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500 years of price history: Price stability is the norm.
What distinguishes the abnormal?

by

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500 years of price history: Price stability is the norm. What distinguishes the abnormal?[1]

Jan F. Qvigstad[2]

Talk at the conference on Historical Monetary Statistics for Norway

Bogstad (Oslo), 7 June 2005

The transition to inflation targeting, which took place in Norway in 2001, may perhaps at the time have appeared to be a transition to a new and unfamiliar monetary policy system. But today's monetary policy system springs from the recognition, based on historical experience, of what monetary policy can in fact achieve.

Price stability has been the norm over the past 500 years, with the exception of 6 episodes of substantial and lasting changes in the price level. The first five episodes are the price revolution in the 1500s, the Seven Years' War around 1760, the Napoleonic wars and the First and Second World Wars. These are examples of monetary disturbances. Growth in the money supply was not in proportion to growth in the economy as a whole. The sixth and last episode relates to the post-war period. The macroeconomic policy of the time and the undermining of the nominal anchor led to a rise in the price level.

Even though price stability has been the norm, we must recognise that disturbances have occurred in the past and will continue to occur in the future. Throughout history, unsuccessful monetary policy, unsuccessful fiscal policy or external conditions, over which we have no control have contributed to periods of expansion and periods of contraction in Norway and other countries. We can learn from these episodes. When the primary objective of monetary policy is to provide the economy with a nominal anchor, monetary policy then also contributes to economic progress.

In these terms, inflation targeting is not new. A nominal anchor expressed in terms of an objective of low and stable inflation is a formalisation of what has actually been the norm.

[1] I would like to thank Director of Research Øyvind Eitrheim, Director Amund Holmsen and Øystein Bieltvedt Skeie for their invaluable assistance and Elvira Sojli for valuable comments. Øystein Bieltvedt Skeie has written his Master's thesis in economics (Skeie 2005) as part of the preparations for this presentation. His supervisor, in addition to Øyvind Eitrheim, was Professor Ragnar Nymoen. Governor of Norges Bank Svein Gjedrem and Deputy Governor Jarle Bergo have also been a source of inspiration. They both recognise the value of compiling historical monetary statistics and draw on this work in their speeches and presentations.

[2] Jan Fredrik Qvigstad is Chief Economist of Norges Bank and Executive Director of Norges Bank Monetary Policy.

Last year, Norges Bank published the book "Historical Monetary Statistics for Norway 1819-2003" (Eitrheim, Klovland and Qvigstad 2004), concluding the first part of our project on historical monetary statistics for Norway. This book included a consumer price index for Norway, constructed by Ola H. Grytten using data from 1516 onwards (Grytten 2004a). Based on data in the Wedervang Archive at the Norwegian School of Economics and Business Administration, Grytten constructed new price indices up to 1871. These were spliced with already existing indices for the period from 1871 onwards.

For those of us who reached adulthood in the 1970s, inflation was the norm. But, if we expand our time horizon, we find that price stability is the norm (Qvigstad, 2004). Over the period from 1516 up to the outbreak of the First World War in 1914, the annual inflation was 0.67 per cent on average. If we extend the period up to 2004, the annual inflation rises to 1.33 per cent.

Even though price stability is a regular feature, this does not mean that prices have always been stable. This article will focus on the periods that fall outside the norm, when prices have not been stable.

I would like to emphasise that I am an economist, not a historian. I will therefore be analysing available data series using an economist's methods. A historian might have selected a different approach.

General features of price developments

Although price data for Norway are available back to 1516, annual price data are only available from 1666. For the period between 1516 and 1666, price data are collected at irregular intervals, over 10 years, for example. This means that we cannot construct *annual* inflation data that dates back further than 1667.

Figure 1 shows the percentage annual change in prices from 1667 to 2004. The change in prices has fluctuated around zero and the level of prices has been fairly stable over long periods. This is not a matter of chance, but a direct consequence of a monetary policy rule.

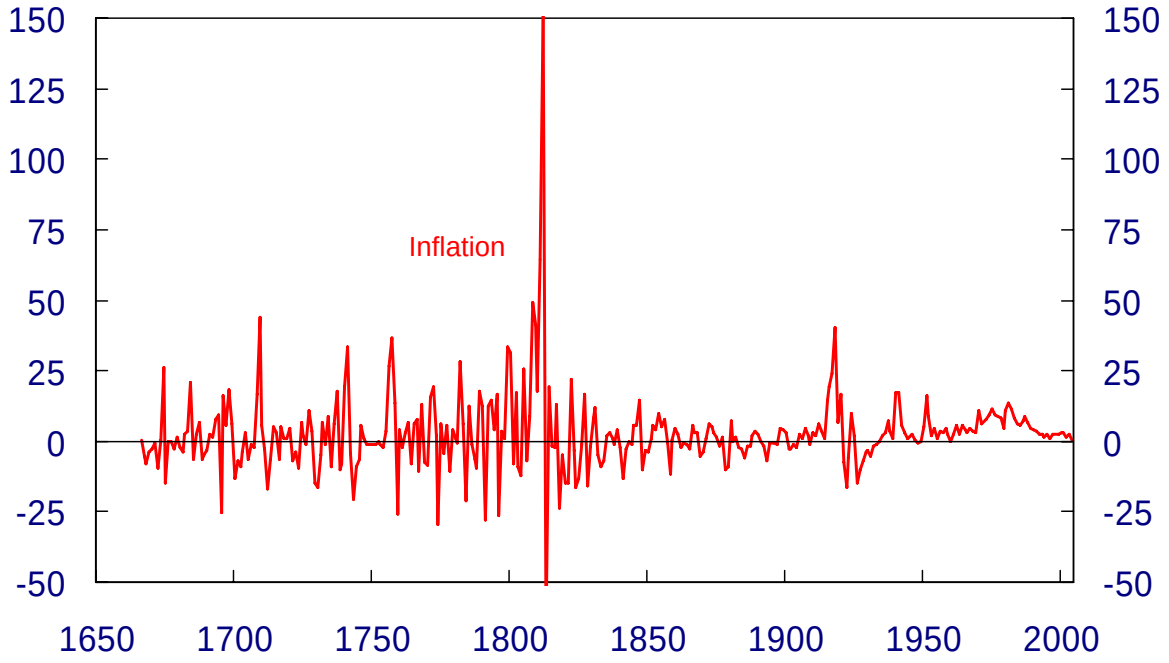

Figure 1: Norwegian inflation rate in percentage, 1667-2004

Through most of this period, i.e., from 1667 to 1873, the monetary policy rule was the silver standard. The value of coins was related to the amount of silver they contained. When paper money was introduced, this was also linked to silver via the obligation to redeem notes for silver. Anyone who owned a banknote could go to their bank and expect to receive a certain amount of silver in exchange, according to the value of the banknote. If we adopt the quantity theory, this means that as long as the amount of metal in the economy did not increase more rapidly than output, the average price level would remain constant. In the short term, the price level could fluctuate widely as a result of demand and supply shocks.

In the period up to 1830, inflation varied considerably, with particularly extreme fluctuations during the Napoleonic wars. Through the afterwar 1800s and 1900s, price developments seem to have been far more stable than during the 1600s and 1700s, that is, if we disregard the First World War and the interwar years. Greater stability in price developments may be related to the declining position of agricultural production as a share of total output. The economy became less dependent on variations in the weather.

To highlight differences between the various subperiods, we present a 25-year symmetrical moving average for inflation in Figure 2. For a given year, the figure shows average inflation for the preceding 12 years, the year itself and the following 12 years.

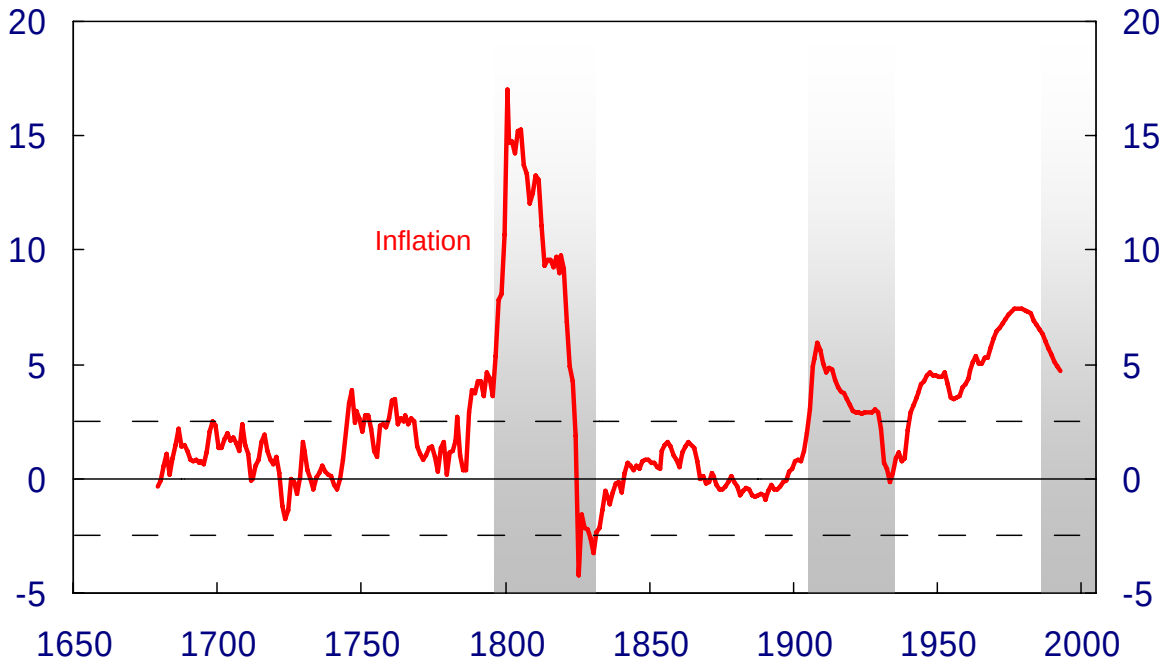

Figure 2: 25-year symmetric moving average for inflation

Figure 2 shows that price stability is the norm, and average inflation has hovered around plus-minus 2½ per cent in most of the period since the mid-1600s. Thus, the dominant picture is one of low inflation and low deflation. We can roughly divide Norwegian price history into 6 periods.

1. In the 1600s and 1700s, price stability was most common.
2. This was followed by a period at the beginning of the 1800s of very high inflation followed by deflation. This episode is related to the Napoleonic wars and the following parity policy.
3. Price stability marked the rest of the 1800s.
4. The 1900s began with a period of price turbulence, high inflation during and after the First World War, followed by a long period of deflation.
5. The second half of the 1900s, on the other hand, was marked by persistent high inflation.
6. Inflation has only shown a falling trend since the mid-1980s. Then followed a new period of price stability, in which the introduction of an inflation target represents the ultimate reestablishment of the nominal anchor.

Figure 2 also shows that prices varied considerably in the 1600s and 1700s although, as we have seen, average inflation was close to zero. This is in marked contrast to the post-Second World War period when price changes were stable while inflation was high.

If we look at inflation developments after the Second World War, next year's inflation rate could almost always be guessed from the current year's inflation rate. Is this a characteristic of price developments that has always existed, or is this a characteristic that is particular to the last few decades? In order to shed light on this issue, Figure 3 shows to what extent high inflation is followed by high inflation for one, two, three and up to six years. We have divided the data into three periods: i) The Pre-First World War period 1667-1913, ii) the period 1914-1945 and iii) the Post-Second World War period 1946-2004.

