

International economy

As expected, the cyclical downturn in the US over the past year has had a pronounced effect on large parts of the world economy during the summer. Consensus Forecasts' 2001 GDP growth projections – which usually function as a good summary of recently published short-term data – have for the world as a whole been lowered from 2.2 per cent in May to 1.7 per cent in August. The forecast for 2002 has in the same period been reduced from 3.0 per cent to 2.6 per cent. The forecast for 2001 for all EU countries has also been revised down by half a percentage point to 2.0 per cent, while the forecast for 2002 has only been lowered by 0.2 percentage point to 2.5 per cent. However, accounts figures for some euro countries that were published in August indicated that at best growth stalled in the second quarter. The possibility that the forecasts will be revised down further in the period ahead can therefore not be ruled out.

On the basis of a traditional cyclical pattern, the US economy can be expected to reach a trough in the fourth quarter of 2001, and as discussed in our previous quarterly report it is likely that the subsequent recovery may be fairly sluggish. With a normal lag of a few quarters, a corresponding turnaround in western Europe will not take place until later in the spring of 2002. This probably means that growth among industrialized countries as a whole will remain subdued over the next six months and not pick up until the latter part of next year and into 2003. We assume that OPEC will continue to be able to keep oil prices within the interval USD 22-28, both though the period of lower economic growth now being experienced and during the subsequent upturn. We therefore assume that the oil market will not generate new impulses that influence the international economy. Hence, developments in the US economy will continue to determine to a large extent the further direction of international markets in the period ahead.

The oil market – OPEC has control

The spot price of Brent Blend fell from USD 33 to USD 22 per barrel from November 2000 to the beginning of January 2001. Oil prices have since fluctuated between USD 23-29, providing an average of a little more than USD 26 per barrel for the first eight months of the year. The most important reason for the fall in prices towards the end of last year was that stocks of heating oil and crude oil in the US started to increase following concern in the autumn about the ability to satisfy future consumption. High oil prices so far this year must primarily be viewed in connection with OPEC's decisions on three occasions to reduce production quotas by altogether 3.5 million b/d until the end of the year. So far, OPEC has satisfied

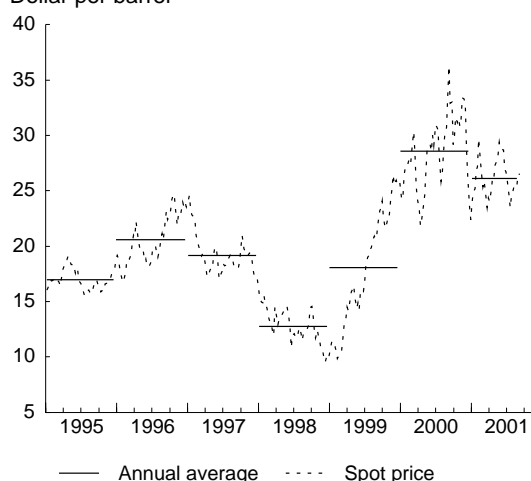
about 70 per cent of the announced cuts, i.e. reduced production by about 2.5 million barrels.

According to forecasts from the International Energy Agency (IEA), oil demand is only expected to show a marginal increase next year, primarily as a result of relatively low estimates for growth in the world economy. Despite high oil prices the last two years, the IEA expects non-OPEC oil production to rise only modestly. This means that the residual demand for OPEC oil is expected to remain fairly constant next year. These developments are contingent on a continuation of Iraq's exports at the current level within the oil-for-food agreement with the UN.

The IEA expects a small decline in stocks of crude oil in the third quarter, a period when stocks are normally built up. For the fourth quarter of 2001 and the first quarter of next year as a whole, the daily use of stocks is expected to be about 0.7 million barrels, which is not abnormal if the winter in the western hemisphere is normally cold with demand for heating oil rising sufficiently.

Over the last one and a half years OPEC has succeeded in keeping the oil price of a basket of OPEC oil within its targeted interval of between USD 22 to 28 per barrel. The price of a barrel of Brent Blend is USD 1-2 above this oil price. The latest decision by OPEC to cut production quotas was carried out by telephone, a factor that amplifies the impression of an effective cartel. Despite some uncertainty concerning stocks and the ability to satisfy future consumption, continued confidence in OPEC's ability to act is generating expectations of an average oil price in the middle range

Spot price, Brent Blend. 1995-2001
Dollar per barrel



Source: Norges Bank.

of the cartel's targeted interval, and we have therefore assumed a Brent price of USD 26 per barrel throughout the projection period.

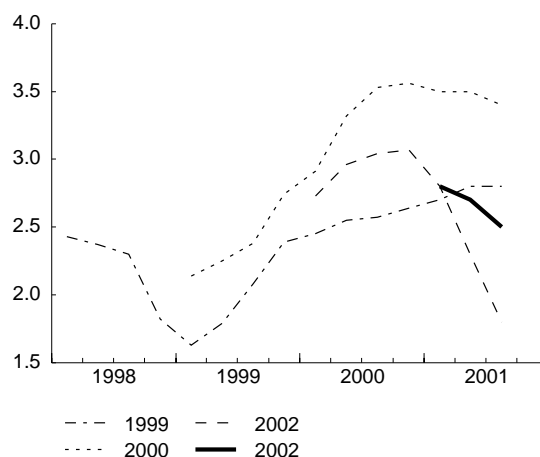
The US – now we just have to wait

During the so far moderate downturn in the US, considerable attention has been focused on the decline in manufacturing output and particularly the sharp contraction in the IT sector, in terms of production, investment and equity prices. Less attention has been given to the fact that the decline in manufacturing in the spring of 2000 started a completely different place, notably in the housing sector. Housing starts peaked at the beginning of 2000 and then fell markedly later in the spring. The peak for the building goods industry and the production of intermediate goods was reached in February, the production of consumer goods in June and the production of raw materials in September. It was not until November last year that the production of machinery and equipment passed a peak. The downturn in the US has therefore not been initiated by the decline in sectors linked to new technology, but rather followed the traditional cyclical pattern for the US where residential construction is the leading component. It is not inconceivable that special problems in the IT sector may play an important role in further developments, but it is still too early to say. The problems in this sector over the past year may also be due to business investment in machinery and equipment, which is primarily affected by a normal cyclical downturn; traditionally, this investment lags behind total production in time. Reference is also made to the previous quarterly report for a more thorough discussion.

It is also in the housing sector that signs of a rebound can be expected first. The fall in housing starts came to a halt as early as the summer of 2000 and picked up through the first half of this year. Even though the picture is not clear-cut, several other indicators for the housing market point in the same direction. Both sales of existing homes and house prices have moved on a rising trend over the past year, and many households are now using the opportunity to refinance consumer loans or in other ways increasing mortgages on their dwellings in order to benefit from low interest rates on housing loans. This will also provide the basis for stronger growth in private consumption in the period ahead. If this occurs, it will contribute to boosting the US economy as a whole as private consumption accounts for such a high share of aggregate demand and thus production.

Revised GDP figures showed annualized growth of only 0.2 per cent between the first and second quarter of 2001. It is not inconceivable that growth will also be subdued during the last two quarters of the year. Even though the Federal Reserve began to reduce its key rates as early as the beginning of this year, it was not until the summer that the cumulative reduction in

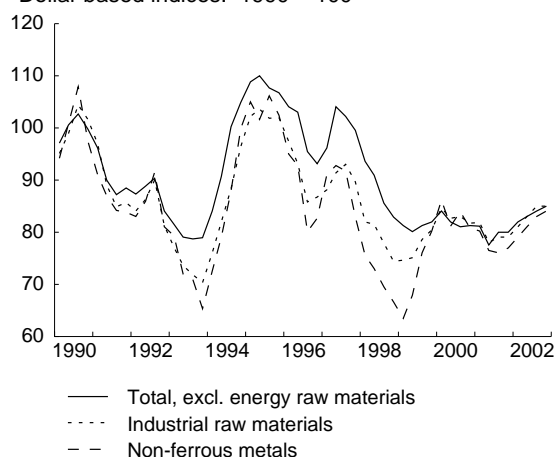
GDP growth forecasts for Norway's main trading partners for 1999 - 2002 given on different dates



Source: Consensus Forecasts.

Commodity prices on the world market 1990 - 2002

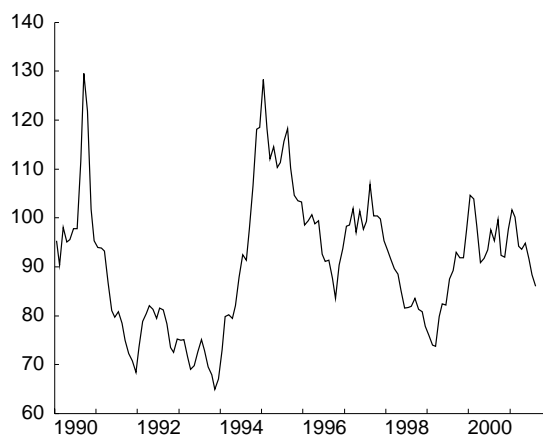
Dollar based indices. 1990 = 100



Sources: HWWA-Institut für Wirtschaftsforschung and AIECE.

Aluminium price. 1990 - 2001

Dollar based index. 1979=100



Source: Norges Bank.

Macroeconomic projections according to selected sources

Annual change in per cent

	GDP-growth				Inflation rate			
	1999	2000	2001	2002	1999	2000	2001	2002
USA								
NIESR	4.2	5.0	1.7	2.3	1.8	2.4	2.1	1.1
OECD	4.2	5.0	1.7	3.1	1.8	2.4	1.9	1.6
ConsF	4.1	4.1	1.7	2.8	2.2	3.4	3.2	2.4
Japan								
NIESR	0.8	1.5	0.6	1.3	-0.7	-1.1	-0.3	-0.2
OECD	0.8	1.7	1.0	1.1	-0.7	-1.2	-0.7	-0.5
ConsF	0.8	1.5	-0.2	0.6	-0.3	-0.7	-0.4	-0.5
EMU								
NIESR	2.5	3.5	2.1	2.4	1.1	2.3	3.0	2.1
OECD	2.6	3.4	2.6	2.7	1.2	2.2	2.3	1.9
ConsF	2.6	3.5	2.1	2.6	1.2	2.3	2.9	2.2
Trading partners								
NIESR	2.8	3.5	2.0	2.4	1.0	1.7	2.2	1.6
OECD	2.8	3.5	2.4	2.6	1.1	1.6	1.8	1.7
ConsF	2.8	3.4	1.8	2.5	1.2	2.0	2.4	1.9

Sources: NIESR from July 2001, OECD from April 2001 and Consensus Forecasts from August 2001. All the inflation projections from the OECD apply to the consumption deflator and the same applies to NIESR's estimates for the US and Japan.

interest rates became significant. So far, interest rates have been cut by 3 percentage points. Normally, it is assumed that it takes 6-9 months before interest rate changes have an effect on the real economy, i.e. the main impact on activity levels will not be seen until the end of the year. If that occurs, this will again be in line with a standard business cycle for the US economy as the cyclical downturn (measured as deviation from trend) will then have lasted 6 quarters, the normal duration of a cyclical downturn in the US.

Europe – substantial growth impetus from monetary policy unlikely

For Europe, considerable attention during the summer – in addition to the discovery of the importance of the US economy to European cyclical developments – has been focused on the European Central Bank's monetary policy. Whereas the Federal Reserve has reduced its rates aggressively through the year, the ECB has so far only delivered two modest interest rate cuts of percentage point each, admittedly from a lower interest rate level than in the US. Many seem to think that the ECB will be forced to reduce interest rates further and more strongly this autumn in response to sluggish economic growth later in the summer. One then disregards the fact that the ECB does not share the Federal Reserve's views on the role of monetary policy. There is every indication that the ECB has inherited its views from the Bundesbank, which in its history has exercised a far more cautious use of the interest rate instrument. This is not only due to differences in ideology. There are clear and genuine economic disparities between the US and most continental European countries which may explain a more cautious

monetary policy, where on the continent considerable emphasis is placed on inflation and to all appearances only little emphasis on economic growth. Whereas the US economy has been very sensitive to changes in short-term interest rates, borrowing by European households and the business sector has mostly been based on loans with a long fixed-rate period. This means that if the ECB is to influence the level of activity, it must influence long-term interest rates. And since long-term rates are largely determined by market participants' long-term inflation expectations, credible inflation targeting is absolutely essential.

In fact, the ECB has less leeway than the German central bank had as the Bundesbank could use the effect of short-term rates on the exchange rate. By tightening interest rates it could push up the Deutsche mark and reduce pressures in the economy; fortunately, the Bundesbank was largely spared from the need to stimulate the economy on its own. In order to achieve corresponding effects on the real economy, the ECB would have to use the interest rate instrument to a considerably greater extent since the euro area is far more closed with regard to international trade than Germany was alone. The "perverse" effects of interest rate changes on the exchange rate that we have seen signs of in recent years come in addition, where a decline in short-term rates is often rewarded by a stronger exchange rate, apparently because as international capital markets are gradually integrated greater emphasis is placed on economic growth and returns associated with direct investment and other investments with a long-term return. Even though this might mean that the ECB could achieve a stronger

euro by reducing interest rates, which would be favourable for inflation, a stronger currency would also have a contractionary effect on the real economy, which would probably counter any small positive effects of lower interest rates on the level of activity. In such an event, the measure would be unlikely to result in higher growth. Irrespective, such waves of sentiment in the foreign exchange market, even though they may last for a long time, are an unreliable ally, and the ECB is unlikely to take chances in its efforts to gain confidence in its inflation targeting and its new currency.

