

Bank of Norway's role as manager of Norway's foreign exchange reserves and the government petroleum fund

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Background information

1. It may be appropriate to begin by providing a brief overview of Norway and the importance of petroleum to the economy.

The Kingdom of Norway is a mountainous, coastal nation with a population of about 4 1/2 million and a land area of about 324 000 square kilometres. It is a little smaller than Finland, thirty per cent larger than Great Britain and 20 per cent larger than New Zealand. Mountains and plateaus cover 73 per cent of the surface while productive forests make up 23 per cent.

Due to low temperatures and a short growing season, Norway has always been dependent on food imports. (Agricultural area accounts for only 3.5 per cent of the total surface). Historically, fish and forestry products were the main exports, but shipping became a major export industry one hundred years ago. Norway was then one of the poorest countries in Europe. Abundant supplies of energy, however, have been developed in this century. Numerous waterfalls were harnessed to produce hydroelectric power in the period 1910-1960. Large oil and gas fields in the North Sea have been developed since the 1970s. Towards the end of this century Norway thus emerges as one of the richest countries in Europe, with a well-developed welfare system. Norway is now the world's second largest exporter of oil.

As a result of substantial oil tax revenues and the state's direct financial interest in the petroleum industry, government budgets show a surplus equivalent to 5-8 per cent of GDP, the country's current-account surplus corresponds to 8-12 per cent of GDP, and inflation is 1.5-2.5 per cent.

Norway is now a creditor nation, with net foreign assets equivalent to 10 per cent of GDP. These assets are projected to rise in the period to the year 2000 to about 40 per cent of GDP. Norway is now in its fifth year of strong growth, and unemployment has declined to about 4 per cent.

The petroleum sector accounts for approximately 18 per cent of GDP, but only 3.5 per cent of total employment. Oil and natural gas represent 35-40 per cent of total exports of goods and services. The sector also has a substantial impact on government revenues, with taxes and royalties from the petroleum sector accounting for about 8 per cent of central government revenues. Including other oil-related revenues, the share is 16 per cent, or a good 6 per cent of GDP.

The chart shows estimated government revenues from the petroleum sector along with government pension expenditure. The estimates are based on prudent assumptions concerning oil prices, known oil fields and existing technology. Each time the curve for projected revenues is redrawn, it shifts to the right and in an upward direction in the chart. This reflects increasingly cost-effective production, new oil finds and improved technology.

The chart also shows rising government expenditure on pensions as the population ages. Norway shares this trend with many other countries. Unlike these countries, however, Norway can cope with this situation without having to raise taxes or implement deep welfare cuts. This can occur if we do not refer to the pumping of oil from the North Sea as revenues - which are included in other budgets - but as the conversion of oil wealth to foreign assets. This financial wealth should provide a current return which will alleviate government finances later in the next century.

When the Government Petroleum Fund was established in 1990, it was therefore important to determine how much oil revenues were immediately consumed in the domestic economy. It was also deemed inappropriate to keep capital in the Petroleum Fund if the government had to borrow to finance its expenditure. It was thus decided that the annual allocation to the Petroleum Fund should be equivalent to the difference between total government oil and gas revenues and the government budget deficit, excluding oil and gas revenues. No allocations were made between 1990, when the Fund was established, and 1994, because the budget deficit exceeded oil and gas revenues in this period. The Petroleum Fund then only showed that total government revenues from the oil sector were added to the Fund and automatically withdrawn and transferred to the government budget.

Even though long-term challenges were the starting point for the establishment of the Petroleum Fund, the principles for transferring capital entail that the Fund is also a "buffer" fund. If oil prices or the cyclical situation in the years ahead result in a budget deficit, including oil revenues, the government can draw on the Fund. This means that the investment strategy must place considerable emphasis on liquidity. This was particularly true in earlier years when the estimates for the size of the Fund were considerably smaller than the level now being projected.

2. When oil revenues proved to be so high that there was a balance in the Petroleum Fund at the end of the year, the Ministry of Finance issued a regulation for its management. The regulation stipulates that Norges Bank is responsible for the operational management of the Fund on behalf of the Ministry of Finance. The Fund is placed in a separate krone account in Norges Bank, and the Bank shall invest this capital in its own name in assets denominated in foreign currency.

