1856	1.47	4.39	1906	4.03	7.80	1956	20.15	26.15			
1857	1.40	4.15	1907	4.20	8.11	1957	20.76	26.70			
1858	1.47	4.29	1908	4.34	8.31	1958	20.76	26.46			
1859	1.53	4.38	1909	4.43	8.41	1959	21.63	27.34			
1860	1.61	4.52	1910	4.62	8.70	1960	22.85	28.65			
1861	1.58	4.39	1911	4.80	8.97	1961	24.28	30.21			
1862	1.73	4.76	1912	5.03	9.32	1962	24.97	30.81			
1863	1.75	4.77	1913	5.30	9.73	1963	25.92	31.75			
1864	1.84	4.94	1914	5.41	9.83	1964	27.21	33.08			
1865	1.94	5.14	1915	5.65	10.16	1965	28.66	34.56			
1866	1.97	5.19	1916	5.87	10.45	1966	29.74	35.59			
1867	2.02	5.28	1917	5.34	9.39	1967	31.60	37.49			
1868	2.02	5.25	1918	5.12	8.92	1968	32.31	38.02			
1869	2.10	5.44	1919	6.00	10.35	1969	33.76	39.41			
1870	2.09	5.40	1920	6.39	10.90	1970	34.44	39.90			
1871	2.13	5.47	1921	5.77	9.72	1971	36.20	41.65			
1872	2.27	5.79	1922	6.39	10.65	1972	38.05	43.44			
1873	2.32	5.89	1923	6.56	10.87	1973	39.72	45.04			
1874	2.41	6.05	1924	6.56	10.80	1974	41.39	46.64			
1875	2.48	6.15	1925	6.97	11.39	1975	43.55	48.81			
1876	2.55	6.26	1926	7.07	11.49	1976	46.11	51.43			
1877	2.57	6.23	1927	7.34	11.88	1977	48.07	53.40			
1878	2.48	5.93	1928	7.66	12.36	1978	49.75	55.05			
1879	2.50	5.90	1929	8.39	13.47	1979	51.98	57.32			

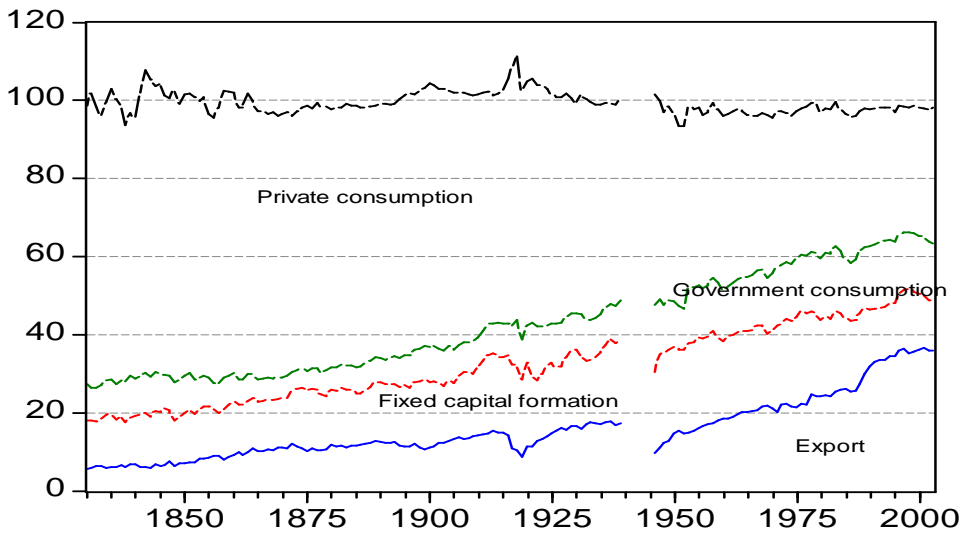


Figure 5: Demand components as percentage share of total supply of goods and services (imports and domestic production, GDP). Data for Norway 1830-2003. Data for the WWII years are not available.

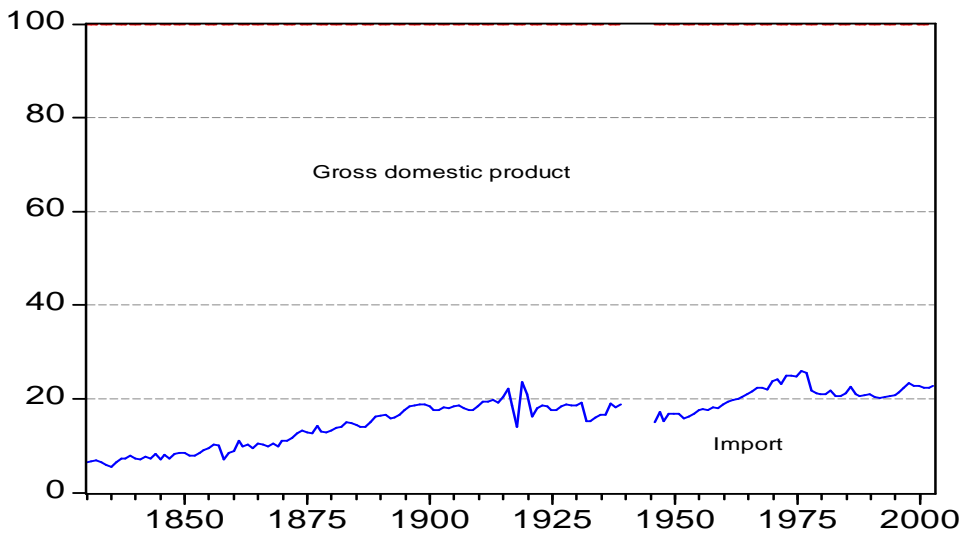


Figure 6: Decomposition of total supply (imports and domestic production, GDP) for Norway 1830-2003. Data for the WWII years are not available.

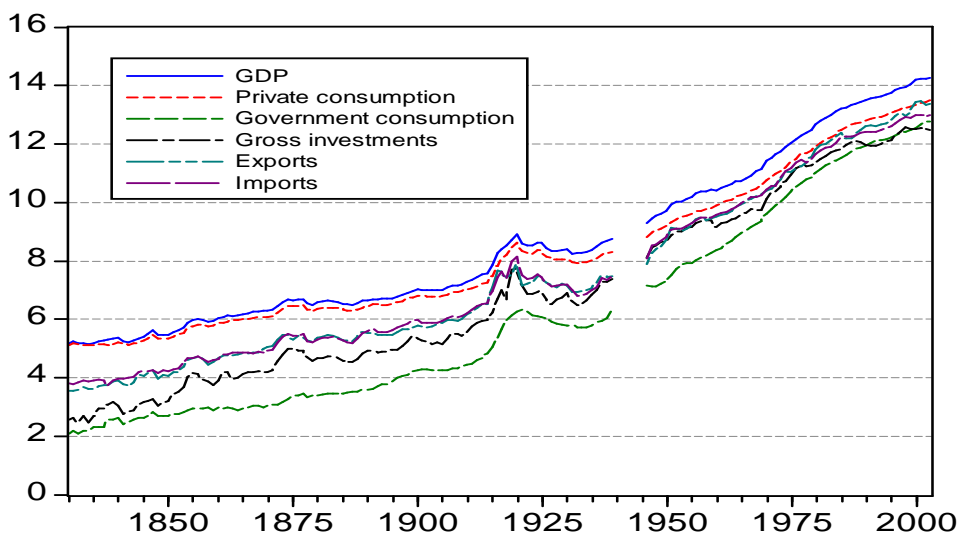


Figure 7: GDP for Norway 1830-2003 in current prices (mill NOK, logarithmic scale). Data for the WWII years are not available.

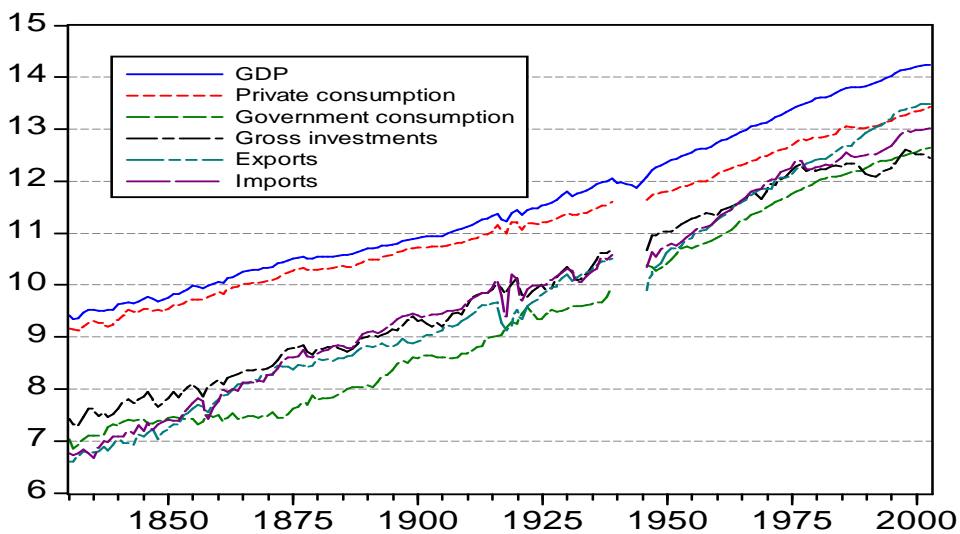


Figure 8: GDP for Norway 1830-2003 (mill 2000-NOK, logarithmic scale). Data for the WWII years are not available for the expenditure components.

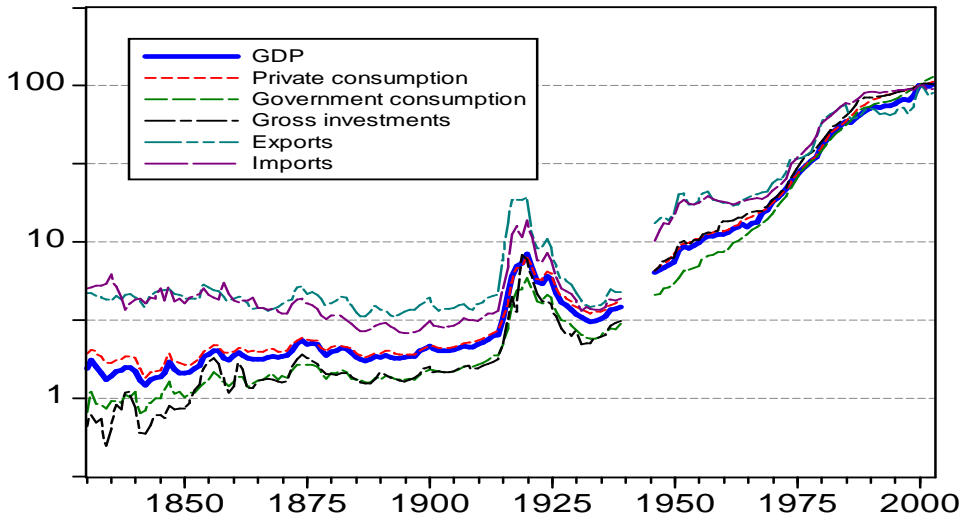


Figure 9: Price deflators 1830-2003 (2000=100), logarithmic scale. Data for the WWII years are not available.

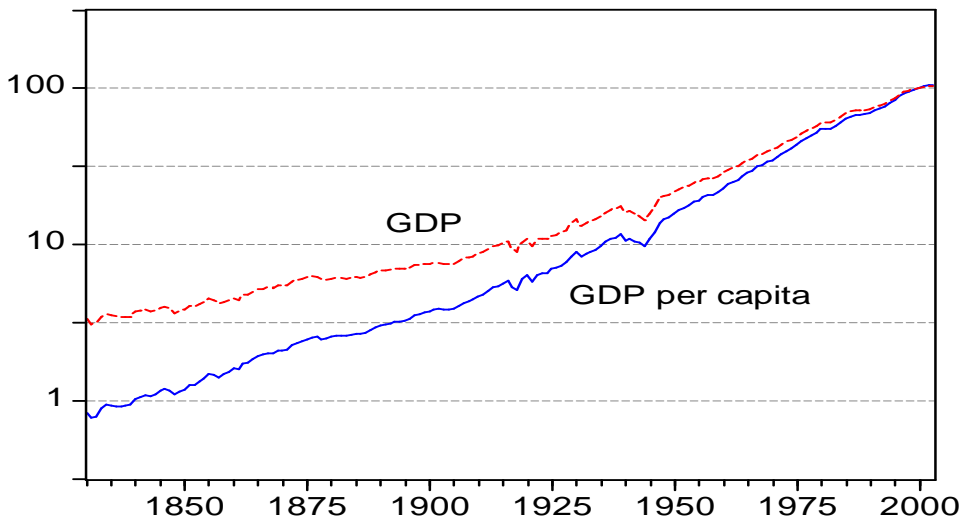


Figure 10: GDP for Norway 1830-2003. Volume indices including WWII (2000=100), logarithmic scale.

Chapter 7 – Historical exchange rate data 1819–2003

Jan Tore Klovland

1. Introduction

On April 15, 1819, exchange rate quotations began on the Christiania Stock Exchange. Prices were quoted twice weekly for bills on London, Hamburg, Amsterdam, Paris and, occasionally, also on Copenhagen and Stockholm.¹ The money market instruments which were used in the foreign exchange transactions did of course change over the 185 year period covered here - from bills of exchange to electronic transfer of bank deposits - but the procedures for quoting exchange rates on the stock exchange remained in principle much the same for 173 years. The quotations were discontinued after August 1991, when the daily publication of ‘representative market rates of exchange’ was left to Norges Bank.²

We have recorded monthly quotations for the most important exchange rates over the 185 year period from 1819 to 2003. With the exception of a few months in 1940 the British pound is continuously recorded over the whole period. The German hyperinflation in 1923-1924 and the collapse of normal financial relations with Germany in the aftermath of WWII create some gaps in the German exchange rate series, but apart from this, the prices of Hamburg banco, the reichsmark and the German mark together cover the whole period. The US dollar was first quoted in September 1914.

2. Exchange rate quotations

There are few measurement problems concerning ‘short’ exchange rates, which can be recorded without further computations. In the nineteenth century a *short* exchange rate is defined here as the price of a demand bill, which was payable at sight (*a vista*), or the price of a three day sight bill.³ The modern equivalent to short rates is the spot rate, which conventionally implies delivery within two working days.⁴ At the end of the 1850s the prices of short bill rates became the standard market quotation for bills on London and Hamburg. However, in the first forty years of our sample period

¹A copy of the first page of the ledger where the exchange rates were recorded is reproduced in Svov (1991).

²See Ramm (1969) and Svov (1991).

³We see that both these instruments were in use as from the late 1850s. Although strictly not identical the implied difference in price is so slight that we make no distinction between these rates here.

⁴See for example chapter 2 of Levi (1996).

there is a mixture of short and long bill prices. The most active markets were generally the ‘long’ bills of exchange (time bills) with maturities of one, two or three months. However, it is important to realize that these bill prices do not represent a short exchange rate series. The recorded prices of time bills must be corrected for the interest component in order to derive a consistent (short) exchange rate series, as explained below.⁵

By purchasing a demand bill on London or Hamburg the buyer would obtain the foreign currency immediately upon presentation of the bill. In the case of a three month time bill the money would only be available three months after presentation of the bill, with the addition of a grace period of three days.⁶ Letting the price of a time bill with d days to maturity be V_d , and the market rate of interest i , the relationship between the short exchange rate (demand bill) S and the time bill price is

$$V_d = S \cdot \left[1 - \frac{i}{100} \cdot \frac{(d+3)}{365} \right]$$

Thus, at a given date the time bill price was always lower than the price of a short bill because of a built-in interest component of the former. The difference is greater the longer the maturity d and the higher the market rate of interest i . Although previously a point of dispute, there is much evidence supporting the practice of using the interest rate in the drawee city (London or Hamburg in our case), where bills are payable, rather than in the drawer city (Christiania).⁷

Turning the expression around we use the following equation for converting time bill prices V_d into a short exchange rate series⁸

$$S = V_d / \left[1 - \frac{i}{100} \cdot \frac{(d+3)}{365} \right]$$

The pound sterling exchange rates are computed from the above formula on the basis of bill prices before May 1859. The interest rate is represented by a short market rate for first class bills in London.⁹ In the case of London three month bills dominated the market. There were two variants of the bills, one time bill payable at three months from the value date (time bill or date bill, *datoveksel* in Norwegian) and a three month sight bill. The price of latter was invariably 2 skilling (say 0.3 per cent) lower than the former, presumably because of the implied effective maturity of the sight

⁵This problem has traditionally been neglected by historians in the case of Norwegian exchange rates in the period 1819 - 1859. In fairness to these authors it may be noted that it is only with the contributions of Davis and Hughes (1960), Perkins (1975) and Offi cer (1996) that the proper distinction between bill prices and exchange rates has been generally acknowledged in the case of dollar-sterling, and that a reasonably accurate short exchange rate series was presented.

⁶Offi cer (1996, p. 61 and p. 295).

⁷This was convincingly argued by Perkins (1975). See Offi cer (1996, p. 69) for a review of these arguments.

⁸All exchange rate data before 1914 have been transcribed from contemporary newspaper sources, chiefly *Morgenbladet* prior to 1891 and *Farmand* thereafter.

⁹The time series was originally published in British Parliamentary Papers, 1857, X, part I, Report from the Select Committee of Bank Activity, pp. 463-464. The data can also be found in the *Economist*, December 27, 1862, pp. 1434-1435 and on the web site of the National Bureau of Economic Research at <http://www.nber.org/databases/macroeconomy/rectdata/13/m13016.dat>. The series was extended by the NBER from June 1857 using the rate of three month banker's bills taken from the *Economist*.

bill would be somewhat longer than the date bill because some days would elapse before the three month maturity period started to run due to the ocean transport to London.¹⁰ During the period from January 1854 to November 1857 one month bills rather than three month bills were most consistently quoted. From then until April 1859 a mixture of bill maturities were quoted; in general, the shortest available maturity was used as the basis for computing the short exchange rate data.¹¹ Beginning May 1859 short rates can be taken directly from the market quotations without further computations.

A similar procedure was adopted for the bills on Hamburg prior to August 1859, when short bill quotations became generally available. Again there are several changes with respect to the maturities most frequently quoted. Three month bills are used as the basis in two short periods: April 1821 - August 1822 and September 1832 - March 1833. Bills on Hamburg specified as 'short sight' was quoted between September 1822 and August 1832, which were used without adjustment. So were the quotations before April 1821, for which details as to maturity was scanty. Finally, one month bills were used as the basis of computations from April 1833 to July 1857.

In the case of Hamburg the difference between one month and three month bills was unchanged for long periods of time. Typically it was 1.5 percentage points in the 1820s and 1830s (when the exchange rate was well above 100), falling to one point in the 1840s and later on as the exchange rate hovered around par.¹² The latter figures are implicitly consistent with a market rate of discount of 5.5 to 6 per cent. To compute the short Hamburg exchange rates the interest factor in the above formula was set to 5 per cent, except for the years 1854 to 1858 when a monthly market rate of discount in Hamburg published in the German translation of Tooke and Newmarch (1859, p. 850) was used.

We only include currencies which were actually quoted in Christiania. Note in particular that there are no official US dollar quotations until September 1914.¹³ If a proximate dollar exchange rate is desired, such a series can easily be computed indirectly by using the dollar-sterling series provided by Officer (2001). The French franc and the Dutch guilder were quoted in Christiania quite regularly from 1881, Belgian franc from July 1898.¹⁴ Other European exchange rates until 1914 can be

¹⁰Between 1823 and 1844 three month sight bill quotations were most frequent. These were increased by 2 skilling to obtain the price of a corresponding time (date) bill.

¹¹For the years 1846 to 1865 the quinquennial reports of the county governor of the city of Christiania to the Ministry of the Interior, published as *Amtmændenes femårsberetninger*, contain monthly averages of bill prices on Hamburg and London. These monthly averages constitute a useful source, which can be used as an alternative series (with proper adjustments) to our end-of-month data. They have been exploited here mainly for the purpose of inferring the prevailing difference between one month and three month bill prices.

¹²On May 29, 1842, bills on Hamburg were quoted at 100.5 at one month, 100 at two months, and 99.5 at three months.

¹³In some periods the commercial banks' bid rate for US dollar was published in the financial press. In the second half of 1892 it appears for the first time in the commercial journal *Farmand*. It was quoted at kroner 3.68 as from June, falling to 3.67 in September 1892. The dollar exchange rate remained at 3.67 or 3.68 throughout the 1890s. US dollar quotations in *Farmand* were discontinued in the early 1900s.

¹⁴Exchange rates on Paris and Amsterdam were less frequently quoted before the 1880s. In 1862 the Stock Exchange Board stated that this was due to few transactions involving these currencies, see Ramm (1969, p. 57). Quotations for the Belgian franc were suspended between February 1915 and December 1918.

derived indirectly from Schneider, Schwarzer and Zellfelder (1991).¹⁵

3. The legal silver standard 1819 - 1842

The law of the monetary standard of 1816 attached the value of the speciedaler to silver. The par value of the speciedaler was specified as one mark fine silver (233.89 g) being equal to 9.25 speciedaler, which is equivalent to saying that one speciedaler contained 25.285 grams of fine silver. The silver value of one speciedaler was equal to that of three Hamburg banco, which was the standard benchmark value of silver currencies at the time.¹⁶ When exchange rate quotations began on April 15, 1819, the key exchange rate quoted was the price of 300 Hamburg banco.¹⁷ Quotations above 100 implied that the market value of the Norwegian speciedaler was below par, which in fact was to be case until April 1842.

The most active commercial bill markets were Hamburg and London. Monthly exchange rates on these two cities are listed in Appendix Table A1.¹⁸ Before 1877 the exchange rates on London were quoted for speciedaler, which was then replaced by the krone at the ratio of one speciedaler equal to four kroner. To preserve the continuity of the exchange rate quotations for sterling the original quotations before 1877 have been multiplied by four. The Hamburg quotations have not been adjusted since they had a par value of 100 and a new currency, the reichsmark, was introduced at the same time as the speciedaler was replaced by the krone. The monthly prices of Norwegian speciedaler as quoted on the Copenhagen Stock Exchange are also included for the years up 1865. In this case the par value was 200 Danish rigsbankdaler per 100 Norwegian speciedaler.

It turned out that the market price of the Norwegian speciedaler was lower than prescribed by the law of 1816 (Hamburg banco was quoted above 100); hence the convertibility of speciedaler into silver at the parity rate had to be suspended until further notice. In 1823 it was decided that the currency notes were to be exchanged for silver species at an adjustable exchange rate fixed by Norges Bank, which was not to be below a minimum rate determined by the Storting.¹⁹ Figure 1 shows how the value of the speciedaler as a percentage of par fluctuated between April 1819 and December 1842.

The silver value of the speciedaler is best measured by taking the inverse of the Hamburg banco short exchange rate.²⁰ A second, but somewhat more indirect, measure is provided by the price of Nor-

¹⁵From 1913 to the present some additional exchange rates (against the US dollar) not provided here are available in electronic form in Offi cer (2002).

¹⁶Keilhau (1952).

¹⁷Occasionally, silver species were also quoted on the Christiania Stock Exchange in the period to 1842. The price of species fluctuated in line with the Hamburg banco, but silver species seem to have been traded at a slightly higher price than the banco (corrected for the interest component) until the first half of 1826.

¹⁸Bill quotations on Amsterdam and Paris or Bordeaux can also be found, but these were far less frequent, so that a continuous series could not be derived for these currencies.

¹⁹See Keilhau (1952) for further details.

²⁰The silver value is computed as 10000/short banco rate. Because the quoted exchange rates are ask (sellers') rates, this

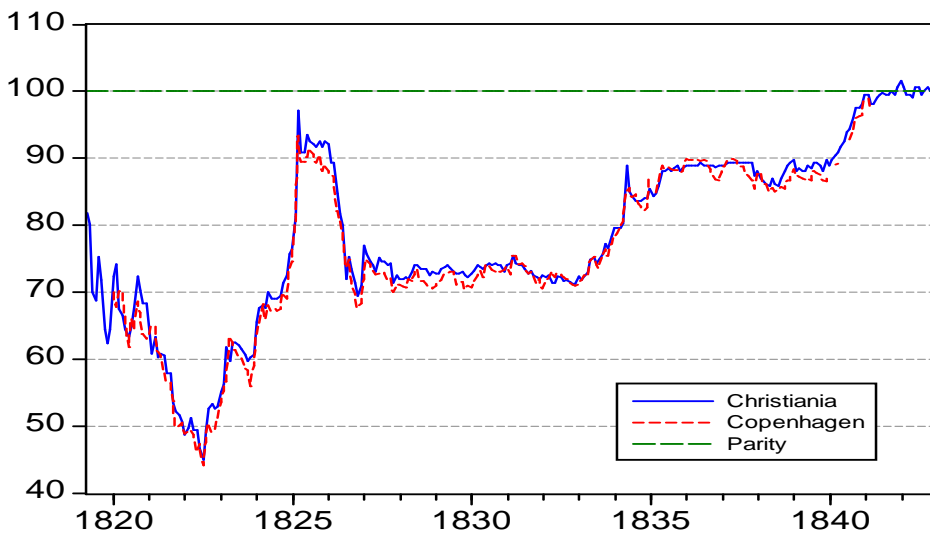


Figure 1: The silver value of the Norwegian speciedaler April 1819 - December 1842

wegian speciedaler notes in Copenhagen relative to the specie value of the Danish rigsbankdaler.²¹ The two measures of the silver value of the Norwegian currency move fairly closely together in this period, as can be seen from Figure 1.

The large fluctuations of the silver value of the Norwegian currency in the 1820s are evident in Figure 1. The currency depreciated, initially somewhat irregularly, towards an all time trough in July 1822, when it was about 45 per cent of its parity. Over the next three years it rebounded strongly, recovering to 93.5 per cent of parity in June 1825. The flourishing timber export trade with Britain, which peaked in 1825, may have been the primary source of the appreciation, but the rising currency value was brought about by some speculative purchases as well.²² When business cycle conditions deteriorated the speciedaler fell back and was stabilized at a level between 70 and 75 per cent of the parity. In 1834 it rose to slightly below 90 per cent, a level which was roughly maintained until the summer of 1840. A new period of appreciation followed, and by January 1841 it was firmly established at a level close to parity, which enabled the Storting to instruct Norges Bank to commence the conversion of notes for silver at the prescribed parity in April 1842. Then the legal silver standard may be said to have been superseded by the effective silver standard.²³

procedure actually renders a bid (buyers') rate series (cf. Levi (1996, p. 52)).

²¹The Danish currency also traded somewhat below parity in this period until its silver value was established at par in 1838. The monthly silver values of the Danish currency have been taken from Rubow (1918).

²²Kristiansen (1925, pp. 150-166), Keilhau (1952, pp. 79-83), Rygg (1918, pp. 278-280).

²³These are the terms used by Keilhau (1952).

4. The effective silver standard 1842 - 1873

This period is characterized by stable exchange rates. Since Britain was on the gold standard the pound sterling exchange rate did of course fluctuate a bit more than the Hamburg banco. Figure 2 graphs the two exchange rates. It was well known by leading contemporary observers that the relationship between the two exchange rates fluctuated in line with the (gold) price of silver. In a report to the Storting in 1873 Professor Broch tabulated the monthly ratios of Hamburg banco to pound sterling quoted in Christiania and the market price of silver in London over the years 1863 to 1872. He found that the exchange rate ratio had followed the fluctuations of the silver price in London with a ‘striking precision’.²⁴

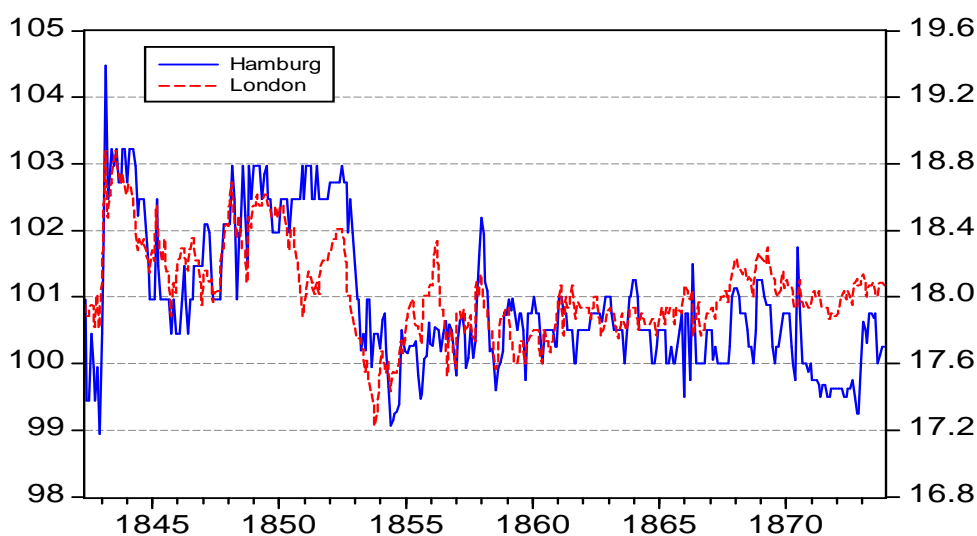


Figure 2: Hamburg banco and pound sterling May 1842 - December 1873

The price of pound sterling was of great commercial interest, but it was the silver currency, Hamburg banco, which was decisive for the functioning of the monetary regime. The exchange rate policy of Norges Bank in the 1840s was severely criticized by the Storting and by several authors for its lack of alertness and understanding of basic market principles.²⁵ At the end of March 1843 Hamburg banco was quoted as high as 104 for one month date bills (equal to 104.47 short). Norges Bank then immediately ceased all lending until late in 1844. In the severe European business cycle recession of 1848 it again ceased to grant new loans. In July 1848 it closed the exchange of notes for silver in Christiania and Bergen, restricting this activity to its head office in Trondhjem only, but raised its ask price for one month bills on Hamburg to 102.5 per cent. These measures may have slowed down

²⁴Norwegian Parliamentary Papers: Appendix to Oth. prp. no. 1 (1873), ‘Særligt Votum fra Professor O. J. Broch’.

²⁵See Keilhau (1952, pp. 100-102) and Rygg (1918, pp. 289-306).

the depletion of the silver stock of Norges Bank, as communications with Trondhjem, particularly at winter time, could be quite hazardous, but they were clearly in violation of the orthodox principles of a metallic standard.²⁶

In 1853 foreign exchange markets became normalized; from now on the short exchange rate on Hamburg rarely deviated more than one per cent from parity, as shown in Figure 2. The 1857-1858 commercial crisis was handled much more professionally by Norges Bank. The establishment of Kongeriget Norges Hypotekbank in 1852 implied that Norges Bank now could allocate somewhat more of its resources to discounting bills. The fierce criticism of the bank's decisions in the 1840s may also have led the board to follow more closely the conditions on European financial markets and strengthened the influence of the Christiania branch.²⁷

5. The gold standard 1874 - 1914

Beginning January 1, 1874, currency notes could be exchanged into gold rather than silver and Norway was effectively on the gold standard.²⁸ The gold standard period lasted until the outbreak of WWI. In 1875 Norway joined Sweden and Denmark in the Scandinavia Monetary Union.²⁹ The unit of account now became the krone, equal to one fourth of a speciedaler. Exchange rates were quoted in kroner as from the beginning of 1877.

In the gold standard period the exchange rates on London and Hamburg remained close to the parities, which were kroner 18.16 for one pound sterling and kroner 88.89 for 100 reichsmarks.³⁰ The exchange rates fluctuated largely within the band set by the costs of transporting gold to or from abroad. The exact position of the gold points is not known, and these may also have changed slowly over time, but Rygg (1954, p. 82) suggests that around 1900 gold export points may be estimated at 18.27 for pound sterling and 89.26 for reichsmarks. Between January 1877 and June 1914, a period of 450 months, it turns out that the pound exchange rate was equal to 18.27 or above in 19 months (about 4 per cent of the time); in the case of the reichsmarks 14 monthly observations above 89.25 were recorded.³¹ But there are only three months, November and December 1907 and March 1913,

²⁶In the first four months of 1849 the exchange rate on Hamburg remained at a high level, close to 103, indicating that the pressure on the bank had not abated. During winter time silver might have to be transported from Trondhjem to southern Norway on ships exposed to winter gales or by means of horse-drawn sleighs if the Christianiafjord was frozen. The board of directors of Norges Bank actually used the fact it was more difficult to transport silver from Trondhjem during the winter as an argument for not moving the head office to Christiania, see Rygg (1918, p. 256). This is perhaps the only example of remoteness being used as an instrument of monetary policy.

²⁷Several times during the century there were political campaigns with a view to move the head office of Norges Bank from Trondhjem to Christiania, but such proposals were resisted by the Storting until 1897.

²⁸Rygg (1954, p. 55).

²⁹See e.g. Bergman, Gerlach and Jonung (1993) and Kærgård and Henriksen (1995, 2003) for a discussion of various aspects of the Scandinavian Currency Union.

³⁰Exchange rates on Hamburg were quoted for reichsmarks beginning January 1877, replacing the old Hamburg banco.

³¹Note that this refers to one end-of-month quotation per month; it is of course possible that the gold points may have been violated earlier in the month. A more elaborate study of this issue would require weekly data.

in which the gold points were violated for both currencies simultaneously. There are two periods of turmoil on foreign financial markets when the exchange rate data suggest that violations of gold points were fairly frequent: December 1899 - January 1900 as well as during most of 1907 and the early months of 1908.³² In both episodes we know that gold was shipped from Norges Bank's domestic gold stock to London.³³

6. Fluctuating exchange rates 1914 - 1939

Table A2 of the appendix contains monthly data beginning in January 1914 for all currencies quoted regularly on the Oslo Stock Exchange.³⁴ In contrast to Table A1, which gave end-of-month quotations, all data in Table A2 are monthly averages of daily quotations.³⁵ We use the present abbreviations GBP and so on for these currencies for the whole period even if there were changes of denominations during the period. In the case of Germany DEM thus refers to reichmarks in the interwar years. Also note that Belgium rebased its currency in November 1926, letting one old franc correspond to 5 new BEF.³⁶ Some currencies were not quoted right from 1914, but were added to the exchange rate list in the following years. The data are mostly taken from the standard Statistics Norway sources, which begin in the years 1917 to 1920 for most currencies except GBP and USD, which go back to 1914.³⁷ However, for a number of currencies it was possible to extend the data series further backwards by computing monthly averages of the daily exchange rate quotations published in Diesen (1922).

On August 5, 1914, Norges Bank suspended the convertibility of notes for gold. The next twenty years represent a dramatic chapter in the history of the international exchange value of the Norwegian krone.

Figure 3 gives an overview of the exchange rate developments of this period. An index of the gold value of kroner is computed from the US dollar quotations in Oslo for the period from September 1914 to the end of 1932, when the United States was on the gold standard. The prewar parity, corresponding to kroner 3.73 per dollar, is set equal to 100.³⁸

³²See Klovland (1995) for more details.

³³Rygg (1954, p. 82).

³⁴After 1940 monthly data on the most important exchange rates are continued in Table A3. The number of currencies listed in Table A3 is reduced compared to Table A2, but exchange rate data for more currencies are available on the web site at <http://www.norges-bank.no>.

³⁵Actually, the data are more precisely defined as monthly averages of quotations on all active trading days of the month. Occasionally these monthly averages will not cover the whole month if trading was suspended.

³⁶To obtain a consistent series for BEF in the 1920s the exchange rate must accordingly be multiplied by a factor of 5 before November 1926.

³⁷The sources are the annual editions of *Statistical Yearbook of Norway*, monthly editions of *Statistiske meddelelser*, *Statistiske oversikter 1926* and *Statistics Norway* (1945). Beginning 1946 these sources were supplemented with data from the *Annual reports of the Oslo Stock Exchange* and the *Annual reports of Norges Bank*. From 1960 the source of all data is Norges Bank.

³⁸The gold index is computed as $100 \cdot 3.73 / S(NOK/USD)$, where the denominator is the actual dollar spot rate.

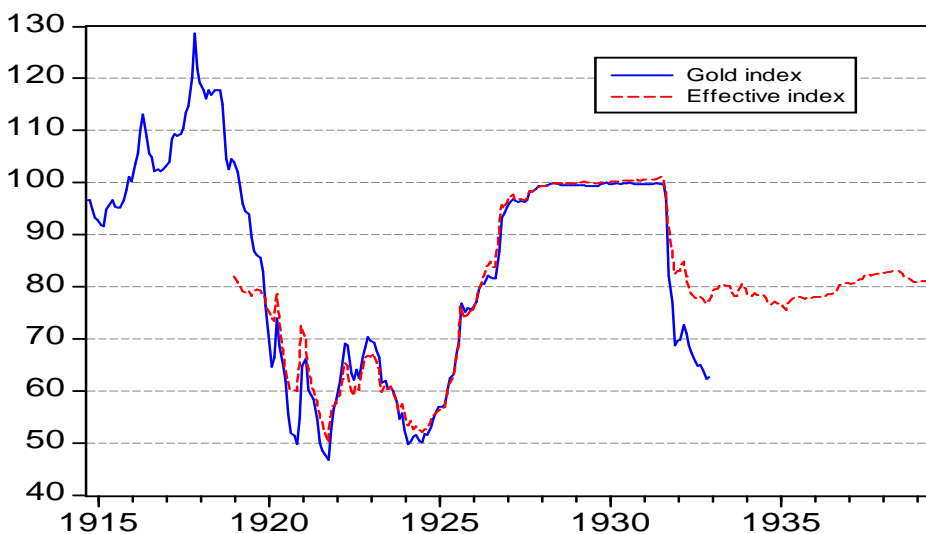


Figure 3: The gold content of the krone and the effective exchange rate 1914 - 1939

An effective exchange rate index for Norwegian kroner (1929 = 100) constructed in Klovland (1998) is also shown for the period beginning in January 1919. The krone index can also be found in Table A2. The weights of this index are derived from the value of bilateral trade in manufactures with 16 countries in 1929, excluding unmanufactured foodstuffs and raw textiles.³⁹ For both indices rising values imply a stronger krone.

After a mild initial depreciation against the pound and the US dollar, the krone was gradually strengthened during 1915, most likely a reflection of the soaring earnings from foreign shipping. After November 1915 the Norwegian krone was stronger than its gold parity, a situation which lasted until March 1919. The figure shows a dramatic fall in the value of the krone from its peak value in November 1917, when the US dollar was quoted at 2.90. From an index value of 128.6 of its parity in November 1917 it fell to 49.8 in November 1920. In October 1921 the krone reached its all-time low of 46.7 per cent of the gold parity. After a temporary dip below 50 again in February 1924 a period of unprecedented appreciation towards the prewar parity followed, which in particular gathered momentum in early 1925.

On May 1, 1928, the krone was back on the gold standard. When the United Kingdom abandoned gold in September 1931 all Scandinavian currencies followed suit. In effective terms, as measured

³⁹The exchange rates are monthly averages of daily quotations for spot exchange rates against US dollars in New York. For other currencies than the USD/NOK rate cross exchange rates (via USD) for NOK were used. Germany is only included beginning November 1924. The index was computed using geometric averages, which imply that the effective weight attached to each country remains invariant to changes in its currency value relative to the base period.

against the trading partners represented in the index, this implied a depreciation of about 20 per cent. After having depreciated somewhat during 1932 the krone was stabilized at kroner 19.90 to the pound as from July 1933, an exchange rate which was fixed until August 1939. The exchange rate policy in the 1930s is thus briefly but adequately summarized by characterizing Norway as an informal member of the sterling block.

7. Non-convertible exchange rates 1940 - 1958

Capital controls had been introduced in several steps during the 1930s, including measures which affected foreign exchange markets. Clearing arrangements were concluded with Germany in 1934 and with some less important European trading partners in the following years.⁴⁰ In March 1940 a currency agreement was made with the United Kingdom which restricted the foreign exchange market to so-called 'special pounds', sold at a fixed price of 17.75 kroner per pound. This currency could only be used for commercial transactions with the British empire.

During the first months after the occupation of Norway in April 1940 a number of measures were taken which ensured that no foreign currency transactions could be undertaken without the consent of Norges Bank. Spot exchange rates were still quoted on the Oslo Stock Exchange, but were equal to the administratively fixed clearing exchange rates.⁴¹ The pound and French franc quotations were suspended during the first war months, but were reintroduced in October 1940.

In principle the system did not change much after the war was over; the monetary authorities held a firm grip on all foreign currency transactions and the level of exchange rates. There was considerable debate concerning the appropriate postwar level of the exchange rate. In the end it was decided to fix the pound exchange rate at 20 kroner.⁴² The most notable event during the following years was the decision once again to follow pound sterling when Britain devalued in September 1949. The dollar exchange rate was raised from 4.97 to 7.15, a devaluation of 43.8 per cent.

The German mark was once again quoted beginning November 1949 at kroner 170.60 per 100 West-German marks, which was fairly close to the level at the end of WWII, kroner 176.75. The currency that showed most variation in this period is the French franc, which depreciated quite much until 1949. In 1960 quotations for new the franc were recorded, being equal to 100 old franc.

Until 1953 the exchange rates were rigidly fixed at the official parities set by the monetary authorities. A limited form of exchange rate flexibility was introduced in December 1953 for the European currencies operating within the arbitrage system of the European Payment Union.⁴³ This system

⁴⁰Rygg (1950, pp. 542-544).

⁴¹The French franc rate deviated somewhat from the clearing rate, see Statistics Norway (1945, p. 116).

⁴²See Norwegian Parliamentary Papers: St.meld. 3 (1945-1946) for a comprehensive discussion of this issue.

⁴³In addition to Norway the countries participating were Britain, France, Sweden, Denmark, Belgium, the Netherlands and

allowed fluctuations within 0.75 per cent of the parity.⁴⁴ In the following years we can therefore observe some slight variations in the exchange rates, except for the US dollar which was still fixed at 7.15. In principle exchange rate quotations were determined by linking the krone to the British pound and the exchange rates against the other EPU members followed the quotations of these currencies against sterling in London. But in practice there was some flexibility in the pound exchange rate; when there was pressure against sterling it was allowed to drop slightly below the parity of 20 kroner. In such episodes Norges Bank aimed at keeping the krone close to the parities of Swedish kronor and German marks.⁴⁵

At the end of 1958 Norway followed the decision of Britain and many other European countries and made the currency partly convertible.⁴⁶ A practical consequence of the extended convertibility was that US dollar quotations were no longer rigidly fixed at kroner 7.15 per dollar. Norwegian authorities could now in principle choose within the 0.75 per cent bands on either side of the parity which currency to peg; the relevant alternatives were the pound or the dollar.⁴⁷ In practice it seems that the krone essentially still followed the pound, but if the pound fluctuated much against the dollar the krone did not follow the pound all the way.⁴⁸

8. The period 1959 to the present

Modern exchange rate quotations present no problems of measurement and interpretation - in strong contrast to the fundamental problems of understanding their fluctuations. The history of exchange rate regimes is also fairly well known, and has been treated in more detail elsewhere than can be done here.⁴⁹ In appendix table A3 only the most important exchange rates are printed (but can be found on the web site) - GBP, USD, SEK, DEM, FRF and the EU currencies, ECU (coded as XEU) until December 1999, and the euro (EUR) thereafter. Quotations for DEM and FRF are discontinued after February 2002. On the accompanying web site additional exchange rate quotations for a number of currencies can be found.

Switzerland.

⁴⁴See the Annual Report of Norges Bank 1953, pp. 40-41.

⁴⁵This is explicitly stated in the Annual Report of Norges Bank 1956, p. 24.

⁴⁶In addition to the members of the previous arbitrage system of the EPU (see above) the currencies of Italy, Austria and Portugal were now freely determined. There were still restrictions on financial transactions and bilateral currency agreements with a number of countries. See the Annual Report of Norges Bank 1958, pp. 63-68.

⁴⁷Norway reported to the International Monetary Fund that the band against the US dollar was to be between kroner 7.09 and 7.20, or about 0.75 per cent on either side of the parity. Since most other countries also declared a similar band against the dollar, including Britain, the krone exchange rate against these currencies could theoretically fluctuate within a band of plus or minus 1.5 per cent of the parity.

⁴⁸See Oslo Stock Exchange report for the year 1959, pp. 168-170 (Oslo Børs: Økonomisk beretning for året 1959).

⁴⁹See e.g. Alstadheim (1995) and Norges Bank (1989, 1995) for an overview of Norway's exchange rate policy until the mid 1990s. An effective annual exchange rate index for the Norwegian krone covering the postwar years up to 1986 can be found in Klovland (1987).

9. Two centuries of exchange rates

We end this chapter by presenting a graph of the price of pound sterling extending over nearly two centuries. Figure 4 shows nominal and real exchange rates of the Norwegian speciedaler and krone against the British pound over the 185 years from 1819 to 2003. The real exchange rate is computed as

$$R = \frac{S \cdot P_{UK}}{P_{NOR}}$$

where S is the nominal spot exchange rate and P_{NOR} and P_{UK} are price indices for Norway and the United Kingdom, respectively. For Norway we use the consumer price index constructed by Grytten (2004). For Britain the cost of living indices constructed by Feinstein (1998, 1991) for the century before WWI have been spliced with the official cost of living or consumer prices index after 1914.⁵⁰ We note that if the real exchange rate remains constant through time the nominal exchange rate behaviour is consistent with the principle of purchasing power parity.⁵¹

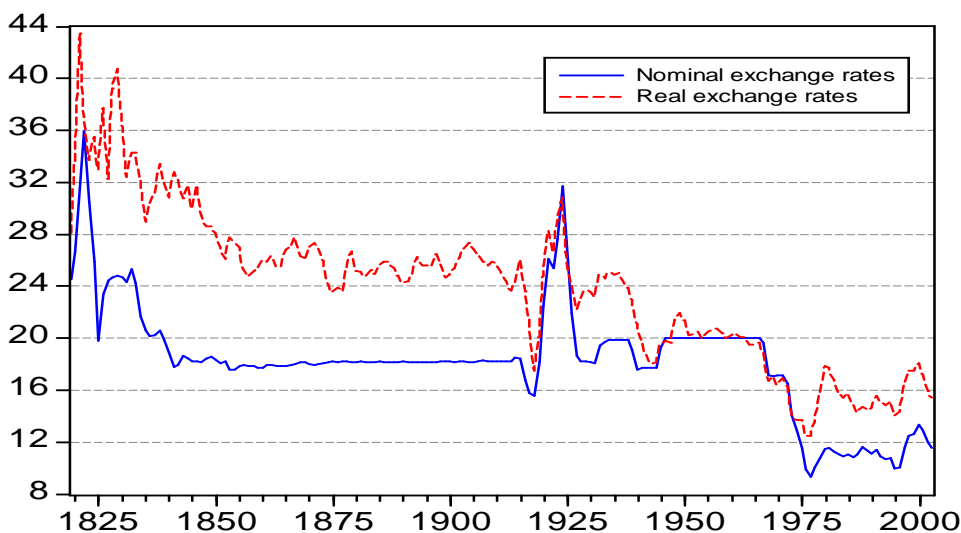


Figure 4: Nominal and real exchange rates against the British pound 1819 - 2003

Britain has been Norway's most important trading partner when these two centuries are viewed as a whole. The relative constancy of the nominal exchange rate against the pound during substantial periods is evident from Figure 4. The initial appreciation of the Norwegian speciedaler towards

⁵⁰The UK cost of living index for the years 1914 to 1988 has been taken from Mitchell (1998). Thereafter we have used the consumer prices index from the web site of Statistics UK at <http://www.statistics.gov.uk/CCI>. The various price series having different base years were spliced by the simple ratio method in an overlapping year and finally rebased to 1959 = 100 to make it comparable to the Norwegian index.