The most likely scenario for the euro countries is therefore that the ECB sees some scope for somewhat lower interest rates as it is gradually reassured that inflation is under control, and on the assumption that it manages to keep long-term interest rates at a low level; for some of the euro countries long-term rates are already slightly below the US level, but an aggressive reduction in interest rates is highly improbable. Consumer price inflation is still higher than the target zone of 0-2 per cent, and even though it is falling it will barely drop below the upper limit next year, according to estimates from Consensus Forecasts. In our calculations, we have therefore assumed a further 1/4 percentage point reduction this year followed by a cautious upward adjustment towards the end of next year, given that GDP growth picks up appreciably.

Japan

The growth forecasts for Japan have also been lowered through the summer and from an already low level. In August, negative GDP growth of -0.2 per cent was expected for 2001 followed by a weak expansion of 0.6 per cent next year. Experience shows, however, that the forecasts for Japan are of little interest other than representing sentiment reports. Inasmuch as Japan's problems are structural, and particularly reflect the strong demographic changes the country has experienced the last few decades, there is little reason to expect any sustained turnaround before it is seen.

Market growth

In addition to low growth in the US this year, growth is expected to be especially low in other important market countries for Norwegian exports, such as Germany and Denmark. Growth among our main trading partners will therefore be lower than e.g. the euro area as a whole, but will nevertheless pick up next year as a result of the projected upswing in the US. Price inflation among our trading partners will also be lower than price inflation in the euro area, both in 2001 and in 2002.

Norwegian economy

The fear of a demand-driven increase in inflation has so far induced Norges Bank to maintain high interest rates. Changes in figures from the quarterly national accounts (QNA) in the first half of 2001 show no strong demand impulses. The level of activity in the mainland economy has been noticeably reduced and is now slightly below trend. Thus, it may be argued that the Norwegian economy is now experiencing a recession even though a precise specification of this is difficult. According to our estimates, however, growth as early as the turn of the year will be slightly higher

than trend mainland GDP growth. For practical purposes we can therefore not characterize the situation in the Norwegian economy as an actual recession. Inflation in Norway is approximately on a par with the level abroad and is expected to remain moderate and lower in the projection period than in previous years. This will provide a basis for a slight decline in interest rates through 2002. However, domestic demand is expected to expand in the period ahead. The prospect of slightly stronger pressures in the Norwegian economy towards the end of the projection period and a further

Macroeconomic indicators 1999-2001

Growth from previous period unless otherwise noted. Per cent

	1999	2000	Seasonally adjusted			
			00.3	00.4	01.1	01.2
Demand and output						
Consumption in household and non-profit organizations	2.2	2.4	-0.1	-0.5	2.0	0.1
General government consumption	3.3	1.4	0.5	0.5	0.8	0.4
Gross fixed investment	-8.2	-1.1	-6.1	-1.0	2.3	-4.6
- Mainland Norway	-2.6	1.4	-3.2	2.5	-0.5	-2.6
- Petroleum activities ¹	-19.9	-17.1	-2.6	-3.3	7.3	-3.5
Final domestic demand from Mainland Norway ²	1.5	1.9	-0.5	0.3	1.2	-0.3
Exports	2.8	2.7	2.0	4.2	1.8	-2.6
- Crude oil and natural gas	-0.1	6.4	4.3	5.0	2.3	-6.2
- Traditional goods	3.2	2.1	-1.5	1.3	5.6	-0.4
Imports	-1.6	2.5	-1.9	-1.6	2.0	-1.1
- Traditional goods	-1.3	1.7	-1.0	-0.9	2.8	0.1
Gross domestic product	1.1	2.3	0.7	0.1	0.5	0.1
- Mainland Norway	1.0	1.8	0.1	-0.3	0.7	0.3
Labour market³						
Man-hours worked	0.2	-0.8	-0.9	-0.9	1.3	1.1
Employed persons	0.6	0.5	-0.5	0.1	0.2	0.2
Labour force	0.5	0.8	-0.3	0.4	0.1	0.2
Unemployment rate, level ⁴	3.2	3.4	3.4	3.6	3.4	3.4
Prices						
Consumer price index ⁵	2.3	3.1	3.5	3.1	3.6	4.0
Consumer price index, excl. energy products ⁵	2.3	2.3	2.6	2.6	3.2	2.9
Export prices, traditional goods	0.0	13.8	0.9	2.1	-2.3	-1.2
Import prices, traditional goods	-2.3	6.0	1.2	1.1	3.3	-0.9
Balance of payment						
Current balance, bill. NOK	47.3	203.6	56.9	66.3	59.6	53.7
Memorandum items (Unadjusted, level)						
Money market rate (3 month NIBOR)	6.4	6.6	7.0	7.4	7.3	7.3
Average borrowing rate	7.6	8.9	8.5	8.9	8.9	8.9
Crude oil price NOK ⁶	141.6	252.0	272.9	278.3	229.3	250.2
Importweighted krone exchange rate, 44 countries, 1997=100	101.0	103.6	104.0	103.6	102.2	100.8
NOK per ECU/euro	8.31	8.11	8.10	8.04	8.20	8.01

¹ Figures for petroleum activities now covers the sectors oil and gas extraction proper, transport via pipelines and service activities incidental to oil and gas extraction.

² Consumption in households and non-profit organizations + general government consumption + gross fixed capital formation in Mainland Norway.

³ Figures for 1999 and 2000 are from national accounts. The quarterly figures are from Statistics Norway's Labour force survey (LFS), since the new quarterly national accounts series for employment are too short for seasonal adjustment.

⁴ According to Statistics Norway's labour force survey (LFS).

⁵ Percentage change from the same period the previous year.

⁶ Average spot price, Brent Blend.

Sources: Statistics Norway and Norges Bank.

increase in the use of petroleum revenues in the following years are factors that may contribute to a relatively modest reduction in interest rates in Norway.

Expansionary fiscal policy

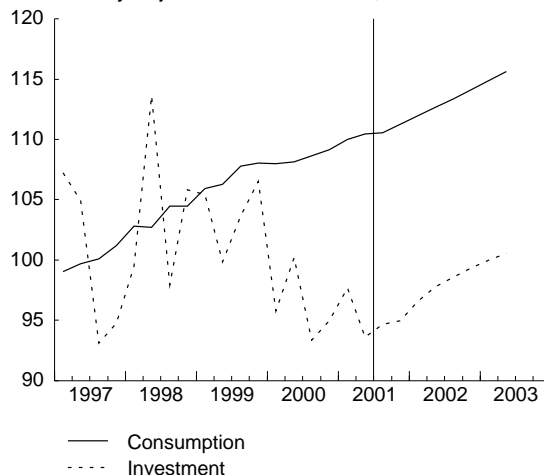
In the calculations, the fiscal policy impetus this year is in line with the Revised National Budget for 2001 and may be characterized in cyclical terms as relatively neutral or slightly expansionary. At this time, just before the general election, there is considerable uncertainty concerning the fiscal policy stance for the new few years. However, it seems clear that fiscal policy will be somewhat more expansionary than what has been customary in recent years, taking into account the cyclical situation. There appears to be relatively broad political agreement concerning the new guidelines for economic policy presented by the current Government in March this year. According to these guidelines, the use of petroleum revenues will increase approximately in step with the expected real return on the Petroleum Fund. The use of petroleum revenues is defined as the structural, non-oil government budget deficit, and this shall be viewed in relation to the expected return on the Petroleum Fund at the beginning of the fiscal year. This implies an increased use of petroleum revenues – assuming that oil prices do not plunge or the Petroleum Fund records sharply negative valuation changes – compared with the previous regime. This implied that the structural, non-oil deficit over time was to rise in pace with long-term Mainland GDP growth. On the basis of the new guidelines, however, there is considerable scope for various adaptations of fiscal policy and studies show that there are considerable differences in the effect of various fiscal policy stances with the same budget balance.

However, there are also at least three other elements that contribute to the uncertainty even if the authorities adhere to the new guidelines:

- It is still the intention to use fiscal policy to counter fluctuations in the economy so that more or less than the level implied by the rule shall be used depending on the cyclical situation.
- Major changes in the use of oil revenues may be carried out over several years.
- The quantification of adjustments in activity that are found in the structural, non-oil budget deficit will depend on the choice of methodology and different assumptions.
- All three elements imply that the budget balance will not automatically follow the “use of petroleum revenues rule”, but incorporate considerable scope for judgement.

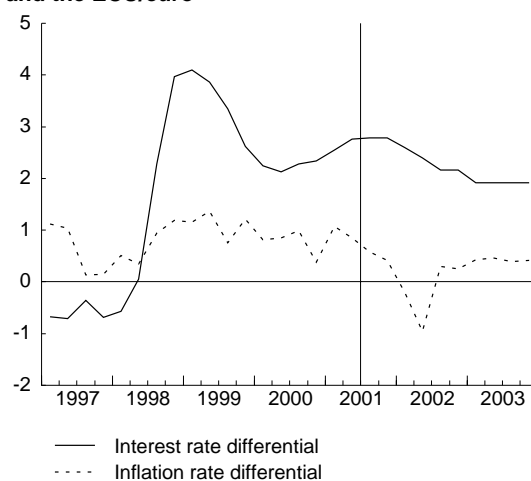
Our estimates for the next two years are based on the assumption that fiscal policy leeway through an increased use of “petroleum revenues” is attained through a combination of higher general government

General government
Seasonally adjusted volume indices, 1997=100



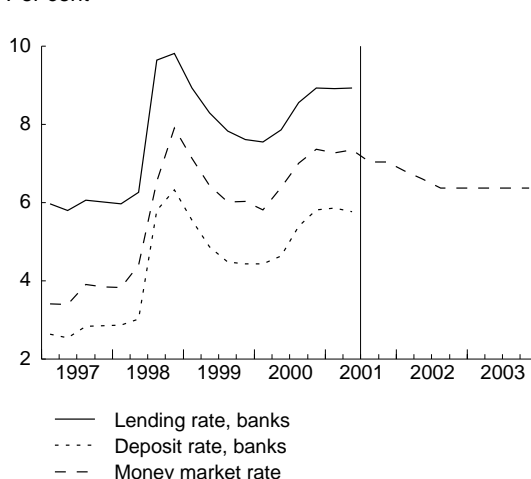
Source: Statistics Norway.

Interest rate and inflation differential between NOK, and the ECU/euro



Sources: Norges Bank and Statistics Norway.

Lending rate and deposit rate
Per cent



Source: Norges Bank.

consumption and investment and reduced direct and indirect taxes. We have assumed somewhat higher growth in general government expenditure on goods and services than trend output growth in the mainland economy in both 2002 and 2003. With regard to the tax programme, we assume that the investment tax will be removed with effect from 1 April 2002, while direct and indirect taxes are otherwise adjusted for inflation. Inasmuch as the halving of the VAT rate on food in July this year will have an effect throughout 2002 but only half of 2001, the expansionary element of the indirect tax policy will be considerable next year. We have therefore not incorporated reductions in income taxes for 2002. In 2003, changes in indirect taxes will still have an expansionary effect, with the elimination of the investment tax affecting the entire year. Moreover, we have assumed a reduction in direct personal taxes of about NOK 3 billion and an increase in general government expenditure on goods and services of less than NOK 2 billion.

Production in the public sector and hence also general government consumption is calculated on the basis of man-hours worked. Fewer working days due to public holidays in 2001 and 2003 and the increase in vacation days in 2001 and 2002 will thus contribute to lower growth in general government production and consumption than the level implied by developments in the number employed in the sector.

Estimates for interest rates and exchange rates

The import-weighted krone exchange rate has in the course of the summer appreciated slightly more than was assumed previously. This can be ascribed to both a weak euro and a fall in the exchange rate for the Swedish krona both against the euro and the Norwegian krone. The Norwegian krone has also appreciated slightly more against the US dollar than assumed earlier. We still expect the dollar to depreciate against the euro in the period ahead, with approximate parity between the euro and the dollar in 2003. The krone exchange rate is still expected to depreciate against the euro, and stand at 8.18 as from 2002. All in all, these estimates imply that the import-weighted exchange rate will appreciate by about 2.5 per cent this year and then remain approximately unchanged the next few years. This will contribute to a levelling off in the rise in import prices. Combined with weaker international cyclical developments, the inflationary impetus from higher import prices will thus be noticeably lower in the period ahead than that recorded in previous years.

Whereas US money market rates have been sharply reduced through 2001, Norwegian interest rates have shown little change after having risen considerably through 2000. The Norwegian money market rate is now 3 percentage points higher than the euro rate,

while the inflation rate in Norway is approximately the same as in the EU. The appreciation of the import-weighted krone exchange rate this year must therefore be viewed in connection with the widening interest rate differential between Norway and other countries. The high level of Norwegian interest rates is a good illustration of how monetary policy is now being oriented towards specific Norwegian factors, which are thus substantially different than in other countries where the cyclical downturn seems to be deepening.