In Norges Bank's balance sheet this appears as follows:

FINANCIAL ASSETS	
Foreign assets	256 587
International reserves	196 622
Government Petroleum Fund investments	46 265
Other foreign assets	13 700
Claims on Norwegian financial institutions	
	4 815
Loans to private banks	4 849
Other assets in the form of deposits, securities, loans and overdrafts	21
Provision for losses on loans to banks	-55
-	
-	
-	
LIABILITIES AND CAPITAL	
Foreign liabilities	14 753
IMF holdings of NOK	4 589
Other foreign liabilities	10 164
Notes and coin in circulation	
	40 642
Domestic deposits	
	194 525
Treasury	134 261
Government Petroleum Fund	46 265
Other public administration (excl. municipalities)	3 355

Private banks	7 802
Other financial institutions	2 717
Other Norwegian sectors	125
-	
-	
-	

It is important to emphasise that the Petroleum Fund in itself will not provide any extra resources for the future. The Petroleum Fund is basically no more than an accounting technique. The purpose of the Fund is to provide an instrument for better, long-term budget discipline in a situation with government financial surpluses. If resources were not allocated to the Petroleum Fund, a sound economic policy would have resulted in roughly the same macroeconomic developments and accumulation of Norges Bank's international reserves equivalent to what is now being transferred to the Petroleum Fund. Central government claims on the central bank would also have been the same, but the entire amount would have been placed in an ordinary sight deposit account.

It was assumed that Norges Bank would not build up the foreign currency component of the Petroleum Fund by reducing its own foreign exchange reserves. This means that the central bank's net foreign currency purchases over a period will, as a minimum, correspond to the allocation to the Fund.

The annual allocations, however, depend on many factors, and are consequently very uncertain. Allocations depend on oil prices, the USD/NOK exchange rate, oil production and the non-oil budget balance - in other words general trends in the Norwegian economy.

The estimates for the Petroleum Fund therefore fluctuate considerably during the year. At the start of 1996, we estimated that the Fund would amount to about NOK 50 billion (USD 7-8 billion) in the year 2000.

This was a modest figure compared with Norges Bank's ordinary foreign exchange reserves. The central bank would probably not be facing any major challenges in managing a fund of this size. However, in the autumn of 1996 this figure was revised upwards to NOK 270 billion (USD 40-45 billion), and this entails challenges of a completely different nature.

The estimates for the allocation for 1996 were also revised upwards by a considerable margin during the year.

The decision to establish the Petroleum Fund also entailed that the Ministry of Finance would channel government capital abroad. As the public sector will be investing a share of the foreign currency surplus in foreign assets via the Petroleum Fund, Norwegian interest rates will have to be somewhat higher than if the private sector were to account for the entire capital outflow.

The substantial foreign currency inflow in 1996 accentuated a monetary policy problem which is a result of the high oil revenues and sizeable current-account surpluses. In Norway, it is the Government which formulates the monetary policy mandate of the central bank. There has been widespread concern that the very profitable oil industry might result in such a strong krone exchange rate that other industries would no longer be competitive internationally. This would create problems when oil production declines. This was one of the reasons Norges Bank was given the mandate of orienting monetary policy towards exchange rate stability. Due to the domestic cyclical upturn and the pressures which began to emerge in the economy, the central bank was reluctant to reduce official interest rates sharply, and instead intervened heavily in foreign exchange markets. Foreign currency purchases, however, reached such high levels that the Bank had to abandon this approach on 10 January this year. Interventions were halted and interest rates were reduced to German levels. The central bank also stated that the responsibility for avoiding pressures in the economy and higher inflation now rested with the Government's fiscal policy if the central bank's monetary policy mandate remained unchanged. The krone has appreciated in effective terms by 5-7 per cent since then.

3. Norges Bank manages foreign assets equivalent to a total of USD 35 billion. The foreign exchange reserves correspond to USD 27 billion or 6/7 months of imports of goods and services.