⁵¹Akram (2002) has shown that the PPP principle has considerable explanatory power in the case of the long-run effective exchange rate index over the years from 1972 to 1997.

silver parity after 1819 and the disruptions following WWI stand out as the most volatile periods. Beginning with the classical gold standard period and well into the post-WWII period the underlying notion of exchange rate stability in Norway was indeed defined with reference to the British pound. Britain's devaluation in 1967 and Norway's vain attempts at obtaining nominal exchange rate stability by attaching the krone to continental European exchange rate mechanisms from the 1970s mark a break with this principle.

Both nominal and real krone-pound exchange rates have appreciated over these years. The comparison of national price levels over two centuries is of course associated with a number of measurement problems, changes in indirect taxation and so on, which implies that movements in the real exchange rate curve should be interpreted with utmost caution. But if the broad outlines are approximately correct, the overall picture is one of extended periods of both nominal and real exchange rate stability, but interrupted by structural breaks, which establish the real rate at a new level.⁵² Between the mid-1850s and the late 1930s the long-run level of the real exchange rate is fairly constant, which is quite remarkable. The Second World War is accompanied by a transition to a lower level and the 1970s see a further real appreciation of the krone. But there is a clear tendency towards more stability in the real rate than in the nominal exchange rate in the postwar era, although the nominal appreciation against sterling goes further than implied by the relatively higher level of inflation in Britain than in Norway.

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A. Technical appendix: The data

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1819												
London				19.73	20.73	23.44	24.94	23.04	25.04	27.65	28.45	27.45
Hamburg banco				122.28	124.79	142.83	145.34	132.81	139.32	155.36	160.37	155.36
1820												
London	24.64	24.34	25.64	26.24	26.98	28.65	28.05	27.45	26.04	26.64	27.45	27.91
Hamburg banco	138.32	134.81	148.09	150.35	155.36	157.87	153.86	147.84	138.32	142.33	146.34	146.34
Speciedaler Cop.	200.00	185.00	185.00	185.00	170.00	157.50	170.00	168.75	177.50	172.50	163.75	162.50
1821												
London	29.05	30.05	28.85	30.05	30.05	32.05	32.05	31.65	34.06	34.96	35.04	35.16
Hamburg banco	154.86	164.38	157.87	166.12	164.60	165.10	172.70	172.70	187.39	191.44	193.46	197.52
Speciedaler Cop.	165.00	170.00	168.75	160.00	158.75	153.75	150.00	147.50	140.00	130.00	126.88	125.63
1822												
London	36.86	36.86	34.59	36.46	36.46	38.46	40.05	36.05	34.45	34.45	34.18	32.44
Hamburg banco	205.62	201.57	195.49	202.58	202.58	214.74	222.84	202.58	190.00	187.50	190.00	189.00
Speciedaler Cop.	123.13	125.00	125.63	123.75	117.50	119.38	110.63	119.38	126.88	124.38	127.50	127.50
1823												
London	32.71	32.64	29.71	31.31	28.17	29.71	29.77	30.11	30.17	30.91	30.51	30.11
Hamburg banco	181.50	178.00	162.00	167.50	160.00	160.00	161.00	162.50	165.00	167.50	166.00	165.00
Speciedaler Cop.	133.75	138.75	140.00	157.50	156.25	153.25	151.25	150.63	147.50	145.63	140.00	147.50
1824												
London	27.43	26.76	26.63	26.83	25.83	26.10	26.00	26.00	25.76	25.16	24.29	23.63
Hamburg banco	152.50	148.00	147.00	148.00	143.00	145.00	145.00	145.00	144.00	140.00	138.00	132.00
Speciedaler Cop.	157.50	162.50	170.63	165.00	170.00	160.00	160.63	160.00	160.63	166.25	157.50	163.75
1825												
London	23.16	22.09	18.15	19.29	19.62	19.09	19.29	19.29	19.53	19.29	19.30	19.30
Hamburg banco	131.00	123.00	103.00	110.00	110.00	107.00	108.00	108.50	109.00	108.00	109.00	108.00
Speciedaler Cop.	165.63	178.13	202.50	195.00	193.13	191.25	194.75	192.00	189.50	190.00	185.75	188.00
1826												
London	19.30	20.23	20.63	21.44	22.30	23.03	25.70	24.63	25.17	25.70	26.50	25.97
Hamburg banco	108.50	112.00	112.00	118.00	122.50	125.00	139.00	132.75	136.00	140.00	144.00	141.00
Speciedaler Cop.	191.00	196.50	205.00	189.50	186.00	181.50	169.75	170.75	164.00	159.00	155.00	155.00
1827												
London	23.30	24.23	24.70	24.56	25.10	24.56	24.42	24.29	24.29	24.14	25.12	24.49
Hamburg banco	130.00	132.00	134.00	135.00	137.00	133.00	134.00	134.00	135.00	134.50	140.00	138.00
Speciedaler Cop.	164.75	171.50	169.75	167.25	164.25	163.63	163.50	163.00	158.25	158.25	154.75	154.75
1828												
London	24.69	24.96	24.62	24.96	24.56	24.42	24.49	24.62	24.69	24.42	24.91	24.76
Hamburg banco	139.00	139.00	138.50	139.00	137.00	135.00	135.00	136.00	136.00	136.00	138.00	137.00
Speciedaler Cop.	156.50	155.25	155.50	159.00	156.75	157.75	158.75	154.75	153.50	150.25	147.75	146.75
1829												
London	24.70	24.63	24.63	24.53	24.49	24.63	24.90	24.89	24.82	24.76	25.43	25.36
Hamburg banco	137.50	137.50	136.00	135.50	135.00	135.75	137.00	137.50	137.50	137.00	138.00	138.50
Speciedaler Cop.	149.00	149.50	150.00	151.50	152.00	152.75	151.25	149.25	148.75	148.75	147.75	147.75
1830												
London	25.16	25.16	25.09	24.89	24.82	24.69	24.55	24.42	24.09	24.09	24.42	24.43
Hamburg banco	137.50	136.50	135.00	135.50	136.00	135.00	134.50	135.00	134.50	135.00	135.00	137.00
Speciedaler Cop.	147.75	149.25	151.75	153.75	152.50	154.50	154.00	153.63	153.25	154.50	154.75	154.75
1831												

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
London	24.09	24.09	23.83	24.16	24.06	24.10	24.37	24.56	24.49	24.63	24.83	24.97
Hamburg banco	135.00	134.50	132.50	134.50	135.00	135.00	136.00	137.50	136.75	138.00	138.50	139.00
Speciedaler Cop.	157.75	154.00	157.50	157.75	155.75	155.25	155.25	154.25	154.00	154.25	152.00	151.25
1832												
London	24.77	25.16	25.16	25.36	25.49	25.36	25.29	25.49	25.49	25.42	25.36	25.56
Hamburg banco	138.00	138.50	138.00	140.00	140.00	138.25	138.50	139.50	139.27	139.78	140.29	140.29
Speciedaler Cop.	148.75	151.25	152.00	153.50	151.75	152.00	153.00	152.25	151.75	151.50	150.75	149.75
1833												
London	25.16	25.42	25.15	24.75	24.22	24.25	24.35	24.29	23.62	23.29	23.23	22.76
Hamburg banco	138.26	139.27	138.26	137.12	133.60	133.10	134.61	133.60	132.10	129.59	130.59	127.58
Speciedaler Cop.	150.25	152.00	153.25	152.75	157.25	157.00	154.75	154.50	157.75	159.25	156.00	159.00
1834												
London	22.43	22.69	22.55	22.09	21.56	21.02	21.19	21.42	21.43	21.29	21.29	21.29
Hamburg banco	125.57	125.57	125.57	124.56	112.51	117.53	118.54	119.54	119.54	119.54	119.04	119.04
Speciedaler Cop.	161.50	163.00	164.75	166.75	176.00	176.75	173.75	175.00	172.75	171.75	170.50	170.75
1835												
London	20.83	21.16	21.16	20.83	20.09	20.36	20.29	20.59	20.29	20.49	20.49	20.36
Hamburg banco	117.03	118.54	118.03	116.53	113.51	113.51	113.01	113.51	113.01	112.51	113.51	113.01
Speciedaler Cop.	180.00		175.75	178.75	184.00	182.00	182.25	181.00	180.00	179.25	178.25	177.00
1836												
London	20.29	20.29	20.36	20.42	20.29	20.03	20.23	20.16	20.10	19.97	20.04	19.97
Hamburg banco	112.51	112.51	112.51	112.51	112.51	112.01	112.51	112.51	112.51	112.51	112.76	112.51
Speciedaler Cop.	181.50	181.25	181.25	181.25	181.00	181.00	181.25	180.88	178.50	176.50	175.50	174.75
1837												
London	20.14	20.10	20.10	20.30	20.16	20.16	20.26	20.36	20.36	20.36	20.22	20.62
Hamburg banco	112.51	112.51	112.01	112.01	112.01	112.01	112.01	112.01	112.01	112.01	112.01	114.52
Speciedaler Cop.	177.75	179.25	181.00	181.50	181.50	181.00	179.25	179.25	178.00	176.50	175.00	172.50
1838												
London	20.42	20.82	20.95	20.95	21.08	20.62	20.75	20.82	20.62	20.42	20.09	19.82
Hamburg banco	113.51	115.02	115.52	116.02	116.53	115.02	116.02	116.53	115.02	113.51	112.51	112.01
Speciedaler Cop.	177.00	177.25	174.00	174.00	171.75	173.00	171.75	171.50	171.50	171.00	173.25	173.25
1839												
London	19.69	20.09	20.09	20.16	20.09	19.97	19.97	19.71	19.81	19.78	20.04	19.71
Hamburg banco	111.50	113.51	113.01	113.51	113.51	112.51	113.01	112.01	112.01	112.51	113.51	111.50
Speciedaler Cop.	176.75	174.75	174.50	174.00	173.50	173.75	173.26	176.25	175.50	174.75	173.25	173.00
1840												
London	19.91	19.83	19.70	19.56	19.29	18.96	18.76	18.63	18.36	17.90	17.90	17.97
Hamburg banco	112.51	111.50	110.50	110.00	108.99	107.99	106.48	105.98	104.22	102.46	102.46	101.96
Speciedaler Cop.	175.00		178.00	178.50				185.75	187.50	192.00	192.50	193.00
1841												
London	17.63	17.76	18.03	18.09	17.89	17.76	17.83	17.63	17.76	17.70	17.70	17.76
Hamburg banco	100.45	100.45	101.96	101.96	100.96	100.45	100.20	100.45	100.45	99.95	100.45	99.45
Speciedaler Cop.	197.25	198.00	195.25				198.50		197.00			
1842												
London	17.59	17.89	18.16	18.16	17.95	17.89	17.89	17.95	17.95	17.82	18.01	17.81
Hamburg banco	98.45	99.45	100.45	100.45	100.96	99.45	99.45	100.45	99.95	99.45	99.95	98.95
1843												
London	18.08	18.28	18.88	18.48	18.61	18.68	18.81	18.88	18.75	18.68	18.75	18.68
Hamburg banco	100.45	101.46	104.47	102.46	102.97	103.22	102.97	103.22	102.71	102.71	103.22	103.22
1844												

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
London	18.61	18.68	18.68	18.61	18.48	18.28	18.35	18.31	18.35	18.28	18.22	18.15
Hamburg banco	102.71	103.22	103.22	103.22	102.97	102.21	102.46	102.46	102.46	101.96	101.46	100.96
Speciedaler Cop.							193.50	193.38	195.50		196.25	
1845												
London	18.28	18.21	18.55	18.42	18.28	18.22	18.35	18.15	18.15	17.88	18.09	18.03
Hamburg banco	100.96	100.96	102.46	101.46	100.96	100.96	100.96	100.96	100.96	100.45	100.96	100.45
Speciedaler Cop.					198.50	197.50	198.00				193.75	192.50
1846												
London	18.16	18.23	18.29	18.29	18.22	18.16	18.29	18.36	18.35	18.22	18.22	18.09
Hamburg banco	100.45	100.45	100.96	101.46	100.96	100.45	100.96	100.96	101.46	101.46	101.46	101.46
Speciedaler Cop.	196.25	198.50	198.00	197.25	198.50	197.63	197.25	197.50	196.25	194.75	193.00	192.00
1847												
London	17.95	18.16	18.16	18.09	18.11	17.97	18.03	18.04	18.04	18.24	18.29	18.44
Hamburg banco	101.46	102.09	102.09	101.96	101.21	100.96	100.96	100.96	100.96	101.46	102.09	102.09
Speciedaler Cop.	195.50	195.50	194.75	195.88	196.00	196.75	197.00	197.00	196.75	196.75	196.50	193.75
1848												
London	18.43	18.55	18.69	18.49	18.35	18.49	18.42	18.28	18.28	18.08	18.48	18.42
Hamburg banco	102.09	102.09	102.97	102.46	100.96	101.96	101.96	102.97	102.21	101.46	102.97	102.46
Speciedaler Cop.	195.25	195.63	194.38	194.00	194.25	193.50	197.25	197.00	193.00	193.33	192.00	193.00
1849												
London	18.55	18.55	18.61	18.55	18.55	18.61	18.61	18.55	18.55	18.48	18.48	18.55
Hamburg banco	102.97	102.97	102.97	102.97	102.46	102.84	102.97	102.46	102.46	101.96	101.96	101.96
Speciedaler Cop.	194.50	196.25	196.00	194.50	195.88	193.75	195.00	195.00	194.75	195.25	195.75	194.75
1850												
London	18.48	18.55	18.55	18.48	18.41	18.28	18.41	18.41	18.28	18.21	18.08	17.95
Hamburg banco	101.96	102.46	102.46	102.46	102.46	101.96	102.46	102.46	102.46	102.46	102.46	102.97
Speciedaler Cop.	195.13	195.56	197.00	195.13	195.75	197.50	198.13	197.63	198.50	197.13	197.13	197.13
1851												
London	17.89	18.02	18.15	18.12	18.08	18.02	18.08	18.02	18.15	18.22	18.22	18.22
Hamburg banco	102.46	102.97	102.97	102.97	102.46	102.46	102.97	102.46	102.46	102.46	102.46	102.46
Speciedaler Cop.	198.13	198.00	197.25	198.25	198.13	197.50	198.00	197.50	197.75	197.50	197.13	197.13
1852												
London	18.28	18.28	18.35	18.35	18.41	18.41	18.41	18.34	18.21	18.01	18.01	17.88
Hamburg banco	102.71	102.71	102.71	102.71	102.71	102.71	102.97	102.71	102.71	101.96	102.46	101.96
Speciedaler Cop.				197.25	197.25	198.50	199.63	198.50	199.13	197.75	197.00	197.13
1853												
London	17.81	17.75	17.75	17.75	17.68	17.55	17.62	17.49	17.42	17.36	17.23	17.30
Hamburg banco	101.46	100.96	100.96	100.20	100.45	100.20	100.96	100.96	99.95	100.45	100.45	100.45
Speciedaler Cop.	197.25	197.13	197.75	198.13	199.50	200.13	200.13	200.00	198.25	198.63	198.13	197.13
1854												
London	17.54	17.67	17.60	17.54	17.61	17.43	17.55	17.54	17.54	17.60	17.74	17.66
Hamburg banco	100.23	100.66	100.75	100.20	99.66	99.06	99.16	99.25	99.27	99.38	100.50	100.36
Speciedaler Cop.	197.50	198.00	197.75	197.25	197.13	198.38	196.88	198.75	198.38	197.38	195.75	193.63
1855												
London	17.74	17.88	17.95	17.98	17.97	17.83	17.82	17.76	17.72	18.01	18.01	18.01
Hamburg banco	100.18	100.16	100.27	100.27	100.27	100.34	99.82	99.47	99.54	100.07	100.11	100.61
Speciedaler Cop.	193.63	195.00	195.25	195.38	195.38	195.25	195.50	197.13	198.25	198.25	197.63	196.38
1856												
London	18.07	18.07	18.27	18.34	18.19	17.94	17.93	17.80	17.53	17.74	17.80	17.66
Hamburg banco	100.29	100.27	100.55	100.51	100.50	100.18	100.45	100.64	100.32	100.59	100.50	100.13

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Speciedaler Cop. 1857	196.88	199.00	199.88	200.00	200.00	200.50	200.25	199.88	200.75	199.50	199.38	196.63
London	17.57	17.91	17.91	17.86	17.92	17.78	17.83	17.89	17.76	17.73	18.09	18.00
Hamburg banco	99.83	100.34	100.64	100.73	100.45	99.93	100.08	100.55	100.09	100.34	100.91	101.62
Speciedaler Cop. 1858	198.00	199.50	200.00	198.50	199.00	200.00	200.50	200.50	200.75	200.38	198.38	199.50
London	18.13	18.00	17.93	17.93	17.80	17.80	17.73	17.57	17.60	17.87	17.87	17.89
Hamburg banco	102.18	101.93	101.23	101.09	100.18	100.23	100.09	99.59	99.93	100.02	100.18	100.77
Speciedaler Cop. 1859	195.38	197.25	199.75	198.75	198.63	200.00	199.63	200.38	200.25	200.13	198.63	199.13
London	17.93	17.93	17.73	17.73	17.60	17.60	17.67	17.73	17.73	17.60	17.73	17.77
Hamburg banco	100.73	100.96	100.80	100.98	100.75	100.50	100.75	100.75	100.50	99.75	100.75	100.75
Speciedaler Cop. 1860	199.25	198.88	198.88	198.88	198.00	198.13	199.88	200.38	199.88	200.13	198.75	198.88
London	17.77	17.80	17.80	17.80	17.67	17.60	17.80	17.73	17.73	17.67	17.73	17.83
Hamburg banco	100.75	101.00	100.75	100.75	100.50	100.00	100.50	100.50	100.50	100.50	100.50	100.25
Speciedaler Cop. 1861	197.88	198.88	199.63	199.00	198.25	198.88	200.13	199.63	199.88	199.38	198.63	199.13
London	17.83	18.00	18.07	17.77	18.00	17.93	17.93	18.07	17.93	17.87	17.97	17.93
Hamburg banco	100.25	101.00	101.00	100.75	100.75	100.50	100.50	100.50	100.00	100.00	100.50	100.50
Speciedaler Cop. 1862	199.00	199.75	199.25	198.63	198.50	199.13	199.63	200.50	200.13	199.75	199.50	199.38
London	17.93	17.93	17.93	17.93	17.87	17.93	18.00	18.00	17.87	17.77	17.80	17.83
Hamburg banco	100.50	100.50	100.50	100.50	100.75	100.75	100.75	100.75	100.75	100.63	100.75	101.00
Speciedaler Cop. 1863	199.38	199.50	199.38	199.63	200.25	199.63	200.63	200.38	199.25	199.88	199.88	199.50
London	17.90	17.93	17.90	17.90	17.82	17.75	17.83	17.90	17.83	17.80	17.87	17.93
Hamburg banco	101.00	101.00	100.75	100.50	100.50	100.50	100.50	100.50	100.00	100.50	101.00	101.00
Speciedaler Cop. 1864	198.63	199.63	199.25	199.50	200.00	199.88	200.38	200.13	200.25	200.00	199.13	198.13
London	17.93	17.93	17.87	17.80	17.90	17.87	17.83	17.83	17.83	17.87	17.87	17.77
Hamburg banco	101.25	101.25	101.00	100.50	100.50	100.50	100.50	100.50	100.50	100.00	100.00	100.25
Speciedaler Cop. 1865	197.75	197.63	197.63	199.13	199.75	200.13	200.13	200.13	200.13	200.25	199.75	199.63
London	17.82	17.87	17.93	17.83	17.93	17.90	17.93	17.93	17.83	17.93	17.92	17.90
Hamburg banco	100.50	100.50	100.50	100.50	100.00	100.00	100.25	100.00	100.00	100.25	100.50	100.75
Speciedaler Cop. 1866	199.88	200.13	200.63	200.38	200.38	200.38	200.63	200.38	200.00	200.38	200.13	200.00
London	18.00	18.07	18.03	17.98	18.03	17.77	17.87	17.97	17.77	17.80	17.80	17.90
Hamburg banco	99.50	100.75	100.75	99.75	101.50	101.00	100.00	100.00	100.00	100.00	100.00	100.50
Speciedaler Cop. 1867	199.88	200.13	200.63	200.38	200.38	200.38	200.63	200.38	200.00	200.38	200.13	200.00
London	17.90	17.93	17.93	17.87	17.97	17.97	18.00	18.00	18.03	17.97	18.03	18.13
Hamburg banco	100.50	100.50	100.06	100.25	100.00	100.00	100.00	100.00	100.00	100.00	100.25	101.00
Speciedaler Cop. 1868	199.88	200.13	200.63	200.38	200.38	200.38	200.63	200.38	200.00	200.38	200.13	200.00
London	18.20	18.23	18.17	18.17	18.13	18.17	18.10	18.12	18.10	18.00	18.17	18.23
Hamburg banco	101.13	101.13	101.00	100.75	100.75	100.75	100.50	100.25	100.25	100.00	100.50	101.25
Speciedaler Cop. 1869	199.88	200.13	200.63	200.38	200.38	200.38	200.63	200.38	200.00	200.38	200.13	200.00
London	18.27	18.23	18.22	18.20	18.30	18.20	18.13	18.10	18.02	18.00	18.04	18.15
Hamburg banco	101.25	101.25	101.00	100.88	100.88	100.88	100.25	100.00	100.25	100.25	100.50	100.75
Speciedaler Cop. 1870	199.88	200.13	200.63	200.38	200.38	200.38	200.63	200.38	200.00	200.38	200.13	200.00

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
London	18.05	18.10	18.07	18.07	18.03	17.93	17.93	18.10	17.97	17.94	17.97	17.93
Hamburg banco	100.75	100.75	100.75	100.25	100.00	99.75	101.75	100.75	100.00	100.00	100.00	99.88
1871												
London	17.93	17.98	18.03	18.00	18.03	18.00	17.93	17.93	17.93	17.87	17.90	17.88
Hamburg banco	100.00	99.75	99.75	99.75	99.68	99.50	99.68	99.68	99.50	99.50	99.63	99.63
1872												
London	17.88	17.90	17.92	17.98	18.03	17.98	18.03	18.00	17.95	18.08	18.11	18.07
Hamburg banco	99.63	99.63	99.63	99.63	99.50	99.50	99.63	99.63	99.75	99.50	99.25	99.25
1873												
London	18.08	18.13	18.08	18.00	18.07	18.07	18.08	18.03	18.00	18.08	18.08	18.07
Hamburg banco	100.00	100.63	100.50	100.31	100.75	100.75	100.69	100.75	100.00	100.13	100.25	100.25
1874												
London	18.07	18.13	18.12	18.10	18.08	18.07	18.13	18.13	18.10	18.15	18.23	18.23
Hamburg banco	100.50	100.38	100.25	100.25	100.00	99.75	99.88	99.88	99.75	100.00	100.25	100.25
1875												
London	18.23	18.27	18.30	18.28	18.30	18.12	18.23	18.05	18.12	18.07	18.15	18.11
Hamburg banco	100.00	100.00	100.25	99.88	99.63	99.00	100.13	100.25	100.25	100.25	100.25	100.31
1876												
London	18.20	18.23	18.20	18.10	18.13	18.08	18.13	18.15	18.10	18.10	18.10	18.20
Hamburg banco	100.25	100.25	100.00	100.00	99.75	99.50	99.88	99.88	99.88	99.88	99.88	100.25
1877												
London	18.22	18.24	18.20	18.15	18.18	18.20	18.18	18.20	18.24	18.20	18.24	18.20
Hamburg reichm.	89.15	89.15	89.05	88.80	88.80	88.80	89.00	89.10	89.24	89.20	89.25	89.25
1878												
London	18.23	18.24	18.18	18.16	18.18	18.15	18.16	18.25	18.24	18.24	18.24	18.24
Hamburg reichm.	89.25	89.25	89.15	89.00	89.00	89.15	89.20	89.25	89.25	89.10	89.25	89.25
1879												
London	18.18	18.22	18.24	18.16	18.16	18.12	18.15	18.15	18.17	18.13	18.15	18.12
Hamburg reichm.	89.20	89.10	88.95	88.80	88.80	88.75	88.75	88.70	88.80	89.10	89.15	89.10
1880												
London	18.12	18.13	18.13	18.11	18.14	18.13	18.16	18.16	18.15	18.15	18.12	18.12
Hamburg reichm.	89.05	88.80	88.65	88.70	88.75	88.75	88.75	88.75	89.00	89.00	88.90	88.90
1881												
London	18.18	18.21	18.21	18.22	18.19	18.17	18.19	18.21	18.18	18.20	18.18	18.20
Hamburg reichm.	89.05	89.00	88.90	88.90	88.85	88.90	88.85	88.95	89.05	89.10	89.10	89.20
Paris	71.75	71.90	71.80	71.85	71.95	71.85	72.05	71.90	71.85	71.85	72.00	72.00
Amsterdam	149.90	150.10	150.10	150.10	150.40	150.25	150.30	150.00	149.70	149.70	149.85	150.00
1882												
London	18.20	18.26	18.22	18.18	18.21	18.18	18.17	18.17	18.18	18.15	18.15	18.13
Hamburg reichm.	89.25	89.20	89.10	89.00	89.10	89.00	89.00	88.90	89.00	88.95	89.15	89.25
Paris	72.30	72.25	72.00	72.05	72.25	72.20	72.25	72.10	72.00	71.75	71.80	71.85
Amsterdam	150.35	150.35	150.35	150.50	150.85	150.40	150.25	150.10	149.75	149.50	149.60	149.50
1883												
London	18.18	18.20	18.18	18.16	18.20	18.20	18.20	18.21	18.16	18.13	18.13	18.14
Hamburg reichm.	89.15	89.10	89.10	88.90	88.90	88.90	88.90	88.90	88.95	89.00	89.15	89.10
Paris	72.15	72.15	72.10	72.00	72.00	71.90	71.95	71.95	71.90	71.80	71.85	72.00
Amsterdam	150.30	150.30	150.70	150.70	150.70	149.90	149.80	149.80	149.90	149.75	149.75	150.00
1884												
London	18.18	18.24	18.19	18.16	18.16	18.16	18.14	18.14	18.14	18.13	18.22	18.23
Hamburg reichm.	89.10	89.10	89.00	88.90	88.90	88.90	88.90	88.90	89.00	89.00	89.10	89.15

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Paris	72.20	72.25	72.15	72.05	72.05	72.05	72.05	72.05	72.05	71.90	72.00	72.05
Amsterdam	150.10	150.20	150.25	150.60	150.20	149.75	149.85	149.75	149.80	149.60	150.00	150.10
1885												
London	18.24	18.27	18.27	18.24	18.18	18.13	18.15	18.17	18.16	18.15	18.15	18.17
Hamburg reichm.	89.15	89.15	89.15	89.15	89.15	89.10	89.15	89.20	89.20	89.25	89.25	89.25
Paris	72.10	72.15	72.05	71.85	71.95	71.95	71.95	72.00	71.85	71.90	71.95	71.95
Amsterdam	150.30	151.00	151.00	150.60	150.60	150.50	150.60	150.40	150.25	150.50	150.60	150.60
1886												
London	18.21	18.17	18.16	18.15	18.15	18.09	18.10	18.13	18.14	18.12	18.15	18.13
Hamburg reichm.	89.25	89.10	89.05	89.00	88.90	88.85	88.90	88.90	89.00	89.00	89.05	89.05
Paris	72.10	72.15	72.20	72.20	71.85	71.60	71.70	71.75	71.70	71.60	71.60	71.55
Amsterdam	150.70	150.80	150.90	150.60	150.40	149.80	149.80	150.00	149.70	149.70	149.70	149.85
1887												
London	18.16	18.16	18.14	18.12	18.13	18.12	18.12	18.17	18.19	18.14	18.13	18.13
Hamburg reichm.	89.05	89.05	89.05	89.05	89.05	89.05	89.05	89.05	89.05	89.05	89.05	89.05
Paris	71.60	71.60	71.50	71.70	71.80	71.80	71.80	71.75	71.60	71.50	71.55	71.50
Amsterdam	149.85	149.85	149.90	150.10	150.30	150.10	150.10	150.00	150.00	150.00	150.00	150.00
1888												
London	18.12	18.14	18.13	18.13	18.13	18.11	18.15	18.19	18.19	18.17	18.17	18.18
Hamburg reichm.	89.10	89.10	89.10	89.00	89.00	88.95	88.95	88.95	88.95	89.10	89.15	89.15
Paris	71.55	71.80	71.65	71.65	71.60	71.80	71.75	71.70	71.60	71.65	71.70	71.70
Amsterdam	150.35	150.50	150.40	150.50	150.20	150.20	150.40	150.50	150.20	150.20	150.30	150.40
1889												
London	18.18	18.20	18.18	18.16	18.15	18.14	18.15	18.19	18.21	18.15	18.15	18.15
Hamburg reichm.	89.15	89.05	88.95	88.90	88.90	88.85	88.90	88.95	88.95	89.05	89.15	89.20
Paris	71.85	71.90	71.90	71.90	72.00	72.10	72.15	72.00	72.05	71.90	71.85	72.00
Amsterdam	150.40	150.50	150.60	150.60	150.65	150.40	150.40	150.40	150.20	150.00	150.00	150.20
1890												
London	18.23	18.22	18.15	18.15	18.13	18.14	18.19	18.17	18.19	18.17	18.22	18.18
Hamburg reichm.	89.15	89.05	89.15	89.15	89.15	89.20	89.10	89.10	89.20	89.30	89.35	89.40
Paris	72.15	72.10	71.95	72.05	72.10	72.00	72.05	71.90	71.90	71.85	71.80	72.00
Amsterdam	150.60	150.50	150.40	150.50	150.50	150.35	150.50	150.40	150.40	150.30	150.30	150.80
1891												
London	18.15	18.17	18.16	18.17	18.20	18.12	18.13	18.13	18.14	18.16	18.18	18.14
Hamburg reichm.	89.35	89.20	89.20	89.00	88.95	89.00	89.20	89.20	89.30	89.25	89.35	89.30
Paris	71.95	72.00	72.00	71.90	71.85	71.70	71.75	71.65	71.70	71.80	71.95	72.05
Amsterdam	151.10	150.90	150.70	150.40	150.25	150.10	150.30	150.20	150.20	150.20	150.50	150.40
1892												
London	18.16	18.18	18.17	18.15	18.14	18.11	18.14	18.14	18.12	18.12	18.12	18.12
Hamburg reichm.	89.10	89.10	89.00	88.95	88.95	88.95	88.95	88.95	89.00	89.00	89.00	89.10
Paris	72.10	72.05	72.10	72.15	72.00	71.90	72.10	72.00	71.95	72.00	72.05	72.10
Amsterdam	150.50	150.30	150.30	150.20	150.20	150.00	150.00	150.00	149.80	150.10	150.20	150.30
1893												
London	18.15	18.17	18.16	18.14	18.21	18.13	18.15	18.23	18.14	18.13	18.13	18.14
Hamburg reichm.	89.10	89.00	88.90	88.85	88.85	88.95	89.05	89.15	89.20	89.20	89.20	89.20
Paris	72.25	72.20	72.20	72.15	71.95	71.95	71.95	71.85	71.85	71.95	71.95	72.00
Amsterdam	150.60	150.85	150.35	150.00	150.00	149.80	149.60	150.00	150.50	150.80	150.60	150.75
1894												
London	18.20	18.19	18.14	18.14	18.14	18.11	18.12	18.11	18.10	18.10	18.12	18.12
Hamburg reichm.	89.10	89.00	88.95	88.90	88.90	88.90	88.90	88.90	89.00	88.95	88.95	88.90

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Paris	72.20	72.20	72.00	71.95	71.95	71.95	71.95	71.85	71.85	72.00	72.10	72.05
Amsterdam	151.00	150.90	150.70	150.40	150.10	150.10	150.10	149.80	149.85	150.00	150.10	150.00
1895												
London	18.15	18.20	18.17	18.18	18.18	18.12	18.17	18.16	18.14	18.16	18.19	18.15
Hamburg reichm.	88.90	88.90	88.90	88.90	88.90	88.85	88.90	88.90	88.95	88.90	88.90	88.90
Paris	72.10	72.10	71.95	71.95	72.05	71.95	71.95	71.90	71.85	72.00	72.10	71.95
Amsterdam	150.20	150.75	150.10	150.10	150.10	149.80	150.00	150.00	149.90	149.90	149.90	149.70
1896												
London	18.20	18.21	18.17	18.16	18.14	18.12	18.13	18.15	18.13	18.15	18.16	18.17
Hamburg reichm.	89.05	89.05	88.90	88.90	88.95	88.95	88.95	89.00	89.05	89.15	89.20	89.25
Paris	72.15	72.20	72.05	72.15	72.15	72.05	72.10	72.10	72.05	72.05	72.05	72.05
Amsterdam	149.80	150.00	149.90	150.20	150.00	149.80	150.00	150.00	149.80	150.00	150.30	150.20
1897												
London	18.18	18.20	18.14	18.13	18.13	18.11	18.11	18.13	18.14	18.12	18.12	18.15
Hamburg reichm.	89.20	89.10	89.05	89.00	89.00	89.00	89.00	89.00	89.05	89.10	89.10	89.10
Paris	72.15	72.25	72.10	72.15	72.25	72.10	72.15	72.10	72.00	72.00	72.00	71.95
Amsterdam	150.40	150.50	149.90	150.00	150.30	150.00	150.00	150.00	150.00	150.20	150.30	150.20
1898												
London	18.17	18.19	18.21	18.24	18.22	18.14	18.16	18.16	18.18	18.27	18.21	18.24
Hamburg reichm.	89.10	89.00	88.90	88.95	89.05	89.05	89.10	89.05	89.15	89.25	89.20	89.25
Paris	72.10	72.05	72.00	72.10	72.05	71.85	72.00	71.95	71.90	72.05	72.05	72.25
Antwerp							71.90	71.80	71.70	71.90	71.80	72.05
Amsterdam	150.70	150.80	150.50	150.80	150.80	150.55	150.80	150.60	150.40	150.70	150.50	150.50
1899												
London	18.24	18.24	18.22	18.22	18.20	18.18	18.24	18.21	18.21	18.24	18.22	18.31
Hamburg reichm.	89.30	89.30	89.30	89.20	89.05	89.00	89.05	89.05	89.10	89.20	89.20	89.15
Paris	72.40	72.40	72.30	72.25	72.25	72.20	72.30	72.15	72.15	72.20	72.20	72.15
Antwerp	72.30	72.30	72.15	72.05	72.10	72.05	72.15	72.00	71.90	72.00	72.10	72.15
Amsterdam	150.70	150.60	150.30	150.10	150.10	149.70	150.30	150.30	150.20	151.20	151.20	151.10
1900												
London	18.28	18.26	18.23	18.28	18.22	18.19	18.25	18.24	18.20	18.22	18.19	18.18
Hamburg reichm.	89.20	89.15	89.15	89.15	89.10	89.10	89.10	89.10	89.10	89.10	89.00	89.10
Paris	72.60	72.50	72.40	72.60	72.45	72.45	72.60	72.45	72.50	72.55	72.45	72.45
Antwerp	72.45	72.40	72.30	72.40	72.30	72.30	72.45	72.50	72.35	72.40	72.30	72.35
Amsterdam	151.50	150.90	150.40	150.70	150.50	150.45	150.70	150.50	150.45	150.85	150.70	150.70
1901												
London	18.24	18.22	18.16	18.16	18.17	18.12	18.15	18.15	18.14	18.14	18.17	18.14
Hamburg reichm.	89.05	89.00	88.95	88.90	88.85	88.90	88.90	88.90	89.00	88.95	88.95	89.00
Paris	72.55	72.25	72.10	72.15	72.20	71.90	72.10	72.05	71.90	72.30	72.20	72.15
Antwerp	72.40	72.20	72.00	72.05	72.05	71.85	72.05	72.00	71.85	72.15	72.10	72.05
Amsterdam	150.90	151.00	150.00	150.20	150.50	150.20	150.00	149.90	149.60	150.00	150.10	149.80
1902												
London	18.17	18.22	18.18	18.21	18.22	18.19	18.20	18.20	18.19	18.17	18.19	18.18
Hamburg reichm.	88.95	89.00	88.95	88.95	88.95	88.90	88.90	88.85	88.90	88.85	88.90	89.00
Paris	72.20	72.40	72.25	72.30	72.25	72.25	72.35	72.30	72.25	72.35	72.35	72.30
Antwerp	72.15	72.30	72.15	72.20	72.20	72.10	72.20	72.20	72.10	72.20	72.20	72.25
Amsterdam	149.80	150.10	149.90	150.00	150.00	149.80	149.95	150.05	149.95	150.00	149.90	149.90
1903												
London	18.25	18.26	18.24	18.24	18.20	18.15	18.16	18.14	18.18	18.18	18.21	18.19
Hamburg reichm.	89.05	89.05	89.00	89.00	89.05	89.05	89.10	89.05	89.20	89.10	89.05	89.05

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Paris	72.60	72.55	72.50	72.50	72.30	72.25	72.25	72.10	72.15	72.40	72.30	72.30
Antwerp	72.45	72.40	72.40	72.30	72.15	72.10	72.10	72.00	72.00	72.25	72.15	72.20
Amsterdam	150.20	150.20	150.25	150.35	150.10	150.10	150.45	150.35	150.40	150.90	150.95	150.95
1904												
London	18.24	18.24	18.20	18.17	18.16	18.17	18.18	18.19	18.16	18.14	18.13	18.13
Hamburg reichm.	89.05	89.05	89.05	89.00	89.05	89.10	88.90	88.95	89.05	89.20	89.10	89.00
Paris	72.50	72.50	72.40	72.40	72.30	72.05	72.05	72.05	72.10	72.25	72.15	72.15
Antwerp	72.30	72.35	72.15	72.25	72.15	72.05	72.05	72.10	72.05	72.10	72.05	72.00
Amsterdam	151.05	151.00	150.55	150.70	150.35	150.20	150.35	150.20	150.30	150.45	150.70	150.50
1905												
London	18.18	18.21	18.18	18.18	18.19	18.17	18.18	18.17	18.15	18.19	18.17	18.17
Hamburg reichm.	88.95	88.85	88.80	88.80	88.80	88.80	88.85	88.85	88.85	88.95	89.05	89.05
Paris	72.35	72.20	72.25	72.30	72.20	72.30	72.35	72.20	72.15	72.00	72.30	72.40
Antwerp	72.15	72.15	72.15	72.20	72.10	72.10	72.20	72.15	72.00	72.05	72.05	72.25
Amsterdam	150.60	150.65	150.85	150.55	150.40	150.50	150.60	150.50	149.95	149.90	149.90	150.15
1906												
London	18.22	18.22	18.21	18.21	18.22	18.20	18.22	18.20	18.21	18.27	18.27	18.27
Hamburg reichm.	88.90	88.85	88.90	88.90	88.85	88.85	88.95	88.95	89.05	89.05	89.10	89.20
Paris	72.50	72.45	72.50	72.45	72.35	72.35	72.40	72.35	72.30	72.35	72.40	72.35
Antwerp	72.35	72.30	72.50	72.20	72.15	72.10	72.15	72.20	72.10	72.15	72.15	72.15
Amsterdam	150.30	150.00	149.85	149.90	149.95	150.10	150.40	150.50	150.45	150.55	150.70	150.70
1907												
London	18.28	18.28	18.30	18.24	18.23	18.21	18.22	18.26	18.25	18.32	18.35	18.37
Hamburg reichm.	89.15	89.10	89.20	89.15	89.10	89.05	89.10	89.10	89.25	89.25	89.40	89.50
Paris	72.50	72.35	72.35	72.45	72.55	72.45	72.45	72.60	72.55	72.85	72.85	72.90
Antwerp	72.20	72.20	72.25	72.25	72.25	72.25	72.25	72.30	72.35	72.65	72.70	72.75
Amsterdam	151.00	150.65	150.85	151.00	151.05	151.05	151.10	151.00	151.30	152.00	151.50	151.50
1908												
London	18.28	18.27	18.23	18.23	18.21	18.17	18.15	18.14	18.14	18.17	18.19	18.20
Hamburg reichm.	89.25	89.20	89.30	89.20	89.20	89.15	89.00	88.95	88.95	88.90	88.85	88.95
Paris	72.65	72.50	72.50	72.60	72.45	72.35	72.25	72.20	72.20	72.40	72.50	72.50
Antwerp	72.60	72.45	72.35	72.30	72.30	72.15	72.10	72.05	72.00	72.10	72.20	72.25
Amsterdam	151.55	151.00	150.60	150.60	150.40	150.30	150.25	150.40	150.40	150.65	150.85	150.90
1909												
London	18.25	18.24	18.23	18.20	18.17	18.18	18.20	18.17	18.16	18.25	18.23	18.21
Hamburg reichm.	88.95	88.95	89.10	88.95	88.90	88.95	89.05	88.95	89.00	89.15	89.10	89.10
Paris	72.50	72.35	72.35	72.35	72.20	72.20	72.25	72.20	72.25	72.35	72.40	72.35
Antwerp	72.25	72.20	72.15	72.15	72.00	72.00	72.05	72.00	72.00	72.15	72.10	72.00
Amsterdam	151.00	150.65	150.65	150.80	150.40	150.65	150.50	150.25	150.20	150.30	150.20	150.20
1910												
London	18.22	18.21	18.22	18.25	18.25	18.18	18.18	18.19	18.18	18.20	18.21	18.18
Hamburg reichm.	89.05	89.05	89.05	89.00	89.00	88.95	88.95	88.95	88.95	88.90	88.95	88.95
Paris	72.35	72.40	72.30	72.25	72.25	72.20	72.15	72.10	72.05	72.05	72.00	71.95
Antwerp	72.05	72.05	72.00	72.00	72.00	71.95	71.90	71.80	71.75	71.75	71.80	71.80
Amsterdam	150.15	150.10	150.05	150.90	150.70	150.75	150.75	150.75	150.50	150.60	150.70	150.65
1911												
London	18.22	18.22	18.18	18.19	18.17	18.17	18.19	18.19	18.24	18.22	18.19	18.21
Hamburg reichm.	89.00	89.05	88.95	88.95	88.90	88.90	88.90	88.85	89.05	88.95	88.95	89.00
Paris	72.05	72.10	71.95	71.95	71.85	71.80	72.05	72.05	72.55	72.45	72.20	72.25
Antwerp	71.90	71.95	71.75	71.75	71.65	71.45	71.80	71.70	72.00	71.95	71.90	71.85

Table A1. Exchange rates monthly 1819 - 1914

End-of-month quotations at Oslo Stock Exchange, Norwegian speciedaler in Copenhagen

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Amsterdam	150.85	150.85	150.55	150.70	150.45	150.40	150.70	150.40	150.55	150.60	150.80	150.85
1912												
London	18.24	18.23	18.23	18.22	18.21	18.21	18.21	18.21	18.20	18.26	18.22	18.21
Hamburg reichm.	88.95	89.05	89.15	89.00	89.00	89.00	88.95	88.95	89.00	88.95	89.00	89.15
Paris	72.30	72.20	72.25	72.20	72.15	72.20	72.15	72.00	72.00	72.40	72.45	72.35
Antwerp	72.00	71.95	71.80	71.80	71.80	71.75	71.90	71.85	71.85	72.10	71.85	71.85
Amsterdam	151.00	150.85	150.85	150.95	150.85	150.90	150.90	150.70	150.70	151.00	150.75	150.85
1913												
London	18.26	18.28	18.28	18.27	18.23	18.24	18.25	18.22	18.21	18.26	18.24	18.22
Hamburg reichm.	89.15	89.25	89.35	89.25	89.20	89.20	89.15	89.15	89.20	89.10	89.00	88.95
Paris	72.45	72.35	72.35	72.45	72.35	72.30	72.30	72.20	72.15	72.20	72.10	72.05
Antwerp	72.00	71.95	71.90	72.05	71.90	71.75	71.90	71.80	71.70	71.75	71.70	71.60
Amsterdam	150.90	150.65	150.55	150.70	150.25	150.30	150.30	150.20	150.45	150.65	150.55	150.50
1914												
London	18.20	18.19	18.19	18.23	18.26	18.25	18.30	18.40	18.75	18.95	19.10	19.33
Hamburg reichm.	88.95	89.00	89.00	89.00	89.05	89.00	89.05	89.25	89.20	86.25	85.00	87.75
Paris	72.25	72.15	72.30	72.45	72.50	72.50	72.80	73.00	74.50	75.50	77.00	77.50
Antwerp	71.80	71.80	71.90	72.05	72.05	72.00	72.30	72.50	74.00	74.00	74.75	75.00
Amsterdam	150.70	150.75	150.55	150.75	150.45	150.60	150.70	151.50	156.00	159.50	161.00	162.00