Our projections for developments in the Norwegian economy in the period ahead do not provide scope for any substantial fall in interest rates in Norway. As in our previous report, we have assumed a 0.7 percentage point decline in interest rates in the first half of 2002, but no further subsequent decline. We believe, however, that European rates may edge up towards the end of next year and reach about 4.5 per cent in 2003. It is reasonable to assume that with a renewed upward trend in the US during the coming winter US money market rates will increase towards the end of 2002. Our estimates imply a nominal Norwegian interest rate differential in relation to euro rates of about 2 percentage points and a probable inflation differential of about 0.5 per cent in 2003, i.e. Norwegian real interest rates will then be about 1.5 percentage points higher. We are uncertain whether this is compatible with a nominally unchanged exchange rate against the euro as we have assumed beginning next year. The quantification of the link between Norwegian and European money market rates, inflation differentials and the exchange rate, based on the historical experience of a fixed exchange rate regime, indicates that our estimates are consistent. However, it is now uncertain how valid this historical relationship is given the new monetary policy regime and in a situation with a large and quickly growing Petroleum Fund. It is also worth noting that our estimates for mainland GDP do not imply that the Norwegian economy will again experience a period of strong expansion during the next few years. This, combined with moderate inflation, might result in somewhat greater interest rate changes than we have assumed in our estimates.

The cyclical situation in Norway compared with the EU and the US is well illustrated by different monetary policy stances. Under Norway's former exchange rate regime, Norwegian interest rates would probably have been appreciably lower than they are today, which in isolation would have generated greater pressures in the Norwegian economy. At the moment, traditional Norwegian export industries are facing both a strong Norwegian krone and slower market growth abroad. This is eroding profitability, which will contribute to a relatively moderate wage settlement when the main settlement takes place next spring, and hence somewhat lower interest rates in the period ahead.

The petroleum sector

So far this year, the oil price has fluctuated in the interval USD 23-29 per barrel (Brent Blend), averaging about USD 26 the first eight months of the year, compared with about USD 28 last year. When calculating our forecasts, we have assumed that the oil price will remain at about USD 26 through the projection period. With an appreciation of the Norwegian krone against the US dollar, the oil price measured in NOK terms may fall slightly in the period ahead, but still remain at a fairly high level.

Following a sharp decline in the demand for goods and services from mainland Norway by investment activities in the petroleum sector through 1999, developments since then have been relatively stable. Admittedly, the quarterly national accounts show a very high level of investment in the first quarter of 2000, but this is largely ascribable to extraordinarily high imports of oil platforms and modules. Petroleum investment is projected to show little change in the period ahead compared with 2001, which will imply approximately the same demand impetus for the Norwegian economy in 2001 as in 2000, but with a noticeable decline in recorded investment (due to high imports in the first quarter of 2000).

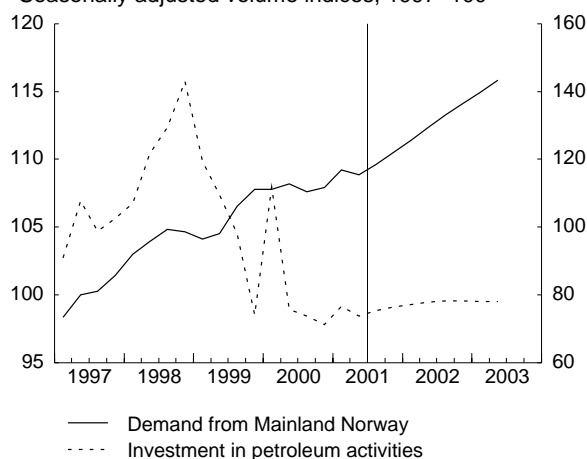
The investment outlook in the period ahead is influenced by two conflicting factors. There are many indications that an investment peak has been reached and that petroleum investment will exhibit an underlying tendency to fall in the long term. However, developments and the outlook for oil prices point to higher investment in the petroleum sector for some time ahead. In the calculations, we assume a slight increase in investment in 2002 and zero growth in 2003.

In recent years, there has been a clear tendency to reduce the development of new fields, but to increase investment in fields that are already on stream. It appears that this tendency will continue. Investment in onshore installations and pipeline transport was at a historically low level in 2000. According to Statistics Norway's investment statistics, pipeline investment will edge up in the period ahead, while investment in onshore installations will remain approximately unchanged.

Substantial production halts in connection with maintenance and various operating problems have contributed to very modest production growth in the petroleum sector through the first half of this year. Oil production is nevertheless expected to increase slightly on an annual basis compared with last year and remain relatively stable through 2002 and 2003. Gas production is projected to rise somewhat in the period ahead, but this production is still relatively modest compared with oil. All in all, we therefore assume that production developments in the petroleum sector will make a fairly moderate contribution to GDP

Demand from Mainland Norway and investment in petroleum activities

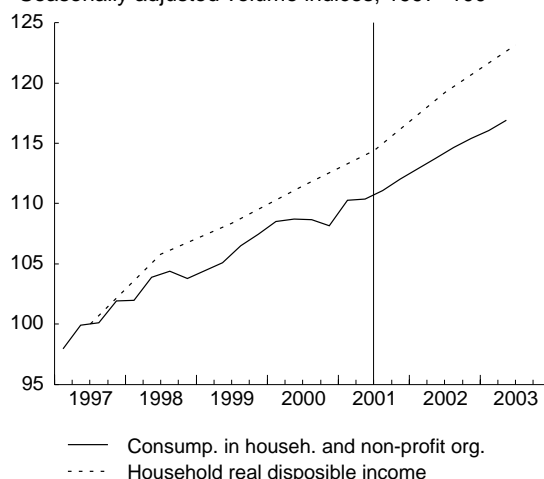
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

Income and consumption in households

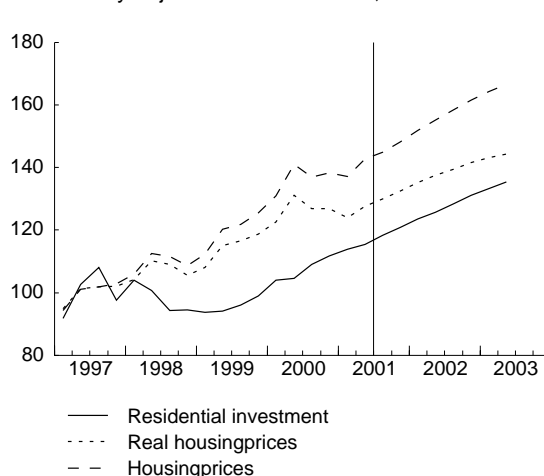
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

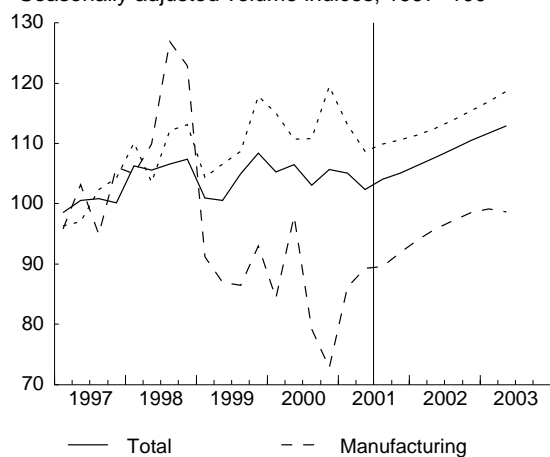
Residential investment and housingprices

Seasonally adjusted volume indices, 1997=100



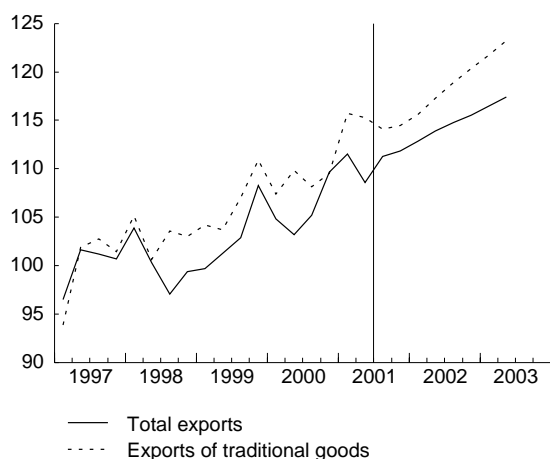
Source: Statistics Norway.

Investment, Mainland Norway
Seasonally adjusted volume indices, 1997=100



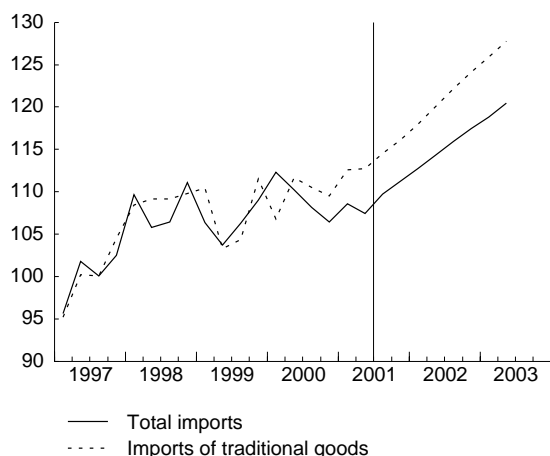
Source: Statistics Norway.

Exports
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

Imports
Seasonally adjusted volume indices, 1997=100



Source: Statistics Norway.

growth. Any major deviation in growth between mainland GDP and total GDP is thus unlikely. However, the estimates for petroleum production are always shrouded in a considerable degree of uncertainty. In the coming five years, a large share of Norwegian oil production will come from fields that are being scaled back and there is considerable uncertainty associated with production developments for these fields.

Rising consumption and high saving

According to preliminary accounts figures, household real disposable income expanded by 2.9 per cent last year. In the calculations, slightly lower growth in benefits from the public sector will contribute to reducing income growth this year. On an annual basis, interest rates both in nominal and real terms show an increase and thus contribute to boost household saving. According to our estimates, the saving ratio will increase by 3/4 percentage point from 2000 to 2001. As a result of the prospect of particularly low price inflation in 2002, real income growth is expected to pick up appreciably next year. In spite of a moderate fall in nominal interest rates and pronounced growth in housing wealth, it is likely that the household saving ratio will increase further, while consumption growth may reach more than 3 per cent. One reason for higher saving is that the real after-tax interest rate does not fall but instead increases from 2001 to 2002.

In 2003, we have assumed a tax reduction for households. This will contribute to higher disposable income, while higher price inflation will in isolation push down real income growth. In the calculations, real income growth is reduced in relation to 2002, but remains at a relatively high level. As a result of the decline in interest rates through 2002 and a further increase in housing wealth, household consumption will rise markedly again in 2003, with only a modest increase in the saving ratio.

Prices for existing dwellings have risen considerably in recent years, and with the exception of a projected relatively low rise this year, we assume a faster rise in prices for existing dwellings through 2002 and 2003. The rise in prices implies an increase in wealth, making it relatively more attractive to construct new dwellings. Growth in housing investment is expected to be maintained during the remainder of the projection period, but at a slightly slower pace than through 2000.

Mainland corporate investment

Mainland private industries recorded higher investment in 2000 compared with the previous year, but a decline in manufacturing investment pushed down overall growth. A slightly different picture is expected this year. Manufacturing investment picked up again in the first quarter of 2001 and Statistics Norway's investment intentions survey indicates further growth through the year and in 2002. Other mainland enter-

prises are expected to record a decline this year, with an overall fall in investment in private mainland industries. It is assumed that the investment tax will be removed with effect from the second quarter of next year. As a result, some investment is expected to be postponed, thereby contributing to reducing investment in 2001 and increasing investment in 2002. For 2002 and 2003, investment is projected to rise in most mainland sectors and corporate investment in the mainland economy is expected to grow by about 4 per cent both years.

Growth in total demand is increasing

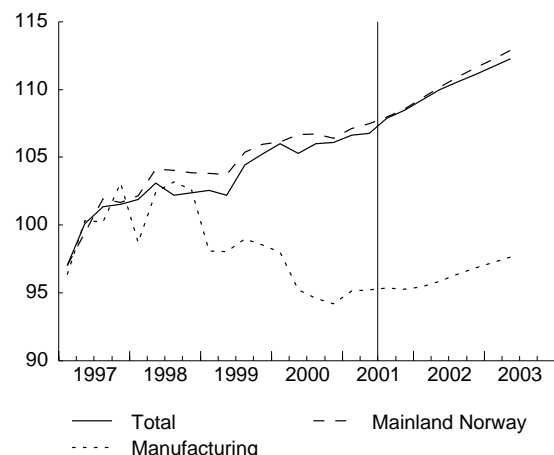
There are now clear signs of faster growth in several domestic demand components. This perhaps applies most to the investment side, with housing investment expanding in particular. It appears that the contraction in manufacturing investment will be reversed to a sharp increase. The decline in petroleum investment has come to a halt and it is not inconceivable that this investment will resume an upward trend in the short-term. The same applies to general government investment. Growth in household consumption has been moderated by high interest rates for a period, but this effect is now ebbing. An increase in vacation days will contribute to curbing growth in household real income, while more subdued price inflation will have a strong opposite effect. These effects will also be in evidence next year. Real wage growth is then expected to increase considerably from a good 1.5 per cent this year to about 3 per cent next year, measured per normal man-year. Foreign cyclical impulses will have the opposite effect and we must assume noticeably lower growth in traditional merchandise exports for some quarters ahead than the level recorded in the first half of this year.