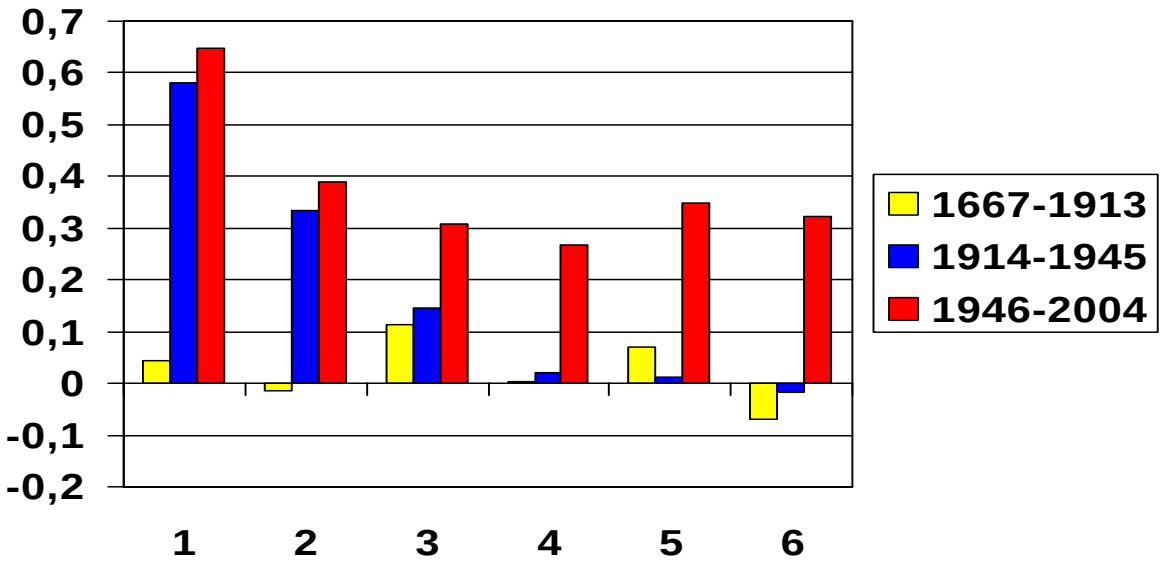

Figure 3: The autocorrelation function for inflation in three different subperiods

A large positive number (close to 1) means that high inflation follows high inflation and low inflation follows low inflation. Numbers close to zero indicate that there is no relationship, and large negative numbers (close to -1) indicate frequent fluctuations between high and low inflation. Figure 3 also shows that before the First World War there was no systematic relationship between inflation in subsequent periods. The yellow columns have low values and are both positive and negative. In the first half of the 1900s, there was a clear tendency towards a positive relationship (the blue columns are high), although of relatively short duration. A shock that results in inflation (or deflation) will typically continue to have an

impact for two to three years. After the Second World War (red columns), the correlation is strongly positive and lasting. A shock that results in inflation is felt for a long period, and inflation seems to show a high degree of persistence.

In the analysis up to now, we have established that price stability is the norm. The abnormal scenario is inflation and deflation. An interesting question to ask is then how often does an abnormal scenario arise? In this context, we have defined abnormal as yearly inflation of more than 5 per cent or yearly deflation of more than 5 per cent. We have constructed a variable that takes the value 1 in all years where *inflation* exceeds 5 per cent and the value 0 in all other years. A similar variable is constructed which picks out years when *deflation* exceeds 5 per cent. Figure 4 shows a 25-year symmetrically moving average of the two variables which illustrates how the relative frequencies of inflation and deflation have changed through history.

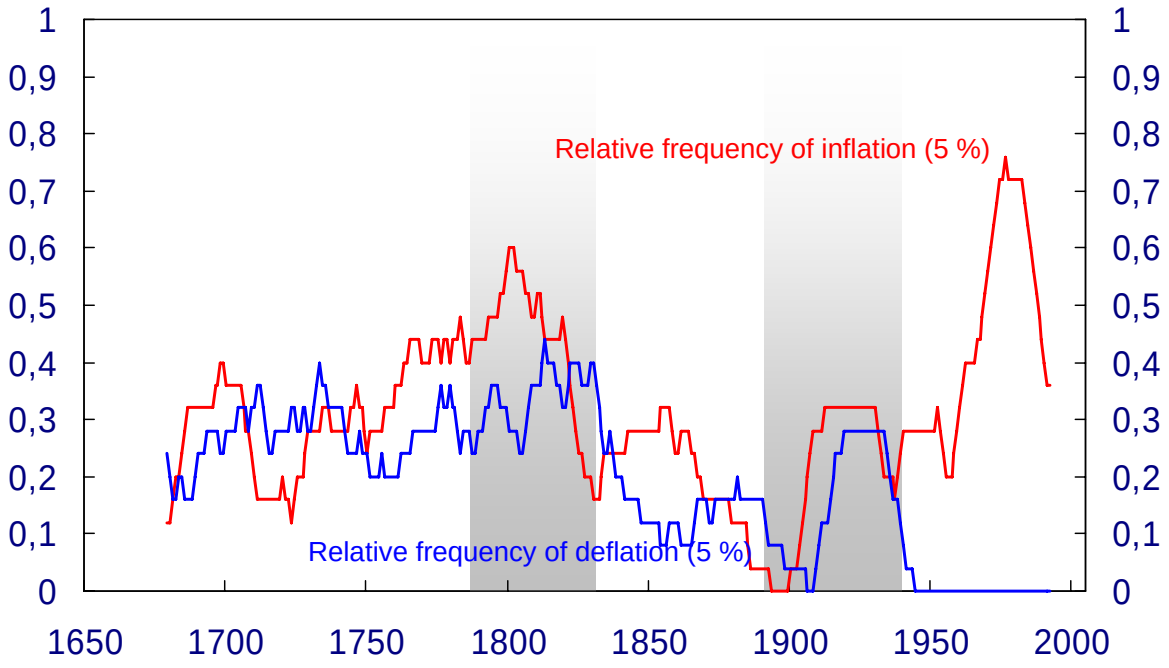

Figure 4: Relative frequency of inflation and deflation

We see that the frequency of both inflation and deflation fluctuates around 0.3. This indicates that inflation and deflation occur with much the same frequency. Nonetheless, inflation tends to occur somewhat more frequently than deflation. Again, the period after 1950 is unique, because this is a period of high inflation and deflation does not occur.

Figure 5 shows the duration of different periods of inflation and deflation of 1, 2, 3 etc. years' respectively. The first thing we notice is that virtually all the periods of both inflation and deflation are short. As many as 28 periods of deflation and 19 periods of inflation lasted for one year. A few deflationary periods, however, persisted for a long period. These occur in nearly every century, but most frequently in the 1800s.

- 1667-1672 (6 years)
- 1840-1844 (5 years), 1883-1887 (5 years) and 1891-1897 (7 years)
- 1926-1933 (8 years)

The longest periods of inflation, on the other hand, lasting more than 10 years all occurred in the 1900s.

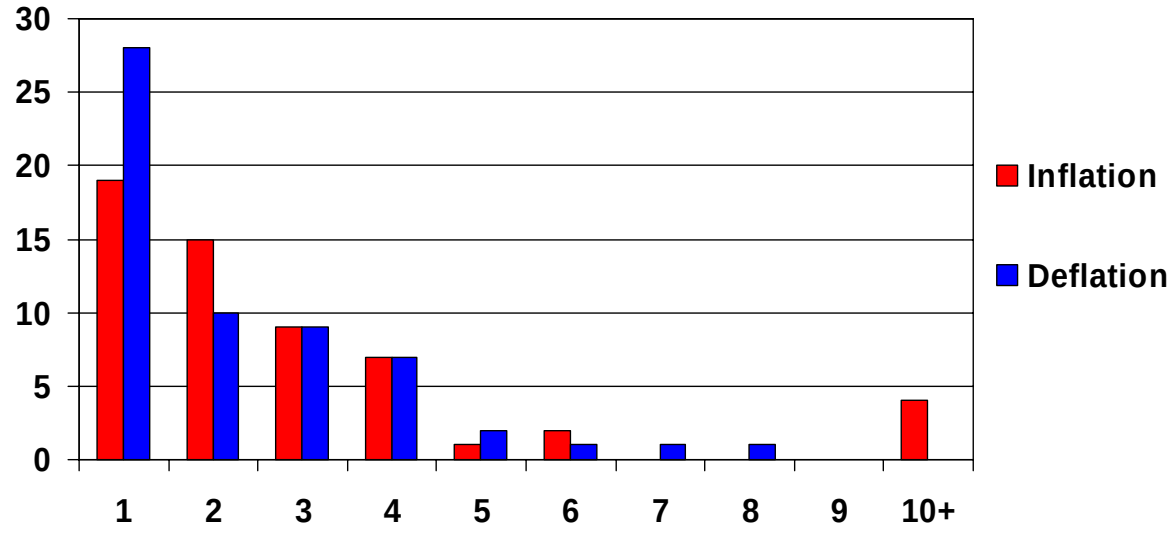

Figure 5: Number of inflation and deflation episodes after duration

A closer study of price developments shows that positive price shocks generally occur before large negative price shocks. There are virtually no examples of large negative price shocks without a preceding positive price shock. At the same time, we have seen that most periods of deflation are of very short duration. This may indicate that deflation is a correction after a previous period of inflation.

From a theoretical standpoint, inflation and deflation should be expected to occur symmetrically. The fact that this does not seem to be the case, may be due to price rigidity. The market economy determines relative prices, while the price level is determined by the supply of metal. When a negative shock occurs, it is difficult to reduce prices. Correction after

inflation, however, is possible since market participants interpret this to mean that prices are moving back to the normal level.

Examples of the abnormal

We will now turn to episodes that are not characterised by price stability. The first period is referred to in the literature as the "16th Century Price Revolution" – a marked rise in prices all over Europe throughout the 1500s.

Figure 6 shows changes in the price level in Norway (red) and England (blue). Both series have been adjusted so that they show the value 100 in the year 1550. As we can see, the price level rose throughout the 1500s and into the 1600s. We can also observe that the price level increased somewhat more sharply in England than in Norway.

Why did the price level steadily increase for such a long period? In the literature on economic history, several possible reasons have been put forward, but according to Professor John Munro at the University of Toronto, the underlying driving force must have been a more ample supply of metal, see Munro (1999) for discussion.

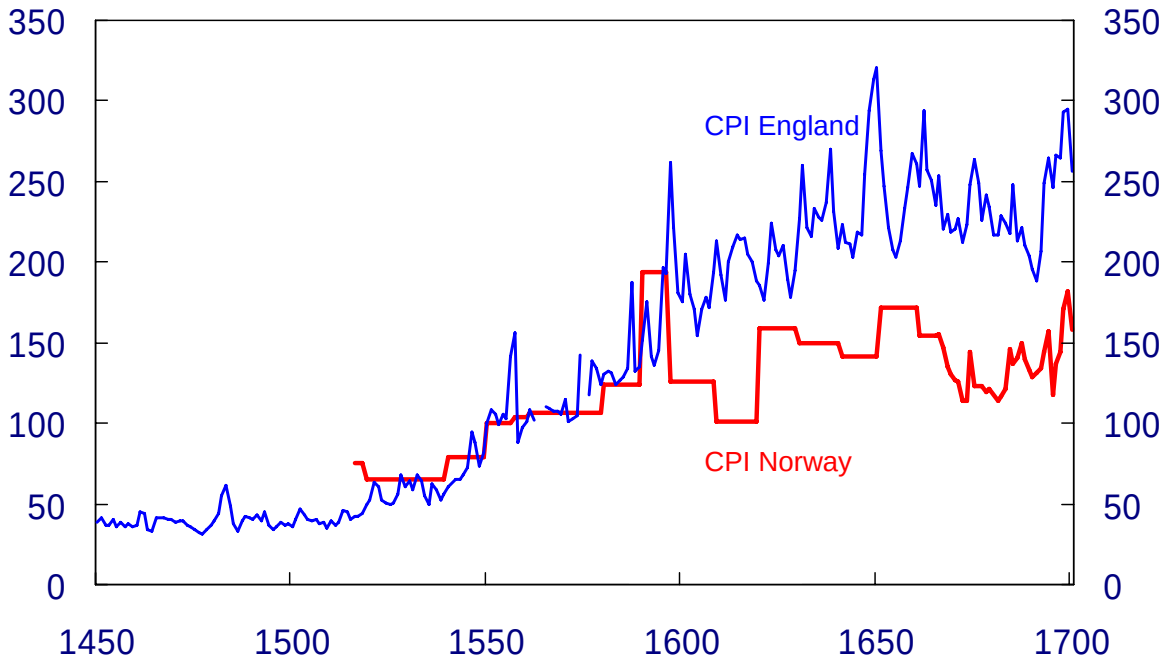

Figure 6: The 16th Century Price Revolution

In the 1500s, coins were made of gold or silver. This meant that the money supply was directly determined by the supply of precious metal. If the supply of metal increased more rapidly than the rate of general output, prices would rise.