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1914												
GBP	18.22	18.18	18.19	18.20	18.24	18.25	18.25	18.35	18.62	18.87	19.00	19.32
USD									3.86	3.86	3.93	4.00
DEM	88.92	88.94	88.99	88.97	89.03	89.02	89.02	89.18	89.28	87.79	85.04	87.51
FRF	72.21	72.21	72.17	72.34	72.49	72.49	72.54	72.99	74.08	75.05	76.14	77.61
NLG	150.75	150.75	150.59	150.63	150.65	150.52	150.63	151.20	154.61	159.88	159.58	162.00
1915												
GBP	19.34	19.49	19.49	18.67	18.43	18.17	18.39	18.29	18.14	17.94	17.39	17.25
USD	4.020	4.060	4.070	3.930	3.900	3.860	3.910	3.920	3.920	3.860	3.780	3.690
SEK										100.16	100.38	102.48
DEM	87.57	86.20	83.81	80.72	79.48	77.97	78.82	79.08	79.53	78.60	75.67	70.96
FRF	77.31	77.73	77.25	73.62	72.31	70.15	69.22	67.14	66.17	65.76	63.44	62.88
NLG	161.19	163.17	161.79	155.21	153.19	152.17	155.59	156.41	157.72	158.17	157.68	157.27
1916												
GBP	17.48	17.05	16.68	16.05	15.63	16.23	16.74	16.77	17.22	17.18	17.24	17.12
USD	3.720	3.600	3.530	3.390	3.300	3.430	3.530	3.560	3.650	3.640	3.650	3.640
SEK	101.60	101.50	100.33	100.02	99.97	100.09	100.61	100.75	102.32	102.30	102.67	104.46
DEM	68.40	65.87	62.61	62.18	61.87	62.68	63.73	63.23	63.93	63.44	62.30	59.80
FRF	63.16	60.90	59.14	56.26	55.46	57.67	59.53	59.71	61.74	62.06	62.21	61.72
DKK		100.50	100.19	100.01	99.94	100.84	100.05	99.32	99.18	99.39	97.00	97.83
NLG	164.85	152.71	149.31	144.04	136.09	141.83	146.04	145.84	148.15	148.03	148.27	147.07
1917												
GBP	17.06	17.01	16.32	16.77	16.23	16.19	16.05	15.58	15.41	14.69	13.70	14.47
USD	3.620	3.590	3.440	3.410	3.420	3.410	3.380	3.290	3.250	3.100	2.900	3.060
SEK	105.32	106.00	102.87	102.50	102.50	102.85	106.13	108.67	108.96	115.41	115.74	105.00
DEM	60.46	59.80	55.32	53.21	52.45	48.39	48.11	46.51	45.34	43.35	43.22	56.24
FRF	61.46	61.26	58.84	59.41	59.75	59.35	58.73	56.81	56.02	53.52	50.51	53.37
DKK	99.56	100.00	100.00	100.00	100.00	100.00	99.15	99.79	99.86	99.96	99.56	97.66
NLG	146.29	145.23	139.18	139.23	140.12	140.42	139.43	137.43	136.62	133.94	126.60	132.19
CHF								73.87	69.42	68.17	66.60	71.27
1918												
GBP	14.67	15.04	15.24	15.04	15.14	15.08	15.07	15.09	15.42	16.98	17.30	16.97
USD	3.130	3.170	3.210	3.170	3.190	3.170	3.170	3.170	3.240	3.570	3.640	3.570
SEK	103.77	104.14	104.77	107.07	108.18	109.84	112.69	112.73	108.58	106.35	102.75	103.79
DEM	60.54	60.89	62.39	62.44	62.55	60.06	55.05	52.61	50.13	55.08	50.00	43.27
FRF	54.12	55.47	56.05	55.41	55.86	55.60	55.55	56.27	59.30	65.30	66.67	65.57
DKK	96.12	97.05	98.52	99.11	99.58	98.92	98.31	99.49	98.11	98.30	97.40	96.03
NLG	134.27	140.22	147.08	149.90	157.31	161.39	164.04	164.26	157.16	154.64	152.80	152.03
CHF	70.89	71.04	73.80	74.97	78.01	80.64	80.32	77.98	73.62	74.12	73.66	73.64
BEF												64.47
1919												
GBP	17.08	17.40	17.74	18.05	18.40	18.36	18.50	18.38	18.09	18.26	18.45	18.69
USD	3.590	3.660	3.770	3.890	3.950	3.970	4.170	4.300	4.330	4.360	4.500	4.880
SEK	103.25	102.86	104.27	103.89	101.94	102.34	103.93	105.90	106.02	105.98	103.62	104.84
DEM	44.29	40.72	37.01	31.96	31.72	28.85	27.91	22.40	18.08	16.42	11.89	10.36
FRF	65.74	67.03	66.63	64.77	62.68	62.18	60.24	55.30	51.18	51.06	48.11	45.95
DKK	95.28	95.33	96.94	97.38	95.38	94.50	94.68	93.77	95.01	94.10	93.66	91.35
NLG	151.03	150.99	153.31	156.67	156.56	156.26	158.39	160.25	161.93	165.46	169.63	185.56
CHF	74.16	75.13	77.11	78.79	78.74	74.95	74.84	76.30	77.48	78.15	81.81	91.07
BEF	64.14	65.33	64.67	62.02	61.66	60.57	58.76	53.65	50.93	51.60	51.93	48.07

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FIM	40.26	39.88	38.31	40.38	40.10	35.96	31.63	28.89	24.83	19.97	17.29	15.95
Index	82.01	80.92	80.04	79.06	78.79	79.12	78.27	78.92	79.41	79.26	78.81	77.87
1920												
GBP	19.21	19.30	20.61	19.81	20.80	22.60	23.42	24.27	25.21	25.21	25.73	23.76
USD	5.210	5.770	5.620	5.050	5.430	5.750	6.050	6.730	7.180	7.260	7.490	6.810
SEK	108.00	107.58	113.06	110.34	114.51	124.86	132.26	137.87	144.97	143.01	143.02	133.28
DEM	8.780	6.110	7.080	8.710	11.990	14.950	15.490	14.230	13.050	10.760	9.960	9.450
FRF	44.86	41.17	40.45	31.20	37.27	45.40	49.50	48.20	48.50	47.56	45.24	40.57
DKK	92.03	86.45	94.64	90.40	90.55	96.51	99.19	100.09	100.21	101.13	100.42	100.81
NLG	197.81	215.38	206.02	187.15	197.76	207.32	212.23	220.91	224.82	224.61	226.60	211.40
CHF	93.82	95.69	95.64	90.69	96.17	104.54	107.29	111.74	116.74	115.81	116.64	105.47
BEF	45.19	42.63	42.31	33.77	39.24	47.98	52.90	51.77	51.64	50.47	48.03	42.88
ITL	38.48	33.10	31.04	23.11	28.35	34.58	35.77	33.35	31.63	28.90	27.55	24.21
ESP	99.26	101.21	99.50	88.07	91.41	95.17	97.29	101.48	106.07	104.74	98.12	89.06
FIM	19.90	24.26	29.79	28.00	28.27	27.12	24.75	22.17	22.83	19.10	16.45	16.78
Index	75.53	74.50	73.34	78.65	74.37	67.78	64.46	62.32	60.15	60.21	59.93	64.92
1921												
GBP	21.38	21.80	24.20	24.70	25.31	25.92	27.06	28.01	29.00	30.73	28.12	27.34
USD	5.750	5.630	6.200	6.300	6.390	6.860	7.470	7.680	7.800	7.980	7.090	6.600
SEK	122.18	125.13	140.68	147.95	148.18	153.84	157.63	162.08	169.77	183.26	164.51	161.67
DEM	8.960	9.250	9.920	10.010	10.340	10.020	9.460	9.210	7.620	5.690	2.930	3.720
FRF	36.80	40.51	43.87	45.57	53.44	55.45	58.56	59.64	57.08	55.51	51.20	51.57
DKK	102.60	104.28	106.98	113.78	115.29	117.97	118.25	123.92	137.91	150.79	130.99	128.64
NLG	188.78	192.65	213.27	218.68	226.40	228.63	238.36	238.67	247.20	265.96	248.17	239.58
CHF	90.20	92.45	105.53	109.36	114.05	116.78	123.94	129.51	133.98	145.33	133.85	128.39
BEF	38.78	42.51	45.97	47.01	43.50	55.23	57.58	58.16	56.43	56.99	49.55	49.54
ITL	20.84	21.12	23.88	29.23	34.15	34.60	34.52	33.26	33.24	31.79	29.62	29.49
ESP	77.98	79.24	86.77	88.17	87.04	89.96	96.08	99.60	101.86	105.99	97.85	96.88
FIM	18.46	18.63	16.75	14.47	13.69	11.90	12.38	11.68	11.18	12.34	13.57	12.66
Index	72.45	70.41	64.18	62.34	60.15	58.07	55.45	54.10	52.56	50.17	55.37	57.09
1922												
GBP	26.99	26.25	24.83	23.78	24.12	26.14	26.68	25.99	26.43	24.86	24.39	24.37
USD	6.400	6.020	5.680	5.400	5.430	5.890	6.010	5.830	5.970	5.610	5.450	5.300
SEK	159.55	157.47	148.71	140.70	140.04	151.86	155.96	153.55	158.10	149.70	146.43	142.89
DEM	3.570	3.060	2.000	2.000	1.960	1.930	1.310	0.630	0.430	0.220	0.090	0.075
FRF	52.18	52.38	51.27	49.81	49.61	51.60	49.63	46.43	45.78	41.53	37.26	38.40
DKK	127.89	124.38	120.02	114.17	116.55	127.44	129.57	125.78	126.14	113.55	110.41	109.70
NLG	235.27	226.71	215.30	204.81	209.80	227.75	233.15	226.39	231.74	218.88	214.05	211.34
CHF	124.28	118.31	110.70	105.29	104.48	112.02	115.04	111.09	112.40	103.94	100.62	100.34
BEF	50.13	50.13	48.09	46.24	45.58	48.50	47.18	44.06	43.29	38.89	34.72	35.39
ITL	28.15	29.46	29.39	29.16	28.83	29.44	27.83	26.51	25.75	23.59	24.59	26.72
ESP	95.77	94.86	89.33	83.94	85.23	92.33	93.84	90.75	91.67	85.81	83.40	82.87
FIM	12.15	12.21	12.00	10.73	11.49	12.90	13.06	12.51	13.12	13.18	14.05	13.44
Index	57.67	59.32	62.31	65.38	64.80	59.99	59.11	60.80	60.14	64.31	66.24	66.79
1923												
GBP	24.94	25.28	25.88	26.13	28.01	27.77	28.32	28.05	28.27	29.19	29.95	29.24
USD	5.360	5.390	5.510	5.620	6.060	6.020	6.180	6.150	6.230	6.450	6.830	6.710
SEK	144.27	143.64	146.78	149.69	161.58	159.99	164.09	163.86	165.47	170.43	179.92	176.68
DEM	0.044	0.022	0.027	0.025	0.015	0.007	0.003					
FRF	36.03	33.19	34.65	37.59	40.41	38.12	36.56	34.88	36.46	38.59	37.82	35.54

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DKK	106.63	103.26	106.04	106.43	113.18	108.40	108.52	113.64	112.94	113.46	117.87	119.87
NLG	212.52	213.49	217.77	220.13	237.29	236.08	242.56	242.13	244.91	252.59	260.02	255.51
CHF	100.88	101.63	102.76	102.49	109.35	108.18	108.64	111.11	111.44	115.38	119.93	117.18
BEF	33.09	29.44	30.19	32.51	34.81	32.68	30.48	28.09	30.51	33.05	32.54	30.88
ITL	26.55	26.13	26.69	28.02	29.52	27.75	26.84	26.56	27.56	29.23	29.82	29.17
ESP	84.07	84.64	85.62	86.13	92.40	90.12	88.58	84.14	84.53	86.99	89.39	87.54
FIM	13.47	14.25	15.22	15.50	16.81	16.66	17.08	17.07	16.84	17.30	18.03	16.62
Index	66.60	67.06	65.41	64.20	59.80	60.93	60.33	60.93	59.90	57.90	56.20	57.43
1924												
GBP	30.27	32.26	31.77	31.61	31.50	32.01	32.42	32.44	32.30	31.50	31.37	31.17
USD	7.110	7.500	7.410	7.280	7.230	7.410	7.440	7.220	7.240	7.030	6.820	6.650
SEK	186.39	196.50	194.80	192.26	191.67	196.97	198.28	192.43	192.81	187.17	182.97	179.40
DEM											164.00	158.94
FRF	33.50	33.48	34.72	44.78	42.26	39.18	38.55	38.21	38.67	36.93	36.08	36.08
DKK	121.21	120.41	116.44	121.31	122.46	124.80	119.92	117.40	122.70	122.16	119.82	117.51
NLG	265.93	280.98	274.91	271.06	270.60	277.89	282.75	280.71	278.99	274.96	273.12	269.29
CHF	123.32	130.41	128.16	128.32	128.28	131.05	135.42	136.22	136.89	134.95	131.82	129.06
BEF	30.12	29.20	28.82	37.93	35.54	34.05	34.21	36.29	36.16	34.02	33.14	33.15
ITL	30.99	32.72	31.84	32.46	32.20	32.14	32.15	32.14	31.74	30.80	29.73	28.64
ESP	90.74	95.71	94.22	99.24	99.81	99.97	99.19	96.92	95.86	94.21	92.66	92.72
FIM	18.43	18.87	18.50	18.27	18.10	18.50	18.74	18.20	18.17	17.68	17.19	16.75
Index	55.77	53.24	54.20	52.65	53.17	52.52	52.16	52.62	52.65	54.14	55.08	55.87
1925												
GBP	31.30	31.29	30.99	29.78	28.96	28.67	27.12	26.06	23.56	24.02	23.86	23.88
USD	6.550	6.560	6.490	6.210	5.970	5.900	5.580	5.370	4.860	4.960	4.920	4.930
SEK	176.70	176.86	175.08	167.52	159.81	158.06	150.14	144.36	130.42	133.08	131.87	132.10
DEM	156.53	156.37	154.87	148.23	142.44	140.63	133.20	128.06	115.87	118.38	117.38	117.45
FRF	35.51	34.87	33.72	32.39	30.95	28.32	26.36	25.28	22.96	22.28	19.71	18.61
DKK	116.90	116.96	117.35	114.77	112.40	112.77	118.84	124.89	119.67	121.94	122.74	122.77
NLG	265.30	263.85	259.47	248.47	240.18	237.15	224.19	216.11	195.58	199.63	198.28	198.17
CHF	126.94	126.47	125.29	120.25	115.62	114.80	108.59	104.37	94.09	95.73	95.07	95.23
BEF	33.21	33.49	33.02	31.69	30.09	28.01	26.04	24.43	21.63	22.57	22.43	22.43
ITL	27.47	27.08	26.46	25.55	24.36	22.85	20.59	19.74	19.87	19.94	19.81	20.01
ESP	92.93	93.34	92.28	88.78	86.74	86.05	81.14	77.40	70.00	71.21	70.34	70.04
FIM	16.53	16.53	16.36	15.70	15.07	14.91	14.15	13.57	12.30	12.56	12.46	12.48
Index	56.28	56.31	56.95	59.36	61.62	62.69	66.23	68.70	76.30	73.85	74.58	75.30
1926												
GBP	23.88	23.55	22.77	22.51	22.49	22.08	22.20	22.20	22.20	20.86	19.40	19.25
USD	4.920	4.840	4.680	4.630	4.630	4.540	4.565	4.570	4.575	4.300	4.000	3.965
SEK	131.87	129.83	125.70	124.17	124.00	121.77	122.44	122.40	122.30	115.00	106.94	106.09
DEM	117.21	115.49	111.66	110.31	110.27	108.19	108.75	108.82	109.00	102.45	95.14	94.51
FRF	18.70	17.87	16.86	15.80	14.81	13.58	11.57	13.13	13.26	12.68	13.77	15.79
DKK	122.19	123.25	122.58	121.41	121.33	120.32	121.02	121.40	121.50	114.38	106.64	105.78
NLG	197.83	194.53	187.89	185.95	186.20	182.56	183.50	183.50	183.50	172.15	160.13	158.86
CHF	95.15	93.58	90.33	89.50	89.59	88.06	88.50	88.50	88.50	83.15	77.32	76.82
BEF	22.45	22.14	20.22	17.26	14.73	13.61	11.42	12.83	12.62	12.16		
BEF											55.86	55.29
ITL	20.00	19.66	18.93	18.68	18.01	16.75	15.60	15.27	16.89	17.72	17.01	17.72
ESP	69.69	68.41	66.10	66.24	67.38	71.46	72.04	70.11	69.79	65.00	60.70	60.53
FIM	12.42	12.26	11.84	11.68	11.68	11.45	11.50	11.53	11.55	10.85	10.09	10.01

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Index	75.10	76.75	79.38	80.79	82.11	84.19	84.88	83.78	83.68	89.82	95.71	94.94
1927												
GBP	19.02	18.84	18.66	18.77	18.80	18.77	18.80	18.75	18.48	18.49	18.41	18.34
USD	3.920	3.880	3.850	3.870	3.872	3.866	3.873	3.859	3.800	3.798	3.777	3.758
SEK	104.77	103.70	102.90	103.57	103.60	103.59	103.73	103.55	102.22	102.35	101.78	101.52
DEM	93.03	92.11	91.30	91.65	91.81	91.64	91.96	91.87	90.16	90.73	90.24	89.85
FRF	15.58	15.29	15.11	15.17	15.20	15.18	15.20	15.14	14.94	14.95	14.88	14.80
DKK	104.57	103.60	102.55	103.15	103.38	103.37	103.53	103.37	101.82	101.84	101.32	100.89
NLG	156.92	155.47	153.99	153.99	155.00	154.92	155.15	154.73	152.43	152.72	152.57	152.06
CHF	75.71	74.79	74.02	74.02	74.53	74.45	74.57	74.45	73.36	73.33	72.92	72.63
BEF	54.60	54.09	53.52	53.52	53.88	53.77	53.87	53.75	53.02	53.01	52.75	52.60
ITL	17.20	16.85	17.43	17.43	21.09	21.71	21.26	21.10	20.74	20.84	20.64	20.29
ESP	62.82	65.34	66.94	66.94	68.40	66.72	66.34	65.43	65.28	65.77	64.19	62.69
FIM	9.890	9.810	9.720	9.720	9.750	9.750	9.750	9.740	9.590	9.600	9.640	9.490
Index	96.03	96.83	97.70	96.81	96.67	96.86	96.65	96.94	98.47	98.25	98.77	99.14
1928												
GBP	18.33	18.32	18.30	18.25	18.22	18.22	18.20	18.19	18.19	18.19	18.19	18.19
USD	3.759	3.758	3.750	3.740	3.733	3.733	3.741	3.748	3.750	3.752	3.752	3.750
SEK	101.14	100.94	100.74	100.47	100.25	100.24	100.26	100.37	100.40	100.38	100.34	100.40
DEM	89.64	89.73	89.74	89.52	89.37	89.31	89.35	89.43	89.46	89.43	89.46	89.46
FRF	14.80	14.80	14.79	14.76	14.75	14.72	14.70	14.70	14.70	14.78	14.73	14.73
DKK	100.76	100.70	100.60	100.40	100.20	100.20	100.10	100.10	100.10	100.10	100.10	100.13
NLG	151.75	151.42	151.07	150.84	150.68	150.69	150.68	150.46	150.43	150.48	150.65	150.70
CHF	72.55	72.74	72.32	72.17	72.00	72.02	72.13	72.21	72.25	72.26	72.27	72.32
BEF	52.55	52.50	52.39	52.30	52.18	52.20	52.25	52.23	52.22	52.22	52.25	52.25
ITL	19.93	19.95	19.88	19.80	19.75	19.72	19.70	19.70	19.69	19.70	19.70	19.70
ESP	64.51	64.10	63.26	62.90	62.62	62.06	61.83	62.46	62.22	62.96	60.65	60.98
FIM	9.480	9.480	9.470	9.450	9.430	9.420	9.430	9.450	9.460	9.470	9.470	9.470
Index	99.24	99.30	99.23	99.46	99.83	99.89	99.91	99.91	99.86	99.86	99.84	99.87
1929												
GBP	18.19	18.19	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20
USD	3.752	3.751	3.751	3.751	3.753	3.755	3.754	3.755	3.756	3.740	3.734	3.730
SEK	100.37	100.32	100.26	100.25	100.34	100.55	100.66	100.65	100.65	100.43	100.38	100.62
DEM	89.26	89.09	89.08	89.01	89.24	89.60	89.52	89.53	89.53	89.36	89.37	89.38
FRF	14.73	14.71	14.70	14.70	14.70	14.72	14.75	14.76	14.75	14.75	14.75	14.75
DKK	100.12	100.06	100.03	100.04	100.05	100.05	100.05	100.05	100.08	100.06	100.10	100.12
NLG	150.57	150.30	150.31	150.64	150.93	150.86	150.76	150.54	150.63	150.61	150.74	150.60
CHF	72.27	72.21	72.20	72.25	72.33	72.33	72.26	72.30	72.42	72.40	72.45	72.59
BEF	52.25	52.21	52.20	52.20	52.20	52.20	52.20	52.26	52.30	52.29	52.30	52.30
ITL	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.70	19.67	19.64	19.60
ESP	61.53	58.94	57.05	56.06	54.02	53.56	54.75	55.42	55.65	54.84	52.79	52.03
FIM	9.460	9.460	9.450	9.450	9.450	9.450	9.460	9.460	9.460	9.440	9.410	9.410
Index	99.91	100.03	100.09	100.13	100.09	99.98	99.93	99.88	99.86	99.99	100.06	100.07
1930												
GBP	18.21	18.19	18.17	18.17	18.16	18.15	18.16	18.17	18.17	18.16	18.16	18.16
USD	3.741	3.743	3.738	3.736	3.739	3.738	3.734	3.731	3.738	3.739	3.741	3.740
SEK	100.49	100.46	100.44	100.49	100.37	100.39	100.43	100.38	100.48	100.43	100.41	100.41
DEM	89.42	89.43	89.26	89.25	89.28	89.22	89.20	89.20	89.15	89.09	89.21	89.27
FRF	14.75	14.71	14.67	14.69	14.70	14.72	14.75	14.73	14.73	14.72	14.73	14.75
DKK	100.14	100.22	100.10	100.08	100.05	100.05	100.07	100.10	100.10	100.10	100.10	100.09

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NLG	150.62	150.24	149.99	150.25	150.46	150.35	150.31	150.42	150.64	150.78	150.63	150.70
CHF	72.48	72.30	72.37	72.46	72.43	72.46	72.61	72.62	72.64	72.67	72.62	72.62
BEF	52.26	52.23	52.20	52.23	52.25	52.25	52.27	52.27	52.24	52.25	52.25	52.32
ITL	19.64	19.65	19.65	19.65	19.65	19.65	19.65	19.60	19.62	19.62	19.62	19.65
ESP	49.81	48.24	46.54	47.00	46.13	44.55	43.74	41.50	40.91	39.28	42.90	41.14
FIM	9.420	9.440	9.430	9.430	9.440	9.440	9.440	9.420	9.440	9.440	9.440	9.440
Index	100.06	100.13	100.29	100.28	100.28	100.37	100.39	100.46	100.45	100.51	100.37	100.40
1931												
GBP	18.16	18.16	18.16	18.17	18.17	18.17	18.17	18.17	17.82	17.68	18.10	18.24
USD	3.745	3.740	3.740	3.740	3.736	3.735	3.743	3.745	3.856	4.540	4.845	5.433
SEK	100.24	100.17	100.20	100.18	100.19	100.18	100.20	100.17	100.31	105.52	101.89	101.76
DEM	89.08	88.98	89.14	89.13	89.00	88.77	88.77	88.94	91.48	106.74	115.94	129.40
FRF	14.72	14.70	14.70	14.66	14.66	14.69	14.74	14.74	15.24	18.09	19.16	21.50
DKK	100.06	100.06	100.05	100.05	100.05	100.05	100.05	100.05	99.96	100.05	101.63	101.38
NLG	150.68	150.22	150.33	150.20	150.18	150.42	150.83	151.03	155.70	185.13	196.19	219.85
CHF	72.54	72.25	72.07	72.10	72.12	72.54	72.79	73.09	75.51	90.14	94.98	106.69
BEF	52.30	52.25	52.23	52.13	52.05	52.10	52.30	52.31	54.00	64.33	68.03	76.43
ITL	19.65	19.65	19.65	19.65	19.61	19.60	19.62	19.65	20.23	23.91	25.28	28.08
ESP	39.66	38.77	40.66	39.84	38.04	36.83	35.71	33.59	35.37	41.79	42.60	46.42
FIM	9.450	9.450	9.440	9.440	9.440	9.440	9.440	9.450	9.750	10.250	9.570	8.820
Index	100.51	100.59	100.53	100.56	100.65	100.75	101.15	100.82	98.62	91.68	87.32	82.55
1932												
GBP	18.33	18.35	18.43	19.64	19.90	20.14	20.13	19.96	19.90	19.79	19.58	19.41
USD	5.365	5.345	5.140	5.250	5.425	5.540	5.675	5.755	5.741	5.825	5.981	5.950
SEK	103.15	103.26	101.70	100.42	101.72	103.62	103.53	102.79	102.41	102.37	104.53	106.41
DEM	127.87	127.20	122.66	125.13	129.58	131.51	135.09	137.36	136.88	138.89	142.87	142.10
FRF	21.22	21.12	20.30	20.75	21.49	21.86	22.34	22.61	22.56	22.95	23.55	23.32
DKK	101.50	101.53	102.11	107.83	108.95	110.20	109.14	106.82	103.44	103.08	102.37	101.03
NLG	216.66	215.94	207.75	212.90	220.41	224.29	229.27	232.06	231.09	234.93	241.26	239.65
CHF	105.40	104.63	100.11	102.14	106.35	108.38	110.93	112.43	111.17	112.88	115.87	115.03
BEF	75.18	74.81	71.78	73.73	76.53	77.50	79.14	80.27	79.98	81.38	83.63	82.72
ITL	27.48	27.88	26.90	27.18	28.13	28.43	29.11	29.60	29.61	30.00	30.75	30.60
ESP	45.71	42.60	39.77	40.59	44.40	45.97	46.21	46.88	46.94	48.17	49.51	48.99
FIM	8.130	8.490	8.620	9.170	9.270	9.350	8.760	8.700	8.700	8.700	8.700	8.700
Index	82.95	82.98	84.84	81.94	80.03	78.61	77.88	77.72	78.10	77.58	76.70	77.27
1933												
GBP	19.45	19.52	19.54	19.55	19.66	19.81	19.90	19.88	19.90	19.90	19.90	19.90
USD	5.805	5.734	5.703	5.480	5.030	4.830	4.340	4.450	4.300	4.290	3.910	3.920
SEK	106.23	104.50	103.66	103.07	101.64	102.21	102.95	102.86	103.00	102.99	102.85	102.85
DEM	138.58	136.53	135.71	134.07	137.94	138.68	142.92	145.05	152.01	152.35	148.98	146.14
FRF	22.74	22.50	22.48	22.54	23.19	23.17	23.50	23.84	24.92	25.01	24.43	23.98
DKK	88.79	87.44	87.34	87.56	88.07	88.60	89.19	89.10	89.25	89.25	89.25	89.25
NLG	233.79	230.65	230.07	230.70	236.41	236.28	241.51	245.24	256.22	257.48	251.38	245.85
CHF	112.46	111.26	110.75	110.67	113.88	113.79	116.11	117.89	123.35	124.00	121.12	118.71
BEF	80.87	80.16	79.87	79.96	82.33	82.33	83.87	85.13	88.93	89.12	87.09	85.17
ITL	29.90	29.48	29.38	29.57	30.79	30.83	31.83	32.09	33.53	33.70	32.99	32.27
ESP	47.95	47.53	48.44	48.99	50.66	50.48	50.32	51.22	53.44	53.59	51.56	50.30
FIM	8.700	8.700	8.700	8.710	8.750	8.810	8.850	8.890	8.900	8.900	8.900	8.900
Index	78.28	79.48	79.63	80.40	80.29	80.15	80.16	79.41	78.28	78.22	79.94	80.47
1934												

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
USD	3.965	3.988	3.945	3.890	3.924	3.965	3.969	3.947	4.007	4.050	4.008	4.045
SEK	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85
DEM	149.25	155.02	156.02	153.89	154.66	152.39	152.77	155.85	161.13	163.89	161.29	162.67
FRF	24.65	25.78	25.91	25.70	25.94	26.15	26.18	26.30	26.77	26.89	26.47	26.75
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25
NLG	252.50	263.33	264.68	263.42	265.99	268.52	268.54	269.56	274.49	275.77	270.89	273.41
CHF	121.78	126.69	127.34	126.32	127.69	129.07	129.34	130.17	132.56	133.18	130.53	131.39
BEF	87.86	91.33	91.80	91.10	91.95	92.80	92.67	93.80	93.35	95.40	93.87	95.10
ITL	33.04	34.44	33.98	33.43	33.51	34.21	34.15	34.30	34.90	35.07	34.39	34.62
ESP	51.84	53.30	53.90	53.50	54.09	54.42	54.50	54.75	55.67	55.90	55.03	55.52
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900
Index	79.59	78.31	78.25	78.69	78.37	78.45	78.32	77.91	76.93	76.55	77.13	76.77
1935												
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
USD	4.090	4.104	4.190	4.140	4.090	4.055	4.035	4.025	4.057	4.075	4.063	4.058
SEK	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85
DEM	163.95	164.72	169.52	166.91	165.06	164.01	163.12	162.57	163.35	164.22	163.60	163.45
FRF	26.98	27.13	27.84	27.39	27.05	26.87	26.82	26.76	26.80	26.93	26.83	26.85
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25
NLG	275.81	277.17	284.91	279.36	276.89	275.18	274.62	272.92	273.99	276.10	275.30	275.03
CHF	132.54	133.16	136.80	134.47	132.74	132.77	132.61	132.08	132.18	132.97	132.15	131.91
BEF	95.91	96.25	97.01	70.97	70.07	69.41	68.93	68.66	69.06	69.29	69.16	68.84
ITL	35.03	34.96	35.17	34.51	33.89	33.62	33.37	33.30	33.30	33.35	33.30	33.30
ESP	56.11	56.31	57.83	56.89	56.22	55.79	55.75	55.63	55.68	55.88	55.68	55.77
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900
Index	76.43	76.24	75.45	77.03	77.48	77.76	77.98	78.04	77.89	77.70	77.83	77.87
1936												
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
USD	4.035	4.002	4.024	4.047	4.026	3.986	3.983	3.980	3.973	4.085	4.090	4.073
SEK	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85
DEM	163.05	163.02	162.97	163.16	162.67	161.03	161.10	160.55	159.70	164.45	165.06	164.20
FRF	26.79	26.80	26.78	26.74	26.58	26.35	26.46	26.28	26.13	19.23	19.15	19.15
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25
NLG	274.94	274.69	270.59	274.73	272.33	269.69	271.17	270.19	266.80	219.70	221.29	222.57
CHF	132.04	132.55	132.55	132.32	130.87	129.76	130.86	130.27	127.95	94.51	94.64	94.15
BEF	68.74	68.69	68.76	68.93	68.62	67.84	67.72	67.54	67.47	69.13	69.64	69.26
ITL	33.30	33.30	33.30	33.30	32.52	31.91	31.75	31.72	31.52	22.00	22.00	22.00
ESP	55.70	55.60	55.60	55.50	55.24	54.62	54.49	51.27	44.19	39.09	36.75	36.75
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900
Index	78.02	78.10	78.06	78.00	78.22	78.64	78.60	78.72	79.17	80.42	80.37	80.62
1937												
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
USD	4.073	4.084	4.092	4.068	4.047	4.050	4.025	4.012	4.036	4.034	4.002	4.001
SEK	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85	102.85
DEM	164.28	164.53	164.96	163.96	162.93	162.78	162.32	161.79	162.38	162.41	162.07	161.55
FRF	19.15	19.15	18.97	18.44	18.25	18.17	15.56	15.20	14.50	13.69	13.74	13.75
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25
NLG	223.36	223.71	224.21	223.12	222.64	223.12	222.14	221.64	222.97	223.40	222.34	222.87
CHF	93.91	93.70	93.73	93.22	93.03	93.15	92.72	92.65	93.38	93.51	93.17	93.00

Table A2. Exchange rates monthly 1914 - 1940

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
BEF	69.04	69.25	69.49	68.98	68.75	68.77	68.23	68.01	68.42	68.50	68.61	68.45
ITL	22.00	22.00	22.00	21.82	21.60	21.60	21.54	21.50	21.50	21.50	21.37	21.40
ESP	34.97	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33	33.33
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900
Index	80.70	80.55	80.69	81.10	81.39	81.45	82.20	82.24	82.12	82.30	82.47	82.52
1938												
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.90
USD	3.998	3.983	4.010	4.015	4.022	4.031	4.053	4.093	4.163	4.191	4.245	4.278
SEK	102.85	102.83	102.77	102.85	102.85	102.85	102.85	102.85	102.85	102.84	102.85	102.82
DEM	161.46	161.56	161.90	161.84	162.03	162.74	163.39	164.58	166.91	168.39	170.50	172.09
FRF	13.53	13.24	12.69	12.59	11.52	11.37	11.37	11.35	11.35	11.35	11.35	11.42
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25
NLG	223.10	223.25	223.17	223.35	223.14	223.52	223.62	224.03	224.89	228.39	231.11	232.97
CHF	93.00	93.00	92.92	92.70	92.33	92.76	93.29	94.13	94.48	95.76	96.66	97.36
BEF	68.08	68.02	68.17	68.16	68.25	68.93	69.17	69.57	70.79	71.41	72.35	72.65
ITL	21.40	21.35	21.39	21.39	21.37	21.45	21.50	21.69	22.07	22.30	22.57	22.77
ESP	24.33	24.33	24.33	22.22	20.60	18.98	18.98	18.98	18.98	18.98	18.98	18.98
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900	8.900
Index	82.63	82.76	82.82	82.84	83.06	82.95	82.80	82.47	82.01	81.67	81.17	80.82
1939												
GBP	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.82	17.85	17.71	17.35	17.35
USD	4.282	4.265	4.265	4.270	4.270	4.268	4.270	4.284	4.400	4.400	4.400	4.400
SEK	102.81	102.83	102.80	102.83	102.82	102.76	102.80	103.12	105.25	105.25	105.25	105.25
DEM	172.25	171.76	171.60	171.76	171.91	171.73	171.75	172.07	177.11	179.19	179.00	179.00
FRF	11.46	11.45	11.45	11.45	11.45	11.45	11.45	11.43	10.66	10.45	10.20	10.13
DKK	89.25	89.25	89.25	89.25	89.25	89.25	89.25	89.25	86.23	85.50	85.50	85.50
NLG	232.61	229.30	226.91	227.29	229.25	227.40	227.75	229.78	238.00	237.19	236.70	236.40
CHF	97.26	97.24	97.05	96.33	96.56	96.78	96.82	97.40	101.00	100.90	100.50	100.28
BEF	72.84	72.46	72.25	72.32	73.24	73.05	73.00	73.23	76.38	76.00	74.82	74.47
ITL	22.76	22.70	22.62	22.60	22.60	22.60	22.60	22.73	23.75	23.45	23.00	23.00
ESP	18.98	18.98										
FIM	8.900	8.900	8.900	8.900	8.900	8.900	8.800	8.940	9.250	9.130	9.160	9.200
Index	80.88	81.03	81.08	81.05	80.97	81.01	81.00					
1940												
GBP	17.50	17.51	17.23	17.75						17.75	17.75	17.75
USD	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400
SEK	105.25	105.21	105.25	105.25	105.25	105.25	105.25	105.25	105.25	105.25	105.21	105.10
DEM	179.00	179.00	179.00	176.75	177.00	177.14	177.50	177.50	177.29	176.75	176.75	176.75
FRF	10.19	10.22	9.86	9.20						9.52	9.95	9.50
DKK	85.50	85.41	85.40	85.40	85.40	85.40	85.40	85.40	85.40	85.40	85.40	85.40
NLG	236.76	236.60	236.50	236.50						235.00	235.00	235.00
CHF	100.25	100.25	100.25	100.25	99.75	99.82	100.65	101.25	101.25	102.60	103.00	103.00
BEF	75.42	75.66	76.15	76.61						71.50	71.50	71.50
ITL	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.01	23.10	23.10	23.10	23.10
FIM	9.200	9.200	9.200	9.200	9.200	9.200	9.200	9.200	9.200	9.200	9.200	9.200

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1941												
GBP	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
USD	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400
SEK	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10
DEM	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75
FRF	9.250	9.000	9.020	9.630	9.960	10.130	10.200	10.200	10.200	10.040	10.000	10.000
1942												
GBP	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
USD	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400
SEK	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10
DEM	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75
FRF	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1943												
GBP	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
USD	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400
SEK	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10
DEM	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75
FRF	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1944												
GBP	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
USD	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400	4.400
SEK	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10	105.10
DEM	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75	176.75
FRF	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
1945												
GBP	17.75	17.75	17.75	17.75	19.28	20.05	20.05	20.05	20.05	20.05	20.05	20.05
USD	4.400	4.400	4.400	4.400	4.780	4.970	4.970	4.970	4.970	4.970	4.970	4.970
SEK	105.10	105.10	105.10	105.10	114.10	118.60	118.60	118.60	118.60	118.60	118.60	118.60
DEM	176.75	176.75	176.75	176.75								
FRF	10.00	10.00	10.00	10.00						10.25	10.25	9.43
1946												
GBP	20.05	20.05	20.05	20.05	20.05	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970
SEK	118.60	118.57	118.55	118.55	118.55	118.55	130.25	138.30	138.30	138.30	138.30	138.30
FRF	4.200	4.200	4.185	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180
1947												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
FRF	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180	4.180
1948												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
FRF	3.810	2.325	2.325	2.325	2.325	2.325	2.325	2.325	2.325	2.124	1.890	1.890
1949												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	4.970	4.970	4.970	4.970	4.970	4.970	4.970	4.970	5.842	7.150	7.150	7.150
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
DEM											170.60	170.60

Table A3. Selected exchange rates monthly 1941 - 2003

	Monthly averages of daily quotations at Oslo Stock Exchange											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FRF	1.890	1.890	1.890	1.883	1.883	1.883	1.833	1.833	1.914	2.049	2.049	2.049
1950												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
DEM	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60
FRF	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049
1951												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
DEM	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60
FRF	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049
1952												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30
DEM	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60
FRF	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049
1953												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.30	138.31
DEM	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	170.60	171.08
FRF	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049	2.049
1954												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.22	138.01	137.82	137.59	137.69	138.13	137.95	137.99	138.16	137.87	137.61	137.85
DEM	171.43	171.19	171.02	170.67	170.47	170.59	170.92	170.95	170.78	170.47	170.28	170.38
FRF	2.047	2.044	2.040	2.036	2.034	2.040	2.042	2.042	2.051	2.047	2.044	2.047
1955												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.02	20.01	20.01	20.01	20.01	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.06	138.04	137.65	137.70	137.95	138.51	138.99	139.19	139.07	138.76	138.10	137.98
DEM	170.52	170.30	169.89	170.00	170.49	171.04	171.44	171.28	171.27	170.85	170.59	170.72
FRF	2.054	2.056	2.051	2.043	2.048	2.051	2.058	2.059	2.056	2.042	2.041	2.041
1956												
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.01	20.00	19.99	20.00	19.96	19.95
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	137.83	137.90	137.87	137.75	137.77	138.28	138.80	138.98	138.87	138.39	138.65	138.15
DEM	170.81	170.92	170.95	170.77	170.84	171.38	171.48	171.32	171.18	171.03	170.83	170.46
FRF	2.037	2.040	2.038	2.036	2.036	2.043	2.044	2.042	2.040	2.039	2.037	2.032
1957												
GBP	19.99	20.01	20.00	20.01	20.00	19.99	20.00	19.99	19.96	19.99	20.01	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.02	138.09	138.20	138.06	138.36	138.47	138.48	138.60	138.24	138.14	138.17	138.33
DEM	170.42	170.43	170.38	170.35	170.48	170.78	171.36	171.38	170.97	170.18	170.15	170.34
FRF	2.031	2.032	2.035	2.031	2.032	2.036	2.042	1.836	1.743	1.694	1.696	1.704
1958												

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GBP	20.02	20.02	20.02	20.02	20.02	20.02	20.00	20.00	20.01	20.01	20.02	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.18	137.99	137.97	138.09	138.32	138.50	138.72	138.75	138.43	138.21	138.34	138.35
DEM	170.19	170.21	170.41	170.77	171.13	171.29	171.46	171.28	171.29	171.33	171.25	171.32
FRF	1.704	1.700	1.697	1.698	1.700	1.704	1.707	1.708	1.706	1.703	1.702	1.672
1959												
GBP	20.02	20.04	20.05	20.05	20.05	20.02	20.02	20.02	20.02	20.02	20.02	20.01
USD	7.140	7.140	7.130	7.130	7.130	7.120	7.120	7.130	7.140	7.140	7.150	7.150
SEK	138.07	138.13	138.06	137.88	137.93	137.86	137.90	137.98	138.26	138.13	138.15	138.28
DEM	170.99	171.01	170.83	170.59	170.67	170.72	170.66	170.65	171.00	171.07	171.55	171.75
FRF	1.458	1.458	1.458	1.456	1.457	1.456	1.455	1.457	1.460	1.457	1.459	1.461
1960												
GBP	20.02	20.03	20.03	20.02	20.02	20.01	20.03	20.04	20.04	20.04	20.04	20.03
USD	7.150	7.150	7.140	7.130	7.130	7.140	7.130	7.130	7.130	7.130	7.130	7.140
SEK	138.25	138.35	138.15	138.35	138.45	138.55	138.45	138.55	138.35	138.25	138.20	138.25
DEM	171.80	171.75	171.70	171.45	171.45	171.65	171.45	171.35	171.25	171.25	171.15	171.45
FRF	146.00	145.85	145.75	145.65	145.75	145.95	145.85	145.75	145.65	145.55	145.65	145.75
1961												
GBP	20.04	20.03	20.01	20.01	20.01	20.00	20.00	20.01	20.03	20.04	20.04	20.03
USD	7.140	7.150	7.150	7.150	7.160	7.170	7.170	7.150	7.130	7.120	7.120	7.130
SEK	138.45	138.55	138.65	138.55	138.95	139.00	139.25	138.75	137.00	138.05	138.05	138.10
DEM	171.55	171.70	176.25	180.45	180.65	180.00	180.75	179.55	179.00	178.55	178.25	178.75
FRF	145.95	146.10	146.25	146.15	146.35	146.55	146.65	145.65	145.25	145.00	145.15	145.45
1962												
GBP	20.04	20.05	20.05	20.06	20.05	20.03	20.04	20.03	20.05	20.03	20.03	20.03
USD	7.130	7.130	7.130	7.130	7.130	7.140	7.140	7.150	7.150	7.150	7.150	7.150
SEK	138.25	138.45	138.40	138.65	138.75	138.95	139.00	139.00	139.00	139.05	138.75	138.00
DEM	178.75	178.50	178.60	178.65	178.75	178.95	179.55	179.15	179.10	178.65	178.75	179.00
FRF	145.75	145.65	145.65	145.75	145.85	145.95	146.00	146.10	146.25	146.25	146.20	146.10
1963												
GBP	20.04	20.03	20.02	20.01	20.01	20.01	20.02	20.03	20.02	20.03	20.03	20.02
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.160	7.160	7.160	7.160	7.160
SEK	138.10	138.20	138.00	137.85	137.95	138.10	138.15	138.00	138.25	138.15	138.25	138.10
DEM	178.75	178.85	179.00	179.35	179.55	179.85	179.85	179.95	180.15	180.25	180.35	180.55
FRF	146.05	146.10	146.15	146.05	146.15	146.10	146.10	146.20	146.35	146.35	146.35	146.35
1964												
GBP	20.03	20.03	20.03	20.02	20.01	20.00	19.98	19.97	19.95	19.95	19.96	19.97
USD	7.160	7.160	7.160	7.150	7.150	7.160	7.160	7.170	7.170	7.170	7.160	7.160
SEK	138.25	138.45	138.95	139.35	139.45	139.55	139.65	139.70	139.85	139.15	139.15	139.35
DEM	180.45	180.65	180.55	180.25	180.25	180.35	180.45	180.55	180.65	180.70	180.65	180.25
FRF	146.35	146.45	146.35	146.20	146.15	146.25	146.40	146.40	146.55	146.55	146.65	146.25
1965												
GBP	19.97	19.99	19.98	19.99	20.01	19.99	19.97	19.97	19.98	20.02	20.03	20.02
USD	7.160	7.160	7.160	7.160	7.160	7.160	7.160	7.160	7.150	7.150	7.150	7.150
SEK	139.55	139.55	139.55	139.60	139.55	139.00	138.75	138.55	138.55	138.35	138.45	138.40
DEM	180.25	180.35	180.35	180.15	179.95	179.35	179.15	178.70	178.85	179.00	179.00	179.00
FRF	146.25	146.25	146.25	146.25	146.20	146.35	146.35	146.25	146.15	146.05	146.05	146.10
1966												
GBP	20.03	20.04	20.00	20.00	20.00	19.98	19.97	19.95	19.95	19.95	19.95	19.95
USD	7.150	7.150	7.160	7.160	7.160	7.160	7.150	7.150	7.150	7.150	7.150	7.150