First line of reserves	6.8
Second line of reserves	12.5
Immunisation portfolio	7.5
Total international reserves	26.8
Government Petroleum Fund investments	7.4
Norges Bank's foreign assets	34.2
The Government Petroleum Insurance Fund	1.2
Total managed by Norges Bank	35.3

The division of reserves into first and second line reserves is primarily in order to facilitate the measurement of returns. The first line reserves act as a buffer which absorbs short-term fluctuations in liquidity, which may include foreign exchange interventions and currency swaps in order to influence liquidity in the banking system. The size of these portfolios is adjusted on the first of every month.

The immunisation portfolio is designed to neutralise exchange-rate and interest-rate risk on central government foreign debt, and is managed with the aim of keeping net borrowing costs as low as possible. Virtually all outstanding central government foreign debt will be repaid in 1997 and 1998.

Transfers from the international reserves to the Government Petroleum Fund are carried out twice a year. The first transfer is made on 31 December, based on preliminary estimates. Final settlement takes place at the end of May for the preceding year.

The Government Petroleum Insurance Fund is not included in Norges Bank's balance sheet, but is a government fund in foreign currency which is managed by the central bank.

Pursuant to the Norges Bank Act, the government may issue regulations for the investment of official foreign exchange reserves. The government has never exercised this right. However, the administration's proposals for regulations are submitted to the Ministry of Finance before they are adopted by the Executive Board.

Furthermore, as it is a government fund, regulations for the investment of the Government Petroleum Fund are issued by the government based on proposals from Norges Bank.

The Bank is currently working on the risk evaluations underlying the existing regulations. As I will return to this later, I will limit myself to giving a brief outline of these regulations here.

The contents of the regulations are very similar, partly because the Petroleum Fund, at least to date, is primarily invested as foreign exchange reserves.

In addition to requirements regarding liquidity, the regulations specify rules concerning exchange-rate risk, interest-rate risk and credit risk in particular.

Exchange-rate risk reflects the import weights in the Norwegian economy and covariance between the currencies. As regards the reserves, considerable emphasis has also been placed on the size and depth of financial markets in each country. As a result, the distribution of currencies is as follows:

	GUIDELINES		ACTUAL 31. DECEMBER 1996		
	FIRST AND SECOND LINES OF RESERVES	PETRO. FUND	FIRST AND SECOND LINES OF RESERVES	IMMUNISATION PORTFOLIO	PETRO. FUND
DEM-BLOCK	50-60%	41-47%	57.0%	54.1%	42.8%
GBP	10-20%	11-17%	16.7%	7.8%	15.8%
SEK	0-10%	14-20%	2.6%	-	17.0%
USD/CAD	13-23%	15-21%	17.8%	18.7%	17.6%
JPY	2-12%	4-10%	5.9%	19.4%	6.8%

As to credit risk, the regulations stipulate that securities shall be issued by governments or have an equivalent guarantee. Some use of bank deposits, repos and reverse-repurchase agreements, currency swaps and interest-rate swaps and futures is also permitted.

As regards average interest-rate risk, the regulations stipulate that the maximum modified duration shall be 5. The benchmark portfolio is set at 3.

Actual management activity may be characterised as relatively passive, and is kept close to the benchmark. The main activity comprises selecting profitable close substitutes for securities included in the given benchmark.

The practical work involved in such investments is carried out by the Market Operations Department, which is also responsible for the bulk of analytical work in connection with investments. The department was established in 1986, when the operational sections of the former Foreign Exchange Department and Credit Policy Department merged. As far as I know, we were the first central bank to organise activities in this way. For reasons relating to competence and efficiency, the department also carries out settlement and supervision, but we have tried to build "Chinese walls" between the front and back office and the back office works extensively with the Budget and Accounting Department and the Auditing Department.

The chart shows the current organisation of the department.

In connection with the substantial growth in the foreign exchange reserves in recent years and the tasks assigned to the Bank in connection with the Government Petroleum Fund, the department has recently started the process of increasing its staff and enhancing its expertise. We now employ 52 persons, of which two work in the somewhat broader field of research in the Research Department.