Munro highlights three factors that contributed to the metal supply:

1. The first factor relates to technological innovation. A vacuum pump to drain water from mines was developed. Silver veins that had previously been inaccessible, could now be mined. In addition, the Saiger process, a chemical process using lead to separate silver from copper, was developed.
2. The second factor was the increase in the supply of metal due to imports from the Gold Coast, i.e. the coast of Ghana in Africa. The Portuguese had established trading stations here to buy gold. It is, of course, no coincidence that the names Slave Coast and Ivory Coast also refer to this part of Africa.
3. The third source of metal was imports from Portuguese and Spanish colonies in Central and South America.

According to Munro, the interesting question is not why prices rose in the 1500s, but why it took so long for prices to begin to rise. The rise in production in European silver mines began as early as in the 1400s. It might be expected that prices would begin to rise at about the same time. Munro explains the delay by pointing out that a large portion of this silver was exported from Europe via Venice to pay for imports from the East. As a small note of interest, our own silver mines at Kongsberg only began operations under King Christian IV in 1623. Inflation in Norway in the 1500s can therefore not be ascribed to our own production of silver.

I would now like to turn your attention to the period from the end of the price revolution in the early 1600s to the mid-1800s. Figure 7 shows the price level in Norway from 1650 to 1875. The horizontal lines show the average price level for the periods 1650-1756, 1757-1798 and 1842-1913.

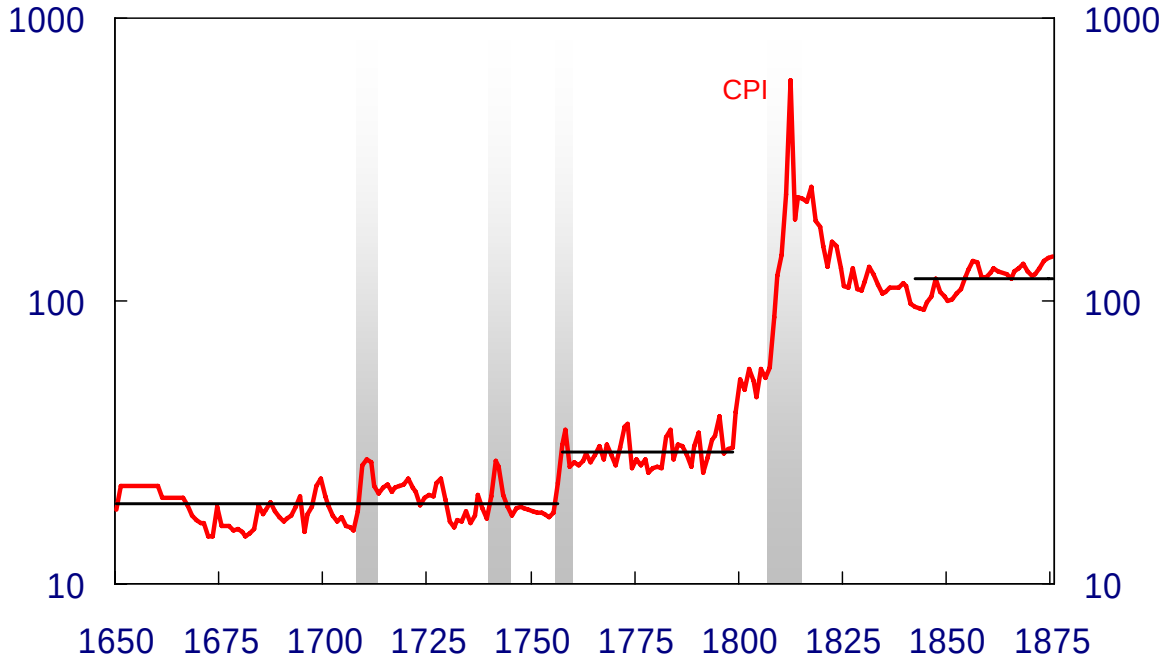

Figure 7: CPI for Norway 1650-1875

We see that the price level has been very stable for long periods. This does not mean that prices have been constant from one year to the next. Substantial price shocks were common, but were neutralised after a period so that prices reverted to the level prevailing before the shock occurred. Some price shocks, on the other hand, led to a permanent shift in the price level.

I will focus on four episodes:

1. The first occurred in 1708-09 and was a positive price shock with reversion. The historical context was that the Great Nordic War at this point shifted from being a war between Sweden under Karl XII and Russia and became a war between Sweden and Denmark-Norway. In the same period, the War of the Spanish Succession was in progress.
2. The second episode occurred in the early 1740s and was also a positive price shock with reversion. This was a period of very high death rates in Norway, often referred to as a demographic crisis, combined with the outbreak of the War of the Austrian Succession.
3. The third episode is related to armed neutrality and mobilisation during the Seven Years' War 1756-1763. This war was a major European war where the old great

powers tried to divide the newly established Prussia and where France and England fought for control over the overseas colonies. Denmark-Norway was not directly involved in the warfare, but it was a close thing! These turbulent times were a costly drain on Treasury funds.

4. The fourth episode is related to the final phase of the Napoleonic Wars 1807-1814.

These last two episodes (the Seven Years' War and the Napoleonic Wars) are both price shocks without reversion.

Two questions are addressed in the following:

1. Why did prices begin to rise in these four periods?
2. Why did not price reversion occur in the last two episodes?

Let us briefly discuss the relationship between inflation and key demographic variables like e.g., the death/birth ratio[3]. An increase in the death/birth ratio will capture both an increase in the death rate and a reduction in the birth rate. Before the demographic transition in the 1800s, the birth rate was relatively stable, hence the variable will primarily capture changes in the death rate.

An increase in the death rate may be due to a number of causes. First, a higher death rate may be a sign of a severe food shortage. This can without a doubt be interpreted as a negative supply-side shock. Second, the death rate may increase due to epidemics. A reduction in population results in reduced demand. The population decrease will also lead to lower production. An epidemic can thereby result in both a negative supply-side shock and a negative demand shock. The third reason for an increase in the death rate may be a combined crisis. Lack of nutrition over a long period weakens the immune system and increases vulnerability to disease. This may contribute to amplifying the original shock and the death rate then becomes what we economists would call an endogenous variable.

[3] Helge Brunborg, researcher at Statistics Norway, has assisted in identifying the correct demographic sources.

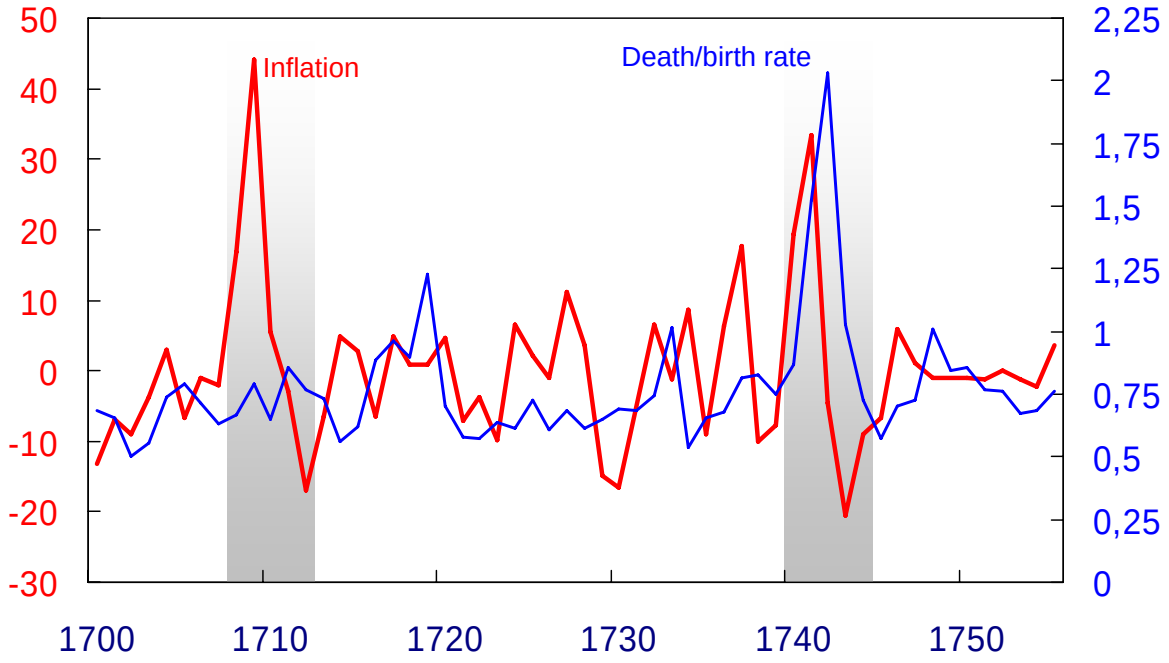

Figure 8: Inflation (left axis) and death/birth rate (right axis)

Figure 8 shows inflation (red) and the death/birth rate (blue) for the two first episodes. As you can see, the inflation episode during the Great Nordic War does not coincide with any significant changes in the death rate. The period of inflation at the beginning of the 1740s, on the other hand, does coincide with a period when the death rate was very high. Thus, we deduce that the relationship between price changes and demographic variables is far from clear.

We will now turn to the two periods where the price level shifted. During the Seven Years' War, the death rate remained stable. During the Napoleonic wars, on the other hand, the death rate rose sharply, particularly in the years 1809 and 1812. In addition to demographic variables, we also introduce meteorological variables, like spring and summer temperatures, in the analysis of price changes. It is a little easier to interpret the relationship between price changes and meteorological variables. Low temperatures will normally result in poor harvests, which in turn lead to a reduction in supply and higher prices.

Per Øyvind Nordli from the Norwegian Meteorological Institute (www.met.no) has reconstructed annual averages for spring and summer temperatures in Trøndelag, central Norway (Nordli, 2004). Unfortunately, temperatures for the period 1708-09 are not available. We have therefore used data compiled by Keith Briffa at the Climatic Research Unit in Norwich for this period. He has published annual data on temperatures back to 1400. (Briffa's website: http://www.cru.uea.ac.uk/cru/people/briffa/)

The years 1708-09 were very cold compared with the norm based on the period 1961-90, see Figure 9. As a result of the cold weather, harvests failed all over Europe. Earl J. Hamilton writes in his book on price developments in Spain from 1650 to 1800:*"The upheaval [in prices] was due largely to the occurrence in 1708-09 of one of the most frigid winters that Europe has ever experienced. The cold wave in December-January damaged vineyards, killed young animals, froze growing grain, and irreparably injured fruit and nut trees"* (Hamilton 1969, page 143) . This indicates that the price shock was due to a negative supply-side shock.

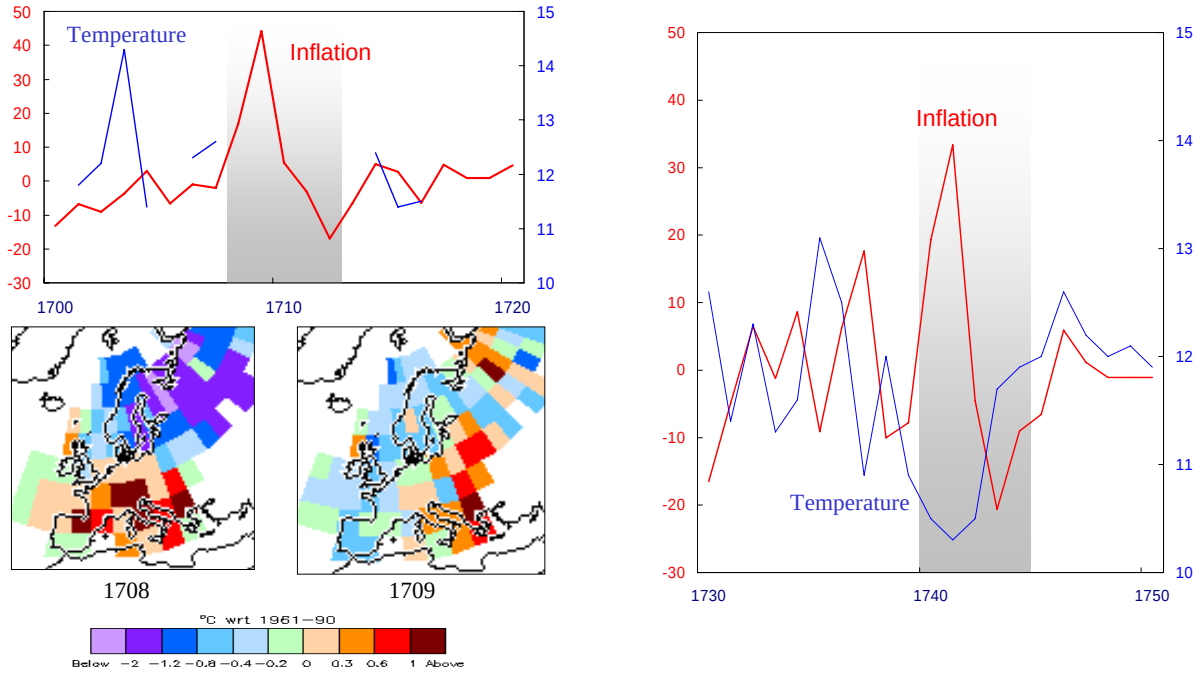

Figure 9: Inflation (left axis) and Temperatures (right axis) during the episodes in 1708-09 and the early 1740s

Nordli (2004) finds that temperatures were very low in the years around 1740. How does this tally with the increase in the death rate in this period? Former Director General of the National Archives, John Herstad, discusses the 1740 crisis in detail in his book on the corn

monopoly (Herstad, 2000). He shows that crops had already begun to fail around 1735. The crisis gradually deepened as the population was forced to eat seed corn. The crisis was full-blown by autumn 1739. Several years of very poor harvests followed, and the crisis only receded with the occurrence of a good grain harvest in 1743.