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SEK	138.55	138.55	138.95	139.10	139.00	139.10	138.85	138.55	138.55	138.55	138.55	138.50
DEM	178.55	178.35	178.65	178.65	178.60	179.00	179.55	179.65	179.55	179.95	180.10	180.30
FRF	146.05	146.15	146.25	146.30	146.35	146.40	146.35	146.15	145.65	144.95	144.95	144.65
1967												
GBP	19.96	20.00	20.00	20.01	20.01	19.96	19.94	19.93	19.92	19.91	19.04	17.18
USD	7.160	7.160	7.160	7.150	7.150	7.150	7.160	7.160	7.160	7.160	7.160	7.150
SEK	138.65	138.85	138.85	138.95	139.00	139.10	139.15	138.95	138.95	138.65	138.45	138.60
DEM	180.25	180.40	180.45	180.35	180.00	180.00	179.55	179.15	179.05	179.15	179.95	179.95
FRF	144.75	144.85	144.75	144.95	145.85	145.95	146.15	146.10	146.15	146.20	146.20	146.05
1968												
GBP	17.21	17.23	17.16	17.18	17.08	17.05	17.08	17.11	17.06	17.08	17.05	17.05
USD	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150	7.150
SEK	138.65	138.75	138.45	138.40	138.55	138.55	138.55	138.65	138.65	138.55	138.35	138.35
DEM	178.85	178.85	179.55	179.65	179.85	179.55	178.55	178.15	179.00	180.00	180.05	179.55
FRF	145.45	145.45	145.50	145.30	144.85	144.00	143.95	143.95	144.00	143.95	144.00	144.65
1969												
GBP	17.08	17.11	17.11	17.08	17.06	17.06	17.08	17.08	17.06	17.09	17.14	17.13
USD	7.160	7.150	7.150	7.150	7.150	7.140	7.160	7.150	7.160	7.160	7.160	7.150
SEK	138.55	138.45	138.55	138.50	138.55	138.35	138.35	138.55	138.45	138.60	138.75	138.65
DEM	179.00	178.10	178.15	177.85	179.00	178.95	178.85	179.25	180.15	192.85	194.00	194.15
FRF	144.65	144.65	144.35	144.10	144.00	143.75	143.95	134.02	129.15	129.00	128.45	128.50
1970												
GBP	17.16	17.18	17.18	17.18	17.18	17.14	17.08	17.06	17.04	17.06	17.08	17.05
USD	7.149	7.146	7.141	7.141	7.148	7.146	7.144	7.142	7.144	7.145	7.143	7.131
SEK	138.42	138.03	137.37	137.39	137.52	137.70	137.79	137.94	137.39	137.81	138.06	137.94
DEM	193.98	193.76	194.35	196.07	196.75	196.75	196.75	196.71	196.76	196.73	196.77	195.70
FRF	128.76	128.90	128.84	129.11	129.48	129.48	129.49	129.38	129.44	129.39	129.46	129.14
1971												
GBP	17.17	17.26	17.26	17.23	17.21	17.20	17.18	17.08	17.04	17.06	17.10	17.05
USD	7.140	7.141	7.137	7.127	7.114	7.110	7.105	7.016	6.895	6.847	6.855	6.745
SEK	138.31	138.07	138.27	138.09	137.75	137.76	137.38	136.90	136.21	136.42	137.08	137.90
DEM	196.33	196.67	196.53	196.13	200.43	202.53	204.07	205.52	205.34	205.94	205.85	206.30
FRF	129.41	129.44	129.42	129.24	128.81	128.66	128.89	127.27	126.94	125.28	125.37	126.17
1972												
GBP	17.23	17.31	17.27	17.22	17.17	16.88	15.90	15.97	16.05	15.82	15.53	15.43
USD	6.704	6.651	6.595	6.600	6.571	6.537	6.508	6.526	6.578	6.609	6.611	6.588
SEK	138.97	138.76	138.21	138.00	138.24	137.97	137.58	137.96	138.97	139.16	139.19	138.73
DEM	207.40	208.69	207.99	207.66	206.67	206.12	205.93	204.67	205.85	205.90	206.11	205.79
FRF	129.63	130.80	132.19	133.18	132.65	132.83	133.79	133.41	133.18	132.48	131.02	129.44
1973												
GBP	15.57	15.10	14.63	14.69	14.72	14.19	13.41	13.64	13.39	13.28	13.41	13.11
USD	6.619	6.233	5.909	5.913	5.819	5.508	5.274	5.509	5.537	5.470	5.609	5.653
SEK	139.46	135.94	131.94	131.07	131.14	130.56	130.70	132.72	131.76	130.94	129.26	124.83
DEM	206.82	206.35	209.13	208.45	208.20	212.72	225.80	227.36	228.46	226.68	217.77	213.26
FRF	130.02	130.19	130.87	130.12	129.91	129.49	130.05	128.91	128.66	128.50	125.86	121.34
1974												
GBP	13.29	13.14	13.21	13.14	12.85	12.97	12.90	12.85	12.87	12.85	12.67	12.38
USD	5.966	5.773	5.647	5.493	5.322	5.429	5.401	5.477	5.555	5.508	5.438	5.315
SEK	124.42	123.34	123.59	124.94	124.59	124.26	123.41	123.90	124.09	125.32	126.03	126.70
DEM	212.34	212.73	215.40	217.80	216.57	215.13	211.64	209.45	208.88	212.35	216.37	216.61

Table A3. Selected exchange rates monthly 1941 - 2003

	Monthly averages of daily quotations at Oslo Stock Exchange											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FRF	117.38	115.87	117.16	113.16	109.52	110.70	113.20	114.67	115.72	116.34	116.38	117.30
1975												
GBP	12.07	12.00	11.88	11.82	11.48	11.19	11.34	11.55	11.68	11.36	11.31	11.24
USD	5.108	5.013	4.910	4.988	4.946	4.902	5.189	5.464	5.599	5.526	5.515	5.559
SEK	126.50	125.93	125.30	125.55	125.81	125.22	125.93	126.62	126.13	125.80	125.79	126.12
DEM	216.01	215.12	212.24	210.07	210.63	209.52	210.51	212.21	214.09	214.03	213.31	211.98
FRF	117.00	117.06	116.98	118.84	122.26	122.44	122.97	124.88	125.29	125.33	125.27	124.71
1976												
GBP	11.269	11.193	10.798	10.155	9.969	9.827	9.979	9.816	9.402	8.721	8.626	8.749
USD	5.555	5.523	5.548	5.494	5.489	5.547	5.585	5.507	5.432	5.317	5.269	5.211
SEK	126.91	126.28	126.01	124.82	124.62	124.76	125.05	124.88	124.84	125.04	125.01	125.31
DEM	213.43	215.73	216.75	216.62	214.76	215.61	216.96	217.83	217.88	218.85	218.54	218.60
FRF	124.15	123.56	120.08	117.63	116.90	117.14	115.50	110.94	110.57	106.84	105.63	104.52
1977												
GBP	9.030	9.044	9.018	9.083	9.062	9.088	9.054	9.224	9.565	9.710	9.926	9.733
USD	5.271	5.288	5.252	5.283	5.273	5.286	5.258	5.301	5.485	5.486	5.453	5.247
SEK	125.22	124.55	124.64	121.73	121.19	119.69	120.90	119.13	113.02	114.37	113.76	110.47
DEM	220.55	219.93	219.61	222.76	223.64	224.53	230.28	229.02	236.05	240.85	243.29	243.65
FRF	106.09	106.24	105.43	106.43	106.48	107.01	108.41	108.30	111.46	112.94	112.41	109.48
1978												
GBP	9.962	10.219	10.171	9.927	9.904	9.924	10.224	10.200	10.203	9.891	9.935	10.106
USD	5.151	5.266	5.324	5.364	5.449	5.403	5.394	5.256	5.212	4.931	5.060	5.096
SEK	110.40	113.48	115.59	116.61	117.08	117.25	118.84	118.43	117.83	114.92	115.88	116.24
DEM	243.25	253.85	261.81	262.85	258.77	259.37	262.75	263.29	264.45	267.45	266.42	270.98
FRF	109.24	108.92	112.99	117.03	117.26	118.00	121.57	120.91	119.56	117.03	116.50	117.93
1979												
GBP	10.16	10.21	10.39	10.66	10.68	10.89	11.40	11.26	10.95	10.67	10.70	10.95
USD	5.065	5.096	5.098	5.142	5.188	5.159	5.042	5.030	4.983	4.968	5.025	4.978
SEK	116.60	116.74	116.77	117.15	118.10	118.86	119.50	119.23	118.89	118.10	118.88	119.16
DEM	274.21	274.62	274.11	271.64	272.03	273.82	276.59	275.08	277.59	277.93	283.19	287.17
FRF	119.49	119.32	118.96	118.25	117.69	118.20	118.82	118.17	118.67	118.45	120.70	122.55
1980												
GBP	11.12	11.19	11.14	11.23	11.31	11.35	11.43	11.53	11.62	11.83	12.03	12.13
USD	4.911	4.882	5.047	5.059	4.912	4.857	4.818	4.867	4.838	4.895	5.015	5.169
SEK	118.48	117.12	116.24	116.15	116.60	116.57	116.80	116.58	116.45	116.83	116.55	117.40
DEM	285.00	279.53	273.19	271.05	274.24	274.80	275.85	271.89	270.41	266.14	261.27	262.33
FRF	121.67	119.27	117.13	116.82	117.47	118.10	118.86	117.32	116.36	115.14	112.90	113.32
1981												
GBP	12.59	12.44	12.04	11.93	11.85	11.69	11.45	11.26	10.85	10.90	11.07	11.05
USD	5.234	5.417	5.397	5.467	5.668	5.908	6.098	6.181	5.974	5.913	5.818	5.791
SEK	117.87	117.58	117.17	116.67	115.82	117.05	117.72	116.60	110.33	106.82	106.10	104.50
DEM	260.99	252.44	256.06	253.37	247.33	248.77	250.05	247.25	253.35	262.83	261.46	256.50
FRF	112.90	108.92	108.65	107.21	103.27	104.45	105.23	103.44	105.85	105.25	103.72	101.40
XEU	6.735	6.529	6.510	6.428	6.278	6.299	6.307	6.226	6.310	6.420	6.391	6.278
1982												
GBP	11.07	11.03	10.90	10.78	10.81	10.87	11.02	11.53	11.82	12.17	11.83	11.38
USD	5.863	5.968	6.026	6.082	5.964	6.188	6.352	6.678	6.895	7.168	7.245	7.027
SEK	104.45	103.64	103.35	102.91	103.26	102.81	103.94	108.84	110.84	100.60	96.51	95.64
DEM	255.91	252.33	253.34	253.89	258.46	254.91	257.76	269.59	275.75	283.49	283.49	290.73
FRF	100.74	99.24	98.20	97.48	99.21	94.29	92.71	96.54	97.66	100.30	100.39	102.65

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
XEU	6.256	6.166	6.105	6.074	6.164	6.051	6.087	6.361	6.492	6.669	6.633	6.713
1983												
GBP	11.11	10.91	10.71	11.00	11.21	11.26	11.20	11.21	11.14	10.96	11.03	11.07
USD	7.045	7.112	7.173	7.137	7.112	7.261	7.323	7.463	7.426	7.321	7.464	7.716
SEK	96.29	95.72	95.98	95.34	94.89	95.15	95.30	94.95	94.32	94.10	94.34	95.78
DEM	295.16	293.08	297.95	292.80	288.26	285.14	283.18	279.09	278.40	281.43	278.28	280.88
FRF	104.14	103.39	102.65	97.64	95.81	94.79	94.18	92.76	92.16	92.11	91.47	92.11
XEU	6.779	6.716	6.740	6.608	6.535	6.482	6.440	6.359	6.327	6.342	6.297	6.344
1984												
GBP	11.09	11.08	10.93	10.81	10.86	10.77	10.84	10.90	10.84	10.82	10.82	10.66
USD	7.867	7.702	7.499	7.591	7.814	7.818	8.205	8.301	8.609	8.870	8.704	8.975
SEK	96.32	96.14	97.01	96.96	96.69	96.52	98.87	99.36	100.45	102.14	101.51	101.40
DEM	280.33	284.77	289.01	287.65	284.14	285.46	288.36	287.56	284.89	289.04	291.27	289.49
FRF	91.68	92.54	93.77	93.51	92.50	92.89	93.95	93.69	92.83	94.25	94.94	94.49
XEU	6.330	6.392	6.453	6.421	6.366	6.380	6.449	6.440	6.384	6.457	6.497	6.461
1985												
GBP	10.36	10.37	10.62	11.08	11.17	11.29	11.64	11.42	11.38	11.25	11.23	11.07
USD	9.171	9.449	9.481	8.899	8.964	8.818	8.452	8.234	8.341	7.908	7.800	7.650
SEK	101.20	101.50	100.66	99.38	99.62	99.63	99.57	99.21	99.38	99.40	99.96	99.65
DEM	289.63	287.23	286.76	289.28	287.89	287.97	289.79	295.28	293.81	299.09	300.82	304.27
FRF	94.60	93.95	93.86	94.78	94.45	94.45	95.31	96.68	96.30	98.09	98.70	99.50
XEU	6.442	6.391	6.391	6.468	6.453	6.465	6.520	6.573	6.542	6.615	6.642	6.677
1986												
GBP	10.77	10.41	10.44	10.71	11.31	11.48	11.28	10.93	10.81	10.49	10.73	10.82
USD	7.550	7.286	7.126	7.155	7.441	7.613	7.471	7.354	7.335	7.349	7.532	7.528
SEK	99.45	98.49	98.58	98.83	104.05	105.65	105.79	106.15	106.18	106.82	108.19	109.04
DEM	309.20	312.14	315.40	314.69	333.53	340.57	346.93	356.43	359.45	366.67	371.90	378.27
FRF	100.80	101.71	102.60	99.34	104.72	106.87	107.82	109.39	109.81	112.02	113.72	115.22
XEU	6.733	6.751	6.812	6.781	7.179	7.319	7.398	7.509	7.542	7.639	7.754	7.871
1987												
GBP	10.80	10.70	11.02	11.03	11.11	10.93	10.88	10.85	10.93	11.01	11.39	11.65
USD	7.172	7.008	6.927	6.771	6.651	6.712	6.755	6.792	6.644	6.627	6.416	6.375
SEK	108.52	107.77	108.02	107.26	106.47	105.86	104.98	104.74	104.23	104.33	105.74	107.35
DEM	385.82	383.80	377.77	373.89	372.55	368.96	365.83	365.75	366.62	367.59	381.56	390.33
FRF	115.77	115.23	113.51	112.29	111.47	110.49	109.87	109.57	109.81	110.11	112.40	115.15
XEU	7.967	7.917	7.840	7.767	7.735	7.655	7.595	7.581	7.605	7.630	7.870	8.054
1988												
GBP	11.45	11.27	11.59	11.64	11.55	11.37	11.45	11.70	11.63	11.71	11.88	11.89
USD	6.345	6.414	6.336	6.208	6.184	6.377	6.707	6.891	6.909	6.753	6.570	6.510
SEK	106.42	106.04	106.51	105.48	104.78	104.77	105.85	106.42	107.34	107.59	107.94	107.13
DEM	384.38	377.95	377.46	371.18	365.22	363.76	364.08	365.08	370.22	370.67	375.62	371.11
FRF	113.89	111.87	111.26	109.37	107.84	107.82	108.03	107.86	108.84	108.67	109.97	108.62
XEU	7.940	7.806	7.815	7.704	7.595	7.557	7.567	7.602	7.674	7.685	7.786	7.710
1989												
GBP	11.85	11.78	11.65	11.55	11.45	11.16	11.27	11.24	11.19	11.02	10.85	10.70
USD	6.663	6.717	6.790	6.790	7.050	7.185	6.952	7.041	7.123	6.942	6.897	6.705
SEK	106.63	106.36	106.49	106.73	107.01	107.50	107.50	107.68	107.85	107.69	107.37	106.56
DEM	364.34	362.81	364.16	363.28	361.17	362.79	367.15	365.48	364.93	372.21	376.90	385.12
FRF	106.90	106.56	107.43	107.44	106.76	106.94	108.27	108.20	108.08	109.65	110.86	112.72
XEU	7.594	7.560	7.577	7.558	7.517	7.517	7.602	7.576	7.567	7.642	7.714	7.817

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1990												
GBP	10.80	10.97	10.71	10.72	10.82	11.07	11.39	11.57	11.42	11.51	11.40	11.30
USD	6.541	6.471	6.589	6.551	6.444	6.473	6.303	6.085	6.074	5.920	5.805	5.861
SEK	106.02	105.79	106.94	107.04	106.47	106.28	105.92	105.35	105.36	104.92	104.36	104.32
DEM	386.62	386.05	386.55	387.93	387.74	384.32	384.35	387.39	386.90	388.25	390.56	392.25
FRF	113.60	113.69	114.53	115.52	115.18	114.26	114.57	115.47	115.52	115.94	116.03	115.50
XEU	7.855	7.881	7.894	7.936	7.950	7.925	7.959	8.041	8.012	8.035	8.057	8.048
1991												
GBP	11.42	11.38	11.44	11.59	11.54	11.48	11.50	11.48	11.45	11.40	11.33	11.25
USD	5.906	5.787	6.225	6.624	6.679	6.960	6.978	6.819	6.644	6.620	6.378	6.169
SEK	104.79	104.60	106.23	108.29	108.76	108.32	107.83	107.63	107.52	107.45	107.46	107.67
DEM	391.15	391.26	390.49	388.97	389.57	390.42	390.15	390.74	391.29	391.53	392.72	393.90
FRF	115.15	114.94	114.73	115.11	114.87	115.07	114.94	114.97	114.97	114.85	114.93	115.27
XEU	8.064	8.050	8.024	8.020	8.005	8.024	8.019	8.021	8.021	8.019	8.017	8.011
1992												
GBP	11.227	11.279	11.238	11.336	11.457	11.407	11.236	11.110	10.743	10.014	9.884	10.360
USD	6.196	6.350	6.519	6.454	6.322	6.155	5.854	5.725	5.796	6.037	6.468	6.684
SEK	107.95	108.02	108.15	108.26	108.32	108.29	108.33	108.31	108.18	108.18	104.25	96.86
DEM	393.05	392.04	392.29	391.81	390.19	390.93	392.79	394.49	400.00	408.05	407.64	422.48
FRF	115.24	115.17	115.55	115.85	116.07	116.14	116.40	116.29	117.56	120.27	120.50	123.89
XEU	8.012	8.015	8.023	8.025	8.017	8.015	8.019	8.019	7.969	7.971	8.005	8.271
1993												
GBP	10.54	10.04	10.22	10.47	10.53	10.55	10.93	10.99	10.79	10.77	10.95	11.07
USD	6.877	6.980	7.004	6.765	6.794	6.981	7.308	7.365	7.082	7.164	7.390	7.420
SEK	94.89	92.74	90.51	91.01	92.71	94.00	91.83	91.42	88.42	89.30	89.42	88.87
DEM	425.67	425.31	425.22	424.19	423.06	422.84	426.04	434.07	436.37	437.54	434.66	433.93
FRF	125.51	125.57	125.16	125.44	125.50	125.61	125.14	124.04	124.73	124.68	125.07	126.90
XEU	8.340	8.266	8.250	8.262	8.271	8.269	8.301	8.284	8.291	8.309	8.338	8.376
1994												
GBP	11.21	11.08	10.96	10.92	10.81	10.79	10.61	10.58	10.64	10.63	10.69	10.69
USD	7.511	7.495	7.349	7.365	7.183	7.079	6.867	6.862	6.804	6.622	6.727	6.855
SEK	92.37	93.87	92.85	93.44	93.10	90.65	88.41	88.67	90.26	91.20	91.51	91.21
DEM	430.91	431.48	434.08	433.71	433.44	434.26	437.28	438.64	438.68	435.43	437.13	436.07
FRF	126.82	126.99	127.38	126.59	126.59	127.11	127.60	128.01	128.25	127.20	127.32	126.62
XEU	8.363	8.370	8.379	8.384	8.353	8.352	8.355	8.360	8.369	8.305	8.324	8.311
1995												
GBP	10.549	10.363	10.034	9.960	9.989	9.945	9.845	9.941	9.968	9.844	9.768	9.774
USD	6.701	6.594	6.269	6.188	6.285	6.236	6.173	6.340	6.399	6.238	6.247	6.352
SEK	89.74	89.30	86.25	84.31	86.24	85.93	85.99	87.72	89.71	91.30	94.72	95.77
DEM	437.36	439.05	446.13	449.27	447.11	445.10	444.41	438.90	437.89	440.96	441.11	440.94
FRF	126.50	126.23	125.91	127.87	126.40	126.80	127.66	127.59	126.95	126.24	127.86	127.98
XEU	8.287	8.254	8.169	8.234	8.234	8.222	8.228	8.212	8.172	8.101	8.099	8.104
1996												
GBP	9.816	9.837	9.814	9.844	9.959	10.073	10.021	9.933	10.065	10.271	10.564	10.762
USD	6.416	6.405	6.428	6.500	6.576	6.531	6.450	6.409	6.456	6.484	6.352	6.466
SEK	95.44	93.04	95.47	96.65	96.68	97.82	97.14	96.84	97.21	98.26	95.92	94.80
DEM	439.09	436.82	435.00	431.37	429.01	427.68	428.69	432.47	428.94	424.45	420.40	416.73
FRF	128.23	127.03	127.05	127.14	126.79	126.19	126.60	126.66	125.96	125.51	124.24	123.35
XEU	8.101	8.027	8.062	8.074	8.077	8.091	8.098	8.134	8.129	8.128	8.073	8.040
1997												

Table A3. Selected exchange rates monthly 1941 - 2003

Monthly averages of daily quotations at Oslo Stock Exchange

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GBP	10.72	10.76	10.94	11.35	11.53	11.84	12.42	12.23	11.70	11.55	11.90	12.05
USD	6.448	6.624	6.818	6.966	7.061	7.204	7.432	7.629	7.316	7.075	7.054	7.250
SEK	91.41	89.50	89.03	90.71	92.03	93.07	95.22	95.41	95.03	93.44	93.33	93.09
DEM	402.35	395.76	401.40	407.51	414.75	417.46	415.44	413.96	409.06	402.66	407.40	407.85
FRF	119.22	117.23	118.98	120.98	122.98	123.68	123.14	122.82	121.69	120.02	121.67	121.84
XEU	7.811	7.682	7.793	7.949	8.084	8.155	8.194	8.147	8.024	7.912	8.058	8.071
1998												
GBP	12.25	12.38	12.58	12.59	12.19	12.49	12.53	12.59	12.72	12.58	12.38	12.67
USD	7.488	7.555	7.577	7.526	7.444	7.572	7.623	7.711	7.577	7.428	7.451	7.589
SEK	93.46	93.52	95.13	96.28	96.81	95.74	95.45	94.87	95.77	94.64	93.22	94.20
DEM	412.39	416.40	415.05	415.08	419.54	422.56	424.09	431.27	444.55	453.18	443.16	454.73
FRF	123.15	124.22	123.81	123.82	125.11	126.03	126.50	128.64	132.58	135.16	132.16	135.60
XEU	8.146	8.222	8.231	8.226	8.265	8.347	8.380	8.506	8.745	8.929	8.713	8.925
1999												
GBP	12.30	12.56	12.67	12.52	12.52	12.56	12.44	12.51	12.72	12.83	12.86	12.93
USD	7.452	7.719	7.817	7.774	7.751	7.870	7.903	7.791	7.835	7.742	7.924	8.011
SEK	95.27	97.10	95.15	93.22	91.81	92.51	93.55	94.38	95.29	94.97	94.88	94.31
DEM	442.33	442.25	434.92	425.10	421.16	417.58	418.29	422.34	420.64	423.78	418.78	413.98
FRF	131.89	131.86	129.68	126.75	125.57	124.51	124.72	125.93	125.42	126.36	124.87	123.43
EUR	8.651	8.650	8.506	8.314	8.237	8.167	8.181	8.260	8.227	8.289	8.191	8.097
2000												
GBP	13.14	13.18	13.28	13.63	13.64	13.10	13.12	13.34	13.21	13.58	13.32	13.26
USD	8.013	8.236	8.411	8.608	9.047	8.679	8.702	8.956	9.206	9.361	9.337	9.066
SEK	94.47	95.16	96.70	98.62	99.49	99.12	97.26	96.48	95.39	93.88	92.66	93.90
DEM	415.24	414.10	414.71	416.90	419.34	421.43	418.05	413.94	410.40	409.20	408.78	415.86
FRF	123.81	123.47	123.65	124.30	125.03	125.66	124.65	123.42	122.37	122.01	121.88	123.99
EUR	8.121	8.099	8.111	8.154	8.202	8.243	8.176	8.096	8.027	8.003	7.995	8.133
2001												
GBP	12.97	12.96	12.97	13.05	13.04	13.02	13.10	12.85	12.84	12.82	12.81	12.90
USD	8.778	8.912	8.974	9.094	9.144	9.299	9.264	8.947	8.781	8.829	8.919	8.955
SEK	92.48	91.49	89.42	89.04	88.24	86.16	86.05	86.52	82.70	83.50	84.14	84.77
DEM	421.08	419.90	417.22	415.08	408.79	405.65	407.57	411.86	408.96	408.88	405.07	408.63
FRF	125.55	125.20	124.40	123.76	121.89	120.95	121.52	122.80	121.94	121.91	120.78	121.84
EUR	8.236	8.213	8.160	8.118	7.995	7.934	7.971	8.055	7.999	7.997	7.922	7.992
2002												
GBP	12.85	12.73	12.53	12.42	11.96	11.50	11.60	11.68	11.68	11.65	11.49	11.36
USD	8.968	8.948	8.812	8.605	8.192	7.753	7.464	7.598	7.507	7.482	7.309	7.168
SEK	85.84	84.78	85.19	83.44	81.53	81.25	79.90	80.32	80.30	80.62	80.59	80.20
DEM	404.98	398.06										
FRF	120.75	118.69										
EUR	7.921	7.785	7.719	7.622	7.515	7.405	7.405	7.428	7.362	7.341	7.319	7.295
2003												
GBP	11.16	11.26	11.49	11.37	11.04	11.63	11.84	11.81	11.76	11.80	11.83	11.74
USD	6.904	7.003	7.261	7.224	6.803	7.002	7.290	7.415	7.307	7.037	7.007	6.709
SEK	79.93	82.49	85.03	85.56	85.97	89.51	90.24	89.37	90.37	91.32	91.14	91.34
EUR	7.333	7.544	7.845	7.832	7.871	8.162	8.289	8.256	8.195	8.228	8.197	8.241

Chapter 8 – Historical stock price indices in Norway 1914–2003

Jan Tore Klovland¹

1. Introduction

This chapter gives a brief overview of the existing stock price indices for Norway, which go back to 1914. We have not collected new material in order to extend or improve the existing indices (with the exception of two months in 1940), but the indices listed in the appendix have been adjusted with a view to present time series without level breaks throughout the period. The principles used are explained in the text below, which also briefly reviews the stock market before WWI and presents some graphs of the adjusted indices.

2. The stock market before 1914

Official stock price quotations on Christiania Stock Exchange began on March 1, 1881. Initially there were monthly quotations of 22 shares, of which there were 13 railway companies, 5 insurance companies, 3 banks (including Norges Bank, which was a limited company) and one domestic steam ship company. The frequency of quotations was increased to twice monthly in November 1896 and further to weekly in February 1908.² By December 1913 the number of companies quoted had increased to 82. The expansion was largest in banking with 35 companies, there were 20 insurance companies and 7 steam shipping companies. Only two industrial companies were found on the official list, Norsk Hydro and Hafslund.³

In addition to those companies trading on the Stock Exchange there is some private information on the prices of other company shares, even before official stock market quotations began. During periods of high business activity, such as the mid 1850s and the early 1870s, stock price lists provided by private brokers found their way to the newspapers.⁴ A typical example from a period of stock market prosperity is a price list dated February 20, 1873, which comprises 24 companies, of which

¹I would like to thank Bjørn Basberg for helpful discussions on the whaling industry.

²Ramm (1969).

³The stock exchange lists can be found in contemporary newspapers and the financial journal *Farmand*.

⁴In the 1850s the stock price quotations were limited to a small number of companies, typically between 5 and 10, most of which were insurance companies. See for example *Aftenbladet* December 10, 1855 and February 26, 1857.

14 are insurance companies, 3 banks, 3 railways, 2 shipping and 2 engineering companies (Aker and Nyland).⁵ In the 1890s private information on share prices seems to have come forward more regularly. Beginning in 1892 the weekly *Farmand* published a quite comprehensive list provided by the stock broker firm J. M. Nielsen. Later in the 1890s several other brokers also began publishing such lists, which were merged into a common list by Christiania brokers in April 1897.

It is thus possible to extend the existing indices backward from 1914, but this task is left for future research.

3. The existing stock market indices

There are basically three sources of publicly available historical share price indices for Norway, those compiled by Keilhau (1927), Statistics Norway and Oslo Stock Exchange. Keilhau (1927) presents monthly indices covering the years 1914 to 1926. The first index compiled by Statistics Norway extends back to 1918. In 1972 Statistics Norway adopted the index constructed by Oslo Stock Exchange, which was first published in 1946.

In 1922 Statistics Norway (SSB) published a monthly stock price index starting in January 1918.⁶ The index is computed by recording the latest bid price of the month for all companies quoted on the Oslo Stock Exchange, expressing this price in per cent of the par value of the shares. It is divided into six groups: manufacturing, shipping, banking, insurance, whaling and sundry companies (mostly domestic services). Within each subgroup all companies are weighted equally. The total index is an arithmetic weighted average of the subindices with weights shown in Table 1, referred to as SSB-1.

Keilhau (1927) presented an alternative index for the period to 1926, extending his data series back to 1914. The index seems basically to be constructed along the same principles as the Statistics Norway index. As can be seen from Table 1, the weights are also nearly identical, the only difference is that the weight of whaling shares is increased and sundry companies correspondingly reduced.

Statistics Norway revised the index in 1931 and 1932, presenting new index figures from January 1928.⁷ A number of technical improvements were made to the revised index, including the application of the chain index principle and the use of geometric rather than arithmetic averages. The new index also included shares not officially quoted on the Oslo Stock Exchange. The weights (SSB-2 of Table 1) were revised, decreasing the weight of shipping and increasing the weight given to banking and insurance shares compared to the previous index. Basically the same principles were used by

⁵The list was printed by *Bergens Tidende* on February 27, 1873, but it was probably first published by some Christiania newspaper.

⁶*Statistiske meddelelser* 1922, pp. 661-665.

⁷*Statistiske meddelelser* 1931, pp. 108-118, and 1932, pp. 76-79. The articles presenting the revised indices are unsigned, but bear all the hallmarks of being written by Eilif Gjermoe.

Table 1. The industry weights of stock price indices

Industry	Keilhau	SSB-1	SSB-2
Manufacturing	33.3	33.3	36.7
Shipping	33.3	33.3	19.8
Banking	16.7	16.7	22.6
Insurance	6.7	6.7	8.5
Whaling	6.7	3.3	4.5
Other	3.3	6.7	7.9
Total	100	100	100

Statistics Norway in the following years until its stock price indices were discontinued after 1971. A minor revision took place in 1955, when the weighting of companies within each group also took into account the turnover rate. Companies on the B-list were no longer included.⁸ The index of whaling company shares was no longer published after 1968, when the few companies left were included in the shipping index.

Beginning 1972 the indices published by the Oslo Stock Exchange were used in the monthly publication of stock market indices by Statistics Norway. This is an index with variable weights using arithmetic averages.⁹ The subindices for banking and insurance companies were discontinued after June 1997. The data series end in July 2001 in the cases of the total index, the manufacturing index and the shipping index .

It is important to note that the indices shown here are stock *price* indices, which means that there are *no adjustments for dividends*. Such price indices must accordingly be supplemented with time series of dividends for the purpose of computing the total return to stock market investments.¹⁰ This is in contrast to present-day indices which takes the dividend into account. Users of the indices presented here are therefore explicitly warned that this material is only one part of the input required to compute equity returns.

Before 1928 the indices also suffer from the technical deficiencies noted above, but even after this time it is likely that not all problems related to the construction of indices of stock prices were taken into account. Several factors, including stock splits, floating of new shares etc. affect stock prices,

⁸*Historical Statistics 1968*, p. 478.

⁹*Historical Statistics 1994*, p. 614.

¹⁰Some data on nominal share dividends can be found in *Historical Statistics 1978*, p. 511. The publication of these data seems to have been discontinued after 1974.

and it is not clear from the sources to what extent this was taken into account.¹¹

4. The adjustments to the index numbers

The index numbers shown here have only been adjusted with a view to present series without obvious level breaks. In cases where a time series A is to be replaced by series B as the basis for the continuous series at a point in time, say month T_1 of a particular year, the splicing is done by taking the ratio of series B to A at time T_1 and multiplying series B by this factor. In the case of the first index computed by Statistics Norway (SSB-1), covering the years 1918 to 1928, there are many instances where the level of the index has changed, for example due to companies entering or leaving the sample. Similar adjustment procedures were applied to all such cases where both the old and the new level of the index were published.

There are two two-month periods when original index numbers do not exist. Following the outbreak of WWI Oslo Stock Exchange was closed between August 5 and October 21, when a limited activity was resumed. There are consequently no quotations for August and September 1914.

On April 9, 1940, Oslo Stock Exchange was once again closed. It reopened for business on May 21, 1940. Initially share price quotations were rather uncertain and incomplete, which is the reason why official index numbers only reemerge in June. We have filled the gaps in April and May by extrapolating the index numbers from March 1940 using the value of share prices computed by the financial weekly *Økonomisk Revue*. The April figures reflect the value of shares on April 8, the day before the German invasion. The May 1940 figure is computed on the basis of prices quoted on May 27. These estimates are very crude and must be treated with caution, but they are included here to give a rough idea of the scale of the price decline following the outbreak of the war.

We use the Statistics Norway indices with January 1928 equal to 100 as the starting point for the calculation of the index numbers presented here. Working backwards from 1928 we correct the index for level breaks as explained above until January 1918, when the Statistics Norway indices were spliced onto the Keilhau (1927) indices. Subsequent base year changes after 1928 were treated in the same way. The Oslo Stock Exchange indices beginning 1972 have been spliced in the same way, so that all data series presented here reflect a basis value of 100 in January 1928.

5. The stock price indices 1914 - 2001

Table A1 of the appendix lists the monthly indices. Figure 1 graphs the total index, the manufacturing index and the shipping index over a sample period extending from September 1914 to July 2001,

¹¹Keilhau (1927, p. 317) explicitly states that no such adjustments were undertaken.

using log-scale. The strong rise in index values beginning in the early 1980s makes the graph little informative as to short-run movements prior to this period, so we present two other graphs showing all indices ending in December 1971.

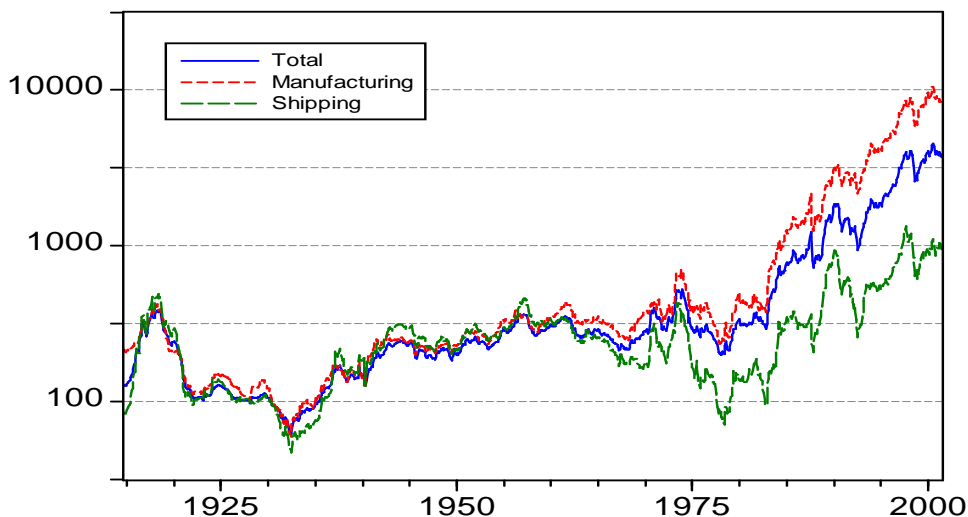


Figure 1: Stock price indices September 1914 - July 2001 (semi-logarithmic scale), January 1928 = 100.

Figure 2 includes manufacturing, banking and insurance as well as the total index. This graph shows that the short cycles were mostly common to all indices in this period. The great stock price boom of WWI exhibits twin peaks in the case of the total index, in September 1917 and May 1918. The manufacturing index reaches its highest value in March 1918. Figure 2 also shows that stock prices were rather depressed in much of the interwar years. The summer of 1932 marks the nadir; thereafter there is considerable increase in all share prices towards the outbreak of the war. Banking had a much weaker development than insurance until the late 1920s, which is no doubt due to the extensive interwar banking crisis, but apart from this these two indices behave in much the same way. The cycles and long-run growth after the mid-twenties are more subdued here than in the case of other indices.

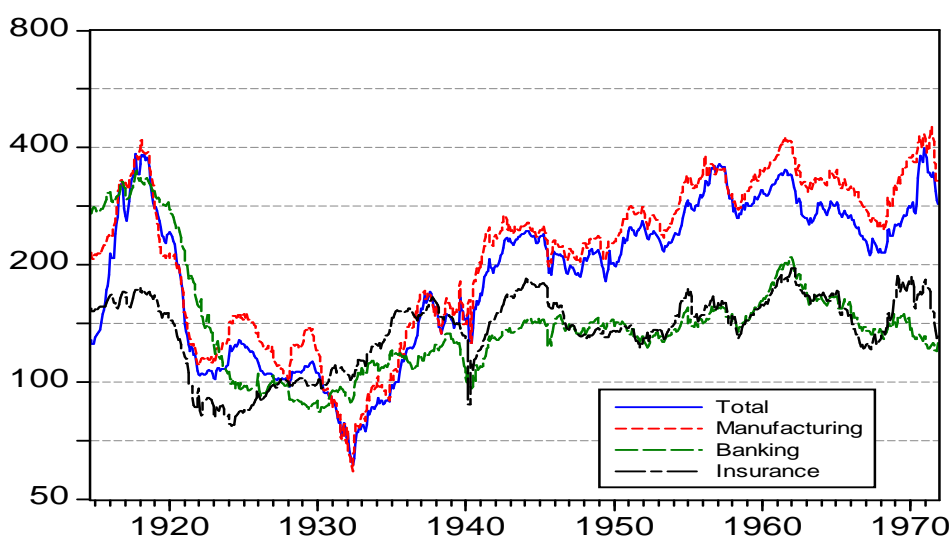


Figure 2: Stock price indices September 1914 - December 1971 (semi-logarithmic scale), January 1928 = 100.

Figure 3 shows the shipping and whaling indices, with the total index serving as a benchmark.¹² The shipping and the total indices behave quite similarly, both with respect to cycles and long run trends. The WWI boom was greatest in the case of shipping, which peaked in May 1918. The data also show that stock prices were quite buoyant during WWII, particularly shipping. The Korean war in 1951 and the Suez crisis in 1956-1957 also gave rise to distinct shipping cycles.

The whaling index is quite volatile, showing many distinct cycles and a permanent rise in the post-WWII years. The heydays of the whaling industry were in the late 1920s, when there is a marked cycle in the whaling index.¹³ After WWII the whaling industry was in decline, particularly after the mid 1950s. Some important whaling companies were financially strong and diversified into shipping and manufacturing, which may explain the great rise in the price of whaling shares in this period.

¹²See Gjermoe (1964) for a detailed analysis of the shipping and whaling stock prices in the interwar years.

¹³The industry expanded globally and especially in Antarctica after 1904, reaching a peak in the late 1920s. After the economic crisis of the early 1930s the whaling industry recovered and experienced marked growth in the first decade after WWII. See Basberg (1985) for further details on the whaling industry in the interwar period.

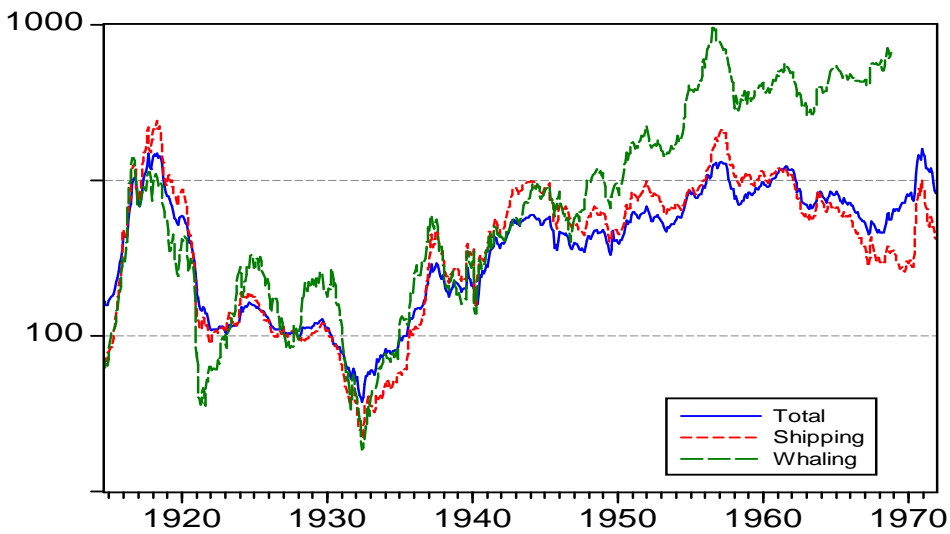


Figure 3: Stock price indices September 1914 - December 1971 (semi-logarithmic scale), January 1928 = 100.