Total estimated resource used in Norges Bank in connection with asset management amounts to 24 person-years. This is probably insufficient, in terms of both resources and expertise, in view of the challenges facing the central bank. A working group is therefore now assessing the ambitions and resources used in connection with asset management, including a possible out-sourcing of some of the work to a subsidiary.

The Bank has an advisory committee, the Investment Committee, which reviews the department's reports on investment activity, and which also evaluates proposals for changes in guidelines, new instruments, etc., before they are submitted to the Governor or Executive Board. The committee is chaired by the Deputy Governor and comprises representatives from each of the policy departments and the Research Department. The committee normally meets four times a year.

Since 1 January this year, the Bank's organisation is composed of 3 wings which cover the central bank's core activities, plus one administrative wing. The Market Operations Department is in Wing I - Monetary Policy.

4. In spring 1996, the Executive Board carried out an assessment of strategies for the central bank's further development. One conclusion was that the Bank should concentrate on its core activities. Another was that the Bank should strive to make its activities more transparent.

Accordingly, it was decided that the Bank should replace the internally constructed benchmark with an externally constructed one, when measuring the result of investment activity. We also intend to publish these results. J.P. Morgan was selected to construct the benchmark. The Ministry of Finance has selected Bacon and Woodrow (CAPS) to undertake the work on a benchmark for the Government Petroleum Fund.

In addition it was decided to transfer the management of some funds to external portfolio managers. This decision was announced and more than 100 institutions subsequently expressed their interest. Drawing up a short-list and making the final selection was therefore an extensive process. We made it quite clear to the candidates that the purpose of having external managers was to establish a cooperation that would entail the transfer of expertise to Norges Bank, and at the same time provide a better basis for comparison for Norges Bank's own management activities. ABN AMRO Asset Management, London, was given responsibility for managing a portfolio equivalent to DEM 150 million for European currencies, and Goldman Sachs Asset Management, New York, was assigned the management of a portfolio equivalent to USD 100 million for investment in USD and CAD. Norges Bank signed a contract with the Bankers Trust Company for deposit services and returns analysis in connection with the external management.

B. Strategic management choices

1. Equity

Norges Bank's foreign currency holdings are now larger than those normally required for intervention purposes. Furthermore, the country no longer has a fixed exchange rate, but

operates an official floating exchange rate regime, which entails that the reserves should to a greater extent be perceived as national wealth. The establishment of the Government Petroleum Fund has increased the need to look at alternatives to the current strategy which comprises secure, liquid investments in interest-bearing instruments.

There are three important reasons why Norges Bank would consider using equity in the management of the Government Petroleum Fund, and possibly also in the management of the ordinary reserves:

1. Historically, stocks have proved to be a better hedge against inflation than bonds. The most important objective of the management of the Petroleum Fund and foreign exchange reserves is to maintain the reserves' international purchasing power - and it is the real purchasing power that is important in this context.
2. Stocks have historically had a weaker correlation to oil prices than bonds. This is important as Norway's total national wealth declines in value when calculations are based on lower oil prices.

	USA	Japan	Germany	UK
Bonds	0.15	0.39	0.23	0.36
Stocks	-0.06	-0.49	-0.39	-0.10

*) Annual changes in the oil price calculated from OECD data, annual returns on bonds from the JP Morgan Bond Index, annual returns on stocks from MSCI.

3. Historically, equity yields higher returns than bonds, and there is reason to assume that this will also be the case in the future. Stocks are also more volatile than bonds, entailing a greater risk of losses in the short term. In the longer term, however, the expected return is higher. If the investments have a sufficiently long time horizon, a number of years with weak (unrealised) results may be acceptable. As there is no perfect correlation between the return on equity and bonds, some diversification gains may be achieved by combining equity and bond investments.

Here are some figures to illustrate this:

	USA		Japan	
	Mean return	Standard deviation	Mean return	Standard deviation
Bonds	9.8%	9.5%	6.6%	10.1%
Stocks	11.4%	15.1%	11.2%	25.5%

*) Data supplied by JP Morgan.

Twenty years is a relatively short period. However, numerical series in the US are considerably longer and show that the longer the investment horizon is, the more certain it is that equity provides higher returns than bonds.