Long-term lack of nutrition, as we know, weakens the immune system. It therefore comes as no surprise that there were also reports of large-scale epidemics in parts of the country during the crisis. Some contemporary commentators also saw the clear connection between crop failure and epidemics. Pastor Søren Tybring (Herstad, 2000, page 274) wrote " ... *dysentery is to a great extent caused by a lack of sustenance, preferably bread and other grain products, of that there is no doubt …*" (our translation). This points in the direction that also the 1740 episode was dominated by a negative supply-side shock.

After having established that the first two episodes were mainly supply-side driven, we now look more closely at the demographic and climatic conditions during the last two episodes shown in Figure 10. During the Seven Years' War, the temperature remained stable. During the Napoleonic Wars, 1812 was a year of particularly low temperatures, cf. Figure 10 (upper right). This is perhaps the most famous year of famine in Norwegian history. Food shortages were exacerbated by the British blockade.

1809 was a year when the death rate was higher than in 1812, cf. Figure 10 (lower left). Although 1809 and 1812 were both years when crops failed during the British blockade, 1812 was probably the worse of the two. Why then was the death rate highest in 1809? The reason is probably related to the war with Sweden. Military camps of that time were not examples of the best hygienic conditions. This led to the spread of a severe epidemic of dysentery (Hodne and Grytten 2000).

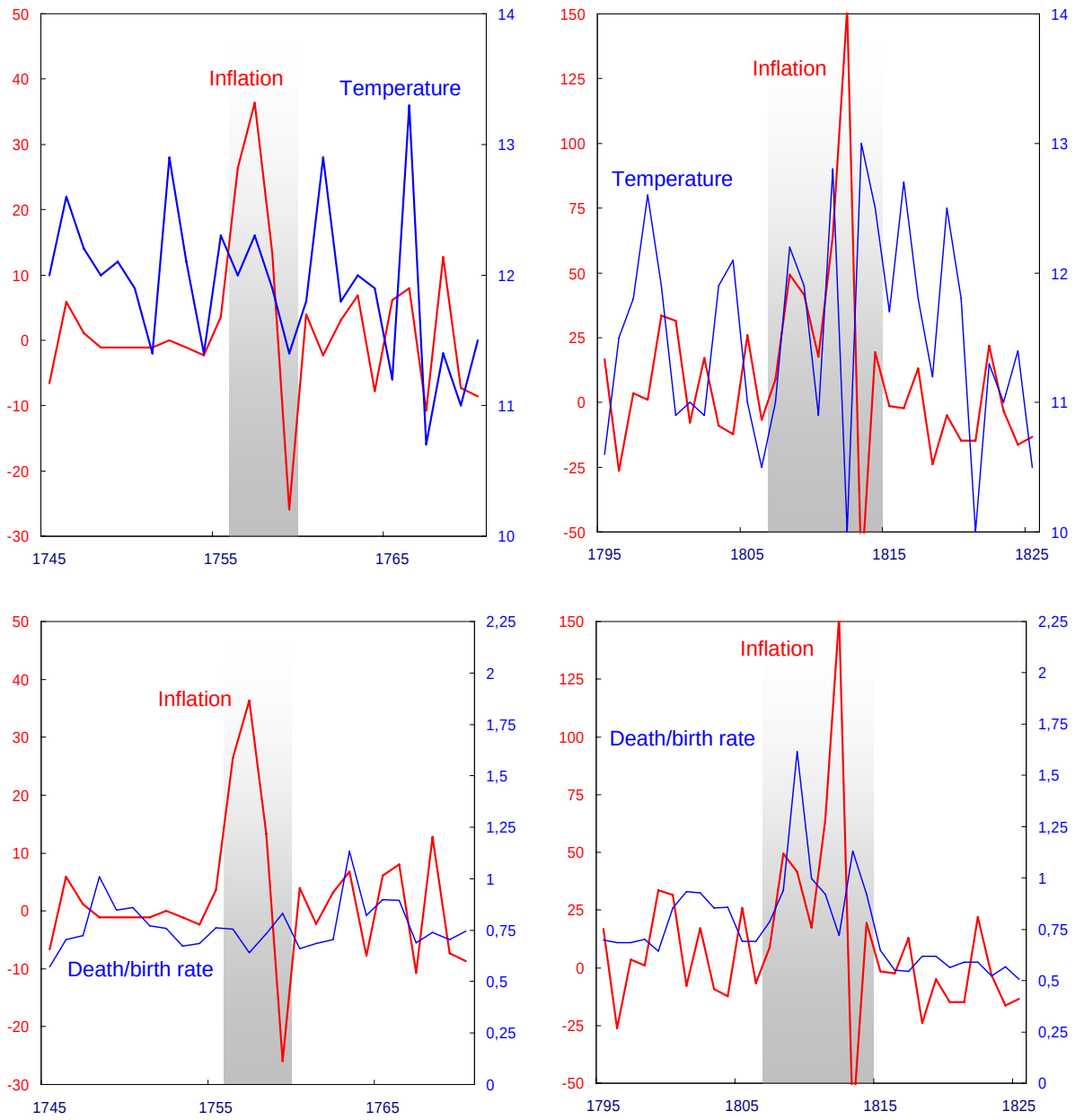

Figure 10: Upper part - Inflation (left axis) and temperatures (right axis) .
Lower part - Inflation (left axis) and death/birth rate (right axis)
during the Seven Years' War and the Napoleonic Wars

The Norwegian economy was exposed to shocks that influenced prices. Which leads us to the next question: are developments in Norway particular to Norway, or do we largely follow international trends? Again, we offer some separate comments on the four episodes.

Figure 11 shows inflation in Norway (red) and England (blue). We see that price developments have been remarkably similar in the two countries. The 1708-09 episode stands

out for both countries. The overall picture around 1740 is not as clear. It would appear that price changes in England occur somewhat earlier than price changes in Norway.

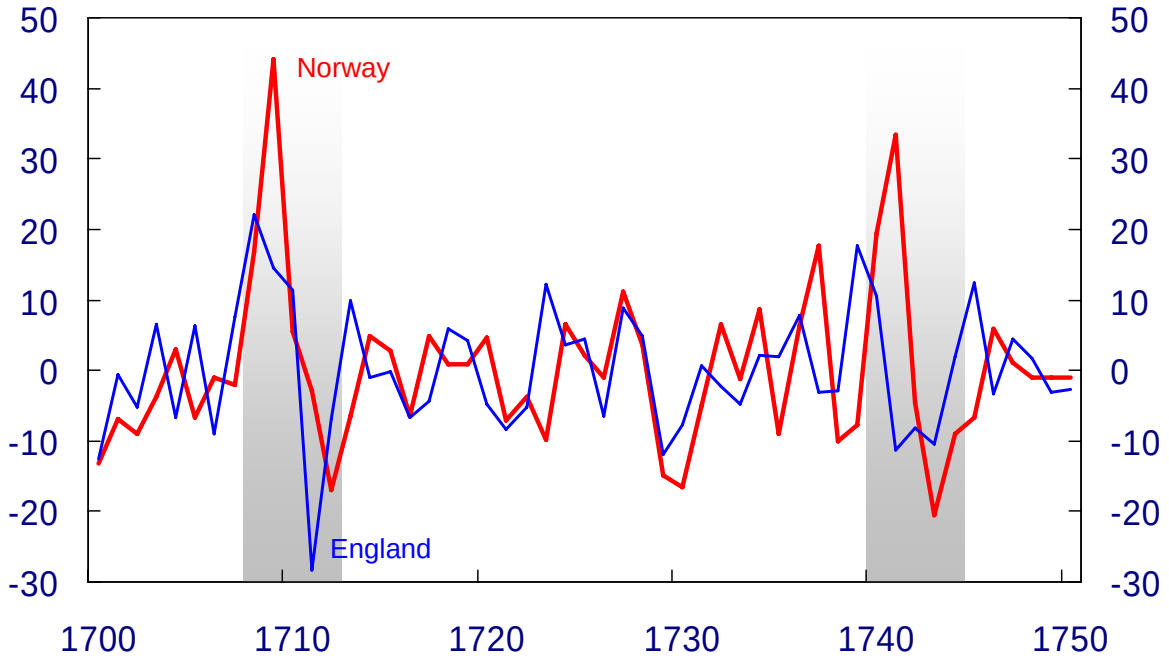

Figure 11: Norwegian and English inflation during the episodes in 1708-09 and the early 1740s

Ole Feldbæk, a Danish historian, also points out that price developments in the Nordic countries are influenced by developments in the rest of Europe (Feldbæk 1998, page 91): "*sudden increases in the price of grain could be due to a poor harvest. But political events could also affect prices. Thus the sharp rise in prices in 1740 was the result of the grain stocks purchased by Fredrik II of Prussia to supply food for his army at the outbreak of the Austrian War of Succession.*" Although, as we have seen, Fredrik II cannot be given sole blame for the rise in prices, it is not unreasonable to claim that his purchases of grain contributed to it.

The shock during the Seven Years' War affected both Norway and England, although the impact on prices was somewhat stronger in Norway, cf. Figure 12. During the Napoleonic wars, however, there was a significant difference between the two countries. Inflation in

England was moderate, in strong contrast to Norway, where prices in 1812 rose by more than 150 per cent.

We have found several features that all these inflation episodes have in common. It would appear that the economy has been affected by one or more supply-side shocks. The big question here is why reversion occurred in the first two episodes but not in the last two?

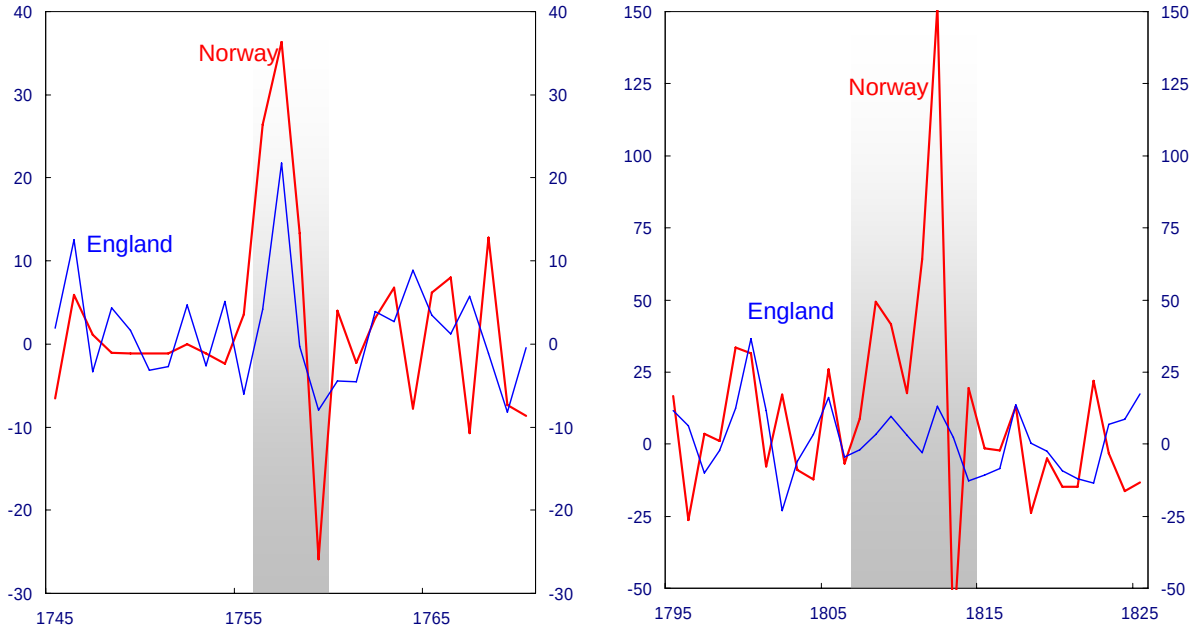

Figure 12: Norwegian and English inflation during the Seven Years' War and the Napoleonic Wars

We will start by analysing the Seven Years' War. This was to some extent a European war between Prussia and the old great powers. They tried to divide the newly established Prussia, but without success. This war was also a war between Prussia's ally, England, and France, fighting for control of the colonies in America, Africa and India.