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A. Technical appendix: The data

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1914												
Total	131.5	131.9	130.8	130.1	129.8	130.5			128.3	124.9	125.5	125.3
Manufacturing	216.9	218.2	216.1	215.2	213.9	215.0			215.4	209.8	207.3	206.4
Shipping	86.8	86.4	86.6	86.6	86.6	86.9			84.7	83.5	82.9	83.2
Whaling	97.0	102.0	93.3	89.2	88.5	90.6			84.0	78.8	83.1	80.0
Bank	281.0	280.2	283.2	282.9	283.5	283.7			276.0	271.1	278.8	281.0
Insurance	157.4	156.8	156.5	152.9	153.2	153.4			154.8	152.0	151.5	151.8
1915												
Total	130.0	131.5	132.8	134.3	136.1	142.0	148.9	152.7	160.9	171.9	176.5	188.6
Manufacturing	212.9	211.3	213.9	213.3	212.0	214.6	220.8	224.3	227.1	228.6	235.5	237.0
Shipping	88.4	90.7	91.7	94.4	97.5	107.1	117.6	121.0	132.8	151.9	154.8	173.1
Whaling	84.1	95.3	99.9	101.9	104.1	107.1	110.8	120.5	132.1	137.5	143.8	167.1
Bank	280.7	274.9	273.0	273.8	275.5	278.0	279.1	282.9	289.0	293.4	305.6	305.3
Insurance	153.7	154.3	152.9	155.5	156.0	155.7	155.7	155.7	155.7	159.4	162.5	165.3
1916												
Total	213.5	207.6	207.4	208.2	239.9	256.3	264.5	311.1	318.3	322.4	313.3	277.9
Manufacturing	239.6	239.6	237.6	246.5	257.9	267.6	284.8	312.4	328.1	331.1	323.6	317.6
Shipping	218.8	209.8	207.4	203.9	249.3	268.1	276.0	345.7	351.3	357.7	351.2	288.1
Whaling	178.0	173.5	189.3	200.1	263.9	308.1	316.0	371.0	371.0	363.1	316.2	301.0
Bank	306.7	290.6	289.5	292.0	291.8	298.4	300.0	303.1	312.5	323.2	326.3	315.8
Insurance	166.8	167.9	167.6	159.7	159.2	157.7	154.3	157.4	164.0	168.1	170.5	170.1
1917												
Total	265.8	259.8	274.1	291.5	318.4	331.6	336.0	350.0	385.5	349.6	342.1	341.2
Manufacturing	324.9	320.1	315.2	312.8	335.4	344.1	343.6	352.7	379.2	381.3	372.7	376.2
Shipping	269.9	271.4	291.0	323.1	364.7	386.5	397.8	415.2	467.4	394.2	387.5	386.5
Whaling	259.8	257.5	273.5	287.2	300.4	296.6	291.7	313.8	335.2	335.8	319.7	313.0
Bank	314.4	293.4	295.1	297.3	304.2	312.2	315.2	325.7	344.2	348.3	335.6	329.0
Insurance	169.5	165.0	158.3	157.8	155.1	159.7	164.0	169.1	172.4	172.4	172.6	173.5
1918												
Total	362.5	377.6	382.4	378.1	384.2	371.1	376.9	372.0	357.2	318.8	300.0	287.5
Manufacturing	399.2	404.8	419.6	389.3	387.4	384.4	388.6	390.7	386.0	346.6	331.3	319.6
Shipping	427.2	460.7	461.6	473.1	491.0	459.0	470.8	456.0	424.5	359.3	324.8	304.4
Whaling	271.2	312.4	324.8	330.3	321.6	307.1	302.3	309.6	302.2	259.3	250.0	238.9
Bank	333.2	328.3	326.9	322.3	322.1	329.6	334.0	327.8	323.5	322.1	311.9	305.5
Insurance	173.9	170.3	170.0	172.4	172.2	168.8	168.0	169.1	170.9	166.6	166.2	163.2
1919												
Total	280.2	281.3	275.3	265.4	259.2	249.9	237.4	236.0	229.2	226.8	238.7	240.0
Manufacturing	293.3	277.8	263.4	252.9	232.7	222.6	209.9	209.7	210.9	208.1	211.4	209.5
Shipping	305.3	326.5	327.6	310.6	315.5	300.4	281.4	281.3	265.3	261.0	286.3	288.2
Whaling	233.5	217.6	187.2	188.4	198.7	211.7	202.7	175.7	158.3	154.8	174.0	187.6
Bank	308.4	298.9	296.2	297.3	293.7	289.8	286.4	285.2	284.6	283.8	287.0	289.3
Insurance	166.3	165.1	162.4	157.0	151.8	150.7	145.8	149.5	150.1	149.3	150.2	150.3
1920												
Total	242.7	240.5	236.4	230.0	225.7	212.2	198.4	199.5	191.9	182.1	172.8	158.5
Manufacturing	213.2	207.6	209.7	210.6	212.5	203.4	195.8	200.3	193.2	186.2	178.0	169.3
Shipping	294.9	295.0	284.3	269.4	259.9	238.7	210.6	210.1	198.5	184.5	174.1	149.2
Whaling	204.5	201.1	208.1	205.5	204.4	172.2	159.8	176.8	172.7	167.3	153.2	128.9
Bank	277.2	274.8	269.5	264.5	256.1	250.0	248.1	250.2	242.9	234.2	226.0	219.7

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Insurance	145.8	145.4	143.4	141.1	139.6	136.6	130.7	128.1	128.4	124.4	121.4	119.7
1921												
Total	140.6	134.7	131.8	124.6	120.8	119.6	123.1	122.1	117.3	117.6	112.9	106.7
Manufacturing	151.2	146.1	141.1	135.0	128.4	128.2	124.5	125.2	123.5	125.2	118.6	110.6
Shipping	122.9	114.9	114.5	109.4	106.3	104.7	114.5	113.5	107.1	108.1	104.6	95.3
Whaling	85.1	87.9	80.7	62.7	59.9	61.1	68.0	66.1	59.6	72.1	71.0	79.4
Bank	216.7	204.7	199.2	184.6	183.2	183.3	187.1	184.6	179.8	178.3	162.9	157.7
Insurance	115.9	114.6	111.4	105.4	98.2	97.5	97.8	97.0	86.9	86.1	85.8	86.1
1922												
Total	104.6	103.6	104.7	104.7	104.6	104.6	104.8	106.7	107.0	106.5	106.5	105.1
Manufacturing	110.4	110.4	114.6	115.5	114.4	113.7	115.0	114.4	114.3	113.7	115.7	111.8
Shipping	94.3	95.5	100.4	101.7	102.8	104.1	101.8	103.5	104.2	105.9	105.4	105.9
Whaling	79.3	77.4	78.2	78.2	76.5	77.6	83.1	81.2	84.9	94.4	98.8	97.0
Bank	156.0	155.3	163.4	146.6	140.4	137.9	139.3	148.8	148.3	137.7	133.7	133.7
Insurance	95.9	84.2	81.7	82.4	88.6	89.3	90.0	90.9	90.8	90.5	89.8	88.1
1923												
Total	102.1	101.3	106.6	108.4	108.6	106.8	107.6	107.8	107.8	108.1	109.8	110.3
Manufacturing	114.8	112.2	117.0	122.1	121.6	118.9	120.9	125.0	126.3	126.2	125.2	128.8
Shipping	103.1	102.8	111.8	118.1	113.9	111.0	110.4	107.7	108.7	107.5	109.4	110.8
Whaling	100.3	91.0	100.3	104.4	106.3	110.8	117.7	115.1	120.1	136.8	156.2	160.9
Bank	127.5	117.9	123.7	127.5	120.2	114.3	116.6	112.2	108.1	107.7	106.6	105.2
Insurance	86.6	81.1	86.4	84.8	84.2	86.5	86.5	87.1	84.9	82.5	81.9	81.2
1924												
Total	116.4	123.5	119.5	121.2	122.9	124.2	123.3	124.9	127.9	127.3	126.2	125.3
Manufacturing	128.1	142.9	141.1	141.7	148.0	147.4	145.7	147.3	150.4	148.3	146.4	145.9
Shipping	125.7	137.9	133.0	134.8	132.7	133.5	132.1	133.4	138.0	134.2	134.9	133.5
Whaling	166.0	157.7	132.8	137.2	139.1	150.1	157.1	168.5	164.9	180.2	181.2	179.9
Bank	105.9	101.3	98.7	100.3	98.9	100.0	96.1	99.3	96.2	99.6	95.5	96.0
Insurance	82.5	78.1	77.3	77.6	77.6	81.5	82.1	82.7	83.8	84.1	83.4	84.0
1925												
Total	125.5	124.4	122.2	123.0	121.5	120.6	119.4	119.7	119.0	116.5	115.6	114.7
Manufacturing	144.1	149.2	145.9	150.3	144.5	144.7	144.7	142.3	142.1	139.8	139.0	132.9
Shipping	133.4	132.7	129.1	127.9	126.1	121.4	119.5	119.1	117.4	112.0	111.0	112.2
Whaling	165.1	165.9	173.1	176.7	162.8	179.3	173.4	159.0	156.5	153.0	143.2	151.8
Bank	96.5	97.5	97.2	97.7	95.1	94.8	95.7	96.2	96.8	97.1	97.1	97.9
Insurance	83.1	84.8	83.7	83.9	83.9	84.7	85.5	87.0	87.0	88.4	89.7	90.7
1926												
Total	111.8	109.8	106.5	106.5	105.3	104.3	104.3	104.7	104.8	105.0	105.0	104.2
Manufacturing	133.9	129.4	126.9	126.0	124.0	121.0	121.0	122.0	123.5	121.3	120.8	119.3
Shipping	112.2	107.1	102.2	101.9	100.2	99.2	99.6	98.8	101.0	103.4	101.2	100.7
Whaling	145.7	129.5	119.2	130.9	129.0	128.4	131.6	127.8	118.1	104.9	113.4	110.0
Bank	104.8	94.4	92.7	91.9	93.3	93.6	93.6	95.2	97.0	98.4	99.2	99.7
Insurance	94.9	91.6	89.8	89.9	89.6	91.5	92.1	93.7	94.7	95.6	97.1	97.4
1927												
Total	102.9	101.8	101.4	100.7	101.9	101.3	101.2	101.9	101.8	101.5	102.0	101.7
Manufacturing	122.8	114.4	111.3	109.7	110.2	108.7	107.7	107.9	106.9	105.2	104.2	104.0
Shipping	107.0	99.1	100.5	99.2	102.0	102.3	102.4	103.0	103.3	104.0	103.9	103.3
Whaling	101.8	97.9	92.8	91.0	95.7	93.7	91.1	92.3	91.6	92.1	107.6	105.6
Bank	103.8	97.6	98.6	99.6	99.4	100.3	99.8	99.3	98.6	97.8	97.9	98.2
Insurance	98.0	97.4	96.7	96.2	98.9	100.0	101.3	100.6	100.6	100.3	100.7	100.6

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1928												
Total	100.0	97.3	99.8	101.7	106.4	105.7	105.4	105.9	105.9	105.9	105.9	105.4
Manufacturing	100.0	100.2	107.9	114.3	124.2	124.5	123.9	124.2	124.2	123.6	122.5	121.6
Shipping	100.0	97.7	97.1	96.6	98.9	97.3	96.2	97.5	97.5	98.6	99.8	99.3
Whaling	100.0	96.9	105.0	110.2	132.4	130.3	147.9	141.3	138.4	148.9	143.2	145.6
Bank	100.0	90.0	90.6	89.7	90.0	89.1	89.3	90.6	90.2	89.5	89.1	89.1
Insurance	100.0	98.0	97.5	98.0	97.5	99.5	99.3	100.2	100.7	101.4	102.1	102.3
1929												
Total	106.9	107.2	109.7	109.4	108.9	109.4	111.2	111.8	112.9	110.7	107.6	105.4
Manufacturing	124.2	127.1	135.5	135.8	134.9	136.2	137.4	135.1	136.9	130.7	125.4	120.2
Shipping	101.9	101.9	102.3	103.3	103.5	105.0	106.4	108.1	109.6	109.0	105.8	103.2
Whaling	151.7	145.9	151.4	143.2	154.5	147.2	154.9	160.4	157.8	142.2	139.5	139.7
Bank	87.3	87.9	87.3	87.1	85.9	85.9	85.1	86.2	87.2	87.9	87.8	88.6
Insurance	102.1	102.8	102.1	100.0	97.5	97.3	97.5	97.6	98.2	98.1	97.8	98.3
1930												
Total	105.7	105.1	101.9	100.1	98.1	93.9	93.5	93.5	93.9	91.8	91.8	91.5
Manufacturing	120.7	120.5	116.0	109.8	103.5	95.1	94.9	95.7	95.9	93.4	90.4	92.3
Shipping	104.0	103.8	99.2	99.0	98.4	95.0	94.0	92.4	93.0	90.8	90.4	86.8
Whaling	132.9	141.5	140.9	146.0	163.8	151.3	143.3	147.6	144.8	125.2	125.9	120.1
Bank	89.6	84.7	83.6	85.9	86.0	85.5	86.0	86.5	87.2	87.0	93.2	94.0
Insurance	99.4	101.4	100.8	96.3	96.5	97.2	97.4	98.3	99.4	100.5	103.6	107.0
1931												
Total	88.1	88.7	86.9	84.0	80.4	78.3	78.7	76.4	72.4	75.2	78.5	76.3
Manufacturing	86.1	90.8	88.6	87.9	83.5	80.5	82.2	80.1	71.2	74.9	78.0	72.3
Shipping	82.7	80.7	75.1	72.4	68.2	66.1	64.1	61.1	59.6	63.7	68.9	68.7
Whaling	112.4	105.8	88.6	84.4	76.3	71.6	76.3	65.9	57.9	62.3	74.4	71.8
Bank	95.3	94.4	94.7	95.3	94.5	93.5	97.0	96.6	96.0	95.7	94.2	94.0
Insurance	108.4	108.8	110.5	105.5	106.8	108.0	108.7	108.2	109.1	107.1	106.8	105.8
1932												
Total	71.8	73.8	67.5	64.3	63.3	61.3	63.4	69.6	74.3	74.2	76.1	75.2
Manufacturing	69.6	76.1	66.5	63.9	61.8	58.7	66.0	73.6	78.5	76.9	76.1	77.7
Shipping	60.8	61.4	54.2	50.3	49.6	48.2	46.6	52.7	59.6	60.4	63.7	60.1
Whaling	64.5	62.8	58.1	53.4	54.3	43.0	43.5	45.2	51.1	50.5	59.4	55.0
Bank	91.8	91.1	91.0	88.6	89.1	90.3	92.2	100.4	101.4	103.6	106.6	104.6
Insurance	104.2	104.4	103.9	100.8	102.1	104.4	103.4	107.5	109.6	110.8	115.1	113.6
1933												
Total	77.3	77.4	76.3	74.7	77.5	84.0	82.4	84.0	86.3	86.0	84.9	86.4
Manufacturing	82.2	82.7	81.1	79.3	84.5	93.1	89.5	92.3	96.8	97.7	95.5	96.7
Shipping	59.4	59.6	58.6	56.6	58.3	64.6	62.4	63.4	64.3	62.9	62.6	65.2
Whaling	63.2	64.9	67.2	67.6	67.6	69.9	73.7	78.4	79.4	78.5	80.6	82.3
Bank	108.3	106.9	103.8	104.6	105.6	111.7	111.6	112.2	112.9	114.7	110.5	110.3
Insurance	113.3	113.6	112.9	109.5	113.6	119.1	119.6	119.4	123.1	124.5	124.3	124.8
1934												
Total	87.4	90.7	87.9	89.3	89.2	87.3	87.9	89.3	89.2	89.8	89.0	91.5
Manufacturing	97.3	103.0	97.0	97.2	98.1	95.2	94.4	95.2	92.6	92.1	89.2	91.5
Shipping	66.6	70.3	68.8	71.4	69.3	67.2	68.2	70.1	71.4	72.2	70.6	73.6
Whaling	85.9	87.3	84.6	84.5	83.9	82.2	84.6	87.9	85.0	86.6	89.8	83.9
Bank	111.4	110.6	105.6	108.5	108.9	108.5	109.9	110.3	108.8	110.8	113.0	117.2
Insurance	124.7	124.1	126.1	121.6	125.2	126.8	128.0	129.5	131.4	132.5	134.6	136.9
1935												

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total	96.2	98.5	96.1	99.0	99.9	99.6	99.8	105.9	110.3	113.7	112.7	114.4
Manufacturing	101.1	105.0	101.2	107.4	107.7	106.1	107.1	113.9	126.2	116.0	117.8	123.8
Shipping	75.8	75.9	74.6	75.9	77.2	78.3	77.9	87.2	96.3	105.0	100.4	100.0
Whaling	98.7	112.8	115.5	113.8	112.2	113.1	112.0	107.2	112.8	129.5	137.4	135.6
Bank	119.8	120.5	115.9	116.6	118.6	117.8	117.4	118.2	117.1	116.2	116.3	114.3
Insurance	137.5	145.8	146.2	149.4	151.5	153.1	151.6	151.6	150.6	150.7	150.4	150.7
1936												
Total	118.8	121.5	121.7	122.6	122.4	121.5	123.3	124.9	129.5	131.3	143.2	146.4
Manufacturing	129.5	135.3	138.0	141.0	140.0	137.2	138.5	142.6	151.8	143.4	157.5	162.7
Shipping	104.3	106.9	105.2	105.7	106.8	107.9	111.5	112.8	116.6	129.8	144.9	150.2
Whaling	151.8	161.1	167.8	159.7	155.8	156.3	166.8	171.6	171.0	176.9	191.1	200.5
Bank	117.2	113.4	112.0	112.3	110.3	107.8	107.8	107.4	109.6	109.4	116.5	115.1
Insurance	151.8	151.7	154.6	154.2	152.8	152.7	148.5	146.8	146.2	143.7	148.9	147.6
1937												
Total	154.0	153.9	159.5	168.9	159.9	162.5	166.1	170.8	168.8	161.7	154.9	152.2
Manufacturing	169.7	170.7	169.7	171.5	162.7	165.8	168.7	169.4	165.5	158.3	153.1	147.8
Shipping	165.1	166.0	183.8	210.7	191.8	196.6	204.3	217.5	213.8	199.2	183.6	183.1
Whaling	226.8	216.6	231.4	241.9	226.5	220.4	225.2	236.5	223.1	197.3	186.9	192.7
Bank	116.3	113.1	113.4	118.4	115.9	116.0	117.2	119.0	120.1	120.3	119.9	124.5
Insurance	148.2	150.4	150.2	151.5	151.8	155.7	156.5	159.1	162.6	164.7	162.8	161.5
1938												
Total	156.3	150.1	141.4	138.5	137.4	133.1	137.8	140.8	143.1	149.2	148.4	147.5
Manufacturing	157.2	152.5	142.8	139.8	139.7	133.3	141.1	145.2	149.2	163.8	159.5	159.1
Shipping	186.2	173.2	158.9	155.4	153.9	148.0	153.7	157.7	159.5	164.0	165.0	164.7
Whaling	180.5	166.9	150.8	142.8	144.6	139.7	146.3	153.8	160.0	151.6	144.0	142.1
Bank	124.5	123.0	120.7	121.1	122.8	123.0	124.3	126.5	128.1	132.8	133.3	133.3
Insurance	159.3	157.4	155.3	151.0	149.0	147.0	145.7	144.5	147.4	148.3	148.3	147.6
1939												
Total	146.5	144.5	142.6	137.6	140.8	141.2	141.6	141.2	165.0	152.5	152.1	144.2
Manufacturing	156.1	152.8	154.3	146.8	150.9	151.2	153.3	151.8	180.7	159.5	157.8	140.6
Shipping	165.0	162.0	154.1	150.0	154.7	153.4	152.1	150.4	197.7	182.5	184.8	182.0
Whaling	133.3	136.6	131.7	126.1	128.6	130.0	131.3	130.5	186.5	181.6	169.7	164.7
Bank	132.7	128.7	128.9	125.5	125.6	127.3	125.1	125.8	121.3	115.6	116.1	109.8
Insurance	146.7	146.5	145.4	141.1	140.2	141.0	140.8	141.6	137.3	135.3	131.7	131.7
1940												
Total	145.1	142.0	148.4	149.9	122.6	125.8	137.1	155.6	153.4	161.4	158.1	161.1
Manufacturing	141.3	140.6	149.9	149.0	118.4	126.0	153.0	182.2	181.5	195.2	190.6	196.1
Shipping	186.6	184.8	189.1	194.8	152.1	156.1	159.7	180.1	175.0	177.7	173.6	175.2
Whaling	173.5	173.6	187.1	192.4	135.9	144.1	154.9	175.5	163.8	168.5	166.9	169.1
Bank	108.7	100.0	108.5	110.5	101.0	95.8	97.1	104.2	100.1	110.3	107.6	108.5
Insurance	130.8	129.0	129.6	131.3	122.3	113.1	107.3	113.8	114.4	116.5	118.4	120.2
1941												
Total	168.6	166.4	175.6	186.1	188.6	191.1	192.9	206.4	205.5	196.9	195.2	190.5
Manufacturing	203.4	197.1	211.4	222.7	236.4	243.7	243.7	249.2	247.1	227.9	225.6	222.7
Shipping	188.3	187.9	201.2	215.5	208.2	203.8	207.4	234.2	237.3	226.3	220.2	210.9
Whaling	187.7	183.6	193.0	212.4	195.1	189.3	197.6	223.9	221.2	211.8	209.5	207.3
Bank	109.8	108.8	109.8	114.8	116.4	121.7	122.3	130.7	127.5	129.0	131.4	128.5
Insurance	121.4	122.8	123.8	128.5	132.0	132.6	136.9	141.3	141.9	143.1	144.1	143.6
1942												
Total	196.6	199.1	197.6	199.9	204.9	211.7	213.9	221.4	230.9	233.8	235.1	229.1

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Manufacturing	230.5	238.8	232.8	235.5	238.6	243.7	245.9	257.4	267.2	267.8	260.0	245.1
Shipping	220.7	221.0	220.0	224.3	234.8	248.9	252.3	259.3	278.9	285.0	296.3	295.3
Whaling	212.3	205.1	203.1	201.3	210.4	218.5	216.0	219.9	228.0	226.4	237.9	237.9
Bank	130.0	128.5	127.8	127.7	129.2	130.3	131.5	135.9	135.6	135.9	136.2	134.1
Insurance	144.8	147.6	150.1	151.1	149.9	151.2	155.7	158.2	162.2	166.3	167.9	164.1
1943												
Total	233.6	227.7	227.6	224.9	228.5	232.3	232.7	235.5	236.0	238.7	239.3	239.8
Manufacturing	254.4	244.1	245.0	239.8	244.1	251.0	248.0	245.3	245.3	250.3	250.5	247.9
Shipping	297.2	292.2	289.4	283.9	290.4	292.8	293.7	305.1	305.5	309.6	310.1	310.3
Whaling	239.4	236.2	231.8	226.2	235.6	237.8	241.4	262.3	267.3	268.7	267.1	273.5
Bank	137.4	134.0	133.9	134.0	134.4	136.3	136.4	136.5	137.5	137.8	139.6	142.0
Insurance	165.8	165.4	165.4	164.4	166.2	169.6	171.0	173.0	172.6	172.7	174.4	176.7
1944												
Total	241.8	243.5	244.4	244.5	240.3	237.5	236.0	237.5	234.6	227.1	226.7	229.6
Manufacturing	251.4	253.1	256.1	256.0	250.1	244.6	244.1	248.5	242.7	235.5	235.5	239.6
Shipping	311.7	312.6	312.1	310.2	303.7	301.0	300.5	301.7	298.7	287.2	286.5	289.5
Whaling	277.0	291.6	293.3	306.4	298.8	296.5	306.0	300.2	299.7	275.4	279.5	281.4
Bank	143.5	142.4	143.7	145.9	145.3	144.4	141.3	142.4	143.2	142.4	142.4	142.3
Insurance	178.7	184.2	182.7	179.2	179.3	179.6	178.3	177.7	177.4	174.9	173.7	174.4
1945												
Total	233.7	236.1	237.7	237.5	240.4	225.1	219.3	217.7	190.8	195.3	188.5	200.7
Manufacturing	241.7	245.4	245.0	245.0	252.4	241.2	231.8	230.4	198.1	204.4	202.6	215.6
Shipping	296.2	301.3	304.8	304.6	308.1	273.0	268.1	262.9	230.8	232.9	219.5	236.5
Whaling	290.5	296.6	297.7	299.3	302.9	272.3	271.7	275.5	241.6	262.3	255.4	278.7
Bank	145.2	141.5	143.9	144.8	144.4	140.2	138.9	140.4	122.8	128.4	123.7	134.1
Insurance	174.9	177.9	178.1	178.9	178.8	177.4	176.2	174.7	156.0	158.6	154.6	154.3
1946												
Total	215.7	213.9	212.6	212.9	211.6	212.7	209.8	209.9	205.4	195.7	190.8	189.5
Manufacturing	231.0	230.7	225.0	226.6	221.9	221.8	222.4	222.7	218.5	208.6	205.0	205.9
Shipping	261.3	256.9	254.9	254.6	255.5	259.3	253.8	255.4	251.6	237.5	226.2	222.0
Whaling	290.3	264.6	256.7	245.9	245.5	240.6	234.3	239.8	236.1	219.1	200.4	213.1
Bank	140.5	141.2	145.2	146.6	147.6	148.7	144.4	143.1	138.5	135.1	136.6	137.8
Insurance	159.4	158.3	159.3	156.3	155.3	157.2	156.8	155.2	147.5	141.6	137.5	136.4
1947												
Total	194.2	198.4	196.7	197.2	193.4	188.8	188.0	190.0	187.6	185.8	192.5	200.8
Manufacturing	212.8	219.8	216.1	216.4	212.7	207.2	205.0	210.1	206.0	203.7	210.4	219.2
Shipping	226.0	227.9	226.2	227.2	221.9	216.8	214.5	215.4	212.2	209.6	216.4	228.4
Whaling	230.1	239.3	235.8	245.6	241.8	232.7	249.9	252.2	253.6	254.9	282.1	299.3
Bank	140.2	138.2	138.9	138.4	138.0	135.2	133.2	132.8	133.1	132.3	134.1	136.3
Insurance	136.0	139.3	139.4	139.9	138.7	135.7	134.6	133.3	131.4	131.0	131.0	131.7
1948												
Total	207.9	207.9	204.5	209.1	212.5	217.1	217.1	219.4	212.5	213.7	214.8	216.0
Manufacturing	226.9	226.9	220.8	222.3	226.9	231.5	231.5	234.6	231.5	233.1	233.1	234.6
Shipping	239.2	242.7	240.3	247.4	250.9	259.2	255.6	256.8	243.9	243.9	243.9	249.8
Whaling	315.8	315.8	311.2	322.7	328.5	330.8	334.2	343.5	331.9	331.9	337.7	327.3
Bank	139.3	132.5	134.5	136.4	137.4	141.3	142.2	142.2	142.2	143.2	144.2	145.2
Insurance	132.0	130.4	129.7	131.2	130.4	131.2	131.2	131.2	132.0	133.6	135.9	136.7
1949												
Total	218.3	213.7	209.1	198.7	195.3	186.1	181.5	189.5	194.1	217.1	201.0	201.0
Manufacturing	237.7	234.6	230.0	219.3	216.2	205.5	203.9	214.7	222.3	230.0	230.0	226.9

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Shipping	250.9	246.2	241.5	227.4	220.3	206.2	200.3	206.2	209.7	215.6	215.6	215.6
Whaling	333.1	314.6	300.8	278.9	274.3	267.4	257.0	277.8	282.4	292.7	303.1	306.6
Bank	146.1	140.3	140.3	139.3	141.3	137.4	136.4	139.3	141.3	142.2	142.2	144.2
Insurance	137.5	136.7	135.1	132.8	135.1	132.0	130.4	130.4	130.4	132.0	134.4	134.4
1950												
Total	202.2	198.7	197.6	203.3	203.3	209.1	212.5	222.8	234.3	227.4	232.0	230.9
Manufacturing	226.9	230.0	230.0	234.6	234.6	240.7	242.3	251.5	262.2	259.1	262.2	262.2
Shipping	217.9	212.1	210.9	216.8	219.1	223.8	229.7	246.2	262.7	250.9	256.8	256.8
Whaling	308.9	295.0	282.4	302.0	304.3	321.6	341.1	358.4	387.3	366.5	384.9	384.9
Bank	144.2	139.3	142.2	142.2	141.3	142.2	140.3	143.2	141.3	140.3	139.3	135.4
Insurance	135.1	135.1	134.4	135.1	134.4	134.4	136.7	138.3	138.3	139.0	138.3	137.5
1951												
Total	243.5	249.3	249.3	245.8	244.7	238.9	237.8	243.5	245.8	247.0	248.1	251.6
Manufacturing	276.0	282.1	283.7	280.6	277.5	269.9	269.9	271.4	272.9	274.5	272.9	271.4
Shipping	276.8	291.0	286.3	281.6	279.2	275.7	271.0	281.6	286.3	289.8	293.3	302.8
Whaling	408.0	417.2	413.8	398.8	406.8	401.1	406.8	424.1	440.3	435.7	440.3	450.6
Bank	135.4	132.5	132.5	136.4	136.4	129.6	129.6	130.6	128.6	129.6	126.7	128.6
Insurance	137.5	139.0	139.8	139.0	135.9	130.4	127.3	127.3	125.8	125.0	125.0	122.6
1952												
Total	259.6	253.9	247.0	240.1	233.2	232.0	238.9	240.1	240.1	243.5	241.2	238.9
Manufacturing	282.1	277.5	269.9	262.2	251.5	246.9	259.1	263.7	263.7	268.3	263.7	260.7
Shipping	313.4	306.3	296.9	288.6	280.4	280.4	286.3	283.9	282.7	283.9	280.4	278.0
Whaling	470.2	449.5	428.7	411.5	402.2	408.0	409.1	412.6	405.7	414.9	424.1	421.8
Bank	130.6	127.6	125.7	124.7	122.8	123.7	125.7	127.6	129.6	131.5	131.5	133.5
Insurance	125.0	129.7	128.1	129.7	133.6	127.3	130.4	132.0	134.4	135.9	135.9	135.9
1953												
Total	235.5	233.2	229.7	224.0	218.3	216.0	222.8	221.7	225.1	228.6	227.4	228.6
Manufacturing	260.7	259.1	256.1	243.8	239.2	234.6	245.3	243.8	246.9	249.9	251.5	254.5
Shipping	269.8	268.6	262.7	258.0	246.2	243.9	254.5	253.3	254.5	259.2	256.8	256.8
Whaling	408.0	394.2	390.7	376.9	384.9	380.3	388.4	383.8	393.0	406.8	398.8	398.8
Bank	133.5	129.6	130.6	129.6	126.7	126.7	128.6	130.6	130.6	131.5	131.5	132.5
Insurance	135.1	136.7	137.5	135.1	132.0	128.9	129.7	132.0	134.4	135.9	138.3	137.5
1954												
Total	232.0	236.6	241.2	240.1	238.9	238.9	247.0	252.7	263.0	272.2	281.4	287.2
Manufacturing	262.2	265.3	271.4	276.0	277.5	279.1	292.9	299.0	308.2	317.4	326.6	334.3
Shipping	256.8	265.1	266.2	260.4	256.8	253.3	258.0	261.5	272.1	276.8	287.5	289.8
Whaling	397.6	416.1	438.0	427.6	421.8	424.1	443.7	467.9	503.7	557.8	593.6	614.3
Bank	133.5	133.5	136.4	134.5	135.4	136.4	139.3	142.2	146.1	150.0	151.0	153.0
Insurance	139.0	140.6	142.2	147.6	148.4	146.9	158.6	161.7	161.7	164.0	164.0	168.7
1955												
Total	292.9	283.7	287.2	286.0	279.1	276.8	275.7	282.6	284.9	283.7	294.1	302.1
Manufacturing	338.9	325.1	332.8	335.8	322.0	319.0	314.3	319.0	319.0	315.9	331.2	334.3
Shipping	298.1	295.7	298.1	292.2	285.1	286.3	289.8	299.2	301.6	303.9	313.4	315.7
Whaling	636.2	616.6	613.1	608.5	618.9	613.1	614.3	638.5	650.0	659.2	681.1	771.0
Bank	154.9	141.3	144.2	144.2	142.2	139.3	138.4	142.2	140.3	138.4	143.2	145.2
Insurance	173.4	168.7	167.2	170.3	165.6	149.2	146.9	146.9	149.2	142.9	146.1	147.6
1956												
Total	297.5	301.0	309.0	328.5	326.2	319.3	323.9	348.1	354.9	353.8	359.5	345.8
Manufacturing	329.7	342.0	351.2	380.3	358.8	335.8	345.0	363.4	361.9	360.4	355.8	342.0
Shipping	314.5	315.7	320.4	339.3	347.5	348.7	353.4	388.8	401.7	407.6	432.4	421.8

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Whaling	729.6	724.9	772.2	834.4	844.8	857.5	862.1	953.1	986.6	953.1	960.1	871.3
Bank	144.2	141.3	142.2	143.2	145.2	144.2	145.2	151.0	155.9	152.0	153.0	152.0
Insurance	148.4	148.4	148.4	157.0	156.2	154.7	156.2	160.9	162.5	165.6	156.2	152.3
1957												
Total	352.6	358.4	361.8	358.4	356.1	356.1	356.1	342.3	318.2	310.1	296.4	295.2
Manufacturing	349.6	352.7	355.8	351.2	351.2	352.7	352.7	346.6	322.0	309.7	300.5	299.0
Shipping	431.2	447.7	458.3	458.3	446.5	447.7	448.8	414.7	381.7	374.6	351.1	354.6
Whaling	882.8	882.8	864.4	846.0	827.5	833.3	826.4	806.8	743.4	721.5	688.1	653.5
Bank	155.9	153.9	154.9	153.9	155.9	154.9	153.9	153.9	147.1	147.1	146.1	146.1
Insurance	154.7	158.6	160.1	157.0	161.7	158.6	159.3	159.3	151.5	149.2	139.0	139.8
1958												
Total	296.4	274.5	280.3	271.1	263.0	263.0	265.3	271.1	269.9	280.3	284.9	276.8
Manufacturing	303.6	289.8	291.3	283.7	277.5	280.6	277.5	280.6	280.6	294.4	302.1	294.4
Shipping	348.7	324.0	326.3	314.5	308.7	301.6	307.5	321.6	311.0	324.0	331.0	322.8
Whaling	647.7	537.1	591.2	563.6	527.9	544.0	574.0	570.5	588.9	612.0	601.6	555.5
Bank	149.1	143.2	141.3	142.2	135.4	134.5	136.4	138.4	139.3	140.3	142.2	141.3
Insurance	147.6	145.3	146.9	142.2	132.0	131.2	129.7	131.2	132.8	138.3	140.6	140.6
1959												
Total	288.3	287.2	283.7	283.7	282.6	286.0	287.2	298.7	295.2	294.1	299.8	303.3
Manufacturing	309.7	309.7	309.7	315.9	315.9	329.7	329.7	343.5	331.2	328.2	332.8	342.0
Shipping	328.7	328.7	322.8	315.7	306.3	303.9	302.8	318.1	316.9	315.7	325.2	325.2
Whaling	605.1	591.2	579.7	567.0	579.7	579.7	588.9	613.1	621.2	623.5	637.4	630.4
Bank	148.1	143.2	142.2	145.2	150.0	150.0	152.0	154.9	155.9	154.9	155.9	159.8
Insurance	143.7	143.7	143.7	146.1	148.4	148.4	148.4	151.5	153.1	153.1	154.7	155.4
1960												
Total	311.3	311.3	304.4	304.4	300.9	300.9	303.2	311.3	317.0	320.5	320.5	322.8
Manufacturing	351.2	352.7	346.5	354.2	351.2	349.6	355.8	363.4	366.5	369.5	368.0	372.6
Shipping	338.1	334.6	326.3	320.4	312.2	308.7	314.5	321.6	331.0	329.9	332.2	333.4
Whaling	645.4	650.0	608.5	600.5	609.7	622.4	601.6	618.9	635.0	661.6	659.2	659.2
Bank	161.7	161.7	163.7	162.7	165.6	166.6	168.6	173.4	178.3	180.2	177.3	181.2
Insurance	157.8	157.8	157.0	158.6	160.1	158.6	162.5	165.6	168.7	171.8	173.4	172.6
1961												
Total	329.7	331.9	338.9	342.3	343.4	338.9	345.8	350.4	349.2	343.4	340.0	340.0
Manufacturing	378.7	383.4	392.6	401.7	406.3	404.8	418.6	417.1	424.8	414.0	417.1	415.6
Shipping	340.5	339.3	345.2	340.5	339.3	334.6	339.3	344.0	336.9	331.0	325.2	324.0
Whaling	688.1	683.5	705.3	708.8	716.9	700.7	708.8	744.5	734.2	724.9	710.0	696.1
Bank	187.1	192.9	194.9	197.8	199.7	194.9	199.7	202.7	201.7	199.7	199.7	202.7
Insurance	175.7	182.0	184.3	185.9	188.2	180.4	183.6	184.3	185.1	183.6	181.2	185.9
1962												
Total	342.3	340.0	330.8	315.9	309.0	287.2	291.8	295.2	289.5	268.8	266.5	265.3
Manufacturing	417.1	414.0	400.2	384.9	375.7	338.9	354.2	360.4	345.0	322.0	325.1	326.6
Shipping	327.5	320.4	315.7	294.5	292.2	275.7	274.5	275.7	272.1	247.4	245.0	242.7
Whaling	699.6	701.9	661.6	639.7	616.6	593.6	580.9	603.9	595.9	561.3	540.5	544.0
Bank	204.6	209.5	205.6	198.8	191.9	184.1	188.0	189.0	188.0	177.3	173.4	174.4
Insurance	189.8	195.3	195.3	196.1	196.1	177.3	177.3	177.3	174.2	171.8	168.7	169.5
1963												
Total	264.2	263.0	258.5	253.9	264.2	256.1	258.5	263.0	267.6	271.1	288.3	284.9
Manufacturing	319.0	315.9	314.3	308.2	325.1	312.8	322.0	326.6	334.3	325.1	332.7	329.7
Shipping	241.5	246.2	245.0	235.6	246.2	238.0	238.0	242.7	242.7	259.2	287.5	278.0
Whaling	556.7	544.0	510.6	519.8	532.5	515.2	514.0	524.4	538.2	545.1	624.7	620.1

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bank	178.3	171.5	162.7	157.8	160.8	159.8	161.7	163.7	166.6	161.7	162.7	165.6
Insurance	165.6	167.2	167.2	165.6	162.5	158.6	160.1	163.3	168.7	165.6	166.4	167.9
1964												
Total	289.5	286.0	278.0	276.8	272.2	267.6	275.7	280.3	290.6	287.2	284.9	282.6
Manufacturing	334.3	332.7	328.2	328.2	322.0	319.0	329.7	331.2	348.1	345.0	340.4	334.3
Shipping	285.1	276.8	266.2	262.7	255.6	248.6	255.6	260.4	266.2	258.0	255.6	254.5
Whaling	629.3	628.1	600.5	605.1	609.7	609.7	637.4	670.8	707.7	713.4	719.2	726.1
Bank	166.6	162.7	161.7	159.8	158.8	156.9	159.8	161.7	164.7	165.6	164.7	164.7
Insurance	167.2	167.2	169.5	167.2	164.8	160.9	162.5	161.7	166.4	168.7	166.4	168.7
1965												
Total	284.9	289.5	284.9	280.3	271.1	268.8	265.3	271.1	275.7	268.8	267.6	264.2
Manufacturing	335.8	351.2	341.9	337.3	320.5	319.0	314.3	325.1	331.2	320.5	315.9	311.3
Shipping	256.8	258.0	258.0	250.9	247.4	245.0	241.5	243.9	248.6	240.3	242.7	241.5
Whaling	734.2	728.4	720.3	712.3	707.7	693.8	674.2	688.1	688.1	688.1	685.8	662.7
Bank	165.6	165.6	160.8	159.8	153.9	153.9	153.9	158.8	162.7	158.8	158.8	157.8
Insurance	166.4	171.1	170.3	170.3	160.1	148.4	148.4	153.1	154.7	153.1	152.3	147.6
1966												
Total	266.5	267.6	260.7	260.7	253.9	249.3	248.1	249.3	240.1	237.8	236.6	232.0
Manufacturing	314.3	317.4	312.8	315.9	306.7	300.5	306.7	308.2	291.4	289.8	285.2	282.1
Shipping	242.7	243.9	236.8	230.9	223.8	219.1	213.2	214.4	210.9	205.0	205.0	196.7
Whaling	671.9	692.7	682.3	674.2	673.1	668.5	659.2	660.4	656.9	652.3	655.8	652.3
Bank	160.8	155.9	145.2	150.0	146.1	146.1	146.1	144.2	137.4	138.4	135.4	138.4
Insurance	148.4	148.4	140.6	139.8	136.7	132.0	130.5	130.5	125.7	123.4	124.2	121.8
1967												
Total	232.0	229.7	224.0	217.1	211.4	214.8	233.2	229.7	227.4	222.9	218.3	214.8
Manufacturing	282.1	279.1	274.5	271.4	260.7	257.6	263.7	262.2	263.7	259.2	256.1	248.4
Shipping	196.7	193.2	185.0	174.4	167.3	177.9	207.3	196.7	188.5	182.6	174.4	173.2
Whaling	654.6	665.0	663.9	635.0	642.0	643.1	734.2	750.3	748.0	746.8	752.6	743.4
Bank	138.4	138.4	135.4	135.4	134.5	132.5	132.5	136.4	136.4	135.4	133.5	133.5
Insurance	122.6	124.2	125.0	125.7	121.8	121.1	125.7	129.7	132.0	125.0	127.3	125.7
1968												
Total	219.4	214.8	214.8	214.8	214.8	221.7	229.7	245.8	247.0	236.6	236.6	236.6
Manufacturing	256.1	248.4	251.5	253.0	245.3	257.6	266.8	292.9	297.5	283.7	288.3	283.7
Shipping	177.9	172.0	172.0	170.8	169.6	172.0	182.6	193.2	193.2	186.1	183.8	186.1
Whaling	739.9	746.8	768.7	712.3	712.3	743.4	766.4	836.7	824.1	778.0	788.3	809.1
Bank	136.4	135.4	130.6	128.6	131.5	133.5	136.4	139.3	141.3	139.3	139.3	138.4
Insurance	128.1	129.7	131.2	134.4	132.0	137.5	138.3	149.2	150.0	142.9	146.1	150.0
1969												
Total	245.8	253.9	251.6	253.9	255.0	250.4	257.3	264.2	267.6	266.5	267.6	278.0
Manufacturing	300.5	322.0	311.3	322.0	335.8	323.6	334.3	341.9	352.7	351.2	357.3	374.1
Shipping	186.1	187.4	188.0	180.6	173.3	170.2	163.5	165.3	165.9	163.5	160.4	165.3
Bank	149.1	142.2	138.4	142.2	148.1	146.1	148.1	148.1	149.1	144.2	142.2	143.2
Insurance	160.9	163.3	163.3	186.7	182.8	170.3	175.0	181.2	176.5	173.4	171.8	177.3
1970												
Total	283.2	280.3	283.2	289.1	274.3	271.4	286.2	333.4	362.8	380.5	377.6	365.8
Manufacturing	376.9	376.9	376.9	383.8	366.6	366.6	366.6	397.5	414.6	428.3	407.8	397.5
Shipping	172.7	170.6	174.7	174.7	166.4	166.4	183.1	228.8	268.4	285.0	295.4	282.9
Bank	146.4	136.2	138.7	131.0	131.0	128.5	128.5	132.3	132.3	131.0	129.8	127.2
Insurance	181.6	177.5	176.1	185.7	174.8	154.3	159.8	167.9	167.9	170.7	167.9	169.3
1971												

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total	398.2	383.5	377.6	345.1	345.1	339.2	336.3	345.1	333.4	309.7	292.0	286.2
Manufacturing	431.8	421.5	414.6	387.2	397.5	431.8	452.3	431.8	414.6	363.2	325.5	329.0
Shipping	314.1	297.5	293.3	258.0	253.8	233.0	222.6	241.3	233.0	222.6	216.4	203.9
Bank	131.0	131.0	124.6	122.1	122.1	123.3	124.6	125.9	124.6	120.8	119.5	125.9
Insurance	180.2	183.0	177.5	176.1	173.4	170.7	152.9	152.9	150.2	135.2	129.7	131.1
1972												
Total	303.8	292.0	289.1	292.0	283.2	309.7	318.6	345.1	327.4	327.4	321.5	324.5
Manufacturing	356.4	339.2	339.2	352.9	342.7	383.8	390.6	418.1	390.6	370.1	356.4	359.8
Shipping	210.1	201.8	189.3	187.2	174.7	189.3	197.6	222.6	222.6	243.4	247.6	255.9
Bank	129.8	131.0	131.0	128.5	127.2	131.0	136.2	146.4	138.7	141.3	142.6	141.3
Insurance	146.1	142.0	140.6	143.4	144.7	147.5	154.3	162.5	154.3	151.6	151.6	147.5
1973												
Total	342.2	365.8	365.8	410.0	457.3	516.2	513.3	519.2	504.4	504.4	498.5	457.3
Manufacturing	390.6	421.5	431.8	517.4	579.1	647.6	661.3	651.1	633.9	633.9	654.5	603.1
Shipping	264.2	285.0	274.6	293.3	355.7	434.8	401.5	428.5	426.5	420.2	376.5	322.4
Bank	143.9	147.7	145.2	147.7	146.4	146.4	152.9	154.2	145.2	145.2	143.9	145.2
Insurance	143.4	146.1	143.4	150.2	150.2	155.7	159.8	159.8	152.9	157.0	157.0	147.5
1974												
Total	522.1	498.5	480.8	457.3	424.8	418.9	386.5	383.5	321.5	342.2	327.4	300.9
Manufacturing	702.5	661.3	637.4	603.1	558.5	544.8	496.8	496.8	407.8	445.5	424.9	383.8
Shipping	368.2	357.8	345.3	326.6	297.5	305.8	278.8	272.5	235.1	233.0	216.4	195.5
Bank	149.0	146.4	142.6	137.5	134.9	133.6	132.3	128.5	118.2	119.5	120.8	118.2
Insurance	157.0	155.7	157.0	152.9	146.1	146.1	142.0	139.3	121.5	128.4	125.6	114.7
1975												
Total	292.0	298.0	283.2	274.3	286.2	277.3	298.0	300.9	283.2	274.3	268.5	256.6
Manufacturing	376.9	404.4	376.9	366.6	404.4	376.9	400.9	407.8	390.6	356.4	356.4	339.2
Shipping	178.9	166.4	160.2	149.8	139.4	139.4	181.0	160.2	143.5	131.1	129.0	120.7
Bank	119.5	120.8	119.5	118.2	115.6	116.9	115.6	122.1	119.5	119.5	123.3	122.1
Insurance	118.8	114.7	110.6	110.6	107.9	107.9	107.9	113.3	110.6	109.2	109.2	105.1
1976												
Total	292.0	295.0	283.2	280.3	280.3	292.0	303.8	312.7	292.0	283.2	280.3	277.3
Manufacturing	404.4	414.6	390.6	380.3	380.3	404.4	414.6	424.9	394.0	373.5	373.5	363.2
Shipping	135.2	141.5	141.5	135.2	133.1	137.3	151.9	164.3	151.9	149.8	145.6	141.5
Bank	127.2	123.3	122.1	124.6	124.6	128.5	128.5	131.0	127.2	123.3	124.6	131.0
Insurance	114.7	116.1	109.2	110.6	109.2	114.7	118.8	120.2	112.0	106.5	105.1	105.1
1977												
Total	274.3	274.3	271.4	265.5	250.8	250.8	247.8	238.9	236.0	230.1	206.5	206.5
Manufacturing	349.5	342.7	339.2	332.4	308.4	308.4	308.4	298.1	294.7	284.4	246.7	239.9
Shipping	143.5	147.7	147.7	143.5	133.1	129.0	129.0	112.3	101.9	91.5	83.2	89.5
Bank	129.8	132.3	131.0	128.5	127.2	127.2	123.3	125.9	123.3	124.6	122.1	123.3
Insurance	105.1	105.1	98.3	94.2	94.2	94.2	95.6	91.5	92.8	87.4	77.8	76.5
1978												
Total	200.6	203.5	197.7	200.6	209.5	203.5	200.6	227.2	241.9	218.3	215.4	212.4
Manufacturing	233.0	239.9	233.0	239.9	253.6	250.1	243.3	287.9	318.7	267.3	263.8	257.0
Shipping	85.3	85.3	79.1	77.0	79.1	74.9	70.7	89.5	91.5	89.5	83.2	85.3
Bank	119.5	120.8	119.5	119.5	120.8	118.2	118.2	122.1	122.1	120.8	123.3	124.6
Insurance	72.4	72.4	71.0	72.4	77.8	77.8	75.1	84.7	81.9	76.5	73.7	72.4
1979												
Total	212.4	224.2	238.9	244.9	268.5	274.3	289.1	289.1	289.1	306.8	318.6	330.4
Manufacturing	257.0	284.4	301.6	308.4	352.9	366.6	376.9	370.1	387.2	418.1	452.3	483.1