Holding period	Percentage of periods with excess returns in the stock market
1 year	59.0%
5 years	71.2%
10 years	82.3%
30 years	100.0%

*) Table from Jeremy J. Siegel; "Stocks for the long run", Irwin 1994, page 31.

If we look at the past twelve years, nominal returns in both international equity and bond markets have been high and the risk premium on stocks has been higher than the average recorded in the period from 1950. If this was used as the basis for determining the acceptable share of equity, the conclusion would be that the likelihood of losses in any given year would be limited, even with a high proportion of equity. This can be illustrated by a simple example: if we take return figures from international equity and bond indices in America, Europe and Asia and weight them, it is possible to calculate average returns and standard deviations for varying equity proportions in the portfolio. This would also provide information about the probability of losses in the portfolio in any given year. Even though such probability calculations rely on dubious assumptions, the relationship between the equity proportion and risk is clearly illustrated.

Bonds:
Salomon Brothers US Index
Salomon Brothers Japan Index
Salomon Brothers European Index
Equities:
Morgan Stanley Capital Int. North-America Index
Morgan Stanley Capital Int. Pacific Index
Morgan Stanley Capital Int. Europe Index

Market allocation:	
USA/North-America:	30%
Japan/Pacific:	20%
Europe:	50%

Some may argue that historical return figures are not representative of expected future developments. As regards the point about avoiding negative returns, the main risk factors are:

- that returns on both bonds and equity will fall,
- that the risk premium on stocks will be reduced in relation to bonds,
- that the correlation between the equity and bond markets increases.

For example, if it is assumed that bond yields fall by 4 per cent (to 5.5 per cent) and the risk premium is reduced from 4.5 to 2.5 per cent (ie the return on equity is 6.5 percentage points lower), the probability of negative returns in some years is naturally greater.

However, it is not only important to be prepared for the probability of short-term negative returns, it is equally important to have some idea of magnitude of the negative returns. And it is not necessarily the portfolio with the higher equity proportion - which increases the likelihood of negative returns in a given year - that will incur the potentially largest losses. As there is no perfect correlation between bonds and equity, substantial losses in bonds and stocks do not necessarily coincide.

Based on historical figures, an equity proportion of between 30 to 40 per cent would incur the smallest losses in the unadjusted returns series. Based on adjusted figures, equity proportions between 0 and 40 per cent would result in roughly the same level of losses in the worst year. If we were only interested in minimising the downside risk, and were of the opinion that the adjusted figures were the most representative of future market developments, we would not recommend any investment in equity. But such an extreme aversion to risk is hardly relevant in our case.

What should then the equity proportion of the Government Petroleum Fund be? This is decided by the Ministry of Finance, not Norges Bank, and depends on the government's risk preference. If we were sufficiently certain that historical relationships would be repeated in the future, and only emphasised long-term returns, the answer is obvious: everything should be invested in equity. In terms of the Petroleum Fund, which is not likely to be realised in the short term, it could be argued that little emphasis should be placed on short-term volatility. However, we do know that attention would be focused on very poor annual results even though the objective of the investment is long term. It is possible that very poor short-term results would erode political support for the Government Petroleum Fund and contribute to

an increase in domestic consumption via the central government budget. Public opinion may also press for a reduction in equity exposure and thereby force the realisation of losses. If such a scenario is a cause for concern, a ceiling should be set for proportion of equity in the portfolio.

2. Currency and market distribution

As mentioned in the introduction, the currency distribution of the Petroleum Fund is based on import weights. Even though the aim is to maintain, and preferably to boost, the Fund's international purchasing power, it is not given that import weights minimise risk.

First: It should actually have been based on future import weights, as the Fund will probably be realised some time in the future. The problem is, of course, that we know what today's import weights are, but can hardly guess what these weights will be in 20 years.

Another point is that the import weights are not adjusted for trade flows with third countries. Germany and Sweden account for the largest share of Norwegian imports. But Swedish and German industry also rely on imports from other countries. Without having studied this further, there may be reason to assume that adjusting for trade with third countries would bring the import weights closer to global export weights, which show individual regions'/countries' share of total world trade.