Faster growth in mainland GDP

Growth in mainland GDP in both 2000 and 2001 is heavily influenced by considerable changes in electricity production. Even though mainland growth will decline slightly from 2000 to 2001, the rate of growth shows an increase when electricity production is excluded. High electricity production in 2000 contributed to pushing up annual growth by 0.4 per cent that year and will make approximately the same contribution to pushing down growth this year. Excluding electricity production, mainland GDP expanded by 1.4 per cent in 2000, while growth in 2001 is projected at 1.7 per cent. Total GDP growth for mainland Norway is now estimated at 1.3 per cent, against 1.8 per cent last year. It also appears that total GDP growth will again this year be somewhat higher than mainland growth, not least as a result of brisk growth in gas production. An increase in vacation days will contribute to reducing growth in the economy somewhat.

In 2002, stronger consumption growth and a turnaround in mainland investment through 2001 are expected to contribute to noticeably higher growth in

Gross domestic product
Seasonally adjusted volume indices, 1997=100



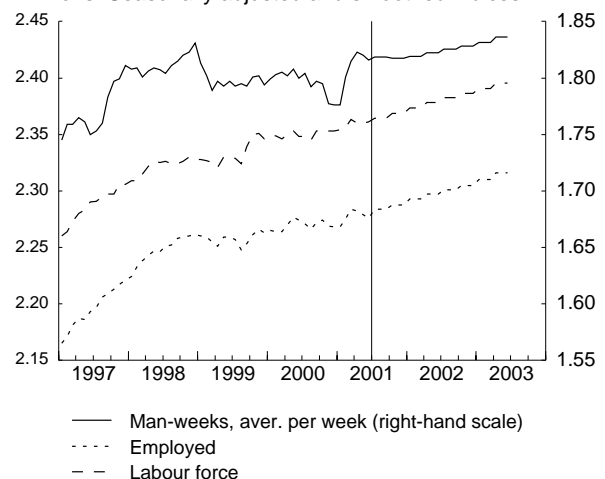
Source: Statistics Norway.

Productivity and output gap
Per cent



Source: Statistics Norway.

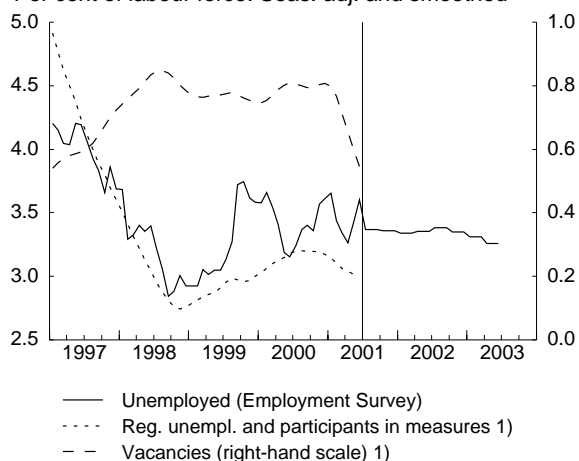
Labour force, employment and number of man-weeks
Millions. Seasonally adjusted and smoothed indices.



Source: Statistics Norway.

Unemployed and number of vacancies

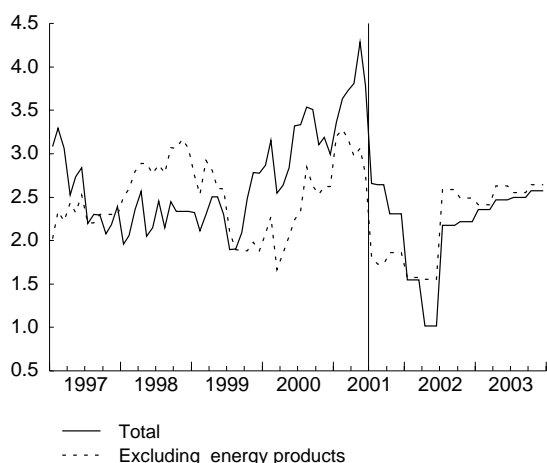
Per cent of labour force. Seas. adj. and smoothed



1) Backwards adjusted for breaks in the series from January 1999.
Sources: The Directorate of Labour and Statistics Norway.

The consumer price index

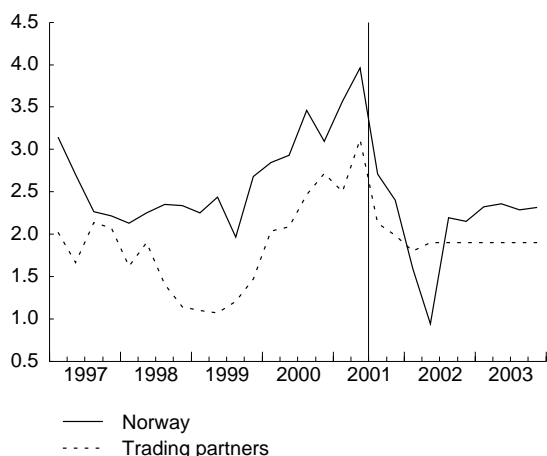
Percentage change from the same month the previous year



Source: Statistics Norway .

Consumer price indices

Percentage growth from the same quarter previous year



Sources: Statistics Norway, OECD and Eurostat.

the mainland economy. Higher petroleum investment is also expected to make a contribution, while moderate export growth will reduce the overall growth impetus. In 2003, the international cyclical upturn will again contribute to stronger growth in traditional merchandise exports, while the impetus from petroleum activities is expected to be limited. All in all, it is therefore assumed that production growth in the mainland economy will increase to about 2.5 per cent in 2002 and 2003. This is slightly higher than underlying trend growth for the mainland economy, but not to the extent that the level of mainland GDP exceeds the trend level in the period.

High productivity growth

Growth in labour productivity came to a good 3 per cent in 2000 for mainland enterprises. Productivity growth is expected to be slightly lower this year, but this reflects the unusual conditions associated with electricity production as discussed above. Productivity growth is projected to remain high in 2000, but may then be curbed somewhat in 2003 as enterprises gradually adjust employment. Productivity growth in 2003 for mainland enterprises will be on a par with normal trend growth of about 2.25 per cent.

Stable or even slight drop in unemployment?

According to Statistics Norway's Labour Force Survey, unemployment was 3.4 per cent in 2000. Our projection for this year is the same. It appears that both the number employed and the labour force will expand by about half a per cent in 2001. The number of man-hours worked, on the other hand, will decline as a result of the increase in vacation days and additional public holidays. This will be repeated next year and while the number employed will continue to show an increase, the number of man-hours worked will decline. Employment growth is expected to be slightly stronger next year, but the labour force is also projected to expand somewhat more than in 2001. Growth in man-hours worked and stronger employment growth are expected in 2003, which in spite of higher participation rates may contribute to slightly lower unemployment.

Even though pressures in the labour market, measured by the unemployment rate, are stable, the number of unfilled vacancies has exhibited a noticeable decline in the course of 2001. This implies that labour market mismatches may have been reduced somewhat compared with last year, and may place a slight damper on wage growth in the period ahead.

Sharp decline in price inflation

There have been pronounced variations in the rate of inflation over the past two years. After the year-on-year rise in the consumer price index (CPI) was reduced to 1.9 per cent in August 1999, the rate of inflation has moved on a clear upward trend until May this year when the rate of increase was as high as 4.3

per cent. The increase in inflation was largely fuelled by changes in the crude oil price on the world market, electricity prices in the Nordic countries along with increases in excise duties. In the last two months, the rate of increase has fallen markedly, and was reduced to 2.7 per cent in July. The halving of the VAT rate on food with effect from 1 July was the most important single factor behind the decline in the rate of inflation, but developments in petrol prices also made a pronounced contribution.

Changes in the rate of inflation are expected to be fairly modest through the autumn. Electricity prices have shown very unusual developments this year, with the normal pronounced decline in prices during the summer months failing to materialize so far. Little snow on mountains in the western part of Norway last winter contributed to a continued high spot price for electricity. Abundant precipitation in recent months has contributed to reducing the spot price and the price of forward contracts. It now appears that electricity prices may remain fairly stable until the end of the year. Inasmuch as electricity prices rose considerably during the second half of 2000, this will contribute to reducing the rate of inflation later in the autumn. A more normal path for electricity prices in 2002 compared with this year will help to reduce the rate of inflation in the summer half-year in 2002 in relation to the winter half-year. At an annual rate, electricity prices (excluding any changes in indirect taxes that have not been incorporated) are expected to be slightly lower next year and show little change from 2002 to 2003.

Our calculations for 2002 and 2003 are based on the assumption that there will be no changes in the indirect tax programme for consumer goods in the period ahead and that all specific taxes are raised by 2.5 per cent as of 1 January both years. Due to the VAT reform on 1 July this year, indirect taxes will make a markedly negative contribution to the inflation rate in the first half of next year, but will thereafter have a neutral impact. The fact that the direct effect of the VAT increase from 23 to 24 per cent on the year-on-year rate of inflation will be eliminated in January next year will contribute to reducing the rate of inflation from December to January next year. As from July 2002, there will no longer be any direct effects of indirect tax changes on the rate of inflation that are now known. This points to a pronounced rise in the year-on-year rate of inflation from June to July 2002 to a little more than two per cent.

In its conduct of monetary policy Bank of Norway has now been given an inflation target of about 2.5 per cent annually. In the short term it is in practice virtually impossible for a central bank to control inflation. Norges Bank's own interpretation of the regulation is that the target shall be linked to inflation expectations a period ahead (about two years). In this time horizon it is difficult to predict "extraordinary, temporary dis-

turbances". One natural interpretation when the regulation states that "normally, the direct effects of changes in indirect taxes and extraordinary, temporary disturbances shall not be taken into account" is that these effects shall be eliminated when later evaluating whether Norges Bank has "done its job". There is, however, no obvious way to identify such disturbances.

Over the past year, many of the changes in the rate of inflation can be traced to changes in indirect taxes and changes in prices for electricity and crude oil. Many of the changes in energy prices can be perceived as such extraordinary, temporary disturbances. A natural solution to the challenge linked to identifying a "success indicator" for monetary policy would be to exclude energy prices from the CPI and, at the same time, adjust for indirect tax changes for other goods. There are at least two fundamental objections to this: first, it is not the case that all real energy price changes can be considered extraordinary, temporary disturbances. Second, there will also always be other goods for which price changes can be considered temporary disturbances. In practice, adjustments must also be made for other short-term disturbances when subsequently evaluating Norges Bank's conduct of monetary policy, while at the same time price formation/developments for energy goods should be studied more thoroughly before deciding to consider all price changes for these goods as temporary disturbances.

Because energy prices have historically varied considerably and their budget share is fairly considerable, Statistics Norway publishes an index where these goods are excluded. This index may serve as a better *starting point* than the unadjusted CPI when evaluating whether the inflation target has been achieved. In July 2001, the year-on-year rise in the consumer price index, excluding energy prices, was 1.8 per cent. The rate of increase is projected at about 1.5 per cent in the first half of 2002 before stabilizing at around 2.5 per cent.