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Shipping	85.3	93.6	106.1	108.2	112.3	122.7	156.0	135.2	137.3	151.9	147.7	143.5
Bank	124.6	123.3	124.6	127.2	131.0	128.5	128.5	128.5	129.8	129.8	129.8	129.8
Insurance	72.4	73.7	83.3	87.4	96.9	98.3	98.3	96.9	101.0	107.9	106.5	103.8
1980												
Total	327.4	336.3	306.8	306.8	312.7	315.7	306.8	315.7	306.8	312.7	309.7	303.8
Manufacturing	472.9	490.0	424.9	421.5	438.6	442.0	424.9	442.0	421.5	431.8	424.9	407.8
Shipping	139.4	137.3	135.2	137.3	139.4	143.5	135.2	133.1	135.2	135.2	131.1	131.1
Bank	131.0	133.6	132.3	132.3	132.3	132.3	132.3	133.6	132.3	133.6	133.6	134.9
Insurance	105.1	117.4	117.4	114.7	114.7	117.4	117.4	124.2	121.5	125.6	132.4	133.8
1981												
Total	309.7	309.7	318.6	315.7	318.6	309.7	321.5	365.8	356.9	342.2	371.7	348.1
Manufacturing	404.4	397.5	411.2	407.8	418.1	400.9	421.5	490.0	472.9	431.8	466.0	438.6
Shipping	139.4	153.9	160.2	156.0	156.0	147.7	156.0	174.7	168.5	170.6	187.2	172.7
Bank	142.6	138.7	142.6	138.7	136.2	134.9	140.0	154.2	146.4	143.9	152.9	143.9
Insurance	139.3	143.4	146.1	147.5	155.7	148.8	157.0	188.4	188.4	191.2	229.4	213.0
1982												
Total	348.1	342.2	327.4	327.4	345.1	330.4	327.4	315.7	312.7	309.7	300.9	289.1
Manufacturing	431.8	414.6	383.8	387.2	424.9	407.8	400.9	394.0	400.9	407.8	390.6	373.5
Shipping	164.3	162.3	145.6	149.8	139.4	137.3	135.2	122.7	112.3	101.9	99.9	95.7
Bank	149.0	154.2	156.7	154.2	155.5	149.0	151.6	145.2	145.2	138.7	137.5	136.2
Insurance	217.1	204.8	206.2	200.7	226.6	208.9	210.3	185.7	176.1	173.4	170.7	159.8
1983												
Total	315.2	366.0	382.0	422.2	461.9	458.1	473.2	501.8	513.9	526.6	503.2	535.8
Manufacturing	430.1	533.4	562.6	639.8	712.4	712.9	734.5	776.7	796.0	800.0	755.0	812.9
Shipping	93.7	123.7	139.2	153.4	157.1	145.4	145.2	163.5	164.0	172.8	158.8	166.9
Bank	139.1	149.7	153.9	157.6	159.6	159.2	158.3	154.6	156.9	167.5	172.4	181.4
Insurance	173.1	194.7	186.2	188.7	211.9	207.7	207.1	218.8	233.8	239.8	225.2	240.7
1984												
Total	597.9	615.6	656.6	708.6	741.8	668.0	642.7	679.0	665.3	661.0	692.6	686.3
Manufacturing	897.8	918.3	967.2	1046.1	1087.1	958.0	925.4	994.3	983.8	989.8	1070.7	1073.6
Shipping	199.3	216.4	259.0	325.7	319.4	274.5	265.8	294.9	283.1	283.9	288.4	284.9
Bank	198.9	195.0	206.8	213.8	227.7	204.2	197.6	198.3	188.7	191.6	202.3	200.4
Insurance	265.5	275.9	313.5	326.8	373.2	339.9	325.6	348.0	322.3	305.8	339.2	358.2
1985												
Total	745.6	775.8	745.8	750.1	785.7	779.6	780.0	807.3	824.6	868.1	930.8	909.0
Manufacturing	1189.6	1256.4	1199.3	1197.1	1270.3	1266.4	1272.6	1333.0	1376.2	1434.7	1529.3	1497.0
Shipping	321.4	345.3	326.7	324.4	345.3	350.2	345.4	349.8	339.5	357.0	374.7	375.1
Bank	209.3	209.1	205.2	203.0	200.9	199.0	201.5	203.2	210.6	226.3	246.4	245.1
Insurance	397.1	411.5	418.1	417.9	445.6	439.4	433.2	447.5	455.2	453.6	456.2	431.5
1986												
Total	889.3	844.9	806.3	808.0	773.3	822.9	806.9	813.5	859.9	845.4	870.2	830.2
Manufacturing	1483.8	1404.5	1335.7	1345.7	1291.3	1353.4	1326.6	1333.3	1428.8	1416.2	1439.6	1378.3
Shipping	366.4	355.2	326.0	317.2	289.9	321.9	308.3	312.0	312.2	308.9	310.7	300.7
Bank	240.5	231.0	225.9	229.4	222.4	228.2	230.1	239.0	254.8	252.1	272.8	256.9
Insurance	411.6	409.3	389.9	380.3	356.3	401.0	401.9	405.8	417.5	434.0	463.5	434.8
1987												
Total	837.5	852.1	890.8	942.2	936.7	964.3	1011.6	1133.3	1231.1	1130.2	798.5	723.3
Manufacturing	1395.1	1438.1	1546.7	1611.7	1584.8	1643.6	1719.1	1973.0	2148.5	1939.7	1353.0	1247.9
Shipping	300.5	296.8	298.7	314.4	307.0	322.6	329.3	342.1	362.2	327.9	228.3	207.5
Bank	259.1	258.6	251.4	260.7	252.4	242.5	249.9	275.5	308.6	289.0	217.0	192.7

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Insurance	442.7	445.4	456.4	497.4	495.9	499.2	507.4	545.7	627.3	595.5	462.3	414.3
1988												
Total	767.7	768.9	829.8	861.9	818.8	851.8	866.6	843.7	807.4	838.3	876.7	950.1
Manufacturing	1328.8	1312.7	1457.2	1520.4	1464.6	1546.9	1580.3	1512.1	1438.3	1511.6	1586.1	1690.3
Shipping	241.8	266.8	273.2	271.7	270.0	282.5	303.1	313.3	322.7	352.8	387.5	412.2
Bank	182.8	169.9	173.7	173.5	158.2	158.8	152.1	149.9	138.4	133.0	126.2	142.8
Insurance	389.8	353.5	416.4	440.9	363.1	338.2	319.3	300.1	272.8	259.6	251.7	309.2
1989												
Total	1112.3	1199.7	1265.0	1370.0	1454.2	1432.2	1481.4	1482.9	1564.1	1481.0	1418.3	1492.0
Manufacturing	1953.6	2095.2	2228.7	2412.1	2453.9	2399.4	2488.0	2476.7	2598.7	2485.1	2362.3	2515.5
Shipping	474.5	504.0	519.9	534.6	641.9	667.7	706.9	719.2	758.7	725.8	736.3	748.9
Bank	182.9	211.2	217.3	254.6	279.5	261.1	254.0	248.1	268.2	236.5	211.5	217.5
Insurance	368.1	400.1	416.8	477.6	532.0	510.8	525.1	540.8	622.7	559.4	502.4	572.9
1990												
Total	1643.8	1765.2	1854.9	1782.8	1846.8	1819.8	1850.4	1796.2	1721.3	1525.0	1395.6	1355.2
Manufacturing	2810.7	3034.3	3152.2	3009.2	3172.4	3176.5	3254.0	3309.3	3243.9	2893.4	2639.7	2569.7
Shipping	802.2	845.7	937.6	916.5	914.9	861.6	859.0	753.2	697.8	603.3	528.1	519.6
Bank	234.6	249.8	251.4	242.5	240.2	233.7	241.0	218.5	189.1	164.8	169.3	150.6
Insurance	619.5	696.5	691.9	662.9	718.1	738.4	721.0	651.5	599.8	568.7	597.1	594.8
1991												
Total	1234.2	1336.8	1441.3	1407.3	1484.4	1497.9	1473.2	1504.9	1466.6	1386.7	1267.7	1177.6
Manufacturing	2383.7	2528.5	2730.4	2713.6	2921.0	2943.2	2908.4	2959.4	2901.0	2764.3	2564.6	2440.2
Shipping	467.1	548.6	593.9	557.6	577.3	602.0	590.9	626.5	611.9	591.6	538.2	472.1
Bank	119.8	121.5	128.5	121.1	107.0	95.6	89.3	83.2	70.8	52.7	40.0	32.0
Insurance	521.7	552.7	580.4	557.2	561.7	541.6	525.5	511.8	497.9	438.4	360.7	327.1
1992												
Total	1295.3	1241.2	1243.2	1229.0	1327.2	1250.0	1132.5	1002.3	937.4	991.8	1018.4	1098.2
Manufacturing	2709.7	2627.1	2671.1	2685.2	2909.7	2781.9	2551.0	2307.9	2167.3	2272.9	2326.3	2544.3
Shipping	490.8	457.2	431.1	395.5	421.1	378.1	335.0	272.0	255.2	285.3	299.2	307.0
Bank	39.2	37.6	37.2	36.4	41.8	40.7	38.1	34.8	30.8	30.3	29.0	29.2
Insurance	390.1	356.9	371.7	384.8	409.2	358.3	279.4	220.3	194.8	209.4	224.4	234.0
1993												
Total	1128.6	1165.2	1265.8	1323.2	1394.4	1396.5	1499.9	1646.2	1620.5	1723.1	1747.2	1715.9
Manufacturing	2609.1	2697.5	2896.6	2997.3	3080.4	3032.0	3213.7	3523.5	3480.6	3754.9	3838.8	3836.5
Shipping	312.8	308.2	344.5	372.1	438.9	468.3	530.1	558.9	543.0	554.9	543.4	518.8
Bank	33.4	41.4	49.2	55.7	59.0	61.2	64.0	74.6	71.8	75.1	75.4	70.6
Insurance	242.9	265.0	271.6	263.4	266.8	245.2	254.5	323.2	324.8	331.4	350.4	312.7
1994												
Total	1904.4	1986.2	1932.2	1886.4	1876.9	1761.9	1826.4	1879.4	1789.4	1754.6	1762.4	1862.6
Manufacturing	4327.2	4528.2	4429.5	4280.2	4250.1	3960.5	4119.7	4281.2	4090.8	4025.2	4004.1	4206.9
Shipping	549.9	569.0	551.9	564.9	575.5	548.4	562.2	562.4	525.4	508.7	518.4	550.6
Bank	77.6	81.8	75.9	73.7	69.5	66.1	68.6	69.4	65.4	64.1	66.3	71.3
Insurance	327.9	323.0	311.7	302.9	291.0	285.1	286.0	293.6	287.6	280.5	302.2	337.6
1995												
Total	1886.8	1889.1	1792.3	1866.0	1976.3	2018.6	2092.0	2112.3	2165.0	2113.1	2074.6	2115.4
Manufacturing	4260.3	4284.7	4043.2	4236.3	4480.9	4542.6	4731.8	4756.7	4843.6	4750.6	4652.9	4729.1
Shipping	553.2	554.5	525.2	532.9	541.5	560.0	568.0	585.6	608.3	574.7	561.6	578.7
Bank	71.9	68.4	66.7	70.0	77.5	81.8	84.7	85.5	86.3	85.6	82.1	82.4
Insurance	355.9	350.7	352.0	365.3	435.6	454.7	470.1	475.8	509.8	512.4	535.3	557.0
1996												

Table A1. Stock price indices monthly 1914 - 2001

	January 1928=100											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997												
Total	2197.5	2226.5	2263.2	2347.4	2410.5	2464.4	2426.1	2400.6	2447.1	2548.4	2642.3	2750.2
Manufacturing	4890.1	4908.2	5046.4	5294.8	5403.5	5502.0	5341.6	5208.7	5319.6	5548.6	5791.0	6073.1
Shipping	611.2	632.5	629.1	648.0	687.7	715.0	730.0	728.1	739.0	767.8	775.7	794.0
Bank	87.5	91.5	92.2	91.1	93.2	97.0	97.4	102.0	102.0	106.5	114.6	119.6
Insurance	567.5	578.3	548.7	522.4	518.8	512.0	520.7	573.6	597.5	612.2	623.9	622.5
1998												
Total	3002.4	3188.2	3173.0	3132.3	3309.0	3450.3	3656.2	3780.3	3825.0	3989.7	3769.8	3686.3
Manufacturing	6688.3	7095.3	7007.4	6890.7	7285.7	7546.3	7970.1	8134.6	8172.2	8463.8	7986.8	7890.6
Shipping	852.4	887.6	883.4	866.0	930.4	1012.0	1105.5	1197.7	1252.8	1332.3	1248.2	1161.3
Bank	131.9	146.5	148.8	153.3	157.7	160.9						
Insurance	616.7	675.2	744.2	751.3	760.9	761.8						
1999												
Total	3590.5	3634.6	3887.5	4070.0	4043.3	3782.8	3835.9	3269.5	2736.5	2569.1	2801.4	2622.6
Manufacturing	7700.5	7887.8	8435.2	8884.3	8650.4	8145.8	8396.5	7327.0	6158.2	5870.2	6283.1	5938.3
Shipping	1092.0	1058.5	1128.0	1159.0	1195.0	1095.2	1066.0	834.5	692.9	637.8	688.4	607.7
2000												
Total	2906.9	2913.7	2989.5	3183.2	3347.3	3396.4	3474.1	3525.6	3583.7	3414.7	3534.5	3799.0
Manufacturing	6504.5	6663.5	6861.7	7386.4	7733.4	7840.2	7934.1	7934.9	8096.9	7707.0	8016.6	8811.4
Shipping	698.4	654.0	684.2	730.2	794.2	823.2	869.2	911.2	896.5	829.3	854.7	898.4
2001												
Total	3951.9	4013.6	4057.1	3725.8	3939.5	3969.3	4130.5	4426.4	4560.7	4357.6	4291.4	3859.3
Manufacturing	9164.2	9525.8	9691.1	8665.1	8995.9	9068.4	9541.4	10140.9	10507.6	9968.5	9902.9	8814.9
Shipping	950.2	919.5	913.8	866.6	963.1	950.3	946.2	1056.8	1095.3	1042.9	984.4	865.4
2001												
Total	3948.2	4060.3	3841.8	3789.2	4013.6	3905.4	3683.5	3584.0				
Manufacturing	8913.3	9121.8	8486.1	8356.2	8795.7	8401.0	7922.3	7694.7				
Shipping	924.0	973.4	965.8	954.5	1035.2	1033.5	944.7	913.6				

Chapter 9 – House price indices for Norway 1819–2003

Øyvind Eitrheim and Solveig K. Erlandsen¹

In this chapter we present annual house price indices for four Norwegian cities over the period from 1819 to 2003. Existing Norwegian house price indices start in the mid-1980s, and hence we present new information about Norwegian house prices for more than 160 years. Raw data are compiled from the real property registers, and the house price indices are constructed by the use of the weighted repeat sales method. The cities in our sample are four of the five largest in Norway - Oslo, Bergen, Trondheim and Kristiansand. We construct house price indices for each city in addition to an aggregate index. The new house price indices are spliced with existing house price indices from 1986.

1. Introduction

Existing price indices for houses in Norway typically cover only a short time span of a few decades or so. Statistics Norway has published house price indices for new single-family houses since 1989 and for existing homes since 1991. Furthermore, the Norwegian Association of Real Estate Agents (NEF) has compiled and published regional and nationwide house price indices back to 1985.² Besides this, some Norwegian house price indices which cover either a limited time period or a particular region, or both, are available. An example of such an index is provided in Hanisch and Ryggvik (1993). They constructed a house price index for apartment blocks in Oslo for the period 1890–1899. Another example is the price index for an area of Oslo for the period 1956–1976 which is published in NOU (1981). Also in an international perspective long runs of house price indices are rare. Generally, house price indices are constructed only for the last decades, and few house price indices are available for the period before World War II. However, some exceptions are noted. One is Eichholtz (1997), who constructed a biennial house price index for an area of Amsterdam for the period 1628–1973. Another is Friggit (2001), who constructed an annual house price index for Paris for the period 1840–1999.

¹The raw data used in this study are compiled from archives by the students Merethe Nødtvedt, Cecilie Ramm, Øyvind Rykke, Kristian Råen, Kristin Skjelbred, Tone Østreim, and cand. philol. Svein Henrik Pedersen. Comments from Peter Englund, Ola H. Grytten, Lars Gulbrandsen, Jan Tore Klovland, Espen Moen, Jan F. Qvigstad and participants at two workshops in Norges Bank and a seminar arranged by "Bolitøkonomisk nettverk" are gratefully acknowledged. The views expressed are those of the authors and should not be interpreted as reflecting those of Norges Bank.

²From 2002 onward NEF collaborates with Eiendomsmeidlerforetakenes Forening (EFF), ECON and FINN.no in producing the house price indices.

In this chapter we present annual house price indices for Norway from 1819 and up to today. More specifically, we construct a historical house price index for the inner cities of each of the four cities in our sample - Oslo, Bergen Trondheim and Kristiansand - in addition to an aggregate index. The five indices start in different years in the 19th century, and they are spliced with NEF's house price indices from 1986. For the period up to 1986 the house price indices are based on nominal transaction prices of real property, compiled from the real property registers. The city house price indices are constructed by the use of the weighted repeat sales method, while a hybrid method is applied to construct the aggregate index.

The remainder of this chapter is organized as follows. In Section 2 we provide a brief description of the four cities in our sample. Data are described in Section 3, while the empirical approach used for constructing the indices is outlined in Section 4. The house price indices are presented in Section 5, and Section 6 concludes. Appendix A tabulates the nominal house price indices.

2. Background

The cities in our sample comprise four of the five largest in Norway, and the cities inhabit currently more than one fifth of the country's population, cf. Table 1 which shows the population development in Norway and each of the four cities since 1815. In the following we give a brief description of some main characteristics of the housing developments in the four cities. At the end of this section a historical overview of Norwegian housing market regulations is provided.

Table 1: Population*(in thousands), 1815-2000

	Norway	Oslo	Bergen	Trondheim	Kristiansand
1815	885	11	16	10	7
1845	1 328	26	22	15	8
1890	2 001	151	54	25	13
1930	2 814	253	98	54	19
1960	3 591	476	116	59	28
2000	4 503	507	229	149	72

*Note that the city boundaries have been enlarged several times over this period.

Sources: Statistics Norway, Bratberg and Arntzen (1996), Tvedt (2000) Hagen Hartvedt (1994), www.kristiansand.kommune.no.

2.1. Oslo³

Oslo is the capital of Norway, located south-east in the country. The city is by far Norway's largest, with more than 10 percent of the country's inhabitants currently living in it. Although the city was founded a millennium ago, the modern Oslo originates from 1624, as a fire had destroyed the old

³This section is in large based on Tvedt (2000).

city.⁴ The new city was built in brick. Both the construction of buildings and the population evolved slowly over the first centuries. It was not until the second half of the 19th century that both the population and the activity in the construction sector increased sharply. The construction sector was in particular booming in the 1880s and 1890s, when a large part of Oslo's current inner city residential buildings were built. Typically, the buildings were four-, and five-story brick apartment blocks, built for rental.⁵ The city boundary has been enlarged several times over the last centuries. With the enlargements in 1859 and 1878 many wooden residential buildings were included in the city's housing stock. The biggest enlargement took place in 1948, when the Aker region was incorporated. After World War II and up to the 1980s construction of residential buildings in Oslo took mainly place in the new suburbs in the previous Aker region.

Oslo's population has increased from 11 000 in 1815 to more than half a million today, cf. Table 1. Except for some few periods the population growth has been continuous over the period. An exception is the period from 1900 to 1905 when the population declined with more than two percent.⁶ Another is the period from 1969 to 1984. During this period the population declined from 488 000 to 447 000 inhabitants. At the same time a large internal relocation of Oslo's population took place, as many people moved from the inner city to the new suburbs in the previous Aker region.⁷

2.2. Bergen⁸

Bergen is Norway's second largest city, situated on the west coast of the country. The city was for centuries the country's leading commercial marketplace, and until the beginning of the 19th century it was the most populated, cf. Table 1. Through the centuries Bergen has been haunted by many fires. The 1702 fire was in particular devastating, in which almost 90 percent of the city's buildings burnt down. However, as the houses mainly were rebuilt as small wooden houses, and the narrow streets and alleys were retained, the fire did not change the city's character substantially. A new housing type was introduced in the city after the 1855 fire, when brick apartment blocks were constructed in an inner city area. In the last decades of the 19th century the activity in the construction sector was high also in Bergen. Typically, the new buildings in the inner city were brick apartment blocks of several floors, while two-story wooden dwellings were constructed on its outskirts. Many buildings in the inner city were destroyed by the 1916 fire. Similar to Oslo, housing construction in the post-WWII period took mainly place in suburbs outside the city centre.

The population of Bergen has ten-folded from 1815 to 2000, and it is currently above 230 000. A large share of the population growth is due to enlargements of the city boundary. The 1972-

⁴The city was both moved and renamed to Christiania/Kristiania in 1624, a name it retained until 1925.

⁵At the turn of the century around 95 percent of Oslo's households were tenants, cf. e.g. Gulbrandsen (1980).

⁶Source: Hanisch and Ryggvik (1993).

⁷While 70 percent of the city's population lived in the inner city, defined as Oslo before the 1948-enlargement, in 1949, this share was reduced to 29 percent in 1988.

⁸This section is in large based on Hagen Hartvedt (1994).

enlargement alone increased the number of inhabitants in Bergen from 111 000 to 212 000. In the 1970s population growth levelled out in Bergen, and the number of inhabitants in the inner city area declined.

2.3. Trondheim⁹

Trondheim is Norway's third largest city, situated in the middle of the country. The city was founded for more than 1000 years ago. Also Trondheim has been haunted by many fires over the centuries, and from the mid-19th century new buildings in the city had to be built in brick. At the end of the 19th century and the beginning of the 20th century many three-, and four-story brick apartment blocks, built for rental, were constructed in the city. However, old wooden houses, of one- to three-story, still dominate many inner city areas. The city boundary was extended three times during the 19th century and in 1952 and 1964. In the decades after WWII construction of new residential buildings took mainly place in these new Trondheim areas.

The population of Trondheim has grown almost continuously over the centuries and it inhabits currently around 150 000 people. In the period 1946-1970 the annual average population growth rate was 1.5 percent. Similar to Oslo and Bergen, the growth rate declined in the 1970s before it levelled out in the 1980s. Towards the end of the 1980s the number of inhabitants started to increase again.

2.4. Kristiansand¹⁰

Kristiansand is the fifth largest town in Norway, located at the south coast of the country. The city was founded in 1641, and it is characterized by its quadratic inner city called "Kvadraturen". The houses in the inner city were originally built in wood. However, after the conflagration in July 1892, the houses in the burnt-down area were obliged to be rebuilt in brick. One-, and two-story houses dominated housing in the city, also after the 1892 fire. The activity in the residential construction sector was huge, both in the inner city and on its outskirts, in the first decades after WWII. In this period many wooden houses in "Kvadraturen" were demolished and replaced by four-, and five-story apartment blocks.

The population of Kristiansand has increased from around 7 000 at the beginning of the 19th century to more than 70 000 people today, cf. Table 1. The city boundary was extended both in 1921 and in 1965. In particular the latter extension increased the city's population substantially.

⁹This section draws on the exposition in Bratberg and Arntzen (1996).

¹⁰This section is mainly based on Garmann Johnsen (2002).

2.5. Housing market regulations¹¹

Price regulations of the Norwegian housing market have not been substantial over the period from 1819 to 2003 as a whole. However, in some sub-periods housing has been subject to massive regulations. This is in particular the case for the period from 1940 to 1969, when sale prices on almost all types of real property were strictly regulated. Rents have also been controlled in several periods. First, in the period from 1916 to 1936 rent control applied for some types of flats. Then, from 1940 onward rents on unfurnished flats in elder buildings in some cities have been regulated. The scope and extent of these regulations have been gradually reduced, and for the period 1985-2010¹² the law has been/is in force only in Oslo and Trondheim. The housing market has also been subject to other regulations than price regulations from time to time. For instance, in the period 1976-1983 it was forbidden to convert rental apartment blocks and housing co-operatives into condominiums.¹³ Table 2 summarizes the main features of the housing market regulations.

Table 2: Regulations of the Norwegian housing market

Type of housing	Period	Type of regulation
Rental dwellings	1916-1935	Rent control on some types of flats.
	1940-2010	Rent control on some types of flats.
	1976-1983	Condominium conversion forbidden.
Owner-occupied dwellings	1940-1954	Prize freeze.
	1954-1969	Price regulations.
Housing co-operatives	1940-1954	Price freeze.
	1954-1982/88	Price regulations on new/old flats.
	1976-1983	Condominium conversion forbidden.

3. Data

Real property transaction data are compiled from the real property registers of the four cities. The data set covers transactions for the period from 1819 to 1989 for the sample as a whole.¹⁴ Over this period the real property registers are stored at different places for two sub-periods. For the period up to around 1935,¹⁵ the real property registers are stored at the regional state archives (statsarkivene), while for the period from 1935 to 1989 the registers are scanned and made available through the internet by Norsk Eiendomsinformasjon AS.^{16,17} In the real property registers information on all transactions of a property are recorded at the same place. Hence, repeat sales information on the

¹¹See e.g. NOU (1981) and Gulbrandsen (1980) for more details on the Norwegian housing market regulations.

¹²The rent control law for old unfurnished flats was repealed in 1999, resulting in a gradual deregulation period until 2010.

¹³See e.g. Wessel (2002).

¹⁴Up until around 1989 the real property registers were recorded manually, whereas the registers are electronic from around 1989 and onwards. Since existing Norwegian house price indices start in the mid-1980s, we have not collected data for the latter period.

¹⁵1949 in Trondheim.

¹⁶At: www.infoland.no.

¹⁷Except for Bergen; the real property registers for Bergen were stored at the State Archive in Bergen also for the latter period at the time we collected the data.

properties are easily available within each of the two sub-periods.

The samples for the four cities start in different years in the 19th century, and they all end in 1989. The Bergen sample spans the longest period with annual observations from 1819, while the Trondheim sample covers the shortest, starting in 1897. For each of the cities except Kristiansand we have collected two samples of real properties; a sample of real properties with transaction data for the period up to 1935,¹⁸ and another for the period 1935-1989. The samples for the two sub-periods for each of the cities, hereafter denoted the first period and the second period samples, respectively, are overlapping in the 1930s. The Kristiansand sample consists of the same real properties in both periods. For each sample we have tried to construct a representative sample of real properties in the inner part of each city, where we define the inner part to be inside, or just by, the pre-WWII boundaries of the four cities, cf. Sections 2.1-2.4. We denote this as inner city samples in the following.

The way of choosing the samples has varied between cities and sample periods. The first period sample of Oslo consists of all real properties in some streets in different parts of the inner city, while the corresponding Bergen sample contains of a set of randomly chosen real properties. The real properties in the first period Trondheim sample have been chosen as a mixture of the Oslo and Bergen procedures. For these cities the second period samples consist of all dwellings of some housing types in some inner city areas. The Kristiansand sample includes all real properties in nine streets of "Kvadraturen", cf. Section 2.4.

The samples consist mainly of residential buildings, although some non-residential buildings also are included in some of the samples.¹⁹ Many types of housing are represented, from rental apartment blocks of many dwellings to single-family houses. Note that prior to 1970 most rental apartment blocks were sold as one unit, hence they get the same weight in the sample as for instance a single-family house. However, in the early 1970s and in particular from the mid-1980s many rental apartment blocks were converted into multiple condominium units. Flats in housing co-operatives are not included in the samples, since transactions of these are not registered in the real property registers. The types of housing differ in the four cities, and they vary over time, cf. Sections 2.1-2.4. The housing types of the samples differ correspondingly.

We have recorded all transaction prices of each property in the sample, in addition to information on the property's attributes. More specifically, we have registered the price and the date of all transactions of the property, its address, the size of its yard,²⁰ and, when available, the year of construction, type of housing²¹ and special comments characterizing the transactions, such as e.g.,

¹⁸For Bergen we have collected two samples of real properties for the period 1819-1935; a sample of properties which were transacted between 1819 and 1935, and, to increase the number of observations at the 19th century, an additional sample of properties which were transacted between 1819 and 1900.

¹⁹The share of non-residential buildings is the largest in the Kristiansand sample.

²⁰For the second period sample in Oslo we have registered the size of the dwelling unit, not the yard.

²¹For the real properties in the second period samples we have collected information on the housing type and the year of construction of the *current* dwelling on the property from "Norges Eiendommer, 3/2003", published by Norsk Eiendomsin-

when the property has been sold to family members or when it only is a part of the property which has been sold. Tables 3 and 4 show two typical examples of the type of information which was collected for two selected properties. The house on the property *Claus Frimanns gate 4*, which is in the first period Bergen sample, is an inner city brick building constructed in the last decades of the 19th century. The property *Skippergaten 125* is in the Kristiansand sample, and it is a typical example of the dwellings in the wooden house area of "Kvadraturen".²²

Table 3: Claus Frimanns gate 4, Bergen

Brick house; built in 1881.			
Date of sale	Price	Sqm	Comments
Apr 1898	15.800	150	
Jun 1910	14.610	165	Auction
Apr 1914	20.000	165	
May 1918	43.000	165	
Feb 1919	48.000	165	
Oct 1920	58.000	165	
Oct 1928	47.000	165	
Jun 1936	42.000	165	

Table 4: Skippergaten 125, Kristiansand

Single-family wooden house of one-story; built in 1859.		
Date of sale	Price	Sqm
Jan 1883	4 210	261
Sep 1912	8 500	261
Mar 1918	15 000	261
Sep 1944	16 000	261
Apr 1957	33 000	261
Jun 1957	33 000	261
Feb 1971	80 000	261
Mar 1971	100 000	261
Nov 1978	542 000	261
Sep 1987	1 566 000	261
Dec 1988	1 400 000	261

The samples of the four cities consist of more than 21 000 transaction prices in total. The sample periods and the number of transactions in each sample and in total are summarized in Table 5.

Figures 1(a)–1(b) plot the annual distribution of the transactions in the samples for each of the four cities and in total, respectively, over the period 1819–1989. Note that, with the exception of the Kristiansand sample, the number of transactions are not comparable before and after 1935 since the

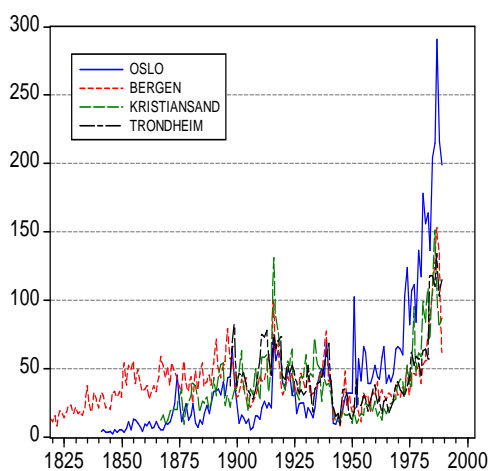
formasjon AS.

²²Garmann Johnsen (2002).

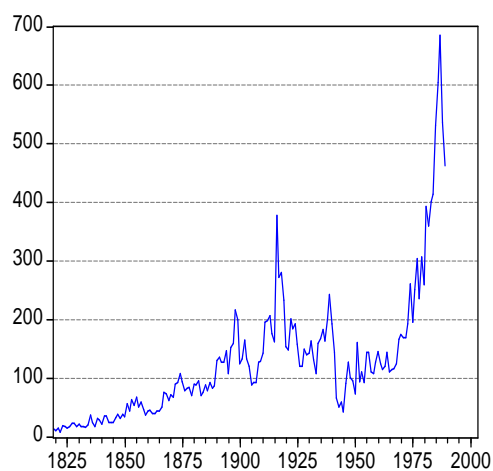
Table 5: Sample description

	Sample period	No. of observations
Oslo	1841-1989	6 171
Bergen	1819-1989	6 720
Trondheim	1897-1989	4 239
Kristiansand	1867-1989	4 821
Total	1819-1989	21 951

city samples for the two sub-periods are of different size. In addition, the samples for the two sub-periods are partly overlapping in the 1930s. On the contrary, the Kristiansand sample consists of the same dwelling units in both sub-periods.



(a) City samples



(b) Total sample

Figure 1: Transactions per year in the samples for Oslo, Bergen, Trondheim, Kristiansand and the total over the period 1819-1989.

Figure 1(a) indicates that the activity in the housing markets have co-moved in the four cities in many periods. For instance, during World War I the turnover in the real estate market was high in all the cities, with 1916 being a peak year in three of them. During World War II all four cities experienced, on the other hand, low activity in the real estate market. In the decades after WWII the pattern of the real estate activity was also similar in the four cities; in the 1950s and 1960s the turnover in the real estate market was low, while it increased gradually in the 1970s before it took off in the mid-1980s. Conversion of rental apartment blocks and housing co-operatives into condominiums can partly explain the increase in the number of real property transactions at the beginning of the 1970s and in the mid-1980s.

While the activity in the real estate markets in the four cities share many common features, the cities have also some special characteristics. For instance, at the end of the 1890s the activity in the real estate market in Oslo boomed, before it busted after the turn of the century. Also the Bergen sample shows a similar, but milder, course over this period. The Kristiansand sample does not show an increase in the number of transactions at the end of the 1890s. On the other hand, many real properties were sold in 1892-94 in Kristiansand. This can partly be explained by that many burnt-out properties, or shares of these, were sold in the aftermath of the July 1892 fire. 1951 stands out as a year with many real estate transactions in the Oslo sample. This is due to that more than 80 of the observations in the sample are local government purchases of apartment blocks in an area of the city in November this year.²³

4. Empirical approach

Different methods are applied in the literature for constructing house price indices. This is due both to the special characteristics of houses, being heterogeneous and infrequently sold, and data availability. Some house price indices are based on changes in the average or median price of houses which are transacted in different periods. However, such house price indices may suffer from composition biases, as houses of different types and quality may be sold in different time periods. It is thus more common to construct house price indices by the use of constant quality methods, like the repeat sales method or the hedonic method, or a combination of these two. Case and Shiller (1987, 1989), Eichholtz (1997) and Røed Larsen and Sommervoll (2003) are examples of studies which use the repeat sales method for constructing house price indices. The Norwegian house price indices published by Statistics Norway and NEF/EFF/FINN.no/ECON are, on the other hand, examples of indices which are constructed by the use of the hedonic method. Among others, Englund, Quigley and Redfern (1998) use a combination of repeat sales and hedonic methods to construct Swedish house price indices.

Repeat sales house price indices are based on repeated transactions of individual houses in the sample, while hedonic house price indices are based on detailed data of the houses' characteristics. Consequently, the hybrid hedonic-repeat sales method utilizes both repeat sales information and data on the houses' attributes.²⁴ As noted in Section 3, the real property registers in Norway are organized such that repeat sales information on the individual houses are easily available. The registers do however not contain much information on the houses' attributes. Thus, due to data availability we have chosen to use the repeat sales method, or a refined version of it - the weighted repeat sales method -, to construct the historical house price indices for the four Norwegian cities. To construct the aggregate index a hybrid method is applied, as in addition to use the repeat sales information of

²³Most of these apartment blocks were resold to exactly the same price after a couple of years. We have excluded these transactions from the repeat sales sample.

²⁴See e.g. Shiller (1993) for a more thorough presentation of these methods.

the total sample of the four cities, we allow the four cities to have different intercepts.

The main advantage of the repeat sales method compared to the hedonic method is that it does not require detailed data on specific characteristics of the dwellings. Thus, the method relies less on dwelling characteristics that may be difficult to observe. Among the drawbacks of the method is that it wastes data. The repeat sales method uses only pairs of transactions of houses, hence observations of houses which are sold only once over the sample period are not used. Another potential disadvantage of the repeat sales method is that houses which are frequently sold may be lemons, starter-homes or speculation objects, and represent houses of a different quality than the rest of the market. In addition, new houses are likely to be under-represented in the sample at the end of the sample period.

A more formal presentation of the weighted repeat sales method is given in Section 4.1, while the samples used for estimation are presented in Section 4.2.

4.1. The weighted repeat sales method

The repeat sales method was introduced by Bailey, Muth and Nourse (1963), and it is, as noted above, based on repeated transactions of individual houses. The method assumes constant quality on the houses between the two transactions in each transaction pair. Bailey et al. (1963) suggested to use the ordinary least squares method (OLS) on the following regression equation

$$y = x\beta + u, \tag{1}$$

where y is a vector of log price differences of n transaction pairs, x is an $n \times T$ matrix of time dummy variables which indicate the timing of transactions within the period indexed by $t = 1, \dots, T$. Each row of the x matrix represents a transaction pair and take on the value -1 in the period of the first sale, +1 in the period of the second sale, and 0 otherwise. The time dummies in the base period are set to 0 for normalization. Furthermore, β is a $T \times 1$ vector of coefficients to be estimated, and u denotes an $n \times 1$ vector of model residuals. The residuals are assumed to have zero mean, constant variance, and be mutually independent. However, as noted in Case and Shiller (1987, 1989), the variance of the residuals may increase with the time interval between the sales in the transaction pairs, and hence violate the assumption of constant residual variance. Such residual heterogeneity may for instance be due to the fact that it is more likely that unobserved characteristics have changed for transaction pairs which span long time intervals.

Case and Shiller (1987) suggested a three-step procedure to take into account this potential heterogeneity, such that transaction pairs of long time intervals are given less weight than transaction pairs

of shorter time intervals.²⁵ The three steps of the weighted repeat sales method are conducted as follows. In the first step, equation (1) is regressed by OLS. Then, in the second step, the squared residuals are regressed on a constant and the time interval of each transaction pair using OLS. In the third step we first divide each variable in equation (1), i.e. both the log price differences and the time dummy variables, with the square root of the fitted values from step two and reestimate the equation with OLS.

House price indices for each of the four cities are estimated with the weighted repeat sales method described above. The levels of the indices are represented by the $\hat{\beta}$ coefficients from step three. Since the estimations are based on logarithmic values of transaction prices, the indices are in logarithms. Hence, to obtain appropriate levels of the indices we take the exponents of the coefficients.²⁶ The indices represent the expected values of geometric mean of the house price growth rates.

For constructing the aggregate house price index we use a hedonic-repeat sales method. Formally, we estimate an extended version of equation (1):

$$y = x\beta + z\gamma + u, \quad (2)$$

where z denotes a $n \times 3$ matrix of dummy variables for the different cities, where transaction pairs from the Oslo, Trondheim and Kristiansand samples take the value 1, respectively, and 0 otherwise.^{27,28} γ denotes the associated 3×1 coefficient vector. The city dummy variables are introduced to allow differences in the price relatives in the transaction pairs of the different cities. The remainder of the equation is as before. We employ the weighted repeat sales procedure also in the construction of the aggregate house price index.

4.2. The repeat sales samples

The real property transaction prices described in Section 3, or pairs of these, form the basis of the repeat sales indices. However, not all of the price observations in the full sample are used in the construction of the indices. First, since we construct annual house price indices, we use annual average prices when a property is sold more than once during a year. In our sample it is in particular during WWI that many dwellings were sold several times in a year.²⁹ Second, as noted above, only observations of a real property which has been sold more than once over the sample period are used in the repeat sales method. Single transactions of a house are hence excluded from the repeat sales sam-

²⁵It was first after the refinements of the repeat sales method by Case and Shiller (1987, 1989) that it became common to construct repeat sales house price indices.

²⁶I.e. Index _{t} = $100 \times \frac{\exp(\hat{\beta}_t)}{\exp(\hat{\beta}_0)}$ = $100 \times \exp(\hat{\beta}_t)$, where t is the time period and period 0 is the base period ($\beta_0 = 0$).

²⁷Bergen is the base city.

²⁸The z matrix could also include other hedonic variables which may help explain the price relatives in the transaction pairs.

²⁹E.g., the property *Nedre Møllenbergs gate 82* in Trondheim was sold thrice in 1918; in April for 54 000 NOK, in July for 62 000 NOK and in August for 69 000 NOK. The average 1918 transaction price for this property was hence 61 667 NOK.

ple.³⁰ A third group of transactions which we do not include in the repeat sales sample is transaction pairs with changed quality on the real property. We have excluded transaction pairs of a real property if the size of the yard has been changed or if a new house has been constructed³¹ between the two transactions. Ideally, we should also have controlled for other changes in the houses' attributes, such as depreciation, refurbishments, electricity and sanitary installations, etc. Unfortunately, data on such characteristics are not easily available. In the early 1970s and in the mid-1980s a substantial number of rental dwellings and housing co-operatives in the cities were converted to condominiums. In the conversion process many tenantry or members of the housing co-operatives bought the flats in the condominiums to prices below market prices.³² Many of these flats were later resold to market prices. To avoid that these transaction pairs disrupt the house price indices we exclude the first transaction of a condominium dwelling unit from the sample. The transactions of the real property *Erling Skjalgssons gate 3* in Oslo, which was converted to a condominium in December 1983, can be used as an example. As shown in Table 6, three of its dwelling units were sold at the time of conversion. Within a couple of years the three units were resold to prices more than 40 times the conversion prices. These three transaction pairs are excluded from the repeat sales sample, whereas the second transaction pair of dwelling unit no 1 (the 1986-1987 transaction pair) is included. The repeat sales sample is reduced by a substantial number of observations at the beginning of the 1970s and in the mid-1980s because of this. A fifth group of observations which is excluded from the repeat sales sample are transactions between family members and transactions of a part of a property, when the part is unidentified. Also this latter group amounts to a substantial number of observations.

After we have removed observations according to these criteria, a total of 10 827 transaction pairs are used to construct the house price indices. Table 7 shows the number of transaction pairs in both the city samples and in total. In addition, it tabulates the average, median, minimum and maximum time intervals of each of the samples. Note that the median time intervals of the transaction pairs are less than the average in all samples, and hence that their distributions are skewed to the left. Figures 2(a)–2(b) plot the annual distribution of the transactions in the repeat sales samples for each city and in total, respectively. Both transactions in each transaction pair are included in the figures.

³⁰There are relatively few single transactions of houses in our samples, since the samples span long time periods.

³¹When we have information on this. In addition, we have excluded transaction pairs when we *believe* a new house has been constructed, for instance when the price of a property is multiplied from a year to another.

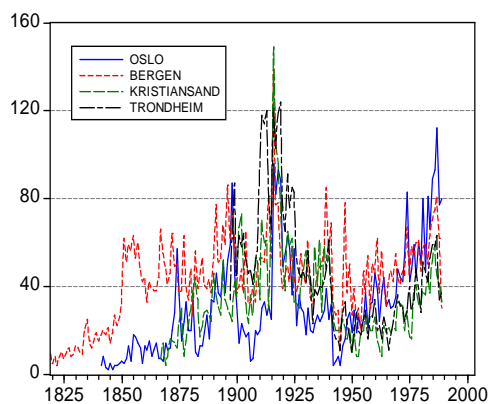
³²See e.g. Gulbrandsen (1989) and Wessel (2002).

Table 6: Erling Skjalgssons gate 3, Oslo
6-story apartment block, built in 1899.
Converted to condominium of eight units in Dec 1983.

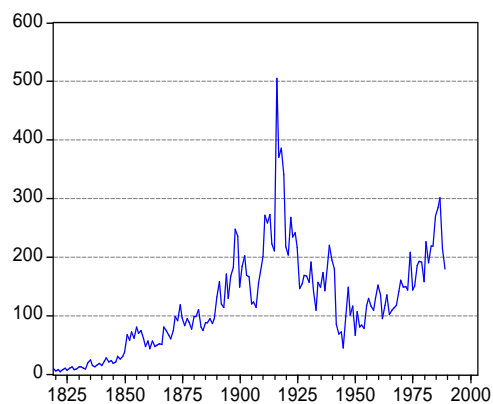
Date of sale	Price	Sqm	Comments
Mar 1917	112.500	2763	
Dec 1983	24.607	307	Unit no 1
Sep 1986	1.050.000	307	Unit no 1
Apr 1987	1.623.000	307	Unit no 1
Dec 1983	19.886	246	Unit no 2
Oct 1984	800.000	246	Unit no 2
Dec 1983	30.759	384	Unit no 4
May 1987	1.580.000	384	Unit no 4

Table 7: The repeat sales samples

	No. of trans- action pairs	Time interval of transaction pairs:			
		average	median	min.	max.
Oslo	2 816	13 yrs	8 yrs	1 yr	69 yrs
Bergen	3 690	16 yrs	12 yrs	1 yr	77 yrs
Trondheim	2 178	9 yrs	6 yrs	1 yr	58 yrs
Kristiansand	2 143	12 yrs	7 yrs	1 yr	86 yrs
Total	10 827	13 yrs	8 yrs	1 yr	86 yrs



(a) City samples



(b) Total sample

Figure 2: Transactions per year in the repeat sales samples for Oslo, Bergen, Trondheim, Kristiansand and the total over the period 1819-1989.

5. The house price indices 1819-2003

As noted above, the weighted repeat sales method is used to construct the city house price indices for the period up to 1985. From 1986 these indices are spliced with a weighted average of NEF/EFF/FINN.no/ECON's annual house price statistics for detached houses, semi-detached houses and flats for the corresponding city.^{33,34} A hedonic-repeat sales method is applied to construct the aggregate index, cf. Section 4.1,³⁵ and the index is estimated on the repeat sales samples for the four cities. The aggregate index is hence based solely on the Bergen sample for the period 1819-1840, on data for Bergen and Oslo for the period 1841-1866, and so on.³⁶ From 1986 onward the aggregate index is spliced with NEF/EFF/FINN.no/ECON's statistics of annual house prices per square metre for Norway.³⁷ Table A1 in Appendix A lists the linear nominal house price indices for the four cities in addition to the aggregate index.

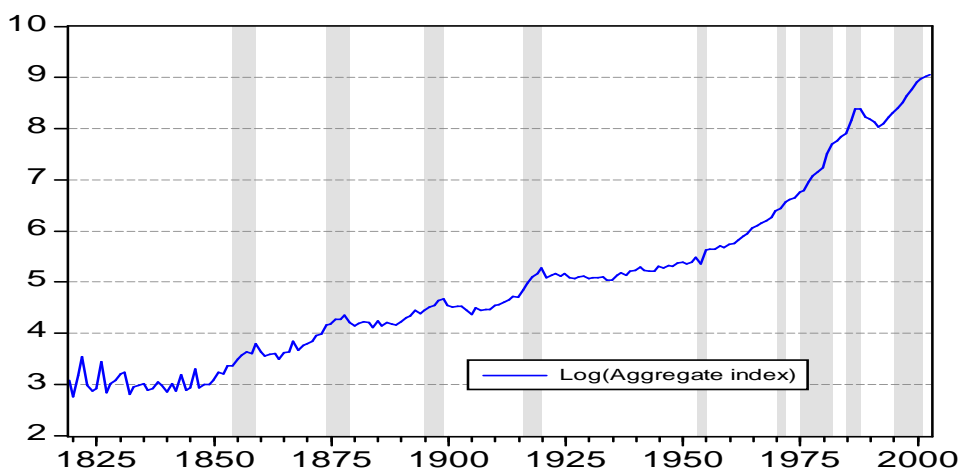


Figure 3: Aggregate nominal house price index 1819–2003 (1912=100, logarithmic scale). The shaded areas designate periods with high nominal house price growth.

Figure 3 displays the aggregate nominal house price index (in logarithms) over the period 1819–2003. It shows that the house price trend has been increasing over the period as a whole. The shaded areas in the figure designate periods of high growth in nominal house prices. Typically, these periods

³³Sources: ECON Analyse (2004a) and ECON Analyse (2004b). Note that these indices are for the entire cities, whereas the indices we have constructed are based on data for the inner part of the four cities.

³⁴The three housing types are given the weights 0.20, 0.28 and 0.52, respectively, which represent the share of housing types in Oslo, Bergen and Trondheim over the period 1993-2001. Source: Gulbrandsen (2003).

³⁵The dummy variables for Trondheim and Kristiansand are significantly different from zero at the 1% level, while the Oslo dummy variable is insignificant.

³⁶Cf. Table 5

³⁷Source: ECON Analyse (2004a). Note that the NEF/EFF/FINN.no/ECON's house price index for Norway covers the entire country, while the aggregate price index we have constructed is based on data for the four cities in our sample.

have been associated with wars and boom periods in the economy. The growth in nominal house prices has in particular been large over the last three decades of the sample period. The nominal city house price indices are shown in Figures 5(a)–5(d).

Figure 4, which plots the aggregate house price index in real terms³⁸ (in logarithms), depicts a somewhat different picture of the house price development over the last two centuries than the nominal house price indices. The difference is in particular large in the first half of the 20th century. While nominal house prices trend upwards in this period, the trend in the real house price index is declining.