One may also raise the question of whether developments in the Norwegian economy should be taken into account when establishing the market distribution. Norwegian import weights are fairly similar to our export weights. This may entail that the return on the Petroleum Fund, given the current set of weights, is positively correlated with developments in our national economy, which in an international context must be perceived as being very open. The supply of domestic and foreign goods may therefore move in pace, which may have an unnecessarily large impact on the total supply of goods.

Another important factor is that the goods we import are priced in an international market, where near substitutes are produced in various countries. Therefore, there may not be any immediate effect of the movement in a given currency in relation to the Norwegian krone on the price of goods produced in that country. It may be that in the long run a country's export capacity or production capacity has a greater impact on future exports to Norway than the current import weights would imply. Global export weights, or global GDP weights, have their appeal from this perspective.

It would also be an advantage to invest in other markets than the current import weights would suggest - namely transaction costs associated with maintaining an import-weighted distribution. In principle, one can build on the assumption that there is a correlation between the size of a market and the transaction costs associated with making large investments in that market. Market capitalisation weights will then minimise these transaction costs. Both GDP weights and global export weights are closer to the market capitalisation weights than the Norwegian import weights.

Finally, one may consider the purpose of an in-depth analyses of the distribution of investments by country. If the assumptions of purchasing power parity and interest parity

apply, there should not be significant differences in return according to investment country in the long run. However, in the short and medium term there will be differences, which probably form the basis for performance measurement.

We are thus left with a number of options which are to some extent quite distinct from each other. The differences are illustrated in the chart:

What is the conclusion? So far we have applied today's import weights, although there are strong arguments in favour of a more diversified portfolio that reduces the proportion invested in Europe in favour of North America and Japan/Southeast Asia/Oceania.

3. Risk management

The points raised with regard to equity and currency/market distribution are essential to determining the composition of the benchmark portfolio. But the composition of this portfolio is not the only determining factor as regards return. Another decisive factor relates to management constraints, that is the restrictions on taking positions that deviate from the benchmark portfolio. In this connection, two questions must be answered:

- How should the manager's degree of freedom in relation to the benchmark be formulated?
- How should the portfolio's risk be measured?

The current guidelines for the management of foreign exchange reserves set out separate limits on currency distribution and duration. The percentage point difference allowed between the currency share in the benchmark portfolio and the actual portfolio is defined, as well as the maximum deviation in duration allowed in each currency. The problem with such partial limits is that they easily prove to be inconsistent, and that they do not take into account underlying volatilities and correlations in the market place. The guidelines may be inconsistent in the sense that, for example, one has the possibility of increasing the risk of the portfolio to a much further extent through the choice of currency distribution than the choice of duration. Separate limits for each currency may entail that a small change in duration in all currencies is allowed - which is potentially high-risk - while large matching positions in two highly correlated markets are prohibited. The latter strategy may easily be less risky than changing duration by a small margin in all markets at the same time. In Norges Bank we have discussed the drawbacks of traditional risk measurement tools, and have recently decided to complement in part, or replace in part, today's partial limits with one overall limit for the entire portfolio's relative volatility, or "Tracking error" against the benchmark portfolio.

As is the case for measuring the portfolio's absolute volatility - Value at risk - one needs information about underlying volatilities and correlations in and between markets in order to estimate the tracking error. For practical reasons, we have chosen to use data from J.P. Morgan's Risk Metrics, which is published daily and is available on Internet and can be used freely. We are now testing this with the intention of using it on a full scale in the near future.

The use of "Tracking error" as an operational limit for the total portfolio represents a substantial methodological step forward compared with partial limits. But the methods "Value at risk/Tracking error" have certain drawbacks. They are not conducive to estimating

the risk associated with instruments that contain option elements, and the underlying assumptions that returns in capital markets have a normal distribution and no serial correlation are dubious. Direct measurements of "Tracking error" with the aid of "Risk Metrics", or other data sources, must therefore be combined with stress-testing of the portfolio. At the same time, it may be a good idea to keep some of the enhanced partial risk limitations in order to avoid "extreme" composed portfolios, but use "Tracking error" as the operational risk limit.