With regard to adjustments for direct effects of indirect tax changes, there are a number of fundamental and practical problems associated with quantifying such impulses. This is the reason why Statistics Norway does not already publish a consumer price index eliminating such effects. We have made some rough calculations and have concluded that indirect tax changes in excess of an adjustment for inflation have contributed to pushing up the rate of increase in the consumer price index by about 0.6 percentage point in the first half of 2001 and to reducing the rate of increase by about 0.6 percentage point in the current half-year. In the first half of the year, the effects of the increase in the electricity tax and reduced petrol taxes offset each other, so that the contribution of indirect taxes was approximately independent of whether energy prices were included or not. The petrol tax,

Main economic indicators 2000-2003. Accounts and forecasts

Percentage change from previous year unless otherwise noted

	Accounts 2000	Forecasts							
		2001			2002			2003	
		SN	MoF	NB	SN	MoF	NB	SN	NB
Demand and output									
Consumption in households and non-profit organizations	2.4	2.0	1.6	1 3/4	3.2	2.6	2 1/2	2.8	2 3/4
General government consumption	1.4	1.9	2.3	3	2.5	2.1	2 1/4	2.6	2 1/2
Gross fixed investment	-1.1	-4.8	0.7	1/2	5.1	1.3	1 1/2	3.5	-2
Petroleum activities	-17.1	-8.8	-1.2	2	4.6	0	0	-0.1	-10
Mainland Norway	1.4	-1.0	0.3	1/2	4.6	0.5	1 3/4	4.6	0
Firms	1.8	-3.5	-0.8	-3/4	3.8	0.2	2 1/2	4.3	1/2
Housing	12.2	9.5	6.8	8	8.3	0.9	1	7.7	0
General government	-7.9	-2.1	-2.2	-2 1/4	3.1	1.1	1	2.6	-1 3/4
Demand from Mainland Norway ¹	1.9	1.4	1.5	1 3/4	3.3	2.1	2 1/4	3.1	2 1/4
Stockbuilding ²	0.8	-0.6	0.1	..	0.0	0.0	..	0.0	..
Exports	2.7	5.0	4.9	4 1/2	3.0	5.1	4 1/4	3.1	2
Crude oil and natural gas	6.4	5.3	8.2	6	1.8	6.9	6	-0.1	0
Traditional goods	2.1	4.7	3.2	4	3.5	4.5	3 1/4	5.0	3 1/2
Imports	2.5	0.8	3.1	2 1/2	5.5	3.7	4	5.5	2 1/4
Traditional goods	1.7	4.1	3.5	3	6.3	4.2	4 1/2	6.3	2 1/4
Gross domestic product	2.3	1.6	2.4	2 1/4	2.5	2.8	2 1/4	2.0	1 1/2
Mainland Norway	1.8	1.2	1.5	1 1/2	2.6	1.8	1 3/4	2.5	1 3/4
Labour market									
Employed persons	0.5	0.6	0.5	3/4	0.8	0.7	3/4	0.9	1/2
Unemployment rate (level)	3.4	3.4	3.3	3 1/4	3.4	3.2	3 1/4	3.2	3 1/4
Prices and wages									
Wages per standard man-year	4.3	4.6	4 1/2	4 3/4	4.4	..	5	4.0	4 3/4
Consumer price index	3.1	3.2	3	3 1/4	1.7	2 1/4	2	2.3	2 1/2
Consumer price index excl. energy products	2.3	2.5	..	..	2.0	..	..	2.4	..
Export prices, traditional goods	13.8	-0.3	0.2	2	-2.8	0.0	0	2.8	0
Import prices, traditional goods	6.0	2.7	1.8	3 3/4	0.6	1.4	0	2.1	1 1/2
Housing prices	14.0	4.9	..	5 1/2	9.3	..	4	7.1	4
Balance of payment									
Current balance (bill. NOK)	203.6	207.8	221.8	205	170.8	193.8	185	153.3	150
Current balance (per cent of GDP)	14.3	14.1	15.0	14	11.3	12.8	12	9.8	9
Memorandum items:									
Household savings ratio (level)	7.7	8.4	6.3	8	9.3	6.4	8	9.8	8 1/4
Money market rate (level) ³	6.6	7.2	7.3	7.4	6.5	7.1	7.4	6.4	7.3
Implicit borrowing rate (level) ⁴	8.2	9.0	..	..	8.4	..	..	8.1	..
Crude oil price NOK (level) ⁵	252.0	233.5	225	237	218.9	194	210	212.7	182
Exports market indicator	10.3	4.6	..	..	5.4	..	..	7.2	..
Importweighted krone exchange rate (44 countries) ^{3,6}	2.5	-2.5	..	-2 1/4	0.3	..	-1/4	-0.1	0.0

¹ Consumption in households and non-profit organizations + general government consumption + gross fixed capital formation in Mainland Norway.² Change in stockbuilding. Per cent of GDP.³ The NB figures are technical assumptions. The interest rate forecasts reflects the implicit expectations of the market participants.⁴ Households' borrowing rate in private financial institutions.⁵ Average spot price Brent Blend.⁶ Increasing index implies depreciation.

Sources: Statistics Norway (SN), Ministry of Finance, Revidert nasjonalbudsjettet 2001 (MoF), Norges Bank, Inflasjonsrapport 2/2001 (NB).

however, was reduced with effect from 1 July, and the contribution of indirect taxes to the consumer price index *excluding energy prices* can be estimated at about 0.5 per cent in the second half of 2001. In the first half of 2002, changes in indirect taxes for consumer goods may, under our assumptions, contribute to reducing the rate of price inflation by about 1.3 percentage points.

Higher real wage growth next year

Growth in wages per normal man-year is estimated about 4.6 per cent this year and is likely to be slightly lower next year, dropping further in 2003. The cyclical downturn now being experienced by large parts of the world points to less favourable profitability in manufacturing and thus lower wage growth. Fairly high productivity growth is a factor indicating the

opposite. Relatively high and stable pressures in the labour market, measured by unemployment, have contributed to increasing the level of real wages in Norway. In our view, however, developments in this area do not indicate higher wage growth in 2002 since the level of unemployment now has been approximately the same for several years. Moreover, labour market mismatches appear to have been reduced, which will push down wage growth in the period ahead. In 2002, a main settlement will take place and experience shows that this contributes to higher wage growth. Teachers' salaries are also expected to contribute to high wage growth this year and next, but not in 2003. In 2003, however, pressures in the labour market are expected to increase somewhat.

Continued large current account surpluses

In the first half of 2001, Norway recorded a current account surplus of a good NOK 113 billion, primarily as a result of high oil prices and sizeable petroleum production. For 2001 as a whole, the surplus is projected at a little less than NOK 210 billion, equivalent to about 14 per cent of GDP. It is then assumed that crude oil prices in the second half of the year will be slightly below the level in July and August. Inasmuch as it is assumed that the Norwegian krone will appreciate against the US dollar, whereas the oil price in dollar terms will remain at the current level, the oil price in krone terms will edge down in the years ahead. Admittedly, oil and gas production and exports will increase, but it is assumed that the value of oil and gas exports has passed a peak and will hereafter fall. Sluggish price developments for Norway's traditional export goods will contribute to falling export earnings, while import growth will increase noticeably in pace with rising growth in Norwegian demand. Trade surpluses are therefore expected to fall in the years ahead. As the return on the Petroleum Fund gradually increases, the interest and transfers balance will show an improvement. The deterioration in the current account balance will therefore be less than the reduction in the trade surplus.

Can Norway afford the National Insurance Scheme?

The challenge to Norway's social security policy in a European context¹

Knut Moum and
Ingvild Strømsheim Wold*

The article presents calculations that show that the pension burden may rise considerably faster in Norway than in the EU over the next fifty years. This must be viewed in light of the fact that relatively favourable demographic developments in Norway are more than counteracted by an estimated sharp increase in pension per beneficiary in real terms. At present, however, Norway enjoys a considerably more propitious financial situation than the EU countries. The Norwegian government has sizeable net assets and substantial petroleum wealth, which can be regarded as an implicit partial funding of future pension obligations. However, preserving today's pension system requires considerable government saving in the years to come. Continual use of petroleum revenues corresponding approximately to the expected real return on the Government Petroleum Fund implies that in the future Norway must either implement cutbacks in the pension system or accept that other expenditure categories will increase more slowly than direct and indirect taxes from mainland Norway.

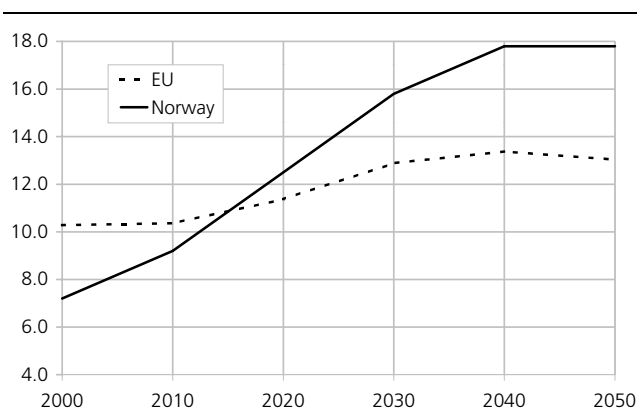
Introduction

During the last fifteen years the question of the long-term viability of public pension schemes has been high on the political agenda. In Norway and in a number of other industrial countries, these schemes involve "pay-as-you-go" financing to a considerable degree. This means that current disbursements are financed by taxes on current value added. Increased longevity and an increasing number of disability pensioners and early retirees, however, have placed strains on established schemes. For a number of industrial countries, continuing to raise pension levels in line with earlier intentions would involve an increase in expenses that would be considerably more rapid than the rise in value added as measured by GDP. This is illustrated for the seven major industrial nations as well as for Sweden by Chand and Jaeger (1996), among others, and for 20 OECD countries by Roseweare et al. (1996). Recently the Ecofin (2000) (EU's council of ministers of finance) also presented estimates for 13 EU countries. For Norway, such calculations have been made on a number of occasions; see, for example, Frederiksen (1998a) and the Ministry of Finance (2001a). If such pension growth takes place without prior accumulation of sufficient financial reserves, the tax burden must either rise over

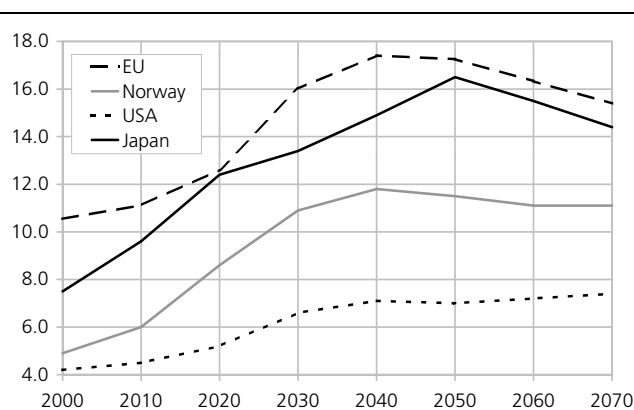
time and/or other public expenditure must be reduced. Such adjustments can have undesired consequences both for income distribution, broadly speaking, and for the economy's efficient use of resources. This article examines the expected growth of Norway's pension burden in a European context. Calculations in the Long-Term Programme 2002-2005 and updated estimates from Statistics Norway's microsimulation model, MOSART, show that relatively favourable demographic developments in Norway are more than counteracted by an assumed sharp real increase in pension per beneficiary. Accordingly we shall examine some possible adjustments to this challenge to pension policy, including funding as an alternative to pay-as-you-go. We shall argue that Norway, over the last 25 years, has implicitly followed a strategy of partial funding. Furthermore, considering current expectations about future petroleum revenues, it looks as if a continuation of the fiscal policy pursued over the last 2-3 years would gradually lead to a situation in which the present value of all future pension payments would have a counterpart in government assets or remaining petroleum wealth. This picture can be altered if, from now on, we phase petroleum revenues into the Norwegian economy in pace with the expected return on the Government Petroleum Fund.

¹ This article is an updated version of a speech given at the conference "Challenges to the Nordic Welfare State," Copenhagen, October 13-15, 2000. We have incorporated new figures for pension obligations in Norway and the EU from, respectively, the Ministry of Finance (2001a) and Ecofin (2000). We thank Axel West Pedersen for his comments on the speech, and Ådne Cappelen, Arne Magnus Christensen and Erling Holmøy for constructive comments on an earlier draft.

* This article was prepared while Knut Moum was Head of Research and Ingvild Strømsheim Wold was economist at Statistics Norway. Both now work in the Ministry of Finance. The article was translated from Norwegian by Helle Snellingen.

Figure 1. Pension burden: Old age and disability pension as share of GDP. Per cent

Sources: Ecofin (2000), Ministry of Finance (2001a).

Figure 2. Pension burden: Old age pension as share of GDP. OECD estimates. Per cent

Source: Roseweare et al. (1996).

Future developments in the pension burden

In a pay-as-you-go system, pension payments are financed by taxes on current value added. In order to quantify the burden under such a system, it is usual, when making international comparisons, to look at payments in relation to Gross Domestic Product (GDP).² Table 1 shows that old-age and disability pensions in Norway accounted for roughly 7 per cent of GDP in 2000. This is a markedly lower portion than for most of the EU countries. According to the calculations by Ecofin (2000), the GDP share for most of these countries was between 9 and 14.5 per cent, with an estimated GDP-weighted average of 10.3 per cent. Of the EU countries, only the UK and Ireland

had a lower share than Norway in 2000, with GDP shares of around 5 per cent.

The table also presents Ecofin's projections for the EU countries for the year 2050, and estimates for Norway from the Long-Term Programme 2002-2005 (see Ministry of Finance 2001a). Both Ecofin and the Ministry of Finance estimate that the pension burden will rise in the future. This is evident both from the table and from figure 1, which show the estimated growth in the pension burdens for Norway and the EU over the next fifty years. According to these estimates, the pension burden in Norway in 2050 may exceed the average for the EU countries by 5 per centage

Table 1. Pension burden, dependency ratio, demographic features, employment ratio, and change in compensation ratio in Norway and 13 EU countries

	Pension burden		Dependency ratio		Fertility rate		Average life expectancy		Employment ratio		Percentage change in compensation ratio 2000-2050
	2000	2050	2000	2050	2000	2050	2000	2050	2000	2050	
Germany	10.3	14.6	26.0	53.3	1.4	1.5	77.8	82.5	65.3	67.8	-28.3
France ¹	12.1	15.8	27.2	50.8	1.7	1.8	78.8	83.5	62.1	65.6	-26.2
Italy	14.2	13.9	28.8	66.8	1.2	1.5	78.8	83.5	53.8	65.0	-49.1
Great Britain	5.1	3.9	26.4	46.1	1.7	1.8	77.6	82.5	71.5	72.3	-55.7
Austria	14.5	15.1	25.1	55.0	1.3	1.5	78.1	83.5	74.4	88.3	-43.6
Belgium	9.3	12.6	28.1	49.7	1.5	1.8	78.4	83.0	59.1	62.7	-18.7
Denmark	10.2	13.2	24.1	41.9	1.8	1.8	76.6	81.0	76.8	77.0	-25.3
Finland	11.3	16.0	24.5	48.1	1.7	1.8	77.5	82.5	68.3	68.4	-27.8
Ireland	4.6	9.0	19.4	44.2	1.9	1.8	76.7	81.5	67.4	75.9	-3.3
The Netherlands	7.9	13.6	21.9	44.9	1.7	1.8	78.2	82.5	65.3	66.6	-14.4
Portugal	9.8	14.2	25.1	48.7	1.5	1.7	75.6	81.0	68.5	71.7	-21.8
Spain	9.4	17.7	27.1	65.7	1.2	1.5	78.5	82.0	55.9	68.0	-5.6
Sweden	9.0	10.0	29.6	46.1	1.5	1.8	79.7	84.0	73.1	77.3	-24.6
EU-13	10.3	13.0	26.7	53.4	1.5	1.6	78.2	82.8	61.4	66.3	-31.6
Norway	7.2	17.8	25.9	41.4	1.8	1.8	78.4	82.5	78.3	78.2	24.9

¹ The figure for dependency ratio is for the year 2040.