Denmark-Norway did not take actively part in the Seven Years' War, but since English and French ships attempted to capture neutral merchant ships, the state was obliged to engage in armed neutrality in cooperation with Sweden. This was a costly affair. Another costly episode occurred towards the end of the War. In January 1761, Czarina Elizabeth died and her nephew, Peter of the House of Gottorp, became czar of Russia. The House of Gottorp and the Danish royal house (the Oldenburgers) had been in conflict for a long time. Peter III and his army marched on Denmark, and Denmark-Norway was forced to mobilise its troops. War was

averted at the last minute when Peter was assassinated and was succeeded by Catherine (the Great), who called off the attack.

Figure 13 shows developments in state finances during the Seven Years' War. State expenditure more than doubled in the course of only a few years. With no immediate tax revenues to meet this expenditure, state debt soared. Note that the increase was in particular a result of the last phase of the war when troops were mobilised against Russia.

The authorities tried to bolster crumbling state finances by raising taxes. In 1762, a regulation imposing an extra tax was issued, specifically to cover burgeoning state debt and military expenditure. *All* inhabitants above the age of 12 were required to pay 1 riksdaler per year in tax, a poll-tax that Margaret Thatcher also tried to use towards the end of her term as prime minister, but without success. (Economic theory likes poll-taxes since they do not influence behaviour and are economically effective.) This was a very high tax burden that resulted in widespread discontent in Norway. The Danes paid their taxes to the King, but the Norwegians were far more reluctant taxpayers.

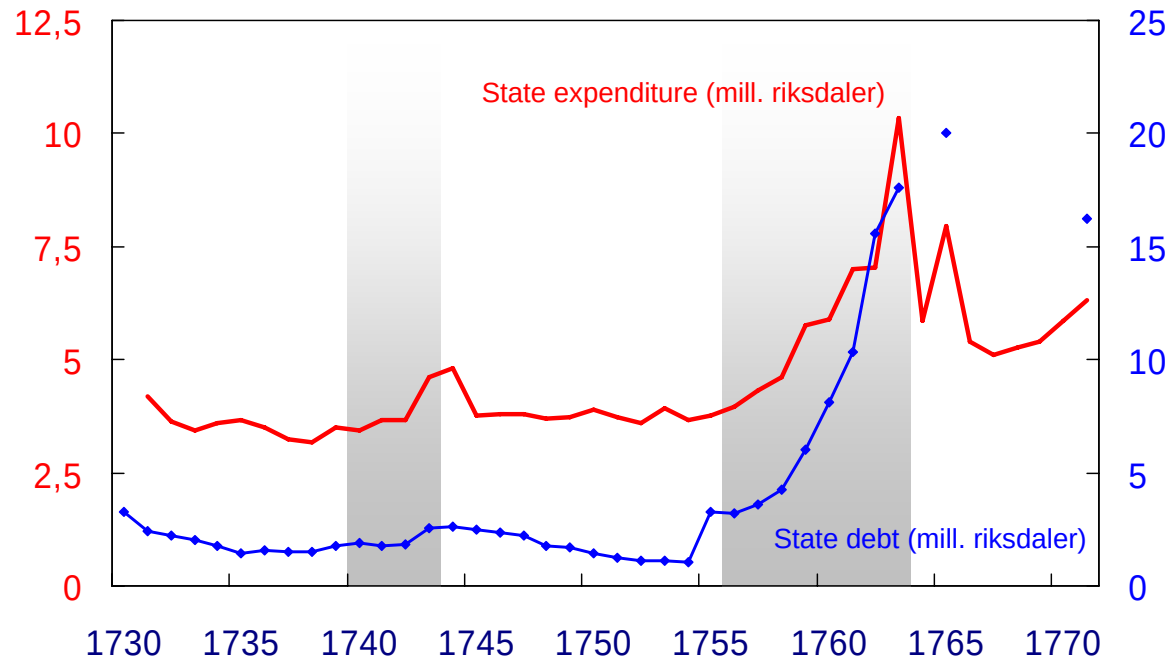

Figure 13: State expenditure (left axis) and debt (right axis) in the 18th Century

Compared with the Seven Years' War, the episode in the 1740s had only a marginal impact on state finances.

Banknotes were introduced in Denmark-Norway during a short-lived attempt by the industrialist Jørgen Thor Møhlen in Bergen in 1695. Møhlen was inspired by the establishment of the first bank of issue in England, the Bank of England, the previous year (1694). However, Møhlen's own manufacturing activities were struggling, and only a year later (in 1696), the King required the banknotes to be withdrawn. Banknotes were again issued to finance the Great Nordic War (1709-1720). These banknotes were also withdrawn a few years after the end of the War. In 1737 the newly established Kurantbanken, the first Danish bank, began to issue banknotes. The bank was originally privately owned and was intended to provide short-term loans to business and industry. It was proclaimed that the bank would be independent of the state and of state intervention. However, Kurantbanken gradually became an instrument used to finance state debt.

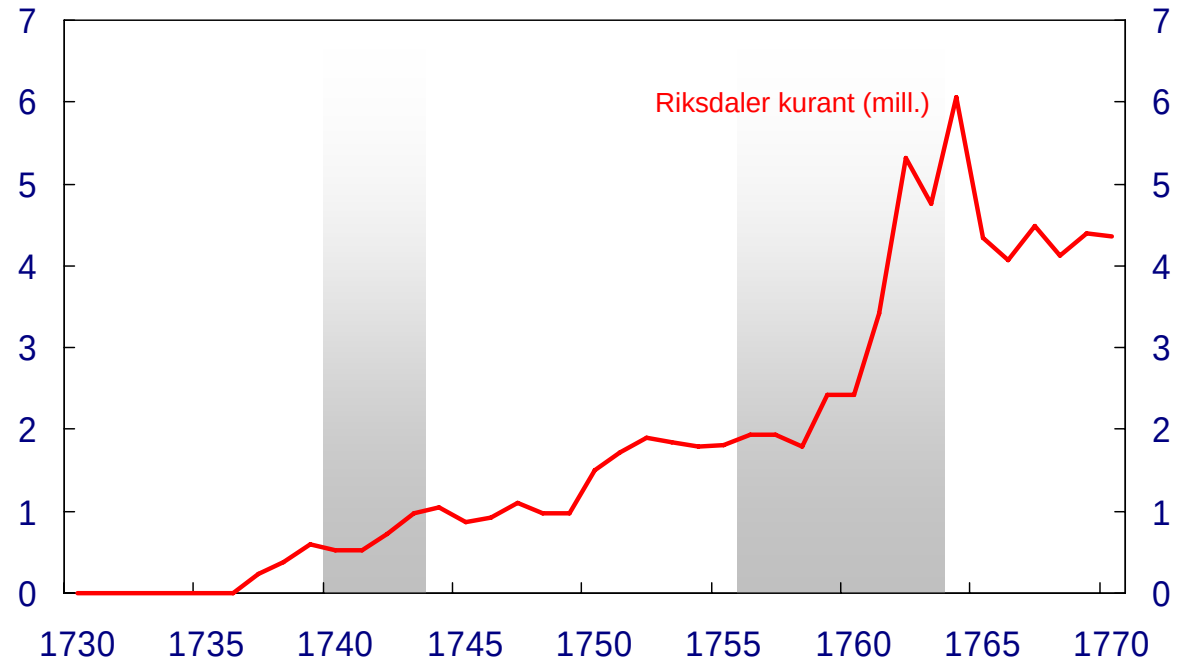

Figure 14: Bank notes in circulation

In 1757, the redemption obligation was removed while banknotes became the only form of legal tender. Thus, the printing press was free to roll. The number of banknotes in circulation increased considerably from this point on and throughout the war, cf. Figure 14. When the number of notes in circulation triples in just a few years, there will obviously be

consequences. In 1762, the smallest denomination of banknote issued was reduced from ten to one riksdaler, and in 1773, Kurantbanken was taken over by the state.

In Figure 12 we saw that inflation at the beginning of the Seven Years' War was an international phenomenon. Normally, prices would have reverted to their original level after a few years, but on this occasion tax revenues were not sufficient to finance state expenditure. Active use was made of the printing press, and a shift in price level was inevitable. In this case (in contrast to the situation following the Great Nordic War), banknotes were not withdrawn in the years following the war.

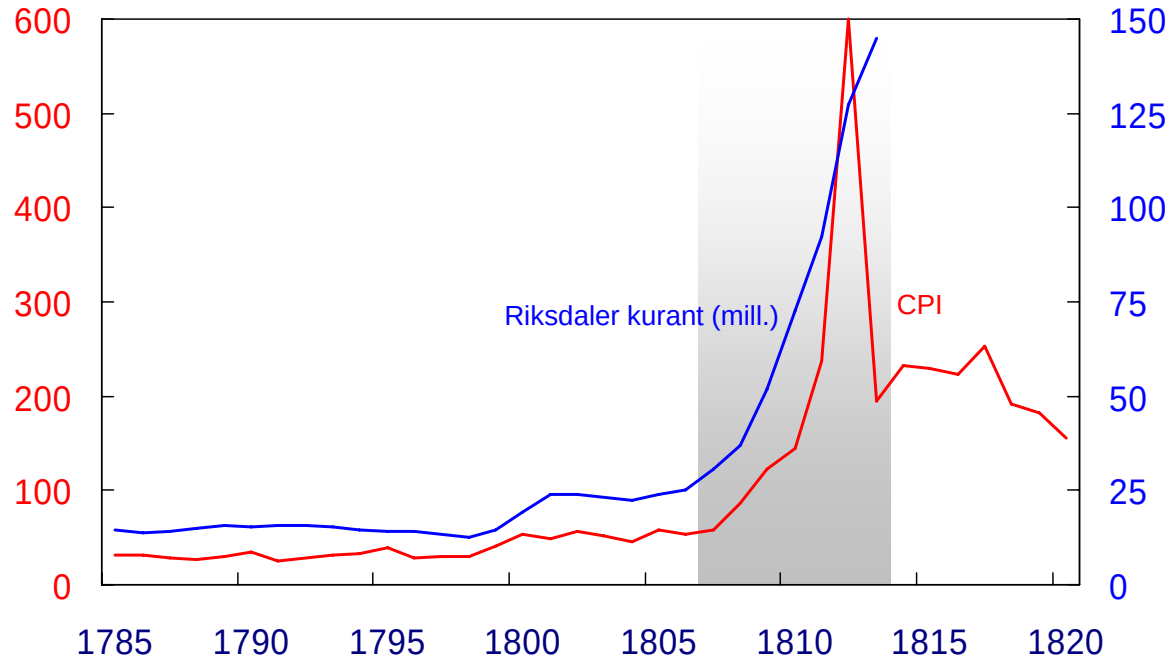

Figure 15: Prices (left axis) and bank notes in circulation (right axis)

The Napoleonic Wars also required substantial state expenditures, which was financed by printing money. Figure 15 shows how both the supply of banknotes and the price level increased. The number of banknotes in circulation was now completely out of control. Ole Feldbæk (Feldbæk 1998, page 334) writes that "*There was no other option than to let the printing press roll at increasing speed. The issue of banknotes was successfully restrained for a period, but in 1812, even the minister of finance could not say how many notes were in circulation*" (our translation).