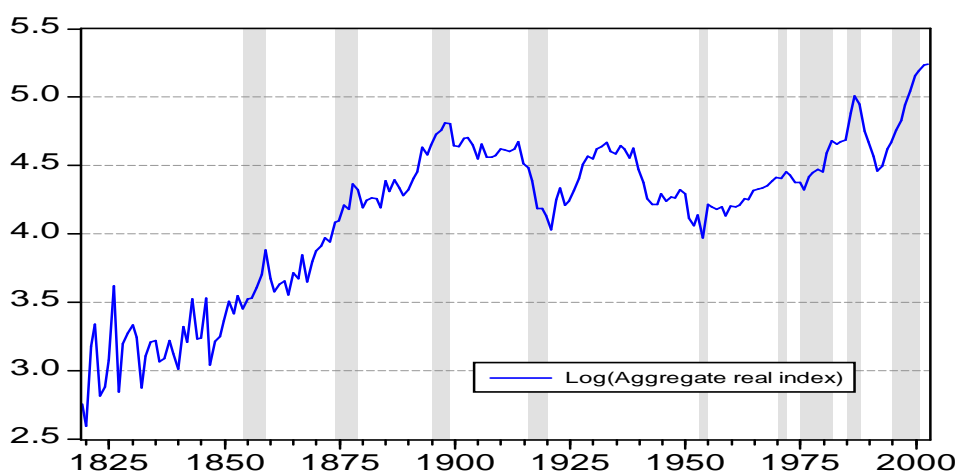


Figure 4: Aggregate real house price index 1819–2003 (1912 = 100, logarithmic scale). The shaded areas designate periods with high growth in the aggregate nominal house price index.

In the subsequent sections the house price indices for each city and the aggregate are briefly discussed for the four sub-periods 1819–1914, 1914–1940, 1940–1970 and 1970–2003. Figures 6(a)–6(d) plot the nominal house price indices (in logarithms) for the different sub-periods. The corresponding average growth rates over five year periods (in percent) are plotted in Figures 7(a)–7(d).

5.1. The period 1819–1914

The coverage of the city house price indices differ at the 19th century. The house price index for Bergen is the only city index spanning the period from 1819 to 1841. In this post-Napoleonic War period the annual house price growth hovers about zero. The index is however very volatile in this period, probably due to few observations, cf. Figures 2(a)–2(b). The index does not recover substantially before the Crimean War starts in the 1850s. Also the house price index for Oslo, which

³⁸Defined as the aggregate house price index deflated by the consumer price index. The CPI is taken from Grytten (2004), Chapter 3 in this book.

starts in 1841, increases sharply during the Crimean War. Both house price indices decline after the war, and they do not rebound until the mid-1870s. The Kristiansand house price index, which starts in 1867, displays a similar rise in the mid-1870s. During the international depression period from the end of the 1870s to the beginning of the 1890s, the three house price indices flatten off again. Then, the Oslo house price index soars in the 1890s, in particular in the second half of the decade. At this time Oslo experienced a boom in the construction sector and fast population growth. However, after the turn of the century the index tumbles.³⁹ The Bergen house price index shows a similar, but less volatile, development over this period. The house price index for Trondheim starts in 1897. We observe that also the house price indices for Trondheim and Kristiansand tend to increase towards the end of the 1890s. However, rather than declining in the first years of the new century, these two indices flatten out. All four city indices as well as the aggregate index start to recover around 1910.

5.2. The period 1914-1940

The city house price indices share many common features during WWI and in the inter-war period. All four indices increase sharply under and shortly after the war, and all four are temporarily peaking in 1920. However, the house price indices decline in real terms over this period; the nominal aggregate house price index increases by 72 percent from 1914 to 1920, while the CPI rises by 197 percent over the same period.⁴⁰ Many of the properties in the samples are rental apartment blocks, and hence the decline in real house prices in this period may be related to the 1916 introduction of the rent control law, cf. Section 2.5. During the 1920s, in which decade a national banking crisis took place, the nominal house price indices first fall sharply before they level out. All house price indices recover in the second half of the 1930s. Real house prices increase in the inter-war period, cf. Figure 4.

5.3. The period 1940-1970

The Norwegian housing market was strictly regulated from 1940 to 1969.⁴¹ In the first 14 years of this period, house prices were more or less frozen at the pre-WWII level. The house price indices indicate that the price freeze served its purpose, as the nominal aggregate house price index increased by a mere 15 percent from 1940 to 1954. For comparison, the CPI increased by around 90 percent over the same period. However, the city indices show some differences in this period. In particular, the Kristiansand index grows more than the other indices from the end of the 1940s. Furthermore, the Oslo index is very volatile during WWII, probably due to very few observations in the Oslo sample for this period. Although both house prices and rents continued to be regulated after the cease of the price freeze in 1954, the indices make a jump from 1954 to 1955. Prices on owner-occupied houses were fixed by local price boards until 1969. The scope and the extent of the regulations were

³⁹This episode is often called the "Kristiania (i.e. Oslo) crash".

⁴⁰Source for the CPI: Grytten (2004), Chapter 3 in this book.

⁴¹Cf. Section 2.5.

however gradually reduced. Over the period from 1954 to 1969 all the house price indices increase substantially.⁴²

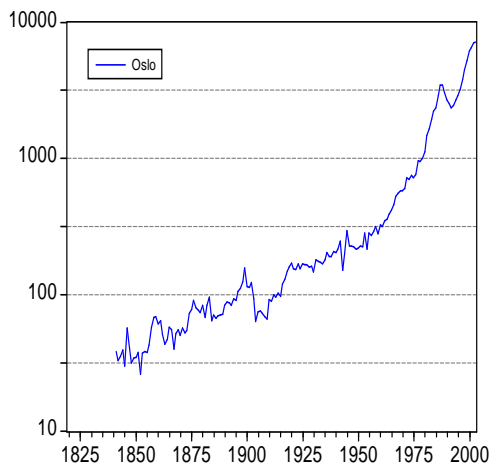
5.4. The period 1970-2003

The increase in the house price indices over the last three decades is tremendous, and from 1970 to 2003 the aggregate index rises by almost 1300 percent. Nominal house prices in the 1970s grows largely with the same rate as consumer prices, hence the aggregate real house price index shows a flat development in this period, cf. Figure 4. However, during the period of credit liberalization in the 1980s the house price indices also increase sharply in real terms. At the end of the decade and in the beginning of the 1990s, the house price indices tumble, both in nominal and real terms. The Norwegian economy is often characterized as a boom-bust economy in this period, and a national banking crisis took place at the beginning of the 1990s. The house price indices rebound sharply from the troughs in 1992-93 and up to today. The latter increase is in particular large in real terms; from 1993 to 2003 the nominal aggregate house price index rises by 158 percent, whereas the corresponding rise in the CPI is below 25 percent.

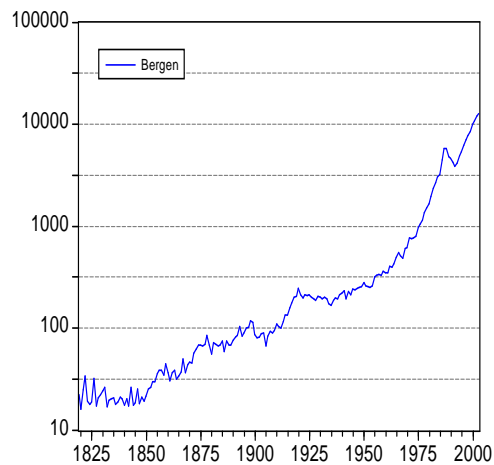
The Kristiansand index is somewhat more volatile than the other city house price indices over the period 1970-2003. This index is also distinctive from the others in that it is declining from 1982 to 1984. The other indices level out in this period.

Note that the house price indices are more volatile before 1986 than after, i.e., the house price indices we have constructed vary more than the NEF/EFF/FINN.no/ECON house price indices. This may be due to the fact that the house price indices we have constructed are based on fewer observations than the NEF/EFF/FINN.no/ECON indices.

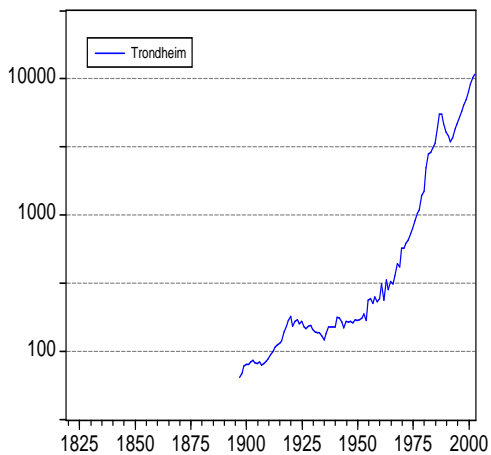
⁴²Note that during the regulation period, a black market existed for purchase of real property. Hence, the registered transaction prices, which we base the house price indices on, could be lower than the actual prices the buyers paid during this period.



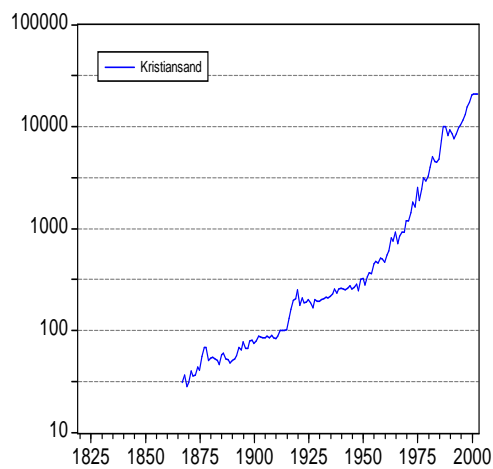
(a) Oslo



(b) Bergen

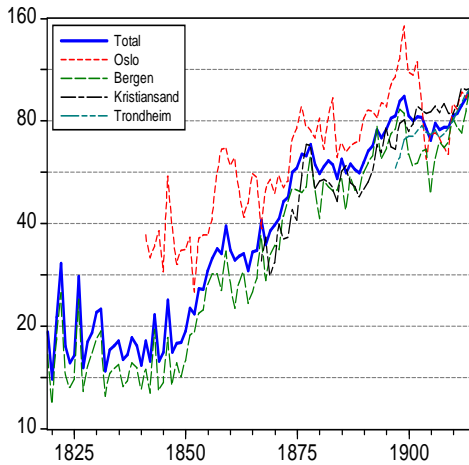


(c) Trondheim

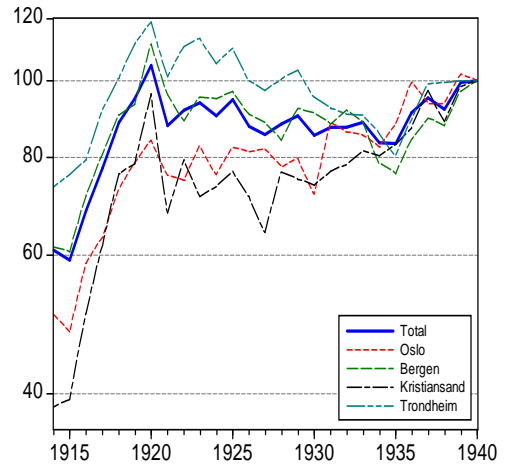


(d) Kristiansand

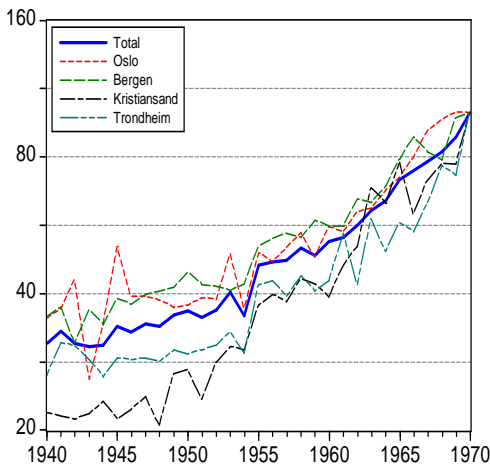
Figure 5: Nominal city house price indices 1819-2003 (logarithmic scale, 1912=100)



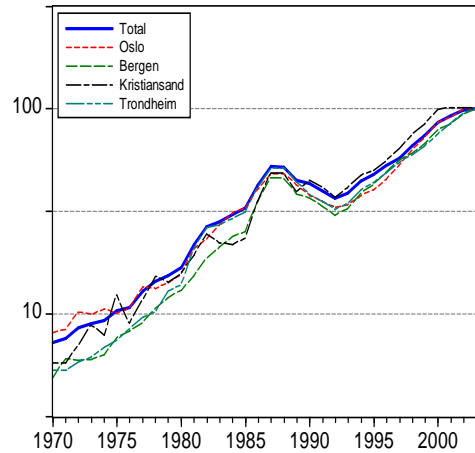
(a) Before 1914 (1914=100)



(b) 1914-1940 (1940=100)

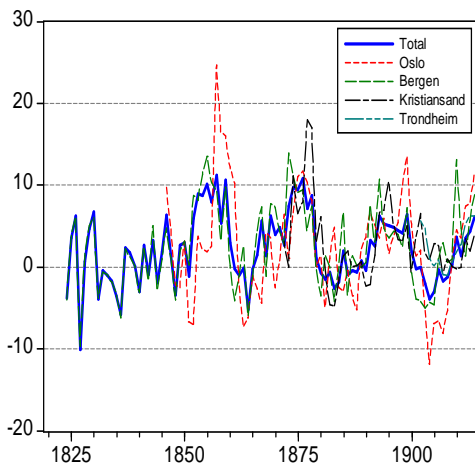


(c) 1940-1970 (1970=100)

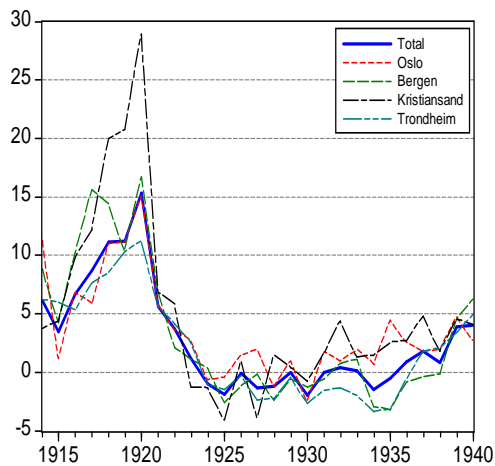


(d) 1970-2003 (2003=100)

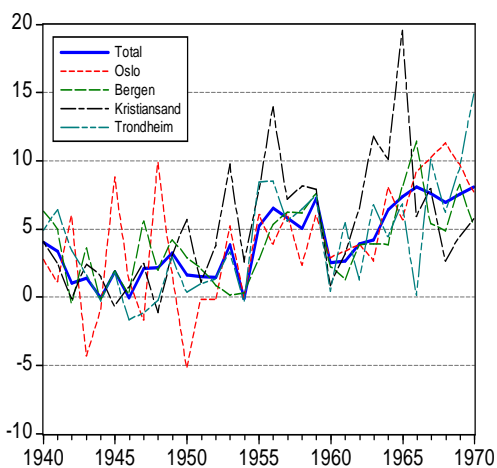
Figure 6: Nominal house price indices for different sub-periods (logarithmic scale)



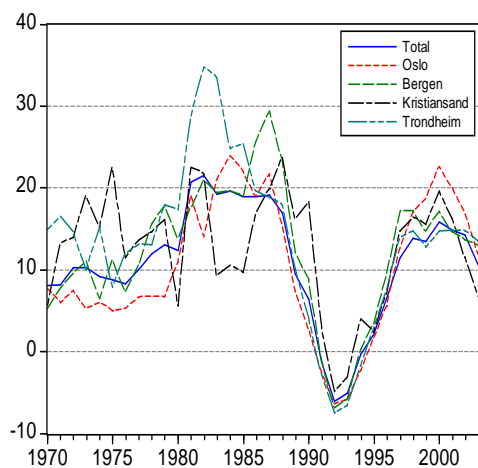
(a) Before 1914



(b) 1914-1940



(c) 1940-1970



(d) 1970-2003

Figure 7: Nominal house price growth rates (average over five year periods; in percent) for different sub-periods

6. Concluding remarks

In this chapter we have presented estimates of nominal house price indices for four Norwegian cities from the 19th century onward as well as an aggregate nominal house price index. To our knowledge, this is the first attempt to construct continuous house price indices for Norway for such a long period. Also internationally there are few long runs of house price indices available. The nominal house price indices seem to fit well in with historical events and available indicators of economic development. Typically, the nominal house price indices soar during wars and boom periods in the economy. The trend in the nominal house price indices is upward sloping over the sample period, and show particularly strong growth during the last three decades. In real terms, however, the picture looks different, especially in the first half of the 20th century. Although there are some differences between the city house price indices in some sub-periods, the overall regional differences are small.

The house price indices for the period up to 1986 are based on transaction prices of individual houses, and they are constructed by the use of the weighted repeat sales method. This method assumes constant quality of a house between the two transactions in a transaction pair. We have excluded transaction pairs from the sample if the size of a property's yard has been changed or, when we have information on this, if a new house has been constructed on the property in the period between the two transactions. Due to data availability we have not controlled for other changes in the properties' quality. Potentially, this can produce biases in the house price indices. It is not obvious, however, in which direction the indices will be biased in this case. On the one hand, a house depreciates, and preferences and tastes when it comes to e.g., the style of a house, may change when time passes. Hence, for many houses the physical and/or subjective quality may be lower at the time of the second sale than at the time of the first within a transaction pair. On the other hand, electricity and/or sanitary installations, substantial refurbishments, rebuilding, etc. may increase the quality of the house between two transactions. Thus, whether the former or the latter arguments dominate will influence the direction of the potential bias. However, if house owners on average retain the quality of their houses over time, quality changes may not influence the indices substantially.

When constructing the house price indices we have, with the exception of the aggregate index, only utilized the repeat sales information of our data set. Hence, we have calculated the geometric average growth rates over all the houses in our sample, independent of their location, housing type, year of construction, etc. However, different housing types can have different price development over time.⁴³ A topic for future research would be to test whether the use of hedonic-repeat sales methods can improve the house price indices. The construction of the aggregate house price index is a step in this direction, as we allow the four cities to have different intercepts. Although the coefficients of the aggregate house price index are not much influenced by the introduction of the city dummy variables, they are more precisely estimated.

⁴³For instance, Røed Larsen and Sommervoll (2003) report that the house price growth for small apartments was higher than the corresponding rate for larger apartments in Oslo over the 1990s.

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A. Technical appendix: The data

Table A1. Nominal house price indices 1819-2003 (1912=100)

	Total	Oslo	Bergen	Trondheim	Kristiansand
1819	21.67		22.37		
1820	15.69		15.98		
1821	23.96		24.80		
1822	34.36		33.88		
1823	19.59		19.42		
1824	17.53		17.86		
1825	18.51		18.93		
1826	31.50		32.38		
1827	16.99		17.39		
1828	20.23		20.70		
1829	21.60		22.34		
1830	24.70		24.63		
1831	25.33		26.23		
1832	16.63		16.84		
1833	19.18		19.70		
1834	19.70		20.35		
1835	20.35		20.90		
1836	17.99		18.04		
1837	18.56		18.75		
1838	20.88		21.07		
1839	19.74		20.38		
1840	17.28		17.69		
1841	20.38	38.09	20.26		
1842	17.71	32.72	17.23		
1843	24.25	35.22	26.44		
1844	17.80	39.23	17.48		
1845	18.91	29.79	18.53		
1846	26.87	56.61	25.09		
1847	18.86	40.55	18.18		
1848	20.10	31.32	21.07		
1849	20.13	34.38	19.22		
1850	21.73	34.56	21.46		
1851	25.38	37.55	25.45		
1852	24.43	25.86	26.09		
1853	29.03	37.24	29.61		
1854	28.89	38.10	30.15		
1855	32.72	37.85	35.90		
1856	35.49	42.31	38.56		
1857	38.10	57.72	38.43		
1858	36.85	67.77	34.45		
1859	44.23	68.55	44.83		
1860	37.58	60.89	36.28		
1861	35.10	64.00	30.60		
1862	36.07	51.17	36.49		
1863	36.69	43.11	38.90		
1864	32.73	47.19	31.58		
1865	37.17	57.71	34.16		
1866	37.67	55.67	37.43		
1867	46.21	39.80	49.89		31.22
1868	39.14	52.00	36.79		36.63
1869	42.92	55.39	43.73		28.31
1870	44.49	50.37	46.60		30.91
1871	46.71	56.95	45.52		39.97

Table A1. Nominal house price indices 1819-2003 (1912=100)

	Total	Oslo	Bergen	Trondheim	Kristiansand
1872	52.45	52.54	56.83		36.19
1873	53.69	54.90	62.40		36.61
1874	63.75	73.11	68.40		44.13
1875	65.48	78.24	67.87		41.03
1876	71.91	90.42	66.93		55.78
1877	71.07	79.79	69.36		68.70
1878	77.09	77.18	85.52		67.74
1879	67.18	73.45	68.04		50.81
1880	63.25	83.59	55.86		53.64
1881	66.48	68.00	71.70		54.31
1882	68.77	84.00	69.40		52.96
1883	67.08	95.98	67.47		51.10
1884	61.11	64.38	68.04		46.68
1885	69.61	70.85	74.35		57.24
1886	63.35	66.71	59.40		59.57
1887	67.43	69.43	74.22		52.88
1888	64.93	71.08	68.05		51.48
1889	63.55	71.81	67.99		48.23
1890	68.28	83.72	76.55		50.67
1891	73.80	88.73	81.70		53.31
1892	76.23	87.26	85.64		56.81
1893	85.16	83.85	104.59		68.48
1894	80.36	93.03	83.98		64.88
1895	85.41	90.54	90.10		77.08
1896	91.60	104.85	99.61		67.54
1897	93.30	110.83	102.55	64.57	66.46
1898	102.78	125.17	117.34	69.10	79.03
1899	106.25	156.00	114.19	78.25	81.19
1900	93.44	114.38	86.77	79.84	75.06
1901	90.33	112.16	80.24	79.95	78.94
1902	93.06	122.27	81.52	82.85	88.37
1903	92.14	93.68	87.87	85.72	86.30
1904	85.27	63.50	89.70	82.28	84.43
1905	79.18	75.14	66.61	80.59	85.62
1906	88.83	75.83	84.14	83.34	88.92
1907	84.83	73.01	93.45	79.17	85.18
1908	86.60	68.90	90.35	81.32	90.34
1909	86.31	65.74	94.00	84.54	84.64
1910	93.52	92.12	110.19	88.25	84.31
1911	95.09	89.15	104.16	94.67	88.77
1912	100.00	100.00	100.00	100.00	100.00
1913	105.26	95.95	116.24	106.53	99.28
1914	112.70	102.86	135.48	110.78	100.56
1915	109.72	97.50	133.65	114.57	102.71
1916	126.80	119.53	157.52	119.73	132.20
1917	143.45	129.07	177.93	138.36	161.08
1918	164.08	148.61	199.66	151.87	198.70
1919	175.72	160.17	205.92	167.84	204.93
1920	193.87	171.24	245.35	179.02	251.12
1921	162.52	154.60	211.80	152.83	177.47
1922	169.83	152.36	196.28	166.60	207.38
1923	173.69	168.61	210.38	170.98	186.17
1924	167.29	154.78	209.16	158.67	191.43
1925	175.39	167.62	213.94	165.98	200.35
1926	161.96	165.76	200.03	150.74	185.87

Table A1. Nominal house price indices 1819-2003 (1912=100)

	Total	Oslo	Bergen	Trondheim	Kristiansand
1927	158.34	166.96	194.67	146.52	167.45
1928	163.39	158.40	185.21	151.73	199.92
1929	167.05	162.35	203.38	155.51	195.44
1930	158.00	146.48	200.44	143.73	192.20
1931	161.60	180.03	194.42	139.10	200.54
1932	161.68	175.21	202.14	136.91	204.36
1933	164.15	173.83	195.12	136.26	212.71
1934	154.55	168.05	173.47	129.22	209.80
1935	154.22	179.08	167.86	121.14	216.93
1936	168.71	202.99	185.90	134.53	227.50
1937	176.19	190.48	197.53	149.44	253.49
1938	170.62	190.75	193.39	150.29	231.86
1939	184.58	207.66	213.55	151.01	256.93
1940	185.27	203.84	220.53	150.88	261.06
1941	197.20	214.70	232.21	177.57	256.41
1942	184.97	247.49	193.35	174.93	252.40
1943	182.24	149.82	228.02	163.10	259.43
1944	184.04	197.15	211.76	149.05	276.13
1945	202.40	293.57	241.95	164.45	252.86
1946	196.75	228.41	235.20	163.01	265.60
1947	204.41	227.22	246.91	164.46	283.25
1948	202.00	223.88	250.72	161.28	245.10
1949	213.92	215.19	256.01	171.05	318.20
1950	218.71	217.77	277.05	167.40	325.15
1951	211.59	226.61	259.02	171.00	280.13
1952	219.37	224.30	257.05	175.45	337.07
1953	240.68	282.44	252.09	187.98	364.88
1954	213.01	214.55	260.33	168.04	359.22
1955	275.70	283.62	315.13	237.97	450.01
1956	280.43	271.02	327.95	243.60	475.16
1957	282.85	292.76	336.85	224.27	458.24
1958	300.86	315.41	329.54	248.87	513.65
1959	290.18	278.63	359.57	230.91	500.68
1960	310.39	324.47	350.18	243.38	469.13
1961	317.09	316.22	348.91	309.60	551.23
1962	337.65	348.74	401.30	238.20	606.18
1963	364.14	357.32	393.47	332.77	816.27
1964	382.78	390.96	428.05	281.91	754.22
1965	424.66	417.03	490.22	326.32	927.87
1966	445.48	461.01	548.06	311.22	715.22
1967	466.38	527.58	509.14	358.73	846.81
1968	490.36	559.16	488.58	436.07	925.09
1969	526.88	581.26	605.06	414.46	920.84
1970	596.68	578.03	620.38	569.52	1193.47
1971	626.67	599.81	762.25	568.51	1188.80
1972	706.21	725.49	752.27	619.21	1437.89
1973	741.32	705.86	759.93	654.21	1807.79
1974	769.77	755.37	801.63	730.25	1621.34
1975	857.46	720.99	971.18	793.31	2535.28
1976	886.26	757.15	1039.46	908.11	1871.17
1977	1062.84	967.71	1149.19	1026.49	2417.96
1978	1186.07	944.47	1352.66	1081.39	3134.39
1979	1271.47	1007.08	1516.55	1384.26	2933.58
1980	1388.81	1115.51	1646.11	1482.17	3244.54
1981	1805.68	1480.85	1952.24	2214.89	3975.91

Table A1. Nominal house price indices 1819-2003 (1912=100)

	Total	Oslo	Bergen	Trondheim	Kristiansand
1982	2207.75	1647.00	2353.20	2812.25	5041.71
1983	2329.60	1935.79	2669.27	2892.63	4583.88
1984	2522.28	2212.44	3007.13	3104.17	4490.05
1985	2703.30	2346.43	3202.25	3362.97	4810.33
1986	3513.14	2880.40	4464.23	4392.37	7348.04
1987	4323.73	3432.34	5810.70	5460.21	10071.68
1988	4306.90	3431.32	5775.99	5483.09	10009.08
1989	3718.72	3027.81	4843.17	4685.29	8135.18
1990	3572.15	2679.08	4627.70	4053.73	9218.15
1991	3293.68	2522.91	4224.35	3781.74	8502.54
1992	3022.19	2341.89	3826.95	3434.66	7611.82
1993	3213.58	2431.77	4123.68	3673.07	8487.61
1994	3670.24	2686.98	4914.06	4283.39	9779.03
1995	3953.52	2875.98	5405.58	4644.91	10323.99
1996	4367.81	3228.82	6193.39	5200.72	11518.82
1997	4750.10	3821.46	7115.91	5832.28	13232.87
1998	5433.96	4502.68	7683.84	6384.69	15480.47
1999	6145.57	5210.62	8542.46	7014.13	17394.71
2000	7076.32	6131.72	10029.17	8075.16	20468.24
2001	7621.23	6463.31	10721.08	9072.94	20879.08
2002	8131.01	7072.06	11969.09	10121.47	20853.01
2003	8275.88	7140.65	12677.25	10689.60	20667.43

Chapter 10 – Credit, banking and monetary developments in Norway 1819–2003

Øyvind Eitrheim, Karsten Gerdrup and Jan Tore Klovland¹

1. Introduction

This chapter gives a brief overview of the historical development of the banking sector in Norway and presents credit and bank data from 1820. The data are not available on an annual basis in the first decades after 1820. In general, the frequency and quality of data improves over time. We first consider the epoch prior to the outbreak of WW1 in 1914 followed by the inter-war period until WW2. Then we describe the main developments in the post-war period until the late 1970s and the more recent epoch after 1980. The development of the banking sector is closely intertwined with the general monetization process as more transactions are settled using money. The velocity of money is a useful indicator to describe this process. In constructing the velocity of money we combine data from Chapter 3 (consumer prices), Chapter 5 (monetary aggregates) and Chapter 6 (GDP). Finally we show some main characteristic aspects of the payment system from 1819 onwards.

2. Bank development prior to WW1

As part of the nation-building after Norway had gained its independence, the establishment of a Central Bank had been envisaged in the Constitution from 1814. Norges Bank was established in 1816 as a limited liability company, in part with private shareholders, and began normal operations in 1818. At the time of establishment of Norges Bank, silver provided by private investors was supposed to form the basis of the bank's capital. However, this had not succeeded, so the government had imposed a so-called "silver tax", which provided the central bank with the required amount of silver, and "depositors" had been given shares in return. Norges Bank was established before any private bank was in operation in Norway, and the use of notes and coins was very limited. Extension of long-term loans constituted an important part of its operations, i.e., as a means of increasing the amount of notes and coins in circulation. As part of this, Norges Bank established several branches over time. The central bank's share of total lending was 82% in 1840, see Figure 1. This share

¹This chapter is partly based on work previously published in Gerdrup (2003, 2004). Thanks to Jan F. Qvigstad for valuable comments.

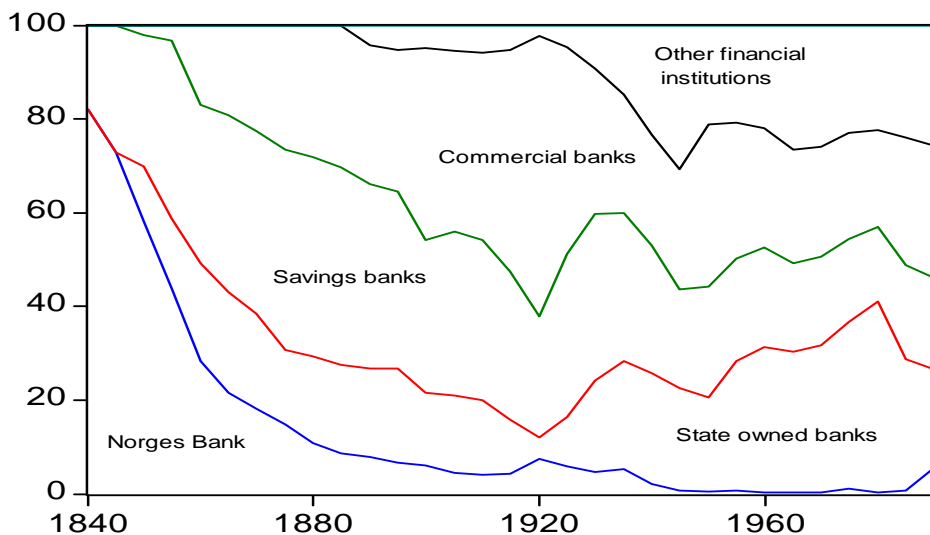


Figure 1: Credit institutions' lending at year-end as percentage of total lending 1840–1990

fell thereafter as Norges Bank gradually evolved into a more typical central bank in the sense that extension of short-term loans and the use of the discount rate as a monetary policy instrument became more important. Notes first became fully convertible into silver in 1842. The silver standard was replaced by the gold standard in 1874. The year after Norway joined the Scandinavian currency union.

The number of private banks and the role of these banks increased during the 19th century, reflecting a rising level of financial sophistication and the central bank's policy of reducing its role in the provision of long-term credit to non-financial companies. Figure 2 shows how the number of banks increased rapidly during the 19th century.

There were two types of private banking institutions, savings and commercial banks. For most of the 19th century, these had different objectives, a different corporate structure and were subject to different regulatory and supervisory arrangements. The first savings bank, *Christiania Sparebank*, was established in 1822, and the first commercial bank, *Christiania Bank og Kreditkasse*, in 1848, see Table A1. Savings banks were organized as mutually held institutions, and they were supposed to fulfill a more social role in collecting and safeguarding "ordinary" people's money, and not involve themselves in risky lending. Hence, they became subject to some regulation and supervision as early as 1824. They were, for example, required to send annual reports to the Ministry of Finance. A separate financial supervisory authority, the Inspectorate of Savings Banks, was established in 1900. The savings banks were small single-office banks, and concentrated their activities in the local

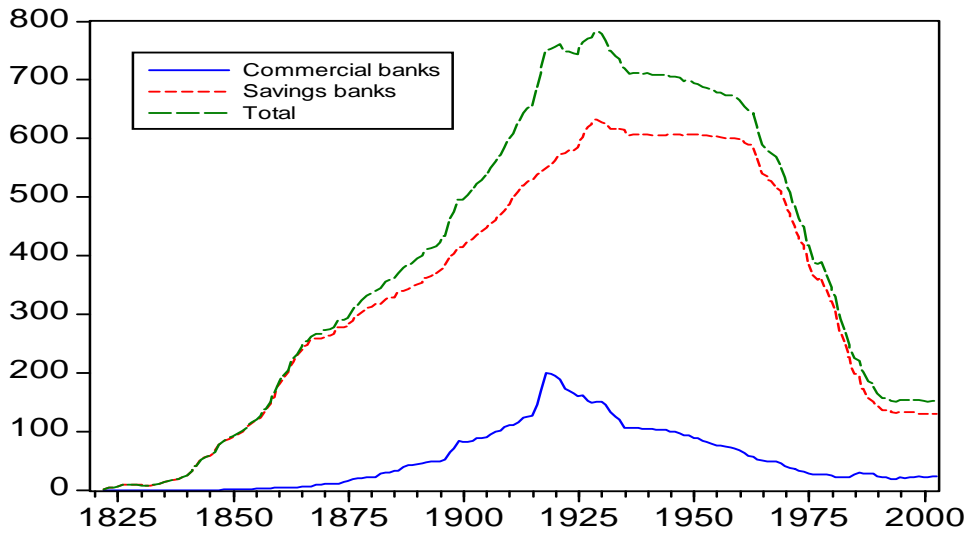


Figure 2: The number of private banks in Norway 1822–2003

community. Until 1888 there was a maximum rate of interest for mortgage loans, which discouraged the extension of such loans. Savings banks therefore preferred to give even long-term loans in the form of collateralized short-term bills, which were in many cases renewed several times after a small downpayment. The development over time in savings bank lending as well as commercial bank lending are reported in Table A2.

Commercial banks were organized as limited liability companies, and according to the liberal ideology of the time they were supposed to operate freely just as any other non-financial firm. Placing deposits at commercial banks was supposed to be at depositors' own risk. Hence, commercial banks were not subject to any regulation or supervision. There were also no uniform accounting and disclosure standards in place. The first Act of Parliament concerning limited liability companies, which implied regulation of the establishment, organization, operation, management, etc. of commercial banks, was introduced as late as 1910. Commercial banks were mostly single-office banks in the same way as savings banks, but their activities often stretched beyond their local community and they were usually larger than savings banks. They extended short-term loans to a greater extent than savings banks, often without requiring collateral. In the period 1852-1903, there was only one state-owned bank in operation, *Norges Hypotekbank*. It was chartered to extend mortgage loans, largely to farmers, and it funded itself mainly by bond issuance. Banks and limited liability companies were not allowed to issue bonds before 1897, and restrictions discouraged their use thereafter. The central government, local municipalities and state-owned banks were the main issuers, in particular before

WW2. The Hypotekbank financed part of its activities by floating bonds on the domestic market, but the government bonds were nearly all issued abroad. Bonds did not become an important source of finance for private banks before the 1980s.

In 1850, lending from savings banks, commercial banks and state-owned banks amounted to 28%, 2% and 12% respectively (Figure 1). All these three institutions' shares of total lending increased the next couple of decades. Changes over time in commercial bank and savings bank lending had also cyclical components, largely affected by changes in the money supply as deposits were the main source of finance. Bond issuance was as mentioned above restricted. Booms and busts in economic activity and changes in the trade balance fed into the money supply through the operation of the silver or gold standard. Balance of payments surpluses contributed to specie or foreign exchange inflow and lower discount rates. When the central bank paid for the gold by issuing notes or buying foreign bills, the money supply and bank lending were boosted. A generally higher level of economic activity, rising prices and asset price inflation raised the demand for money and encouraged discounting at the central bank. The central bank could discount more paper as long as its note reserves were not unduly low, and was in fact motivated to do so because this was a way to increase its profits.

Commercial and savings bank lending growth were for example high in the first half of the 1870s and early 1880s (Table A2). Both were periods of booms in economic activity. In contrast, in the prolonged downturn in large parts of the 1880s many private banks faced high losses and difficulties and their lending growth was low. Commercial bank lending fell by more than 10% in 1886, the same year as the first commercial bank failure in Norwegian banking history occurred.

The mid-1890s represented an important turning point for the banking structure in Norway. From 1895 to 1900, commercial bank lending growth was considerably higher than at savings banks and state-owned banks, and the commercial banks' share of total lending rose from 30% to 41%. An important reason for this was that commercial banks became an important part of the real-estate driven boom in this period. Commercial banks increased their lending well in excess of what they collected in deposits by issuing new share capital. The stock market was buoyant, and appears to have been highly willing to subscribe bank shares. Hence, banks' external financial constraints were lessened and decoupled from deposits, thereby facilitating rapid expansion at the new banks. The number of commercial banks increased from 48 in 1895 to 82 in 1900. Six new banks were established in Oslo, and evidence points to an aggressive lending policy stance at the new Oslo banks (Sundt (1901)). However, when the real-estate boom crashed in 1899, many commercial banks went bankrupt or incurred high loan losses. However, the crisis was not systemic, in part because of continued growth in economic activity abroad as well as money supply in 1900. Bank lending growth abated the next couple of years after 1900. The number of bankruptcies rose in the period 1899-1905, see Table A3. The years from 1906 to 1914 was a stable growth period both with respect to economic activity and banking. Economic growth varied annually between 2.2 and 5.4 per

cent in terms of real GDP. The First World War (WW1) brought the stable economic environment of the pre-war years to an end, and constituted a new important turning point for the banking structure.

3. Bank development 1914-1939

The banks and the stock market were immediately affected by the macroeconomic development during the war. In the first half of the war both high economic activity and monetary expansion supported expansion in the banking sector. In the second half of the war growth in economic activity was negative while the banking sector continued to expand against the background of continued monetary expansion. The number of commercial banks proliferated from 125 in 1914 to 200 in 1918, a sharp deviation from the previous trend (Table A1). The number of savings banks also increased, but not faster than before. The banking structure thus became even less concentrated than before (Nordvik (1992)). Commercial banks expanded their lending significantly during WW1 (Table A2), also in real terms. In addition to considerable increases in deposits, which reflected high growth in money supply, high earnings and new share capital issues boosted the commercial banks' lending possibilities. The buoyant stock market lessened the commercial banks' external financial constraints in the same way as during the latter half of the 1890s, by making it easy to issue new bank shares. By contrast, lending growth at savings banks was much lower in nominal terms during WW1, and being lower than the inflation rate. As a result, commercial banks' share of total credit rose from 47% in 1915 to 60% in 1920, whereas savings banks' share of total credit fell from 32% to 26% in the same period.

The banking structure changed considerably after 1920 and until WW2 as a result of severe banking difficulties. The precipitous fall in nominal GDP from 1920 to 1922 led to a sharp increase in the debt burden of the non-financial sector, and the number of bankruptcies rose to historically high levels (Table A3). Commercial banks experienced far more severe liquidity and solvency problems than savings banks, and their capital vanished rapidly in the early 1920s against the background of a world recession, considerable increases in the number of bankruptcies and materialization of high risks built up during the preceding boom years. Losses at savings banks were mostly concentrated in the latter half of the 1920s, once the "gold-parity depression" led to falling asset prices and increases in the debt burden. Difficulties in the farming sector added to the losses. The banks faced new difficulties in the early 1930s when the Great Depression affected Norway. Real GDP declined by 8% in 1931, slightly less than the decline of nearly 10% in 1921. In contrast to the earlier 1920s, a widespread solvency crisis was, however, avoided. Norges Bank suspended the prewar parity gold standard in 1931.

Norges Bank provided liquidity support to banks in crisis and increased its share of total lending in 1920. Commercial banks' share of total lending fell from the historical peak of 60% in 1920 to 24%

in 1940. Savings banks' share of total lending increased somewhat in this period. State-owned banks increased their share of total lending considerably in the inter-war years because of the establishment of several new state-owned banks and expansion in existing ones. Other financial institutions also increased their share of total credit considerably, in particular life insurance and mortgage companies. Non-financial companies and municipalities had borrowed heavily on a short-term basis from commercial banks during WW1 and its immediate aftermath, also to long-term projects, and faced difficulties when the banks were hit by crises. Expansion in State-owned banks, life insurance companies and mortgage companies thus lessened the burden for the non-financial sector. In addition, the bond market became an important source of finance for non-financial companies and municipalities in the inter-war years, see Table A4. However, the burden of the debt increased in years of economic crisis and deflation, in particular in the periods 1920-22 and 1925-27 and in 1931. Total debt measured as a percentage of nominal GDP fell sharply in the remainder of the 1930s as economic activity rebounded. The economic development from 1933 until WW2 was favourable and commercial and savings bank lending growth gradually returned to positive levels.

4. Bank development 1939-late 1970s

Norway was occupied throughout WW2, and this created a completely different environment for the banks. Inflation increased markedly during the war as some of the occupants' activities were financed by printing money. Bank deposit growth was thus high, but bank lending fell even in nominal terms (Table A2). Banks chose to place their funds in treasury bills and bonds instead of extending loans (Skånland (1967)). There was a period of high bank lending growth after WW2 as banks had vast amounts of deposits and wanted to normalize their balance sheet structure. Regulation of banks lending and interest rates were gradually imposed on the banks. From the 1950s a long period of comparatively stable bank lending growth started, both in nominal and real terms. The real interest rate was near zero and often negative until the beginning of the 1980s, as in many other countries. Suppression of private banks went hand in hand with the erection of new state-owned banks and expansion in existing ones. The expansion in State-owned banks pertains in particular to the 1970's. State-owned banks' share of total lending increased from 22% in 1945 to 41% in 1980, while commercial banks, savings banks and other financial institutions decreased their share of total lending.

5. Bank development late 1970s-2003

Deregulation of the financial sector in late 1970s and until the mid-1980s, represented an abrupt shift in the competitive environment for the banks. The number of banks increased slightly in the

mid-1980s, reversing the steady decline after WW2. There was, however, a rapid expansion in the number of branches at existing commercial banks following the liberalization of the authorization to establish branches. Competition from foreign-owned banks, credit companies, insurance companies and in particular finance companies led to intensified pressures. Bank managers were not used to operating in a competitive environment and increased their focus on gaining market share. Many banks expanded into geographical and business areas in which they had little prior knowledge, as many had during WW1. Contrary to WW1, however, commercial banks expanded into new areas through an increased number of branches because deregulation made this possible. Commercial and savings bank lending increased rapidly after 1982. Growth in commercial bank lending was supported by an inflow of foreign capital, as deregulation of capital movements made this possible. The same development occurred at the savings banks. Commercial and savings banks increased their share of total lending from 1980 to 1985, while state-owned banks decreased their share. The non-financial sector increased its debt much more than nominal GDP from 1981 to 1987, when it reached the same level of indebtedness as in 1931. A banking crisis developed after 1987, and it peaked in 1991 and 1992. The banking crisis coincided with the worst recession since the interwar period, reflecting the unsustainable boom in the mid-1980s. Bank losses mounted in line with the number of bankruptcies. Growth in commercial and savings bank lending slowed markedly in nominal and real terms from 1986 to the mid-1990s, and lending fell far more than deposits as banks repaid their foreign loans. Commercial banks suffered the most in the crisis because they had a more risky portfolio consisting of a higher share of risky business loans as opposed to household loans. There are indications of higher losses in the new branches. Non-financial sectors reduced their indebtedness in the course of the crisis as they corrected their balance sheets by increasing savings and reducing their debt. There was also a shift in the source of borrowing from state-owned banks to private banks, reflecting a political decision to reduce their role. Indebtedness fell further when economic activity rebounded in 1993. Since 1993, growth in bank lending and total credit has been high, measured in nominal terms or as a percentage of nominal GDP. The number of banks has, however, continued to fall because of mergers and acquisitions.

6. Credit aggregates

We can summarize the developments in bank lending and credit growth in the different sub-periods in two graphs. Figure 3 shows the development in commercial bank and savings bank lending over the entire period from 1840 to 2003. The variables are measured in logarithms. In the beginning we have only observations of savings bank lending every fifth year starting in 1840. Annual observations start in 1848 for commercial banks and in 1869 for savings banks. We have also included total lending to the general public from 1899. The different sub-periods are commented in the previous sections. Figure 4 shows average growth rates for commercial bank lending and savings bank lending. Commercial bank lending increase rapidly during the Crimean war in the early 1850s after

the first commercial bank was established in 1848. After the initial period with strong commercial bank lending there are four distinct periods of rapid growth, during the last half of the 1890s, during World War I, during the rebuilding period after World War II and during the deregulation period in the first half of the 1980s. Three of these periods were followed by periods with lower growth or even decline in lending (the 1920s) and involved also financial crises and restructuring of the banking sector. These three periods of financial distress have been discussed in detail in Gerdrup (2003). Figure 5 shows growth rates for total credit to the general public from 1900 to 2003.