Sources: Ecofin (2000), Ministry of Finance (2001a), Statistics Norway and our own calculations.

2 This approach is used by Ecofin (2000) and the Ministry of Finance (2001a). One can argue, however, that national income and not GDP should be used in such comparisons. National income also includes, among other things, the return on the country's net foreign assets. With such assets accumulating very rapidly, GDP is a less reliable measure of national income for Norway than for most other industrialized countries. Since the accumulation of assets, in part, has its corollary in the reduction of petroleum wealth, it should also ideally be adjusted for this. This could be done by calculating GDP excluding the excess return deriving from petroleum activity (petroleum rent) by calculating national income and then adding the estimated return on petroleum wealth. The concepts of petroleum rent and petroleum wealth are explained in an appendix.

points. Of the EU countries, only Spain is expected to be faced with approximately the same pension burden as Norway in 2050, and none of the EU countries will experience anything close to the same estimated growth in the pension burden during the period as will Norway.

The calculations referred to above deviate slightly from earlier estimates of the growth in *old-age* pensions in Norway and in a selection of OECD countries that were presented in Roseweare et al. (1996). As shown in figure 2, the earlier calculations assumed that Norway's old-age pension burden would also be relatively low in 2050, even though these calculations also showed a sharp increase in the pension burden for Norway over the next 50 years. Several EU countries have implemented changes in their pension systems in the wake of the estimates by Roseweare et al. This may imply that their figures for these countries are systematically overestimated. One merit of the calculations, however, is that the figures for the individual countries have been arrived at by means of a uniform method of calculation. This is not necessarily the case when we compare the estimates for Norway in the Long-Term Programme with Ecofin's estimates for the EU countries. Below we will take a closer look at the significance of different assumptions for the scenarios associated with these two projections.

Why is the growth in Norway's pension burden expected to be so high?

In order to understand the background of the pension developments outlined above, it is appropriate to decompose the pension burden by contributions from the following key variables:

$$(1) \quad \frac{P}{X} = \frac{W}{X} * \frac{p}{w} * \frac{N^B}{N^Y} * \frac{1}{N^E/N^Y}$$

Here P is pension expenditure, X is Gross Domestic Product (GDP), W is aggregate wage expenditure, and N is number of persons. p is pension per beneficiary, and w is wage cost per employee. B , Y , and E stand for, respectively, the beneficiaries, those of working age, and the employed.

According to the decomposition in (1) the pension burden (P/X) can be considered as the product of wage share (W/X), compensation ratio (p/w),

dependency ratio ((N^B/N^Y)) and the inverse of the employment share ((N^E/N^Y)).

Historically, the wage share has been reasonably stable. If we disregard that this may change in the future,³ the growth in the pension burden will depend on developments in the following three key ratios:

- Dependency ratio
- Employment ratio
- Compensation ratio

The dependency ratio is given by the sum of the number of old-age and disability pensioners relative to the working age population,⁴ while the corresponding compensation ratio denotes the ratio of average benefits for old-age and disability pensioners to average wage cost.⁵ Unfortunately, unlike the Long-Term Programme 2002-2005, the report from the Ecofin contains no estimates for these two ratios. It does, however, give the expected growth in number of persons over 64 relative to the number of persons in the working population, defined as the population between 20 and 64. In the following, the discussion will be confined to this last ratio as an indicator of the growth in the dependency ratio, and we will refer to it as the demographic dependency ratio. We can residually calculate an associated estimate for the compensation ratio. This estimate is the product of two variables: the actual compensation ratio and the number of old-age and disability pensioners relative to the number of persons over 64. Over time the latter ratio is influenced primarily by two factors: changes in the average retirement age and changes in the number of disability pensioners relative to the number of old-age pensioners. This must be taken into account in interpreting changes in the three key ratios for Norway and the EU.

Developments in the dependency ratio

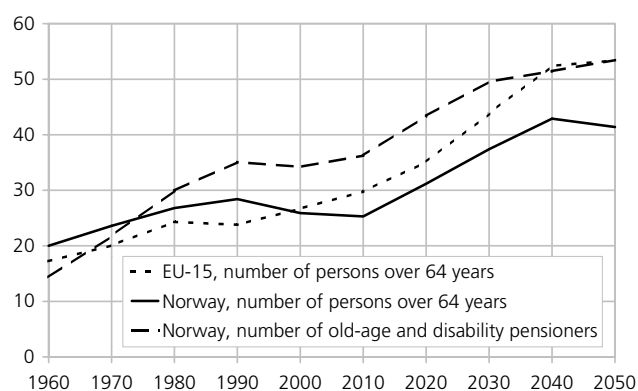
Figure 3 shows developments in the demographic dependency ratio for the EU countries and Norway through the second half of the last century, and projections for the first half of the current century. While the figure only includes this variable for the EU, for Norway the figure also shows the change in the relationship between old-age and disability pensioners and the working population, i.e. the actual dependency ratio. What emerges from the figure is that the actual dependency

3 Both the ageing of the population and the adjustment to this (for example in the form of increased saving) can in principle influence the wage ratio. In Norway's case the expected decline in oil activity is likely to have the greatest significance, since value added per employee is significantly higher in this sector than in the rest of the economy.

4 In the decomposition, we are interested in the dependency ratio that is associated with the retired population. Children and young people are also dependants. The total dependency ratio is the sum of these two variables. The change in the dependency ratio associated with children and young people has significance for the economy's ability to sustain the burden of the dependency ratio associated with the elderly. If the last figure rises as a result of higher life expectancy or lower retirement age, however, there is limited comfort to be found in a decrease in the number of children. This will also gradually have the effect of reducing the working population.

5 In this decomposition, changes in average working hours that are not offset by a corresponding change in wage per hour influence the wage cost per employee and thus the compensation ratio. In the calculations for Norway, more or less unchanged working hours are assumed over the projection period. The same is presumably the case for the EU calculations, since these take account only of approved changes in economic policies.

Figure 3. Number of persons over 64 years of age / number of old-age and disability pensioners relative to the number of persons aged 20-64. Per cent

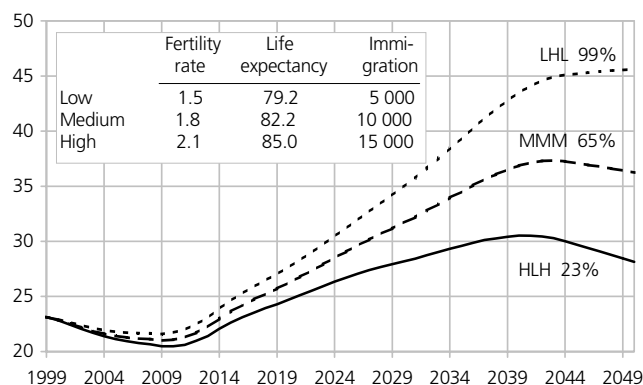


Sources: UN (1998), Ecofin (2000), Statistics Norway's population statistics and our own calculations.

ratio, according to the estimates in the Long-Term Programme, will roughly keep pace with the demographic dependency ratio over the next 50 years.⁶ If we look back in time, however, the number of old-age and disability pensioners has risen much faster than the number of persons over 64 years of age. The figure also shows that, as measured by the first indicator, Norway has thus far had a dependency ratio higher than the EU average. This picture, however, is changing. In the years to come, many of the EU countries stand to experience a considerably higher dependency ratio than Norway. This development is also illustrated in table 1. According to the table, the EU will double the demographic dependency ratio between 2000 and 2050, while the figures for Norway suggest a rise of 60 per cent.

Table 1 also shows that the large continental European countries face a considerably greater demographic challenge than the UK and most of the smaller European countries. Italy and Spain are in a class of their own, while Germany and France are close to the EU average. It would thus appear that the problems generally become greater the farther south one goes in Europe. The table suggests that the particularly unfavourable demographic change in the southern European countries is related to a low fertility rate, since the estimated increase in life expectancy is not particularly pronounced. It is nonetheless worth noting that Ecofin has assumed that the fertility rate will rise in all the EU countries except Ireland and

Figure 4. Dependency ratio 1999-2050, three alternative estimates. Per cent



Sources: Statistics Norway and our own calculations.

Denmark, while the fertility rate is postulated to remain stable in Norway. The increase in the fertility rate in Italy and Spain is quite substantial. With a continuation of today's low birth rates the rise in the dependency ratio in these countries, as well as in Germany, may become even more pronounced than suggested in the table. This underscores the significance of the fact that future birth rates, life expectancy, and other key demographic factors are not known variables, and that considerable uncertainty is associated with the long-term population projections.

The significance of the uncertainty surrounding future demographic variables is further illustrated in figure 4. The figure shows three alternative paths for the dependency ratio in Norway based on different estimates of the fertility rate, life expectancy, and immigration. The dependency ratio is here defined as the number of persons 67 or older, as a proportion of the population between 20 and 66. The figure is thus not fully comparable with the previous figure. This has no significance, however, as far as the main point is concerned: namely, that reasonable variations in assumptions as to the overall fertility rate, anticipated life expectancy, and estimated immigration levels can have considerable impact on the dependency ratio over a 50-year horizon. It is worth noting that the variations in assumptions lie within, or in the vicinity of, what we have historically observed in Norway or other industrial countries.⁷

6 There is reason to believe that this roughly applies also to the EU estimates, and that the use of the demographic dependency ratio as a substitute for the real dependency ratio therefore has little impact on the decomposition of the pension burden. According to Ecofin (2000), pages 4 and 12-18, there are only minor changes in the different age limits qualifying for pensions after 2004. The report does not address changes in disability, which may indicate an assumed constant rate of disability over time.

7 During the post-war period, until the beginning of the 1970s, the fertility rate in Norway was higher than in the high scenario. Even though the fertility rate in the low scenario has not been observed in Norway during the last fifty years, as much as eight EU countries did, during the mid 1990s, have a comparably low aggregate fertility rate (Belgium, Sweden, and the Netherlands) or an even lower rate (Germany, Austria, Spain, Portugal, and Italy). As far as life expectancy is concerned, we note that the low scenario is less than a year over the average life expectancy at birth in 1998, while the high scenario is closer to seven years above this level. Such an increase in average life expectancy at birth may seem very sizable, but is nevertheless only a year greater than the increase between 1950 and 1998. For immigration, the middle scenario is on the higher side of the observed average for the 1990s, while the low scenario is close to the average for the previous twenty-year period.

Even though the figures are uncertain, the figure illustrates that the future dependency ratio will, in all likelihood, show a considerable increase. Even given a stabilization of life expectancy at today's level, a rise in birth rates to reproduction levels, and the highest of the alternative projected immigration rates, the dependency ratio will, as shown in the figure, rise from 23 per cent in 2000 to 28 per cent in 2050, i.e. by over 20 per cent. The dependency ratio, however, will be *twice* today's level in 50 years' time, if life expectancy continues to rise at the same rate as during the second half of the last century, if the fertility rate falls to the average for the EU countries, and if net immigration drops to the levels reported in the 1970s and 1980s. The middle scenario would lead to developments roughly halfway between these two extreme variants, with growth in the dependency ratio of about 60 per cent.

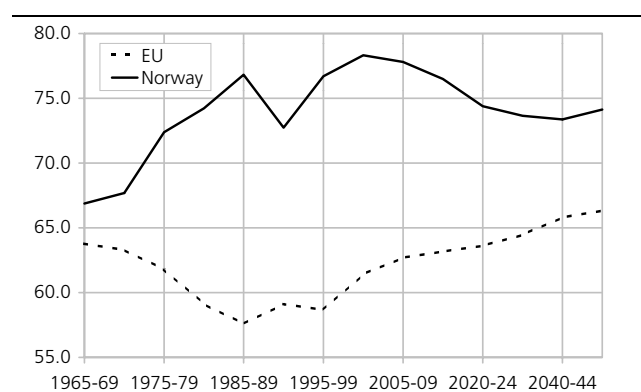
Employment ratio

Far from all persons of working age are employed in income-generating work.⁸ This may be due to, among other things, unemployment, education, work at home, illness, disability, or early retirement. Thus it is not clear that the employment ratio will be stable over time. As illustrated in figure 5, neither the EU countries nor Norway has had a stable employment ratio over the last 40 years.