In the period from the last year of peace in 1806 up to the peak price year of 1812, prices increased 11-fold. Even though most people suffered as a result of rising prices, some made a profit. For borrowers, the real value of their debt decreased. One example was the fishermen in Nordland, northern Norway, who were in debt to merchants in Bergen. The Nordland debt had been an important element in the Norwegian economy, with roots going back as far as the late Middle Ages. Hyperinflation reduced the importance of the Nordland debt.

When economists express themselves in more popular terms, they often refer to the internal and external value of money. The internal value of money expresses purchasing power in relation to the country's own goods and services, while the external value expresses international purchasing power. We have seen that the internal value of money was eroded due to (hyper)inflation, but its external value also dwindled. Figure 16 shows the exchange rate for the Danish kurant against the silver-based hamburger banco. The parity rate was set at 125. Up to Denmark-Norway's entry into the Napoleonic Wars in 1807, the rate remained stable at somewhat above par. Then the value of the *kurant* began to fall. In December 1807, the exchange rate was 151. In March 1811, the rate was 814, and in September 1813 the kurant reached its lowest level with an exchange rate at 14000. The kurant had by then been reduced to below one per cent of its original value.

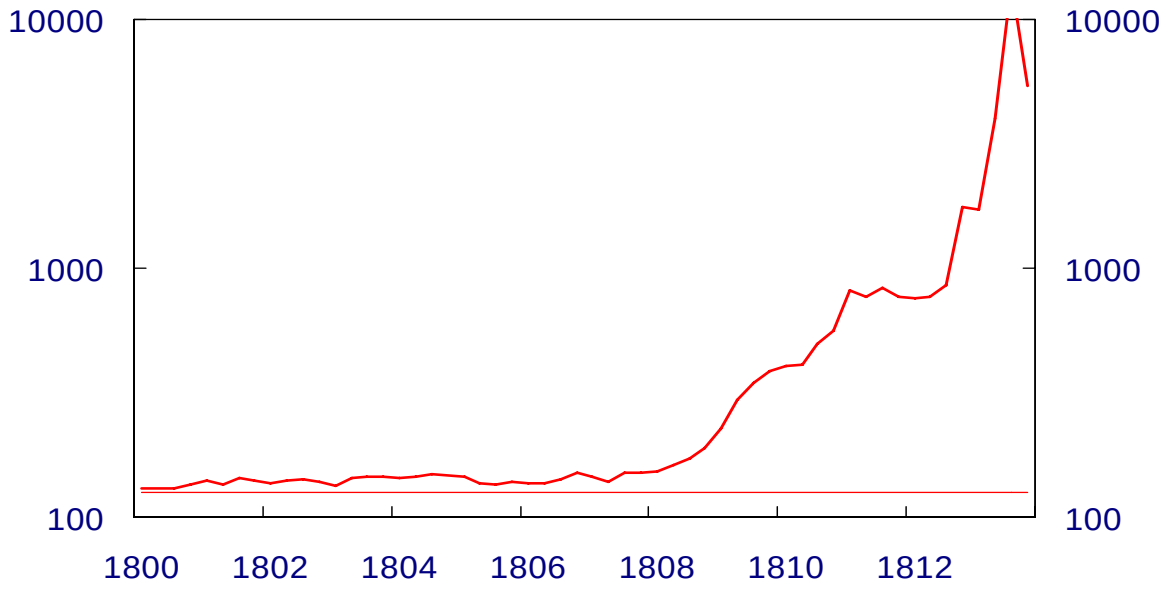

Figure 16: Exchange rates 1800-1814. Danish kurant against Hamburger Banco (parity = 125)

In the discussion above we have argued that demographic factors, a poor climate and international prices all contribute to explain the observed price shocks in the four episodes. But what can explain the two shifts in the price level?

During the time period we have considered so far, Norway-Denmark followed a silver standard. In normal periods, such a metal standard serves as a nominal anchor which pins down the price level. Provided the nominal anchor is credible, a shock will only result in temporary changes in the price level. Over time, prices will revert to their original level.

Episode	War	Temperature	Mortality	Follows England	Money growth
1708-09	Yes	Cold	Normal	Yes	Low
1740-43	No	Cold	High	Yes	Low
1756-63	Almost	Normal	Normal	Yes	**High**
1807-14	Yes	Cold	High	No	**High**

Table 1: Summing up the abnormal episodes 1700-1830

A persistent change in the price level will result only when the nominal anchor weakens. As we have seen, an expansionary fiscal policy (to defend ourselves against an advancing army) can be financed by allowing the printing press to cover the state deficit. The money supply will then increase more than implied by economic growth, the nominal anchor will weaken and result in a permanent change in the price level.

The monetary chaos from the Napoleonic Wars was not easy to resolve. After Norges Bank was established by the Act of 14 June 1816, it was decided to secure the new Norwegian *speciedaler* by establishing a metal fund of 2 million silver speciedaler coins. The fund was built up by means of a silver tax. It was to prove difficult to acquire sufficient silver. In fact, the silver tax was not fully paid in until 1832.

In 1815, a violent volcanic eruption took place in Tambora in Indonesia. Huge clouds of dust and ash spread over many parts of the world, substantially altering the climate and causing crops to fail. This natural disaster was a contributing factor to the European recession in the years following the Congress of Vienna in 1815. Economic contraction in Europe resulted in a decline in Norwegian exports. In addition, the private and public sectors both had substantial foreign debt. In this situation, the Norwegian parliament decided not to take the risk of guaranteeing redemption of silver. It was decided to let the speciedaler float.

In 1822, the Norwegian state signed a loan agreement with the banking house of Hambro so that its debt to Denmark could be paid off. This loan was provided on the condition that the monetary system was brought into order. This was done by permitting silver redemption, although not at par value. In the years that followed, the rate for silver redemption gradually moved closer to par, and in 1842, par value was finally reached and the speciedaler was now made fully convertible to the official value of silver. (Banknotes were regarded as debt certificates and debts were to be honoured. Anything other than par value was a breach of promise and a failure to meet one's obligations.)

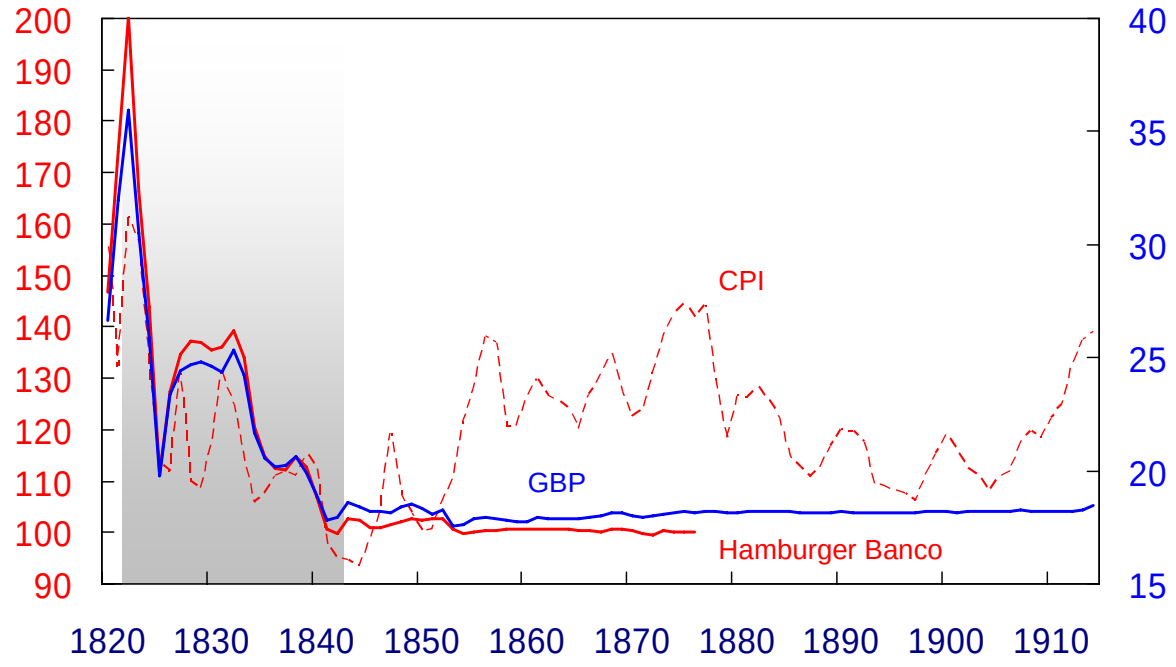

Figure 17: Price level (left axis) and exchange rates (right axis)

Figure 17 shows the price level and exchange rates against the gold-based English pound and the silver-based hamburger banco. We see that the period of parity policy, often referred to as

the legal silver standard, was a period of both falling prices and falling exchange rates. As soon as par was reached, the period of the effective silver standard began. Exchange rates were very stable in this period. This stability continued when the Scandinavian countries decided to switch to the gold standard in 1873.

There is a clear relationship between price developments in the 1800s and the extraction of gold. Figure 18 shows the price level (red) and annual global production of gold measured in tons (blue).

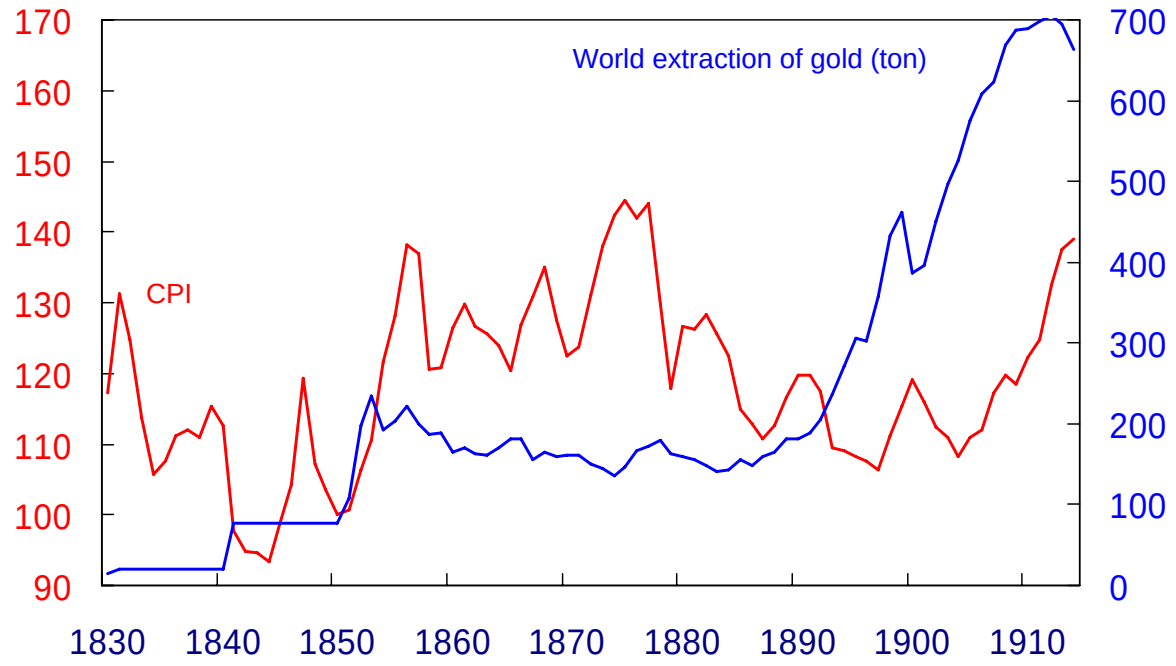

Figure 18: Price level (left axis) and gold extraction (right axis)

Towards the end of the 1840s, gold production began to rise. In 1848, gold was discovered in California. This was followed by substantial finds in Australia in 1851. The metal supply increased and international price levels rose. The global cyclical turnaround in the early 1870s introduced a period of falling prices. Prices continued to fall until new discoveries of gold were made from the 1890s onwards, in Australia, Colorado, Alaska and South Africa. In comparison with other periods, however, the 1800s was a period of very stable prices.

1966 saw the release of the film “Il Buono, il brutto, é il cattivo”, better known as “The Good, the Bad and the Ugly”, directed by Sergio Leone. This was a western about three trigger-happy men hunting for a treasure. The title of this film has subsequently been used in

economic literature by authors such as Michael D. Bordo and Andrew Filardo. Bordo and Filardo (2004) use output developments from price peaks to price troughs to classify periods of deflation. If output rises, the period of deflation is defined as “good”. If output falls, but by less than 10 per cent, deflation is regarded as “bad”, and if output falls by more than 10 per cent, it is defined as “ugly”.