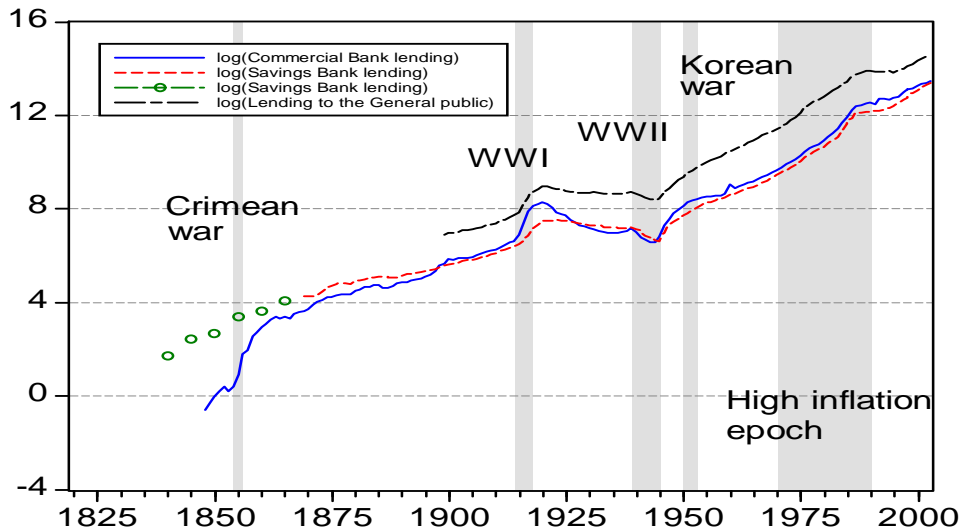


Figure 3: Commercial bank and savings bank lending 1840-2003. Logarithmic scale.

7. Main monetary developments 1830-2003

7.1. The velocity of money

Important aspects of the development in the monetary system can be summarized by the velocity of money, defined in terms of actual monetary balances relative to a scale indicator for the level of income. Bordo and Jonung (1987) shows that many countries, Norway included, experienced a sharp drop in the velocity of money in the period from 1870 to 1914. They found that the main factors behind the decline in velocity had to do with the expansion of the banking sector. In this section we investigate whether this picture fits for an extended historical data set for Norway starting in 1830. We calculate the velocity of money using as a proxy for the level of nominal income the GDP-indicator, Y , presented in Chapter 6 multiplied with the consumer price index, P , presented in Chapter 3. These data are combined with the data on the stock of broad money, M , presented in

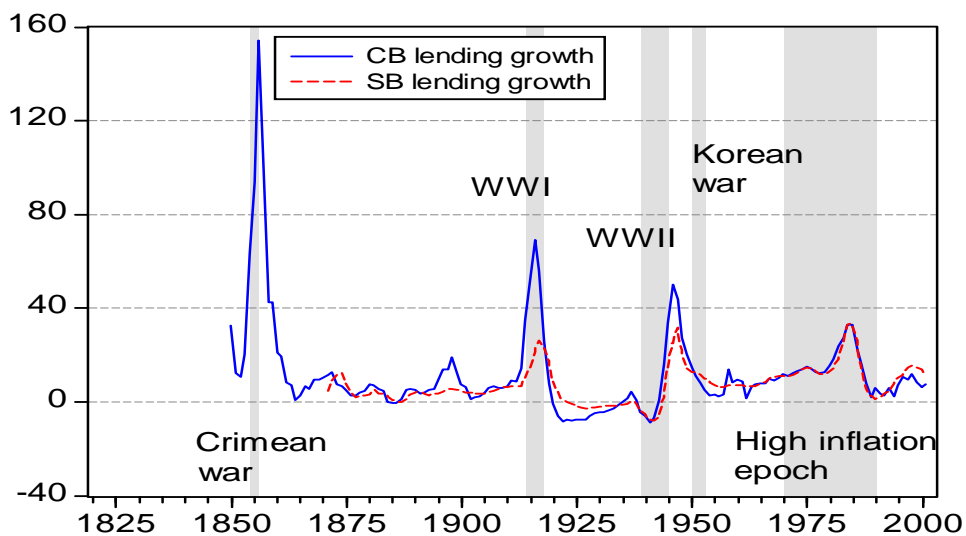


Figure 4: Commercial bank and savings bank lending 1840-2003. Annual growth rates in per cent (five year averages)

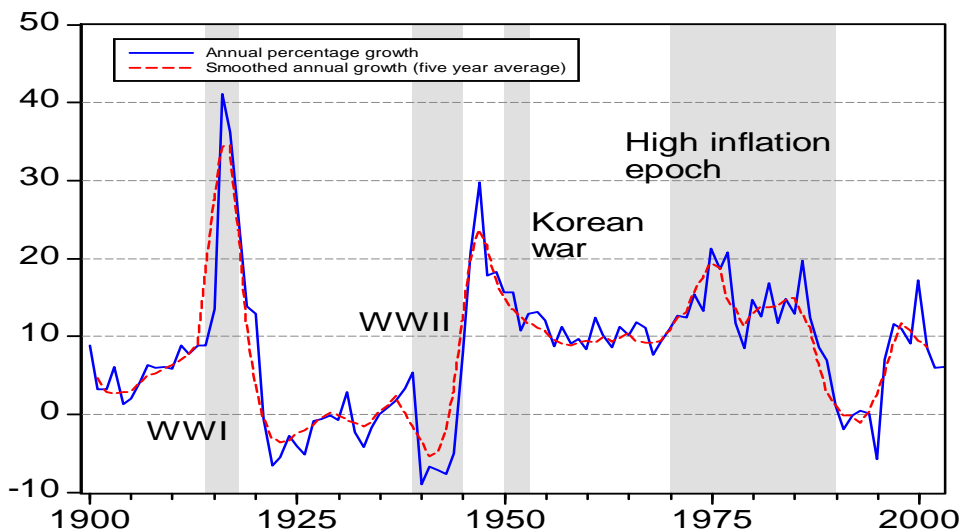


Figure 5: Total credit to the general public 1900-2003. Average annual growth rates.

Chapter 5 into a measure of the velocity of money, V , using the well known “equation of exchange” identity associated with the quantity theory of money (Fisher, 1911):

$$V = \frac{P \cdot Y}{M}$$

The resulting velocity series are shown in Figure 6. The data are smoothed using a five-year centered average to highlight the long run trending behaviour of velocity. We note that during the period of strong growth in the banking sector the amount of money in the economy grew much faster than the nominal activity and the velocity of money fell substantially over a prolonged period of almost 100 years. As we see from Figure 6 the decline in the velocity of money fits well with the development in the banking sector in the 19th century and the number of banks increased rapidly, confirming the inverse relationship between the size of the banking sector and the velocity of money from 1830 to the early 1920s. The empirical investigation of velocity behaviour across five countries (US, UK, Canada, Norway and Sweden) conducted by Bordo and Jonung (1987) over the period 1870 and onwards indicates several interesting characteristics. The velocity of money typically seems to decline as the banking sector grows and the economy relies more heavily on money to settle transactions. We can denote this as the monetization process. This tendency seems to be strongly supported by our data as we move back to the first half of the 19th century. As pointed out in Siklos (1993) increased monetization has typically reduced long-run velocity, at least until the interwar period. Increased financial sophistication, on the other hand, is predicted to have the opposite effect on velocity and may explain why velocity flattens out and eventually starts to rise, indicating a U-shaped development in velocity. In their studies of velocity behaviour, Bordo and Jonung (1987) and Siklos (1993) let the currency-money ratio, CM , serve as an indicator of financial sophistication, and both studies find that CM helps predict the long-run trend in velocity.

Figure 6 reveals that while the number of banks seems to be almost perfectly negatively correlated with velocity prior to 1920, indicating increased monetization, the stagnation and subsequent decline in the number of banks in the post-WWII period is a less likely explanation of velocity behaviour in this period. Admittedly, our eyeball technique is less sophisticated than rigorous econometric testing. We observe, however, that the currency-money ratio seems to pick up a similar effect as hypothesized by Bordo and Jonung (1987) and Siklos (1993) and yield some support to the view that velocity behaviour depend on the maturity and degree of sophistication of the financial sector. Similar results are reported in a previous study for Norway by Klovland (1983) who analyze data from 1867 to 1980.

We also observe that while the velocity of money in Norway is strongly downward trending in the period before 1920, its behaviour in the period from 1920 onwards is less variable and in particular velocity has remained less volatile over the last 50 years. From the quantity equation it transpires that when velocity is constant, the price level, P , becomes proportional to the money stock M scaled with the level of activity Y , cf. Figure 7 where we have plotted P against $\frac{M}{Y}$, setting both indices to

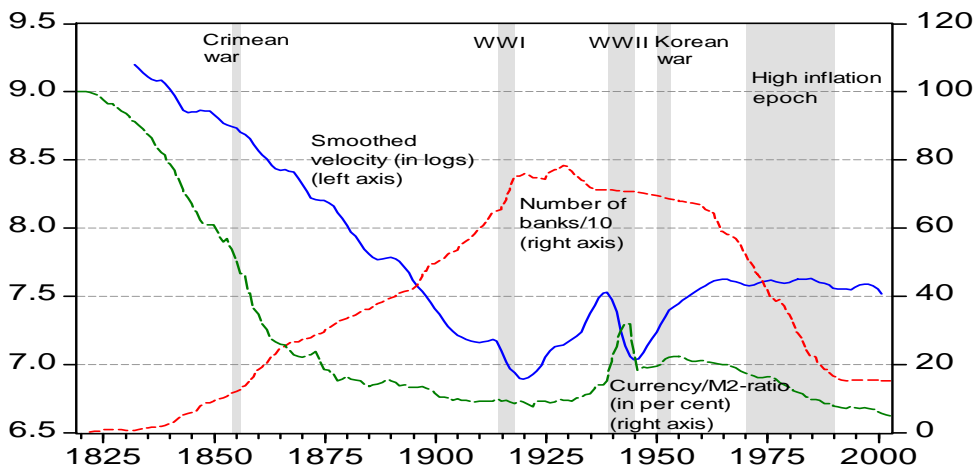


Figure 6: The velocity of money 1830–2003 (in logarithms) (left axis), the number of banks divided by 10 (right axis) and the Currency/M2-ratio (in per cent) (right axis).

100 in 1960. The relatively constant velocity over the last 50 years is reflected by the close mapping of the two indices over this period. So, if we disregard the first hundred years, we observe a very close link between the development of the CPI and the ratio of M2 to GDP. This relationship does not, however say anything about the causality or third factors that influence both money and prices.

The monetarist view of inflation — that inflation is always and everywhere a monetary phenomenon (Friedman (1963) p.17) has been central in the search for stable empirical relationships linking money and prices. Numerous attempts have been made to construct models where monetary authorities control inflation through monetary aggregates. Over the past decades, however, it is recognized in the monetary policy literature, that central banks typically employ short-term interest rates as their operating monetary policy instrument, and hence the role of monetary aggregates has been deemphasized in more recent generations of monetary policy models.

This is also reflected by the fact that the view on causality implied by the simple monetarist model inflation runs contrary to many of the inflation models which have emerged in the literature over the past 40 years. Examples of such models are the simple Phillips curve models of the 1960s following the seminal work in Phillips (1958), the natural rate (or NAIRU) models of unemployment by Phelps (1967) and others, Aukrust's (1977) main-course model and Calmfors (1977), who reconciled the Phillips curve model with the Scandinavian model of inflation. Later developments include the incomplete competition model of e.g., Layard and Nickell (1986) and the New Keynesian Phillips curve model used in modern monetary economics, see e.g., Clarida et al.(1999), Svensson (2000) and Woodford (2003). There are also models which explicitly include monetary aggregates such as

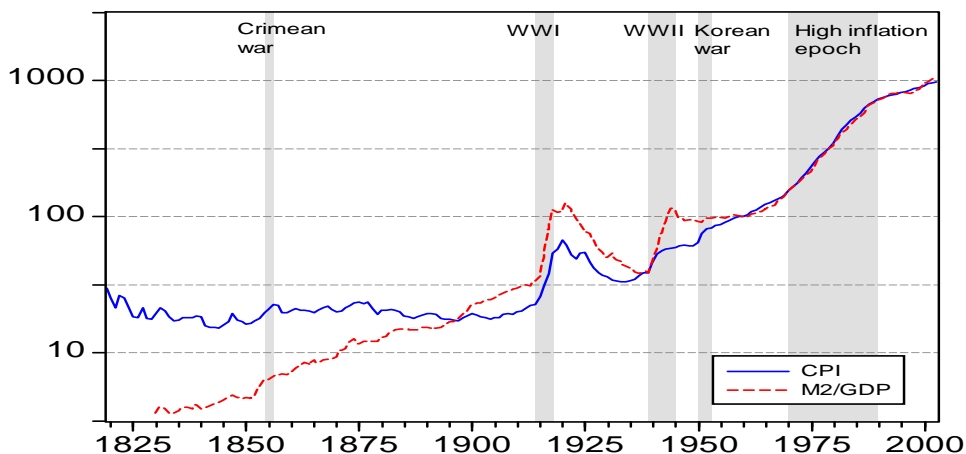


Figure 7: The price level P and the stock of money scaled with the level of economic activity, M/Y . 1960=100

the P-star model of inflation proposed in Hallman et al.(1991). In a recent application by Gerlach and Svensson (2003) they find empirical support for the P-star model on aggregated data for the Euro area. For a comprehensive review of 40 years of international research on price and wage inflation in small open economies, see Bårdsen et al. (2004). Despite the notable differences that exist between these competing models, they all reflect the view that inflation is best understood as reflecting imbalances in product and labour markets. This view is inconsistent with a simple quantity theory of inflation, but not with having excess demand for money as a potential source of inflation pressure. Nelson (2003) reviews the literature on the role of monetary aggregates in monetary policy, focusing on the information content of money for aggregate demand.

7.2. Changes in payment technology from 1819 onwards

In Figure 6 we saw how currency has declined as a fraction of broad money M2 from 100 % in the first part of the sample to less than 10 % in the 1990s. Chapter 2 describes in detail the development in the currency share in the 1920s and during WW2. In the early part of the nineteenth century the means of payments for ordinary transactions were solely based on the amount of currency in circulation. The amount of currency in circulation was made up of notes and coins held by the private non-financial sector for transaction purposes. Note that gold coins are excluded from our definition of currency. Since gold coins were mainly denominated in large values they were less attractive for transaction purposes and we assume that they were mainly used as a store of value.

To get a more detailed picture of the development in the means of payment in Norway in the period

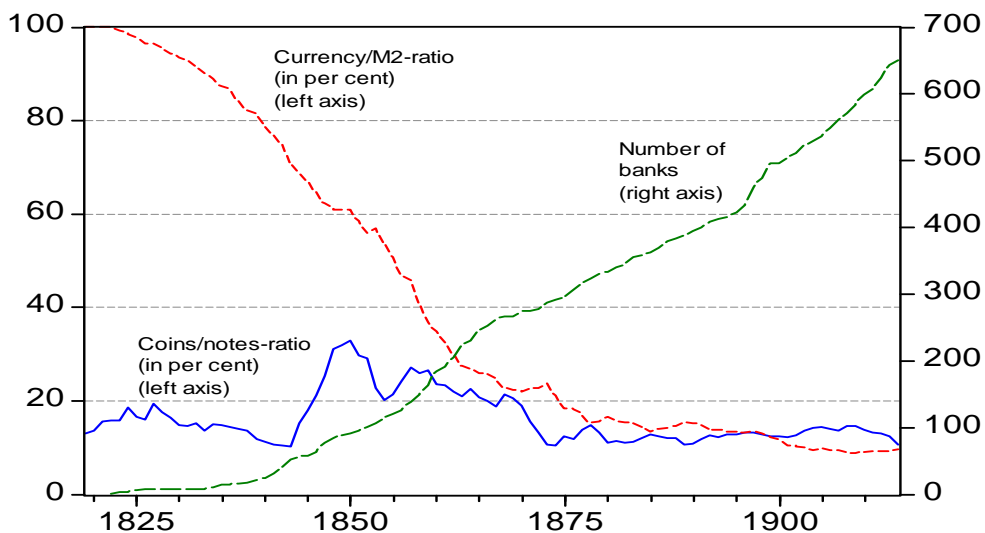


Figure 8: Coins, Notes and banks 1819–1914

from 1819 to 1914 we plot the time series of notes and coins in per cent of broad money M2 (dotted line) and coins in per cent of notes (solid line) against the development in the banking sector (number of banks). Figure 8 shows how the currency share starts to decline soon after the first banks emerge in the early 1820s. As the number of banks starts to increase at a faster rate around 1840 we see that the currency share declines at a faster rate as well. Eventually the currency share stabilizes and is about 10% in 1914. Our estimate of coins in per cent of notes are based on figures for the production of mint between 1814 and 1865 reported in Langberg (1865) and Rønning (1971).² The level of coin production was particularly large in the mid-1840s after Oscar I became king and during the years after the conversion from speciedaler to kroner in 1874, i.e., from 1876-1879, when the new conventional mint denominated in kroner and øre was produced. Parliamentary documents from 1875 contain information about the amount of coins in circulation which are corrected for additions of new mints, withdrawals of old mints and losses.

²Our estimates of the accumulated production of mint between 1814 and 1865 (measured in nominal values in kroner) from these two sources deviate with less than 0.8%.

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A. Technical appendix: The data

Table A1

The number of savings banks The annual banking statistics give data for the number of savings banks in operation at the end of each year from 1873 (see the 1948, 1968 and 1994 editions of *Historical Statistics* published by Statistics Norway). Norges Bank is the source for data from 1993. Before 1873 the number of banks has been estimated here as a by-product of the construction of aggregate savings bank deposits discussed in chapter 5 of this volume. The numbers include all savings banks in operation, as corroborated by the publication of annual accounts or other evidence that the banks had opened for business. In some cases we only have information on the date at which the bank's plan was authorized by the government, which may deviate somewhat from the first year of business (in both directions). Before 1919 a few unauthorized savings banks have been added.

The number of commercial banks. Estimates before 1900 are based on the information in Matre (1992a), with the addition of a few banks which we know were in operation as commercial banks in this period. In the period 1900 to 1919 information from the foreword of the annual commercial bank statistics (annual editions of *NOS Private aksjebanker*, Statistics Norway) was used as the basis for the estimates, which supplemented with additional information on individual banks. From 1920 the number of banks were taken from official sources as explained above for savings banks, from 1993 from Norges Bank sources.

Table A2

Matre (1992a) is the source for the commercial bank lending data reported in column 1 in Table A2 for the period 1848-1900, as this source is more complete than Statistics Norway in this period. Statistics Norway is used as the source from 1901 to 1991, and Norges Bank thereafter. The commercial bank lending numbers understate, however, the actual numbers before 1924 since the number of reporting banks is lower than the total number, see Table A1. Commercial bank lending growth from 1900 to 1901 based on Statistics Norway is 6.6%. Commercial bank lending numbers from 1992 also include Postbanken, and this leads to a jump up in the lending number in 1992 of NOK 48276 million for total lending and NOK 15653 million for lending to the general public. A new change in the way Postbanken is handled in the statistics is made in 1996, leading to a shift downwards of NOK 31640 million that year for total lending. Savings bank lending numbers prior to 1869 are not available from Statistics Norway, but Matre (1992b) has estimates of total savings bank lending for 1840, -45, -50, -55, -60 and -65. Publications from the Ministry of Finance is used in the period 1869-1885, Statistics Norway in the period 1886-1991, and Norges Bank thereafter. From 1952 for commercial banks and 1953 for savings banks, lending numbers are reported before en bloc depreciation. En bloc depreciation amounted to NOK 101 million in 1952 for commercial banks and NOK 30 million in 1953 for savings banks. From 1953, Statistics Norway also reports commercial banks' and savings banks' lending to local governments, non-financial enterprises and

households. This data is also included in Table A2. Norges Bank is used as the source for this data from 1992.

Table A3

Different publications from Statistics Norway are used as the source for bankruptcies for the whole period 1887-2002.

Table A4

Skånland (1967) is used as a source for the non-financial sector's (households, non-financial companies and municipalities) total debt (loans from all banks, including foreign banks, and from other financial institutions, and bond debt) for the period 1820-1956. The data for the period 1820-1890 is only available at 10-year intervals, and is not specified and probably of not very good quality. The data for the period 1899-1956 is better, and total credit is the sum of bond debt and loan debt (from all sources). I have calculated total debt for the period 1957-84 on the basis of historical statistics 1994 (Statistisk sentralbyrå (1995)), i.e. by combining bond data by issuer sector (<http://www.ssb.no/emner/historisk-statistikk/tabeller/24-24-27.txt>) and data for loans to households, non-financial companies and municipalities by sector (<http://www.ssb.no/emner/historisk-statistikk/tabeller/24-24-18.txt>). Norges Bank's credit aggregate C3 is used from 1985 (only C3 mainland Norway from 1995). The different credit aggregates are available at <http://www.norges-bank.no/front/statistikk/en/k3/>.

A.1. Data

Table A1. Number of commercial banks and savings banks. 1822-2003

	Commercial banks ^{*)}	Savings banks ^{**)}	Total
1822		1	1
1823		4	4
1824		4	4
1825		6	6
1826		8	8
1827		8	8
1828		8	8
1829		8	8
1830		7	7
1831		7	7
1832		7	7
1833		8	8
1834		10	10
1835		14	14
1836		15	15
1837		16	16
1838		18	18
1839		21	21
1840		25	25
1841		32	32
1842		41	41
1843		52	52
1844		56	56
1845		58	58
1846		64	64
1847		77	77
1848	1	83	84
1849	1	87	88
1850	1	90	91
1851	1	95	96
1852	1	100	101
1853	1	105	106
1854	1	114	115
1855	2	118	120
1856	2	124	126
1857	3	135	138
1858	3	147	150
1859	4	159	163
1860	4	181	185
1861	4	188	192
1862	4	201	205
1863	4	219	223
1864	4	227	231
1865	5	240	245
1866	5	248	253
1867	6	256	262
1868	8	259	267
1869	9	258	267
1870	11	262	273
1871	11	264	275
1872	11	266	277
1873	11	277	288
1874	13	278	291
1875	15	279	294

Table A1. Number of commercial banks and savings banks. 1822-2003

	Commercial banks ^{*)}	Savings banks ^{**)}	Total
1876	18	289	307
1877	20	296	316
1878	20	303	323
1879	21	310	331
1880	21	313	334
1881	22	318	340
1882	28	317	345
1883	30	325	355
1884	30	329	359
1885	33	329	362
1886	33	336	369
1887	39	340	379
1888	42	342	384
1889	42	346	388
1890	44	351	395
1891	46	354	400
1892	47	362	409
1893	48	365	413
1894	48	368	416
1895	48	374	422
1896	52	381	433
1897	65	395	460
1898	71	403	474
1899	84	412	496
1900	82	414	496
1901	82	422	504
1902	84	428	512
1903	88	435	523
1904	89	440	529
1905	90	447	537
1906	95	454	549
1907	100	461	561
1908	101	470	571
1909	107	477	584
1910	111	488	599
1911	111	497	608
1912	115	509	624
1913	123	520	643
1914	125	526	651
1915	127	528	655
1916	146	538	684
1917	169	542	711
1918	200	550	750
1919	198	555	753
1920	195	562	757
1921	189	572	761
1922	173	575	748
1923	170	579	749
1924	165	580	745
1925	160	584	744
1926	162	602	764
1927	152	619	771
1928	148	624	772
1929	151	633	784
1930	151	627	778

Table A1. Number of commercial banks and savings banks. 1822-2003

	Commercial banks ^{*)}	Savings banks ^{**)}	Total
1931	145	622	767
1932	133	617	750
1933	125	615	740
1934	120	616	736
1935	105	614	719
1936	105	605	710
1937	105	606	711
1938	105	606	711
1939	104	605	709
1940	104	607	711
1941	104	605	709
1942	103	605	708
1943	103	605	708
1944	103	605	708
1945	99	606	705
1946	99	606	705
1947	96	607	703
1948	93	604	697
1949	93	606	699
1950	89	606	695
1951	88	605	693
1952	83	605	688
1953	82	605	687
1954	78	604	682
1955	76	603	679
1956	76	602	678
1957	74	600	674
1958	73	600	673
1959	71	600	671
1960	68	597	665
1961	63	592	655
1962	58	590	648
1963	56	586	642
1964	52	567	619
1965	50	540	590
1966	48	534	582
1967	48	527	575
1968	48	520	568
1969	46	509	555
1970	40	493	533
1971	37	471	508
1972	36	450	486
1973	32	432	464
1974	31	418	449
1975	28	390	418
1976	27	368	395
1977	27	359	386
1978	27	362	389
1979	26	345	371
1980	24	322	346
1981	22	308	330
1982	22	270	292
1983	22	253	275
1984	21	227	248
1985	27	198	225

Table A1. Number of commercial banks and savings banks. 1822-2003

	Commercial banks ^{*)}	Savings banks ^{**)}	Total
1986	29	192	221
1987	28	173	201
1988	28	158	186
1989	28	151	179
1990	23	142	165
1991	21	136	157
1992	21	134	155
1993	19	133	152
1994	19	132	151
1995	21	133	154
1996	20	133	153
1997	21	133	154
1998	21	133	154
1999	23	130	153
2000	22	130	152
2001	22	129	151
2002	23	129	152
2003	23	129	152

*) Sources: 1848-1900: Matre, H. I. (1992a): "Norske forretningsbanker" 1848-1990. "En tilbakeføring av forretningsbankstatistikken". Det nye pengesamfunnet, Rapport nr 41. 1905, 1910, 1947-1992: Statistics Norway (1995). Historical statistics 1994. NOS, C 188. Oslo-Kongsvinger. 1914-1946: Statistics Norway (1949). Statistical overviews 1948. NOS X. 178. Oslo. 1993: Norges Bank (1998). Annual statistics for 1991-97. Financial statistics, no. 14/1998. Oslo. 1994-2000: Norges Bank (2001). Annual statistics for banker 1994-2000. Financial statistics nr. 11/2001. Oslo. 2001-2003: Norges Bank.

**) Sources: 1822-1946: Statistics Norway (1949). Statistical overviews 1948. NOS X. 178. Oslo. 1947-1992: Statistics Norway (1995). Historical statistics 1994. NOS, C 188. Oslo-Kongsvinger. 1993: Norges Bank (1998). Annual statistics for 1991-97. Financial statistics, nr. 14/1998. Oslo. 1994-2000: Norges Bank (2001). Annual statistics for banks 1994-2000. Financial statistics nr. 11/2001. Oslo. 2001-2003: Norges Bank.

Table A2. Commercial bank and savings bank lending in millions of NOK. At year-end 1840-2003. Lending to the general public comprise lending to municipalities, non-financial enterprises and households.

	Commercial banks		Savings bank		Private banks	
	Total lending †	Lending to the general public †	Total lending ‡	Lending to the general public ‡	Total lending	Lending to the general public
1840			5.6		5.6	
1841						
1842						
1843						
1844						
1845			11.3		11.3	
1846						
1847						
1848	0.6					
1849	0.8					
1850	1.0		14.4		15.4	
1851	1.2					
1852	1.5					
1853	1.2					
1854	1.5					
1855	2.5		29.7		32.2	
1856	6.1					
1857	7.0					
1858	13.0					
1859	15.0					
1860	19.1		37.8		56.9	
1861	21.9					
1862	26.7					
1863	29.5					
1864	27.1					
1865	29.9		58.6		88.5	
1866	27.9					
1867	33.6					
1868	36.3					
1869	38.3		70.4		108.6	
1870	41.4		71.6		113.0	
1871	49.8		70.2		120.0	
1872	55.2		73.1		128.3	
1873	60.5		86.4		147.0	
1874	68.0		100.7		168.7	
1875	68.2		110.4		178.6	
1876	74.0		118.2		192.2	
1877	76.4		123.7		200.0	
1878	76.7		124.6		201.3	
1879	77.2		120.7		198.0	
1880	88.9		133.8		222.6	
1881	94.4		140.6		235.0	
1882	105.3		144.8		250.0	
1883	105.3		151.2		256.5	
1884	113.4		157.9		271.3	
1885	116.4		161.5		278.0	
1886	104.1		162.3		266.4	
1887	104.0		158.3		262.3	
1888	110.7		157.3		268.0	

Table A2. Commercial bank and savings bank lending in millions of NOK. At year-end 1840-2003. Lending to the general public comprise lending to municipalities, non-financial enterprises and households.

	Commercial banks		Savings bank		Private banks	
	Total lending †	Lending to the general public †	Total lending ‡	Lending to the general public ‡	Total lending	Lending to the general public
1889	122.8		160.7		283.5	
1890	129.8		173.1		303.0	
1891	132.2		183.8		315.9	
1892	139.9		188.0		327.9	
1893	145.0		194.9		339.9	
1894	154.3		202.3		356.6	
1895	166.6		208.8		375.4	
1896	177.8		219.7		397.5	
1897	210.7		230.3		441.0	
1898	261.1		247.4		508.5	
1899	283.2		266.2		549.4	
1900	349.0		278.7		627.7	
1901	341.6		291.3		632.9	
1902	360.4		302.1		662.5	
1903	371.2		318.4		689.6	
1904	368.9		331.5		700.4	
1905	376.1		339.8		715.9	
1906	403.5		354.5		758.0	
1907	442.7		375.7		818.4	
1908	475.8		399.2		875.0	
1909	502.6		423.4		926.0	
1910	524.0		449.2		973.2	
1911	577.1		487.8		1 064.9	
1912	637.4		528.0		1 165.4	
1913	727.3		566.3		1 293.6	
1914	751.3		598.0		1 349.3	
1915	985.3		656.0		1 641.3	
1916	1 755.0		788.0		2 543.0	
1917	2 640.0		959.0		3 599.0	
1918	3 346.0		1 242.0		4 588.0	
1919	3 755.0		1 520.0		5 275.0	
1920	4 034.0		1 732.0		5 766.0	
1921	3 668.0		1 799.0		5 467.0	
1922	3 175.0		1 812.0		4 987.0	
1923	2 609.0		1 856.0		4 465.0	
1924	2 377.0		1 805.0		4 182.0	
1925	2 299.0		1 805.0		4 104.0	
1926	1 875.0		1 730.0		3 605.0	
1927	1 632.0		1 669.0		3 301.0	
1928	1 468.0		1 603.0		3 071.0	
1929	1 433.0		1 547.0		2 980.0	
1930	1 295.0		1 491.0		2 786.0	
1931	1 246.0		1 458.0		2 704.0	
1932	1 148.0		1 444.0		2 592.0	
1933	1 103.0		1 381.0		2 484.0	
1934	1 055.0		1 361.0		2 416.0	
1935	1 069.0		1 347.0		2 416.0	
1936	1 058.0		1 307.0		2 365.0	
1937	1 108.0		1 298.0		2 406.0	
1938	1 137.0		1 309.0		2 446.0	

Table A2. Commercial bank and savings bank lending in millions of NOK. At year-end 1840-2003. Lending to the general public comprise lending to municipalities, non-financial enterprises and households.

	Commercial banks		Savings bank		Private banks	
	Total lending †	Lending to the general public †	Total lending ‡	Lending to the general public ‡	Total lending	Lending to the general public
1939	1 293.0		1 364.0		2 657.0	
1940	1 104.0		1 257.0		2 361.0	
1941	873.0		1 115.0		1 988.0	
1942	798.0		964.0		1 762.0	
1943	731.0		850.0		1 581.0	
1944	720.0		765.0		1 485.0	
1945	910.0		754.0		1 664.0	
1946	1 453.0		1 065.0		2 518.0	
1947	1 968.0		1 466.0		3 434.0	
1948	2 521.0		1 723.0		4 244.0	
1949	2 894.0		1 953.0		4 847.0	
1950	3 441.0		2 244.0		5 685.0	
1951	3 958.0		2 500.0		6 458.0	
1952	4 347.0		2 803.0	2 803.0	7 150.0	
1953	4 509.0	4 485.0	3 145.0	3 145.0	7 654.0	7 630.0
1954	4 835.0	4 814.0	3 516.0	3 516.0	8 351.0	8 330.0
1955	5 005.0	4 919.0	3 761.0	3 753.0	8 766.0	8 672.0
1956	4 976.0	4 896.0	3 958.0	3 952.0	8 934.0	8 848.0
1957	5 187.0	5 117.0	4 242.0	4 227.0	9 429.0	9 344.0
1958	5 366.0	5 250.0	4 553.0	4 523.0	9 919.0	9 773.0
1959	5 789.0	5 508.0	4 935.0	4 901.0	10 724.0	10 409.0
1960	8 475.0	6 365.0	5 381.0	5 336.0	13 856.0	11 701.0
1961	7 356.0	7 241.0	5 741.0	5 718.0	13 097.0	12 959.0
1962	7 924.0	7 809.0	6 192.0	6 172.0	14 116.0	13 981.0
1963	8 359.0	8 221.0	6 667.0	6 656.0	15 026.0	14 877.0
1964	9 108.0	8 951.0	7 135.0	7 129.0	16 243.0	16 080.0
1965	9 681.0	9 462.0	7 629.0	7 623.0	17 310.0	17 085.0
1966	10 885.0	10 530.0	8 331.0	8 316.0	19 216.0	18 846.0
1967	11 706.0	11 305.0	9 146.0	9 120.0	20 852.0	20 425.0
1968	12 651.0	12 166.0	10 082.0	10 046.0	22 733.0	22 212.0
1969	14 408.0	13 842.0	11 396.0	11 352.0	25 804.0	25 194.0
1970	15 762.0	15 108.0	12 669.0	12 620.0	28 431.0	27 728.0
1971	17 722.0	17 000.0	14 156.0	14 040.0	31 878.0	31 040.0
1972	20 110.0	19 323.0	15 674.0	15 570.0	35 784.0	34 893.0
1973	22 508.0	21 685.0	17 603.0	17 534.0	40 111.0	39 219.0
1974	25 312.0	24 258.0	19 981.0	19 929.0	45 293.0	44 187.0
1975	29 374.0	28 630.0	22 917.0	22 798.0	52 291.0	51 428.0
1976	33 905.0	33 035.0	26 498.0	26 330.0	60 403.0	59 365.0
1977	39 537.0	38 749.0	30 551.0	30 462.0	70 088.0	69 211.0
1978	43 284.0	41 863.0	33 677.0	33 361.0	76 961.0	75 224.0
1979	47 897.0	46 543.0	37 892.0	37 704.0	85 789.0	84 247.0
1980	54 566.0	53 295.0	42 093.0	41 899.0	96 659.0	95 194.0
1981	64 400.0	61 661.0	48 369.0	47 999.0	112 769.0	109 660.0
1982	76 703.0	71 832.0	55 543.0	54 324.0	132 246.0	126 156.0
1983	91 693.0	81 950.0	64 889.0	61 671.0	156 582.0	143 621.0
1984	119 183.0	103 967.0	80 505.0	77 465.0	199 688.0	181 432.0
1985	152 128.0	132 679.0	111 073.0	104 024.0	263 201.0	236 703.0
1986	203 608.0	173 560.0	146 547.0	129 801.0	350 155.0	303 361.0
1987	242 352.0	211 822.0	173 068.0	159 074.0	415 420.0	370 896.0
1988	250 544.0	222 678.0	185 688.0	173 158.0	436 232.0	395 836.0

Table A2. Commercial bank and savings bank lending in millions of NOK. At year-end 1840-2003. Lending to the general public comprise lending to municipalities, non-financial enterprises and households.

	Commercial banks		Savings bank		Private banks	
	Total lending †	Lending to the general public †	Total lending ‡	Lending to the general public ‡	Total lending	Lending to the general public
1989	276 961.0	247 639.0	192 511.0	184 100.0	469 472.0	431 739.0
1990	285 402.0	250 986.0	187 734.0	191 951.0	473 136.0	442 937.0
1991	264 412.0	231 893.0	197 049.0	191 652.0	461 461.0	423 545.0
1992	325 770.0	251 237.0	197 040.0	192 312.0	522 810.0	443 549.0
1993	325 957.0	250 251.0	207 038.0	202 474.0	532 995.0	452 725.0
1994	325 484.0	256 826.0	221 049.0	216 930.0	546 533.0	473 756.0
1995	345 214.0	284 693.0	241 112.0	236 350.0	586 326.0	521 043.0
1996	363 705.0	318 467.0	273 709.0	266 123.0	637 414.0	584 590.0
1997	441 583.0	382 473.0	313 955.0	303 642.6	755 538.0	686 115.6
1998	498 353.0	413 172.0	348 111.0	336 085.2	846 464.0	749 257.2
1999	510 749.0	426 005.0	418 765.0	393 480.3	929 514.0	819 485.3
2000	576 757.0	483 636.0	484 835.0	454 404.1	1 061 592.0	938 040.1
2001	624 511.0	522 146.0	544 477.6	508 474.3	1 168 988.6	1 030 620.3
2002	657 259.0	545 929.0	592 807.1	550 364.5	1 250 066.1	1 096 293.5
2003	703 768.0	580 702.0	654 655.0	605 381.0	1 358 423.0	1 186 083.0

†) Sources: 1848-1900: Matre, H. I. (1992a): "Norske forretningsbanker 1848-1990. En tilbakeføring av forretningsbankstatistikken". Det nye pengesamfunnet, Rapport nr 41. 1901-1923: Statistisk sentralbyrå (1949). Statistiske oversikter 1948. NOS X. 178. Oslo. 1924-1951: Statistisk sentralbyrå (1969). Historisk statistikk 1968. NOS XII 245, C 188. Oslo-Kongsvinger. 1952-1991: Statistisk sentralbyrå (1995). Historisk statistikk 1994. NOS, C 188. Oslo-Kongsvinger. 1992-1995: Norges Bank (1998). Årsstatistikk for 1991-97. Finansstatistikk, nr. 14/1998. Oslo. 1996-2003: Norges Bank. Accounting statistics for banks and other financial intermediaries (<http://www.norges-bank.no/front/statistikk/en/fiks/>). See "Loans (utilized) by borrower sector"

‡) Sources: 1840-1865: Matre, H. I. (1992b): "Norske kredittinstitusjoner 1850-1990. En statistisk oversikt". Det nye pengesamfunnet, Rapport nr 42. 1869-1872: Finants- og Told-departementet (1876). Tabeller vedkommende Norges Sparebanker i aarene 1870, 1871 og 1872. D. No. 2. Christiania. 1873-1878: Finants- og Told-departementet (1880). Tabeller vedkommende Norges Sparebanker i aarene 1876, 1877 og 1878. Norges Officielle Statistik. D. No. 2. Christiania. 1879-1885: Finants- og Told-departementet (1880). Tabeller vedkommende Norges Sparebanker i aarene 1876, 1877 og 1878. Norges Officielle Statistik. D. No. 2. Christiania. 1886-1890: Det statistiske centralbureau (1887). Tabeller vedkommende Norges Sparebanker i aaret 1886. Norges Officielle Statistik. Tredie Række No. 45. Kristiania. 1891-1895: Det statistiske centralbureau (1892). Tabeller vedkommende Norges Sparebanker i aaret 1891. Norges Officielle Statistik. Tredie Række No. 156. Kristiania. 1896-1902: Det statistiske centralbureau (1897). Tabeller vedkommende Norges Sparebanker i aaret 1896. Norges Officielle Statistik. Tredie Række No. 265. Kristiania. 1903-1906: Det statistiske centralbureau (1904). Tabeller vedkommende Norges Sparebanker i aaret 1903. Norges Officielle Statistik. Fjerde Række No. 93. Kristiania. 1907-1910: Det statistiske centralbureau (1907). Norges Sparebanker 1906. Norges Officielle Statistik. V. 44. Kristiania. 1911-1913: Statistisk sentralbyrå (1949). Statistiske oversikter 1948. NOS X. 178. Oslo. 1914-1952: Statistisk sentralbyrå (1969). Historisk statistikk 1968. NOS XII 245, C 188. Oslo-Kongsvinger. 1953-1991: Statistisk sentralbyrå (1995). Historisk statistikk 1994. NOS, C 188. Oslo-Kongsvinger. 1992-1995: Norges Bank (1998). Årsstatistikk for 1991-97. Finansstatistikk, nr. 14/1998. Oslo. 1996-2003: Norges Bank. Accounting statistics for banks and other financial intermediaries (<http://www.norges-bank.no/front/statistikk/en/fiks/>). See "Loans (utilized) by borrower sector"

Table A3. Number of bankruptcies. 1887-2003

Year		Year		Year	
1887	554	1927	1 292	1967	288
1888	350	1928	1 017	1968	283
1889	259	1929	822	1969	332
1890	241	1930	723	1970	326
1891	345	1931	621	1971	355
1892	478	1932	755	1972	478
1893	420	1933	583	1973	630
1894	361	1934	482	1974	657
1895	341	1935	387	1975	589
1896	348	1936	337	1976	506
1897	352	1937	286	1977	538
1898	336	1938	294	1978	671
1899	587	1939	316	1979	801
1900	586	1940	243	1980	765
1901	663	1941	111	1981	810
1902	625	1942	53	1982	955
1903	736	1943	86	1983	1 236
1904	588	1944	105	1984	1 304
1905	539	1945	103	1985	1 340
1906	487	1946	109	1986	1 426
1907	390	1947	110	1987	2 075
1908	455	1948	162	1988	3 891
1909	485	1949	192	1989	4 536
1910	426	1950	221	1990	3 814
1911	395	1951	199	1991	4 926
1912	441	1952	219	1992	5 749
1913	395	1953	280	1993	5 158
1914	398	1954	301	1994	3 634
1915	378	1955	296	1995	3 500
1916	147	1956	340	1996	3 458
1917	97	1957	300	1997	3 333
1918	110	1958	330	1998	3 347
1919	190	1959	288	1999	3 243
1920	386	1960	279	2000	3 576
1921	1 030	1961	313	2001	3 562
1922	969	1962	291	2002	4 473
1923	916	1963	295	2003	5 223
1924	866	1964	323		
1925	889	1965	276		
1926	1 317	1966	298		

Sources: 1887-1947: Statistics Norway (1949). Statistical overviews 1948. NOS X. 178. Oslo. 1948-1993: Statistics Norway (1995). Historical statistics 1994. NOS, C 188. Oslo-Kongsvinger. 1994-2001: Statistics Norway. Statistical yearbook 2002. 2002-2003: Statistics Norway. Bankruptcies. http://www.ssb.no/english/subjects/11/02/konkurs_en/

Table A4. Total credit to the general public in millions of NOK. At year-end. 1820-2002

	Bond debt	Loan debt	Total
1820			10
1821			
1822			
1823			
1824			
1825			
1826			
1827			
1828			
1829			
1830			31
1831			
1832			
1833			
1834			
1835			
1836			
1837			
1838			
1839			
1840			48
1841			
1842			
1843			
1844			
1845			
1846			
1847			
1848			
1849			
1850			76
1851			
1852			
1853			
1854			
1855			
1856			
1857			
1858			
1859			
1860			154
1861			
1862			
1863			
1864			
1865			
1866			
1867			
1868			
1869			
1870			242
1871			

Table A4. Total credit to the general public in millions of NOK. At year-end. 1820-2002

	Bond debt	Loan debt	Total
1872			
1873			
1874			
1875			
1876			
1877			
1878			
1879			
1880			390
1881			
1882			
1883			
1884			
1885			
1886			
1887			
1888			
1889			
1890			536
1891			
1892			
1893			
1894			
1895			
1896			
1897			
1898			
1899	62	908	970
1900	82	974	1056
1901	82	1008	1090
1902	87	1038	1125
1903	109	1085	1194
1904	109	1100	1209
1905	108	1125	1233
1906	114	1170	1284
1907	114	1251	1365
1908	118	1328	1446
1909	129	1405	1534
1910	137	1486	1623
1911	152	1614	1766
1912	168	1735	1903
1913	180	1891	2071
1914	216	2039	2255
1915	222	2336	2558
1916	285	3325	3610
1917	324	4594	4918
1918	371	5749	6120
1919	445	6523	6968
1920	584	7285	7869
1921	720	7101	7821
1922	895	6407	7302
1923	958	5939	6897

Table A4. Total credit to the general public in millions of NOK. At year-end. 1820-2002

	Bond debt	Loan debt	Total
1924	1017	5685	6702
1925	1061	5366	6427
1926	1064	5030	6094
1927	1186	4854	6040
1928	1163	4838	6001
1929	1137	4855	5992
1930	1112	4839	5951
1931	1215	4902	6117
1932	1204	4772	5976
1933	1005	4723	5728
1934	940	4693	5633
1935	890	4740	5630
1936	853	4831	5684
1937	820	4964	5784
1938	860	5118	5978
1939	807	5492	6299
1940	789	4942	5731
1941	771	4575	5346
1942	748	4213	4961
1943	715	3868	4583
1944	731	3620	4351
1945	745	3946	4691
1946	864	4804	5668
1947	977	6377	7354
1948	942	7718	8660
1949	1110	9133	10243
1950	1319	10524	11843
1951	1384	12313	13697
1952	1655	13507	15162
1953	1804	15321	17125
1954	1902	17465	19367
1955	2059	19648	21707
1956	2187	21419	23606
1957	2229	24018	26247
1958	2392	26248	28640
1959	2688	28735	31423
1960	2969	31078	34047
1961	3367	34900	38267
1962	3738	38393	42131
1963	4130	41635	45765
1964	5023	45858	50881
1965	5786	50269	56055
1966	6039	56664	62703
1967	6873	62792	69665
1968	7514	67449	74963
1969	8005	73933	81938
1970	8786	82157	90943
1971	9400	93022	102422
1972	9893	105301	115194
1973	10410	122471	132881
1974	11083	139472	150555
1975	13593	168924	182517

Table A4. Total credit to the general public in millions of NOK. At year-end. 1820-2002

	Bond debt	Loan debt	Total
1976	17614	198868	216482
1977	21306	240093	261399
1978	23793	268177	291970
1979	24281	292411	316692
1980	27149	336071	363220
1981	33195	375608	408803
1982	40677	436966	477643
1983	43941	489736	533677
1984	34193	578403	612596
1985			691 823
1986			828 265
1987			931 306
1988			1 011 190
1989			1 080 751
1990			1 092 488
1991			1 071 413
1992			1 069 466
1993			1 074 109
1994			1 075 804
1995			1 014 051
1996			1 085 112
1997			1 210 661
1998			1 342 838
1999			1 464 689
2000			1 716 902
2001			1 861 608
2002			1 973 266
2003			2 093 242

Sources: 1820-1956: Skånland, H. (1967): "The Norwegian credit market since 1900", Samfunnsøkonomiske studier 19, Statistics Norway. 1957-1984: Statistics Norway (1995). Historical statistics 1994. NOS, C 188. Oslo-Kongsvinger (Bond debt: http://www.ssb.no/emner/historisk_statistikk/tabeller/24-24-27.txt. Loan debt: http://www.ssb.no/emner/historisk_statistikk/tabeller/24-24-18.txt). 1985-2003: Norges Bank. Credit indicator (C3): <http://www.norges-bank.no/front/statistikk/en/k3/> (from 1995 C3 to Mainland-Norway)