While the employment ratio generally exhibited a rising trend in Norway during this period, the reverse was the case for many of the EU countries. In the latter half of the 1990s, more than 75 per cent of the Norwegian population between 16 and 64 were engaged in income-producing work. At the same time the average for the EU was under 60 per cent. Over the next 50 years, the Long-Term Programme expects relatively stable age- and gender-specific employment and no significant changes in unemployment. This also implies that the employment share will remain fairly stable. Given the high Norwegian employment level, it is unlikely that it will rise in Norway in the years to come. The labour force participation rate for women is still lower than that of men, and some increase among some age groups is conceivable. If this does not occur, i.e. if age- and gender-specific labour force participation rates remain unchanged, changes in the age composition of the population will give a slight decrease in the average labour force participation rate later in this century.

The high employment share partly explains Norway's low pension burden relative to that of many other countries, but it is not unlikely that this difference will narrow in the future. Ecofin thus assumes that in the future the labour force participation rate will rise somewhat in the EU countries, while unemployment is assumed to fall. Both factors suggest an increase in the employment

Figure 5. Employment in per cent of the population between 16-64. Five-year averages 1965-2050. Break in the series in 2000¹



¹ The numbers are arrived at by extending the historic series of employment ratios for the 16-64 age group from the OECD. For the EU, the series is extended using growth rates taken from Ecofin's projections for the 20-64 age group. For Norway, the series is extended using the growth rate for the 16-74 age group based on a projection with constant age-specific employment ratio and steady unemployment rate. This projection is close to the estimates in the Long-Term Programme 2002-2005.

Sources: OECD, Ecofin (2000), and our own calculations.

share. With a time horizon as long as 50 years, however, one must also take into account the fact that a higher participation rate will be accompanied by higher pension payments, because those who have been employed generally receive higher pensions than those who have not. It is not clear from the source to what extent this factor has been taken into account in Ecofin's calculations.

Compensation ratio

Compared with many EU countries, Norway stands to experience relatively favourable demographic changes. Nonetheless figure 1 and the figures in table 1 indicate that the pressure on state finances may prove to be particularly strong in Norway. This is due primarily to different assumptions as to future changes in the compensation ratio.

In most countries changes in the compensation ratio are subject to a relatively complicated set of regulations. In Norway the pension from the national insurance scheme consists of three components: basic pension, supplementary pension, and special supplement. The basic pension is owed to all, and is tied to the current value of the national insurance scheme's basic pension unit. The supplementary pension is linked, but not rigidly, to the individual's previous labour income. Because of the entitlement rules, this linkage will not be fully implemented until the cohorts born around 1950 retire. In order to ensure a reasonable income level for persons without supplementary pension, or with low supplementary pension, the national insurance scheme also provides for a special supplement that is now equivalent to approximately 80 per cent of the basic pension unit. The minimum pension consists of the basic pension plus this special supplement.

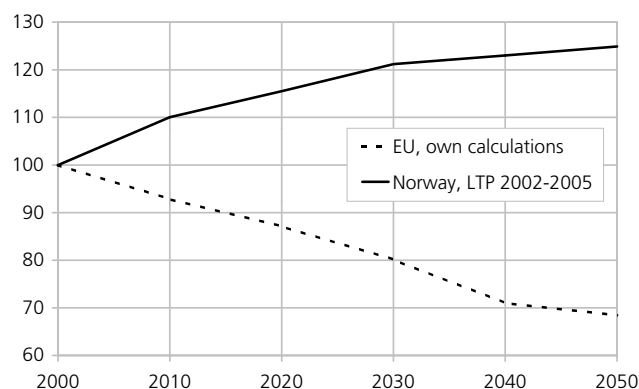
⁸ A small fraction of the population over 65 is also employed, but this has no substantial implications for the following reasoning.

For a given set of rules, the rise in the compensation ratio is determined in the Norwegian system partly by indexation of the basic pension unit and partly by the prior employment of the pensioners. There have been clear political signals that the adjustment of the basic pension unit will enable pensioners with a national insurance pension to receive increases in income that are approximately in line with the increases enjoyed by the employed. Ever since the national insurance scheme was introduced, however, the basic pension unit has risen more slowly than average wages. This also applies to the last 15-20 years and the annual difference has been approximately percentage point in disfavour of the basic pension unit during this period. That the minimum pension has nonetheless clearly risen faster than average wages can be explained by an upward adjustment of the special supplement. An effect of this practice, however, is a reduction in the future growth of the supplementary pension. This is because there is a ceiling on the income that qualifies for earning supplementary pension entitlements, and this ceiling is dependent on the size of the basic pension unit.

Fredriksen (1998b) looks at possible future developments in the compensation ratio based on two different assumptions as to the indexation of the basic pension unit. By wage-indexing the basic pension unit over the next 50 years, he estimates a rise in the compensation ratio of about 17 per cent for men and 37 per cent for women between 2000 and 2050. In an updating of the type of MOSART-calculations that are presented in Fredriksen (1998a), the average compensation ratio for old-age, disability, and early-retirement pensioners is estimated in line with this to rise by a good 23 per cent between 2000 and 2050. With a continued slower growth of the basic pension unit of 3/4 per cent per year over the next 50 years, the compensation ratio, according to Fredriksen (1998b), will fall by around 14 per cent for men. However, the rise in the participation rate from about 1970 and into the future will in this case also contribute to a rise in the average compensation ratio for women, but only by a couple of per cent. If the difference between the rise in the basic pension unit and average wages is smaller than 3/4 per cent per year, then, there is a likelihood of a marked increase in future compensation ratios, partly as a consequence of the phasing in of supplementary pension and partly as a result of an increased labour force participation rate among women over the last 30 years. Basing its calculations on estimates from the National Insurance Administration, the Long-Term Programme 2002-2005 assumes an increase in the average compensation ratio of around 25 per cent (appendix table 2.3). This development is illustrated in figure 6.

Ecofin (2000) provides an overview of current rules for the indexing of pensions in the EU countries. It is evident from this overview that some countries index pensions to wages and some to consumer prices,

Figure 6. Average compensation ratio. Index 2000=100



Sources: Ecofin (2000), Ministry of Finance (2001a) and our own calculations.

while others have chosen a combination of the two. The report from Ecofin, however, contains no figures for expected changes in the compensation ratio, neither for individual countries nor for the EU on average. We can, however, use the relationship given in equation (1) to calculate the *change* in the compensation ratio implied by the estimates for the pension burden, the dependency ratio, and the employment share, if we assume a stable wage share over time. The result is shown in table 1 and in figure 6.⁹

Figure 6 illustrates a very important difference between the projections for the EU and Norway. Given a continuation of current rules and an assumption of wage indexing, the compensation ratio in Norway is expected to rise by around 25 per cent. Ecofin's figures, meanwhile, imply that the compensation ratio will decline markedly in the EU, by a little more than 30 per cent over the next 50 years. The sharpest declines are estimated for Italy, the UK, and Austria, with an approximate halving in the compensation ratio. This must be considered dramatic. In contrast to Norway, then, Ecofin's figures seem to indicate that the EU countries, to a greater or lesser degree, are preparing to meet the pension challenge by providing pensioners with a substantially lower degree of income growth than that achieved by the economically active.

Some possible responses to the pension policy challenge

Regardless of the pension schemes, it is always the case that the source of current pensions must be current income. Basically, there is a limited number of options as to *how* we, as pensioners, will acquire our share of this income. We can raise our families and hope that future generations will be willing to support us, or we can set aside funds (in the form of durable consumer goods, durable production equipment, or "durable" claims on others). Pay-as-you-go social security systems are based on the first model, fund-based pension schemes on

⁹ The estimate must be regarded as tentative, since the residually calculated change in the compensation ratio, as mentioned, also captures the assumed changes in pension ages and in the number of disability pensioners. As mentioned in footnote 6, however, there is reason to believe that these changes is assumed to be small, at least after 2004.

the other. Below we will first briefly examine some possible responses to the pension policy challenge associated with pay-as-you-go systems. We shall then consider funding as an alternative approach.

Pay-as-you-go

As illustrated above, demographic changes – and, in the case of Norway, rising compensation ratios – suggest that pensions will account for a rising share of GDP later in this century. If compensation rules remain unchanged, societies with pay-as-you-go systems must respond to such developments by raising taxes or by reducing public benefits other than pensions. *Reduction of public benefits* can be problematic from a welfare perspective, in terms of both efficiency and distribution considerations, depending on the benefits selected. *Increased taxation* of the broad tax bases earned income and consumption can, for its part, also reduce the incentive to work, by further shifting the private financial trade-off between consumption and leisure in favour of leisure. Such a shift can result in social losses if it in fact results in people working less than what is optimal from an economic viewpoint.¹⁰

Over time, one result of a rising tax level will be that future employees will keep a smaller portion of their income than present-day taxpayers. With sufficient growth in productivity, however, they can in real terms be left with more after taxes than today's employees. A simple calculation illustrates this possibility: according to estimates in the Long-Term Programme, the pension burden in Norway will rise from 7.2 per cent of GDP in 2000 to 17.8 per cent in 2050. An average GDP growth of about 1/3 per cent per year would suffice for GDP (less the pension burden) to be as large as it is today, viewed in relation to the population (excluding pensioners). A higher growth rate makes it possible for everyone to achieve real income growth after taxes. The material welfare of the working population, however, will rise considerably more slowly than productivity. It is therefore likely that future working generations may at some point refuse to meet their predecessors' expectations, even though, in principle, they will be making similar demands on later generations.

Another possible approach to addressing the future pension challenge is *to reduce or reverse growth in the compensation ratio*. This can be done by underindexing pensions in relation to wage growth. As argued above, it looks as if underindexing is in the process of becoming an important part of the EU countries' strategy for "solving" the pension problem. A striking consequence of such an approach is the reduction of pensioners' level of welfare growth. If a considerable underindexing of public pension schemes is not combined with one or another form of individual saving, society may again gradually face a large *relative poverty* problem. Such problems were, in their time, among the reasons why public welfare schemes were introduced.

A third approach can be to raise the retirement age. In the 30-odd years that have passed since the national insurance scheme was introduced in Norway in 1967, life expectancy at birth has risen by about 4.5 years for both men and women. With a constant formal pension age, such a rise in life expectancy will almost entirely translate into an increase in the number of years as a pensioner. The drop in the real pension age in Norway has contributed to the fact that a larger proportion of people's lives is spent living on a pension. A possible answer to the pension policy challenge can thus be to raise the actual retirement age instead of lowering it.

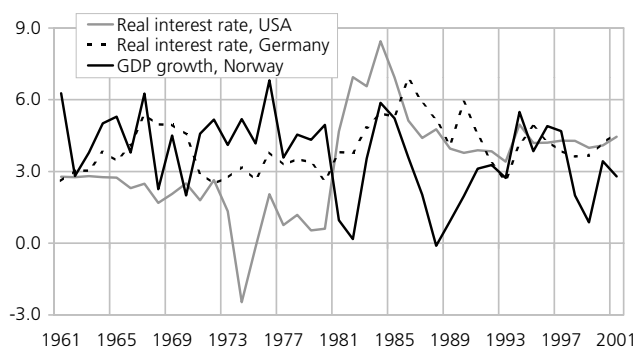
Funding as an alternative to pay-as-you-go

When comparing pay-as-you-go financing and funding of public pension plans, it can be appropriate to distinguish between a situation in which one or another system is fully implemented and the transition from one to the other. In a fully funded system, people save for their own pensions, and the earnings on the saving correspond to the real rate of return. For participants in a pay-as-you-go system, the world looks a little different. They pay for their predecessors' lives as pensioners, and assume that their descendants will pay for them in the same way. Seen in this way, the financing of predecessors' pensions can be regarded as a contribution, where the return is determined by the size of the pension payments they themselves will receive later in life. As shown by Aaron (1962), this return is roughly equal to GDP growth.¹¹ A pay-as-you-go pension system thus makes for a higher pension for a given contribution than

10 A person who reduces his or her work effort by one hour per week will have one hour more in leisure. The personal cost of this is a reduction in purchasing power approximately equivalent to the value of the hourly wage after direct and indirect taxes. Value added, however, shows a considerably larger decline, approximately equal to the value of the hourly wage, including employers' contribution tax.

11 In order to understand the logic of this result, it is appropriate to make some stylized assumptions. First, assume that the compensation ratio is not changed, i.e. that pensions make up a fixed portion of the real wages of the economically active (for example, 2/3). Second, assume that both life expectancy and the pension age remain constant, and that the pensioner period is equal to a fixed per cent of the economically active period (say, 1/3). Finally, assume that the population is stable over time. Under these assumptions, the individual pay-as-you-go participant will work during three periods and be pensioned during one. In each of the economically active periods, she has relinquished 1/3 of 2/3 of her real wage. In return, she receives, as a pensioner, 2/3 of the prevailing real wage from subsequent generations. The return per period is given by real wage growth. This is easily seen if we think of the pension as divided into three equally large sums. The first third of the 2/3 of the prevailing real wage can be regarded as a return on the third of the 2/3 of the then-prevailing real wage that was used to finance pensions three periods earlier. Obviously this "contribution" has in three periods had an annual growth equal to real wage growth. Likewise, the second 1/3 may be viewed as the return on the third of the 2/3 of the then-prevailing real wage that was used to finance pensions two periods earlier, and so forth. Assume now that the population is not stable, but grows over time. This means that every new generation of workers is larger than the preceding one, and therefore does not need to contribute an entire 1/3 of 2/3 of prevailing real wage to the financing of social security in a single period. The rate of return thus becomes higher than the growth rate of real wages, or, to put it more specifically, is roughly equal to the sum of the periodic growth in real wages and in population, which normally is roughly equal to GDP growth rate.