Bordo and Filardo’s system does not work well for Norway. The reason is that Norway since 1830 (the period for which GDP figures are available) has only experienced 2 periods of a fall in GDP (measured at constant prices) of more than 10 per cent. Both were periods of inflation during the First and Second World Wars respectively.
For Norwegian data, therefore, the following classification may be more appropriate: I have chosen to define a period as “ugly” if per capita GDP (measured at constant prices) falls by more than 5 per cent. A “bad” episode means a decline of less than 5 per cent or an increase of less than 1 per cent. A “good” episode is when real per capita GDP rises by more than 1 per cent. Bordo and Filardo only studied periods of deflation. I feel it makes sense to use the classification for both inflationary and deflationary periods.

With this definition, there are 6 “ugly” episodes. Four of the episodes are deflationary periods (1848, 1857, 1921 and 1931) and two are inflationary periods (1917-18 and 1940-44). I would like to take a closer look at these “ugly” episodes. The first two episodes are in 1848 and 1857. Figure 19 shows inflation (red) and annual per capita growth in GDP (blue).

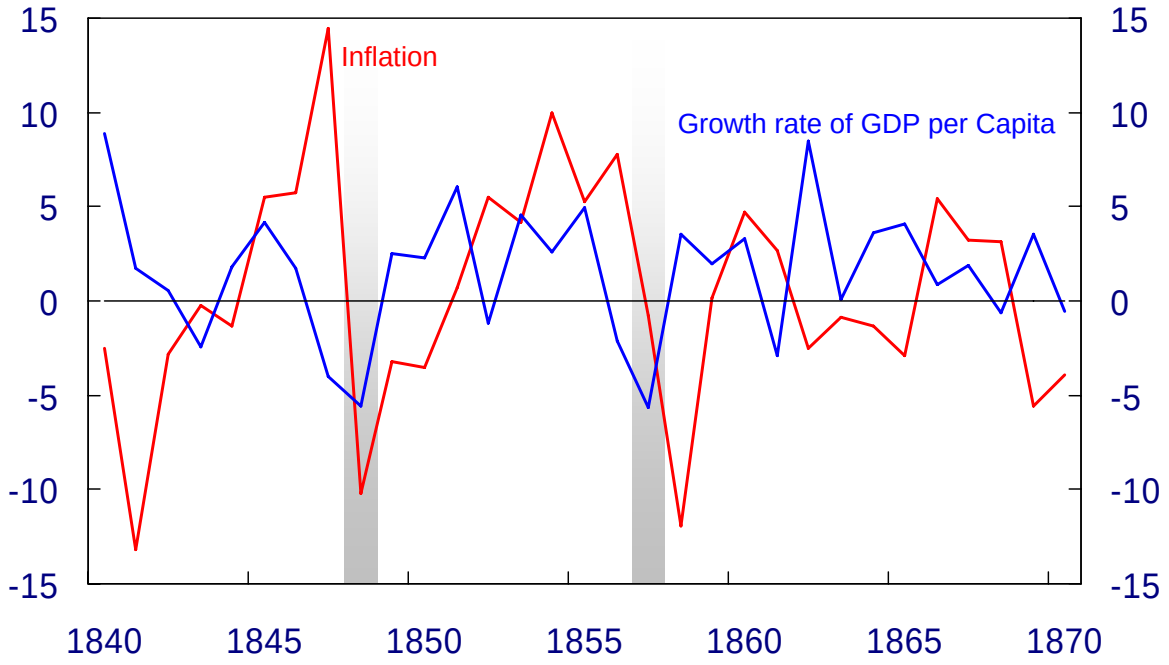

Figure 19: Ugly deflations in 1848 and 1857

In February 1848, revolution broke out in France. The monarchy was abolished and the Second Republic was established. There were also disturbances in other parts of Europe. International unrest resulted in both a decline in international trade and turbulence in credit market. For Norway, this led to lower exports and a weaker speciedaler. In foreign exchange markets, the speciedaler now had a value that was far lower than the official redemption rate. In order to prevent silver holdings from falling to a level that was too low in relation to outstanding banknotes, Norges Bank had to conduct a tight monetary policy. The volume of notes was reduced, the discount rate (key rate) was increased and silver redemption was discontinued. The measures safeguarded the exchange rate, but amplified the downturn. The crisis was finally overcome when the Norwegian state raised an emergency loan in Hambro Bank in London.

The next crisis came in the wake of the Crimean War (1853-56). The War was one of the factors contributing to a large number of bankruptcies that quickly had spillover effects on international credit markets. Norwegian companies were also affected. Exports were reduced and the international credits of Norwegian enterprises were not extended. In order to prevent a major financial crisis, Norges Bank now took on the role of lender of last resort. In addition, a government loan was raised in order to pay for the foreign debt. During this crisis, Norges

Bank decided to give higher priority to credit requirements than the exchange rate, i.e. a policy that differed from the one applied during the crisis ten years earlier.

On the whole, prices were very stable from the early 1800s until into the 1900s. This situation changed with the outbreak of the First World War on 1 August 1914, cf. Figure 20. On 5 August 1914, Norges Bank was released from its obligation to redeem notes for gold. This brought the money supply out of control, exerting upward pressure on inflation. Between 1914 and 1920, the monetary base (measured by M0) increased four-fold and prices tripled. This is a very dramatic increase in the context of almost 100 years of price stability.

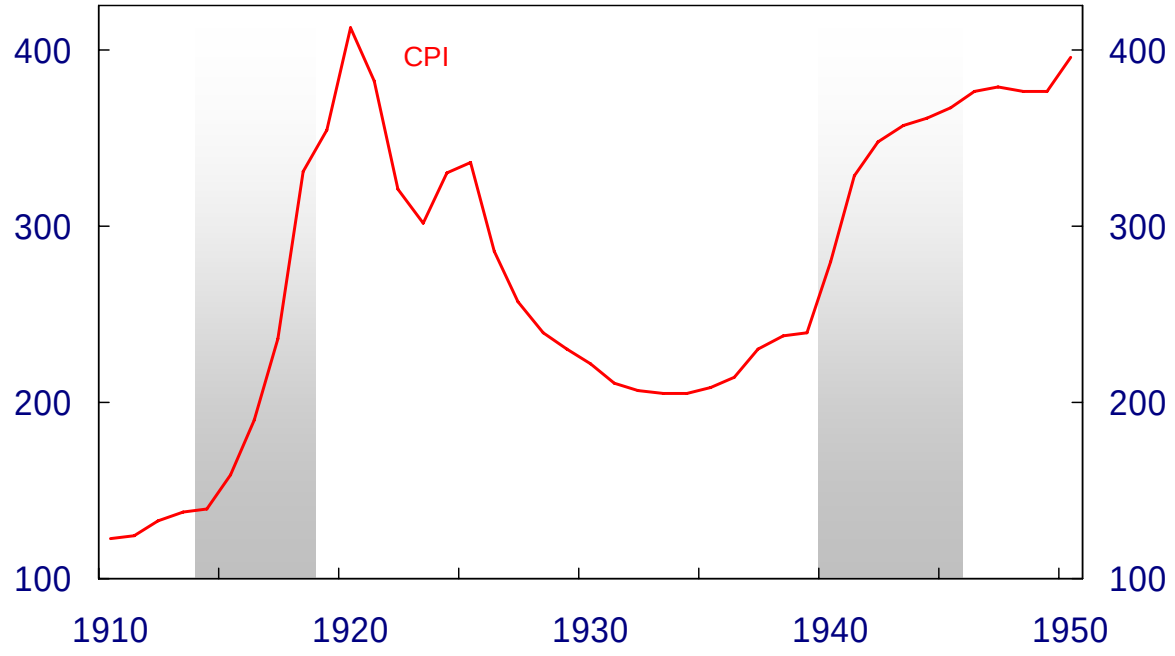

Figure 20: CPI from World War 1 to World War 2

The political turnaround came when Nikolai Rygg took over as central bank governor in 1920. His primary function was to bring the monetary system into order. At the time, this was synonymous with restoring the value of the krone against gold. The parity policy was the logical and necessary consequence of monetary policy thinking at the time. Rygg based his approach on a century-long tradition of reversion. The fact that many have later maintained that the parity policy was a mistake is another matter.

The parity policy and international economic conditions led to a substantial fall in prices through the 1920s and up to the mid-1930s. In the years up to 1920, prices only showed a rise

in 1924 and 1925. Prices did not begin to move up again until 1935. The Great Depression had been overcome and rearmament in preparation for the Second World War was under way.

Figure 21 shows developments in inflation (red) and growth in per capita GDP (blue). A quick look may easily give the impression that the interwar period was a very favourable one. If we disregard the crisis years of 1921 and 1931, average per capita GDP growth in the period 1919 to 1939 was as much as 4.8 per cent annually. This is a surprisingly high figure. GDP growth has, in fact, been higher than this in only 5 of the last 50 years.

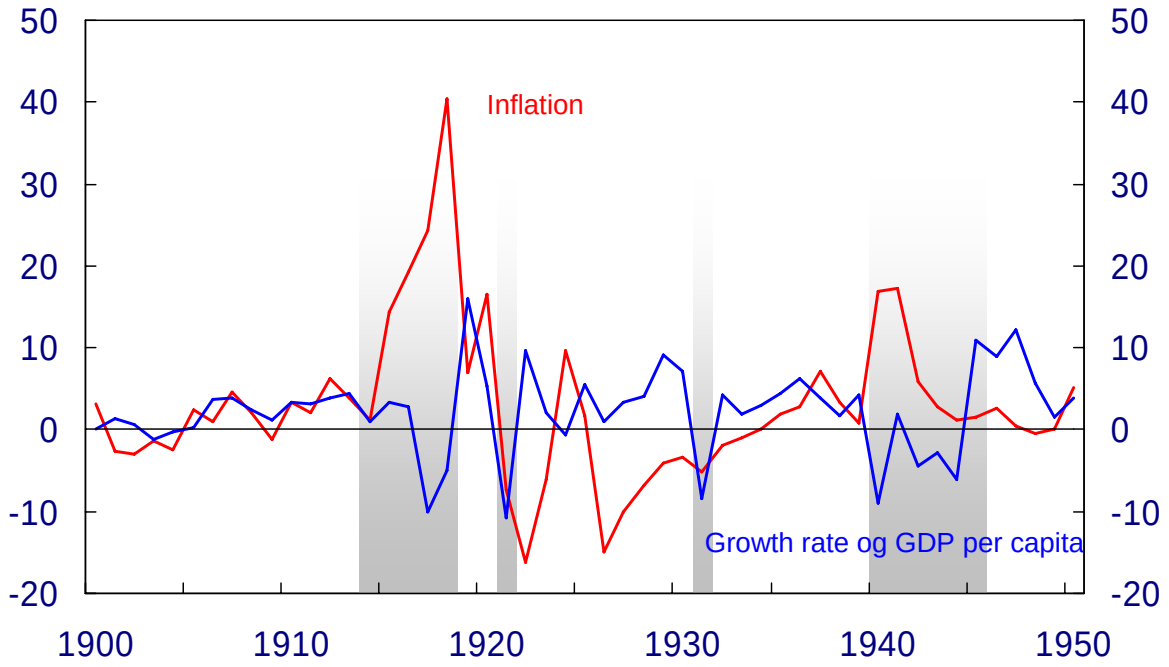

Figure 21: Inflation and growth rate of GDP per capita

Four episodes can be noted in Figure 21:

1. The first period of really sluggish growth in production took place during the period of high inflation during the First World War.
2. The next episode took place in 1921. The combination of international recessions and a tight monetary policy led to a sharp fall in output.
3. Output also fell sharply in 1931. This crisis was caused by international economic conditions, but the decline in production was further exacerbated by the most extensive strike that had ever taken place in Norway in 1931.
4. The fourth and last episode of sluggish growth occurred during the Second World War.

What is the origin, then, of the traditional impression that the 1920s and 1930s were a difficult period?

In order to shed light on this issue we need to take into account developments in the labour market. Figure 22 shows inflation (red) and the percentage of unemployed trade union members. We see that unemployment rises markedly at the beginning of the 1920s and remains at a very high level throughout the period to the Second World War. It should be emphasised that these unemployment figures do not measure the unemployed as a share of the labour force. They are therefore not comparable to current unemployment figures. Ola Grytten has estimated that total unemployment was never higher than 10.4 per cent (Grytten, 1995). He also finds that unemployment was considerably higher in the period 1921 until the outbreak of the Second World War than both the period before and after. Measured by unemployment figures, there is therefore no doubt that the interwar period was difficult.