The management of the Petroleum Fund entails new challenges as regards the definition of risk limits. Limits must not only be defined for fixed-income portfolios, but also for portfolios with a high probability for equity investments. In view of the public focus on the Fund, it is especially important to define thoroughly considered risk limits.

One advantage of using "Tracking error" as an operational management tool for risk control is that the methodology can also be applied to equity portfolios and balanced portfolios (stocks and bonds). Ideally, the government's preference for absolute risk should therefore be defined in the guidelines for the Petroleum Fund through a clear definition of the benchmark portfolio - and the relative risk preference in the form of a limit for "Tracking error". There is probably some gap between what is ideally desirable and what can realistically be formulated in the guidelines, which leads me to believe that the guidelines which are drawn up will be relatively general in character. It will therefore be our task, as managers, to develop our own internal risk management tools so that at any given time we will be in a position to control the portfolio's overall risk in an effective manner.

4. Operational aspects

A fairly substantial share of the Petroleum Fund, which at the end of 1997 will come to at least USD 15 billion, might be invested in international stock markets in 1998. (This will come in addition to any investments of the ordinary foreign exchange reserves in equity). The estimated size of the Petroleum Fund in the year 2000 implies that the Fund may become a substantial investor in the capital markets of some countries. As the central bank lacks special competence in equity investment, whether it be in the front or back office, a number of operational questions must be considered. There are three questions in particular that we have considered so far, notably questions relating to liquidity, ownership and internal/external management.

a. Liquidity

National equity markets, particularly in smaller countries, will be affected if we should decide to transform foreign exchange reserves/bonds into an equity portfolio. It will probably be necessary to spread the purchases over a longer period. This will create problems when comparing against the benchmark portfolio. As regards our neighbouring Scandinavian markets, the Fund will become so large that this in itself is a strong argument in favour of reducing the market share in these countries.

b. Ownership

It goes without saying that Norges Bank, as the central bank, avoids investments that entail expectations of active ownership on the part of the Bank. With a broad diversification strategy in each market, we will contain our ownership interests to a only a small fraction - even with a large Petroleum Fund.

Another problem is that we may have ownership interests in companies that are politically controversial (for example, companies that are in legal conflict with the Norwegian state, or known for polluting the environment, or that have an industrial base in countries with human rights problems, etc.) This could put the central bank in an unfavourable light in the public opinion. It would be an impossible task for the central bank to define which investments are "acceptable" and which are not. If we are to take such aspects into consideration, we must receive instructions stipulating the companies in which we are not allowed to invest.

This question also makes synthetic equity investments potentially interesting.

c. Internal/external management

The management of equity portfolios requires broad competence in an organisation. In the front office the competence required will obviously depend on the management style adopted. Active management, where one takes positions in individual companies and industries, requires more resources than a more risk-averse strategy such as indexing. I would assume that Norges Bank will require several years of preparation before we will be in a position to take responsibility for active management of an equity portfolio. However, indexing does not require the same insight into individual companies, but is more a question of having the necessary technological support and flexibility for combining direct investments and derivatives. Moreover, it should be possible to implement indexing strategies or so-called enhanced indexing with a limited increase in resource use and with a substantially shorter preparation time than in the case of active management.

But equity investments also require considerable resources for purposes of settlement, accounting, and control. In an equity portfolio which replicates an index, there will be constant movements every day merely due to corporate actions. When these amounts are to be invested, it will generate a number of smaller transactions in a large number of individual stocks. This requires an adequate risk-monitoring system and a sufficient number of people to carry out the necessary settlement procedures. Such a system is not implemented overnight.

The fact that we have a limited period to make the system operational favours out-sourcing as much as possible in the start phase, both in terms of management, settlement and accounting. The settlement and accounting functions will probably be about the same whether we are talking about active or risk-averse management strategies. But we are hesitant to define mandates for external managers which we are not able to control ourselves. This means that the share of traditional active management will be limited in the beginning phase. It will thus be appropriate to use external managers in order to develop the broad competence which our own organisation requires, and to help us assess the resources required for internal management. It will then be possible at a later stage to assess whether we should take over the operational management of the "passively" managed portfolio. If at

a later stage the central bank performs this function at a lower cost than private managers, there are solid grounds in favour of internal management.