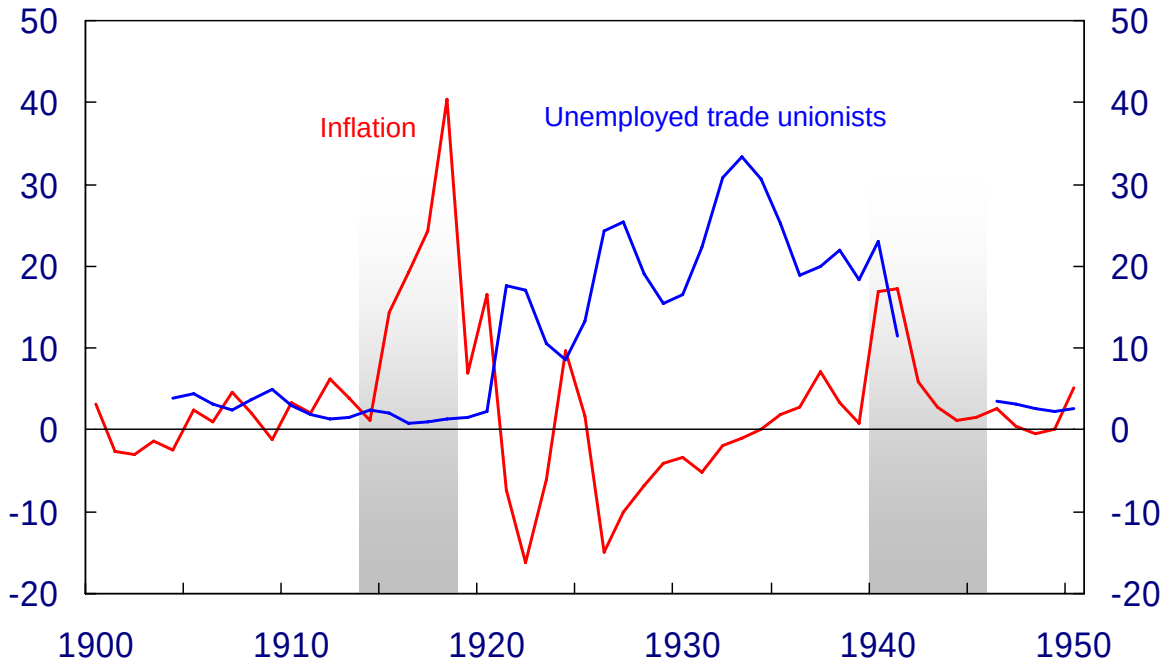

Figure 22: Unemployment

We recall that Rygg conducted a policy where the objective was to re-establish the nominal anchor. Developments in the 1920s and 1930s prompted both economists and politicians to

focus on the real economy and cyclical policy rather than on the nominal anchor. Unemployment was given higher priority than price stability.

After the Second World War, an attempt was made to re-establish the classical gold standard through the Bretton Woods regime. This was successful to some extent, but the Vietnam War, the lack of fiscal discipline in the anchor country, the US, and the oil price shock in 1973 put a final end to the gold standard. The prolonged period of expansion after the Second World War was over.

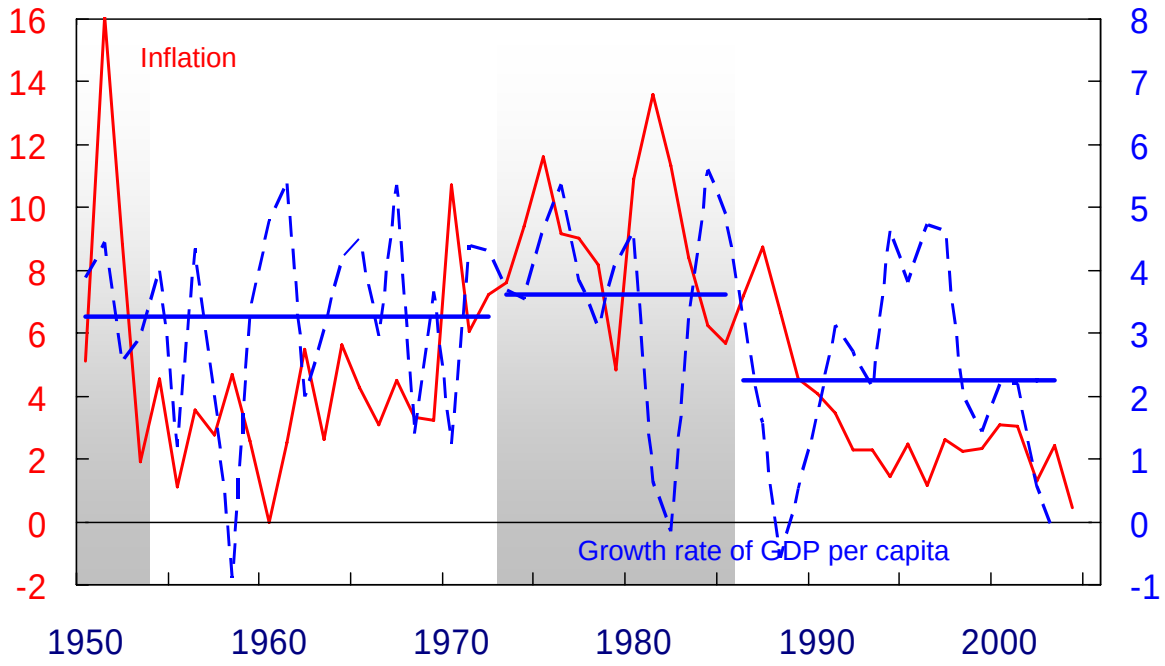

Figure 23: Inflation (left axis) and growth (right axis) Post -World War 2

In order to counter the downturn, many countries conducted a counter-cyclical policy, which was pursued extensively in Norway. With unemployment in the interwar years as a backdrop, the central government's task was to hold up production. In Norway, it was thought that the international recession was only temporary. It was essential to bridge the gaps until normal growth was resumed. It was important that unemployment did not become entrenched at a high level. Counter-cyclical policy contributed to a rise in inflation. After a period, participants revised up their inflation expectations and inflation took hold at a high level.

In both economic theory and practical policy, it was gradually recognised that there is no trade-off between inflation and unemployment in the long term. Attention was again focused on the need to restore the nominal anchor. After Paul Volcker was appointed president of the Federal Reserve in the US, monetary policy was gradually oriented towards combating inflation. The nominal anchor was to be restored. A shift in policy took place in 1982, while in Norway this occurred somewhat later - in 1986. Following the last devaluation in 1986, economic policy was oriented towards safeguarding confidence in the fixed exchange rate system. After a period, Norges Bank also made use of its formal independence in interest rate setting, provided by the central bank Act of 1985.

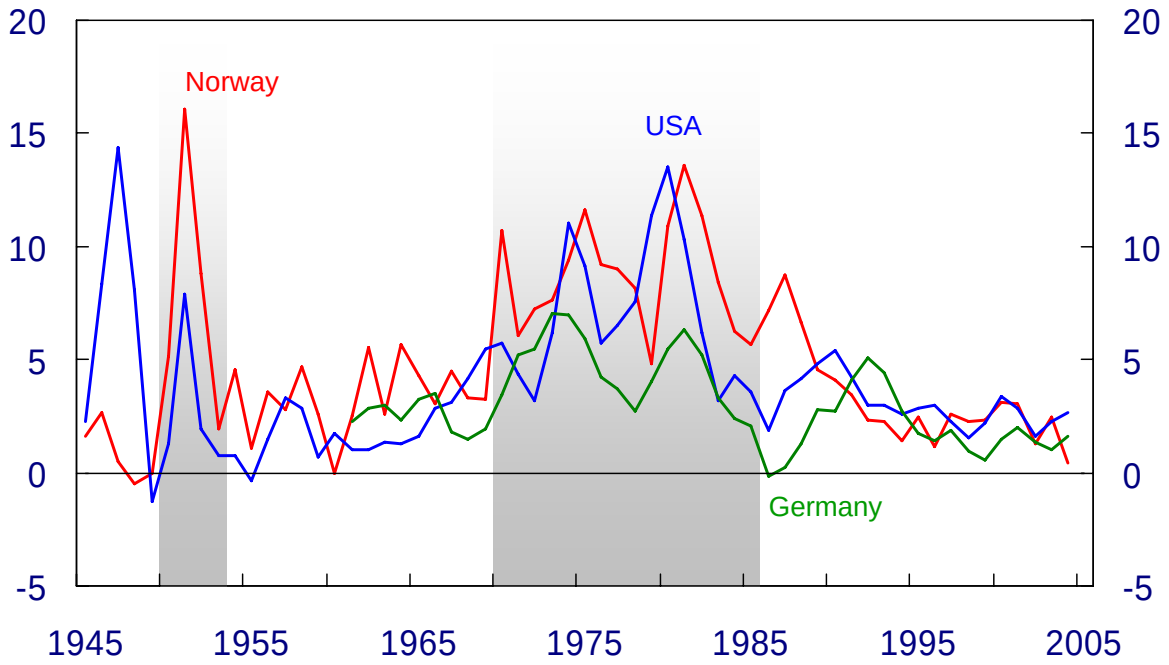

Figure 24: Inflation in Norway, USA and Germany

Through the 1990s, the nominal anchor was restored in many countries, and direct inflation targeting became the most common objective of monetary policy. During this decade, the rise in prices in Norway was about 2½ per cent. There was solid growth and a relatively smoothly functioning labour market. At the end of the decade, problems again arose when the authorities did not manage to stabilise the upturn in time.

In March 2001, the fiscal rule was introduced and Norges Bank was given the task of setting the interest rate on the basis of an inflation target of 2½ per cent.

Inflation expectations now seem to be well anchored around the target. Experience may indicate that inflation expectations remain stable even if inflation varies somewhat as long as the interest rate is used actively to moderate the variations in inflation. Monetary policy cannot fine-tune economic developments, but it can avoid the largest effects when the economy is exposed to disturbances.

Between December 2002 and March 2004, the interest rate has moved from a high to a low level. The real interest rate is now lower than a neutral real interest rate. A real interest rate that is lower than the neutral rate will stimulate activity even after the effects of the interest rate fall itself have been exhausted. This was pointed out by the Swedish economist Knut Wicksell in 1907: "(...) *the upward movement of prices, whether great or small in the first instance, can never cease so long as the rate of interest is kept lower than its normal rate*" (Wicksell 1907).

The interest rate is thus the instrument for securing price stability, defined as 2½ per cent in our case, and contributing to smoothing cyclical fluctuations.

Conclusion

The transition to inflation targeting, which took place in Norway in 2001, may perhaps at the time have appeared to be a transition to a new and unfamiliar monetary policy system. Inflation targeting has, after just a few years, resulted in changes in the way central banks work and not least in the way we communicate with the outside world. But from a long-term perspective, as I have applied today, inflation targeting can be seen more as a logical consequence of what we have learned about monetary policy over several hundred years. But today’s monetary policy system springs from the recognition, based on historical experience, of what monetary policy can in fact achieve. Inflation targeting in this sense is not new, but a way of orienting monetary policy with a view to making the best possible contribution to economic growth. A nominal anchor expressed in terms of an objective of low and stable inflation is a formalisation of what has actually been the norm.

Price stability has been the norm if we look beyond our own period of adult awareness and look at long-term historical trends. However, we must also recognise that disturbances have occurred and be prepared that disturbances will continue to occur, as I have shown in my discussion of both inflationary and deflationary periods through history. Such disturbances, whether due to unsuccessful monetary policy, unsuccessful fiscal policy or external conditions over which we have no control will continue to contribute to periods of expansion and periods of contraction in Norway and in other countries. We have been aware of this for a long time. But if we look back, we also see that monetary policy in some cases may have contributed to amplifying these disturbances. The historical knowledge we have now acquired may provide us with greater insight into what inflation actually is, why prices rise or fall and how the monetary policy system should be organised in order to address these disturbances in an optimal way. An important advantage of direct inflation targeting as an objective for monetary policy – in addition to explicitly providing the economy with a nominal anchor – is that the system also gives the central bank and other economic agents a clear guide as to how monetary policy shall and should be oriented when disturbances occur. Again, insight into our own history has been an important starting-point.

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