Figure 7. Real interest rate and GDP growth 1961-2000. Per cent



Sources: OECD and Statistics Norway.

does a fully funded system, if the GDP growth rate is higher than the real rate of return on financial investment and vice versa.

The above result can also be expressed in the following way: if GDP growth is lower than the real rate of return on investment, all generations cannot profit from a transition from funding to a pay-as-you-go system. The first generation, however, will always profit from the transition, because it does not need to contribute to the system. Accordingly, there is profit to be reaped for the birth cohorts that manage to raise its own compensation ratio or the length of the pension period (which comes with lower pension age or longer life expectancy) in relation to its predecessors. The increased burden is passed on to the subsequent generation, and so on, until the system is dismantled or breaks down. These kinds of changes to a pension system can be likened to an intergenerational ponzi game. The first generation receives something without making a corresponding contribution, whereas later generations must pay for their pensions by contributing to their parents' support. If the system breaks down, the last paying generation is left holding the bag, since they have paid something in without getting anything out.

As the above discussion illustrates, the relationship between GDP growth and the real return on investment is crucial in evaluating the logic of a pay-as-you-go system. Figure 7 sheds some light on this. First of all, the figure shows real growth in Norway's GDP over

the last 40 years. In the first half of the period the growth rate averaged 4.5 per cent annually; in the second half it was 2.8 per cent. For the period as a whole growth was around 3.6 per cent. We can further observe developments in real yields on government bonds in the US and Germany, which provide an indication of the long-term level of return on fairly sound investments. In the first half of the period the interest rate averaged 1.7 per cent in the US and 3.6 per cent in Germany, whereas in the second half it stood at 4.5 per cent in both countries. Thus the interest rate was first substantially lower than, and afterwards considerably higher than, the GDP growth rate for Norway. For the period as a whole the real rate of return on investments in government bonds was 4.1 per cent in Germany and 3.2 per cent in the US. Fixed investment and equity investments have systematically generated a considerably higher return than investment in government bonds, but have probably also involved greater risk.

The fact that the real rate of return on many investments has been systematically higher (sometimes considerably higher) than the GDP growth rate has induced some economists to argue in favour of a shift from pay-as-you-go pension systems to funded systems; see, for example, Feldstein (1997). The point is that individuals will fare better in the long term if they can invest their pension contributions with a real rate of return that is clearly above the GDP growth rate. A transition, however, will involve a double burden on the generation or generations that must both save for their own pension and finance their predecessors' pay-as-you-go-based benefits, a burden that corresponds to the one-time gain reaped when the system was introduced (or the pension period extended). An important question thus becomes whether a transition to funding allows for a profit that is large enough to compensate the transition cohorts for the double burden.

As pointed out by Breyer and Straub (1993), the answer is generally no, if there are no efficiency losses associated with the tax funding of the pay-as-you-go system.¹² If the additional taxation that is necessitated by a pay-as-you-go system leads people to work less than they would have in a funded system with a lower tax level, however, it is possible to come out better. In such circumstances there is a real economic

12 To illustrate the principal point we make a few simplifying assumptions. Assume, first, that all agents enjoy the same real rate of return, and that this rate is higher than the GDP growth rate. Further assume that an arbitrary individual in the first cohort who will not be financed by a pay-as-you-go system saves an amount equal to that which she otherwise would have paid to finance her predecessors' pensions. This amount gives a return per krone that is equal to the interest rate, while in the pay-as-you-go system it would have given a return per krone equal to the GDP growth rate. In order to finance the social security disbursements that are now not covered by payments into the pay-as-you-go system, the state borrows. If no principal is paid, this debt will increase from period to period at a rate equal to the rate of interest. Since the rate of interest is assumed to be higher than the GDP growth rate, the debt will rise relative to GDP. In order to keep the debt constant as a share of GDP, annual downpayments must be approximately equal to the difference between the real rate of interest and the GDP growth rate. If every individual in the first generation without a pay-as-you-go pension finances this repayment in addition to his or her own fund accumulation, the profit from funding will be canceled out by the increased tax payment which purpose is to keep the state's debt stable in relation to GDP. The increased tax per krone of the shortfall in pension contributions is approximately equal to the difference between the real interest rate and the GDP growth rate, which is precisely equal to the gain per krone invested in the new pension funds.

cost tied to social security funding, which can be reduced or eliminated by shifting towards funding. Such a possible gain can be shared between the generations by using public borrowing as a part of the financing of social-security payments while moving towards a funded system. These kinds of gains, however, can also be realized, at least in part, in a pay-as-you-go system. This requires a closer linkage between contributions and benefits so that the social-security tax (at the margin) is considered to be not a tax but a contribution to one's own pension. One disadvantage of such a linkage (and of funding) is that it may impair a pension system's redistributive role.

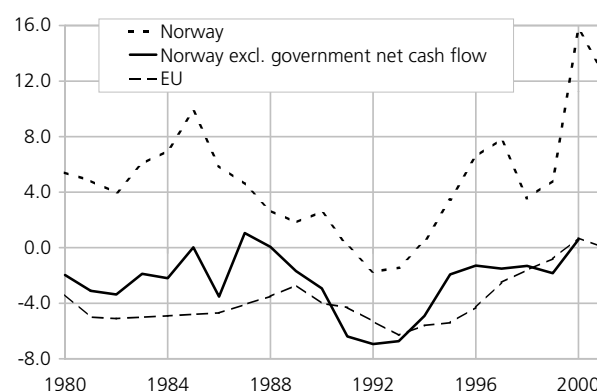
Pension expenditure and petroleum wealth – a Norwegian perspective

Excluding the efficiency losses associated with tax funding of pensions, there is not much to be gained by switching from a pay-as-you-go system to funding for an *existing* pension scheme. It will be a different matter if the question is one of expanding such schemes. In such cases one can also argue *from a distributional perspective* that generations that intend to live longer on pensions than their predecessors, and/or want to have fewer children and higher pensions relative to the incomes of the economically active, should not, in addition, raise the implied debt in the pension system, but should instead save more money.

The Norwegian social security system today involves no explicit saving.¹³ The Norwegian government does accumulate financial savings, however, unlike most of the EU countries. This is illustrated in figure 8, which shows developments in general government net lending in Norway and the EU over the past 20 years. While the EU countries have generally increased general government net debt during this period, the Norwegian government has accumulated both net assets and real capital. In part, this increased demand has its corollary in the decline of government petroleum wealth, while some is genuine saving. One may ask how large actual saving has been in relation to the accumulation of "debt" in the form of an increase in expected future pension outlays, how sizeable this "net wealth" is today, and how it may be expected to evolve in the future.

In an appendix, the relationship between general government wealth and net cash flow is explained in greater detail. It is illustrated that the overriding requirement of long-term balance in public finances means that the present value of all future expenditure must not exceed the sum of today's wealth and the present value of all future revenues. There is an array of possible paths for the future general government revenues and expenditure that are consistent with this

Figure 8. General government net lending 1980-2000. Per cent of GDP



Sources: OECD, Statistics Norway, Ministry of Finance and our own calculations.

requirement, but also many paths that are not. A policy that ensures stable general-government net assets over time, i.e. net lending that at all times equals zero, is clearly viable. Since not all revenues and expenditures grow at the same rate, however, such a path can involve considerable changes in tax and/or expenditure levels over time. This is hardly a desirable scenario.

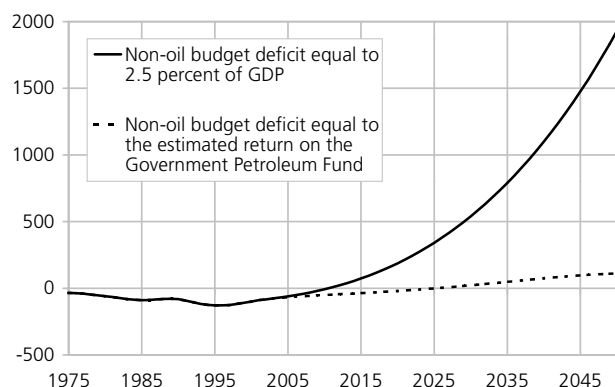
We have seen that pension disbursements by the National Insurance Fund may follow a different course in the future than the tax base as measured by GDP. The same is true of the net cash flow from petroleum activities. It may thus be appropriate to consider these as *wealth items* by calculating the present value of future revenue and expenditure flows. This leads to a broader definition of government "net wealth" as equal to net assets (including the Petroleum Fund) + the present value of government net cash flow from petroleum activities (petroleum wealth, including the government's share of the capital in the sector) – the estimated present value of future government old-age and disability pension disbursements under the national insurance/early-retirement scheme ("pension debt").¹⁴

At the end of 1999 government net assets, excluding the capital in the Government Petroleum Fund, came to around NOK 340bn. This item now changes little over time because the entire central government budget surplus is transferred to the Government Petroleum Fund. At the end of 2000 the capital in this fund amounted to just under NOK 390bn. In the Long-Term Programme 2002-2005 the present value of the government's future net cash flow from petroleum activities is estimated at a good NOK 2300bn at the beginning of 2001. The total value of the aforementioned assets thus comes to a good NOK 3000bn.

¹³ Originally such saving was intended to be part of the National Insurance Fund. After 1979, however, the Fund has not received any capital other than the return on its own investments.

¹⁴ Note that we include pension "rights" that are still not earned in the debt concept.

Figure 9. Change in government "net assets" under two alternative assumptions about fiscal policy and constant basic pension units in real terms. Constant prices. Index = 100 in 2000

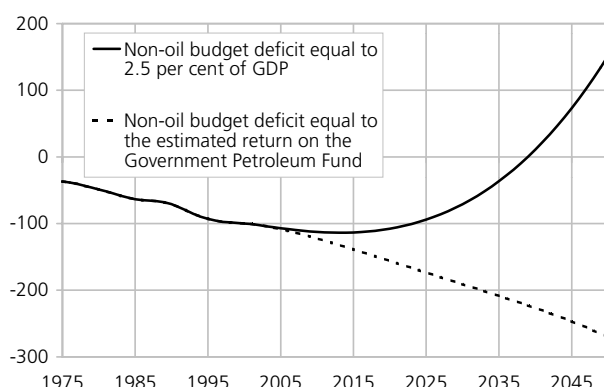


Sources: Statistics Norway, Ministry of Finance and our own calculations.

The Long-Term Programme also contains an estimate of the present value of the government's *accrued obligations* under the national insurance scheme. The size of the accrued obligations is relevant to a discussion of funding of earned pension rights, but constitutes only a part of the present value of the *expected future pension disbursements* under the national insurance plan. It is this last variable that is relevant to a discussion of the government's total finances, and it may be estimated on the basis of the updated calculations in Statistics Norway's microsimulation model MOSART.¹⁵

The MOSART calculations give estimates for changes in pension outlays measured in constant basic amounts, and can be converted into amounts in constant prices by applying an assumption about indexing. We have focused on the sum of old age and disability pensions, together with early retirement pensions. The rise in the average compensation ratio between now and 2050 in these calculations differs little from the corresponding estimates in the Long-Term Programme. The same applies to the estimates for the number of beneficiaries. In the period to 2050, therefore, there cannot be a very large difference between the estimates of future disbursements in the updated MOSART calculations and the estimates in the Long-Term Programme, even though the figures are not identical. The MOSART calculations, however, are carried through to 2200, and we have therefore made use of these as the starting point for calculating the present value of the government's expected future pension payments. In the calculations of present value we have assumed that the basic pension unit is wage-indexed.¹⁶ With a discount rate (real rate) of 4 per

Figure 10. Change in government "net assets" under two alternative assumptions about fiscal policy and a future real growth in the national insurance scheme's basic pension units of 1 per cent per year. Constant prices. Index = 100 in 2000



Sources: Statistics Norway, Ministry of Finance and our own calculations.

cent, this gives a present value for *future social security disbursements* of NOK 6900bn.¹⁷

This estimate of present value is very sensitive to altered assumptions as to changes in the basic pension unit. We have thus looked at two alternative paths: no real growth in the basic amount, and a real growth of 1 per cent per year. In the first of these cases the present value of future pension disbursements is reduced to somewhat below NOK 3800bn (2001 prices); in the other case the present value is estimated at around NOK 5450bn (2001 prices).

All three alternative estimates of the size of pension debt exceed the estimate of the total value of the three asset items mentioned above. In the case of fully wage-indexed future social-security disbursements, the difference is considerable. This implies that the present value of future tax revenues from the mainland economy must be correspondingly larger than future expenditure, excluding pension disbursements, if the balance in government finances is to be maintained. A sufficiently large surplus in the near future implies that the surplus can be smaller at a later stage, and vice versa. It can therefore be of interest to examine whether we find ourselves on a path where the government's *total "net wealth"* increases or declines over time, because this provides information as to the need for future adjustments in fiscal policy (or in the social security system).

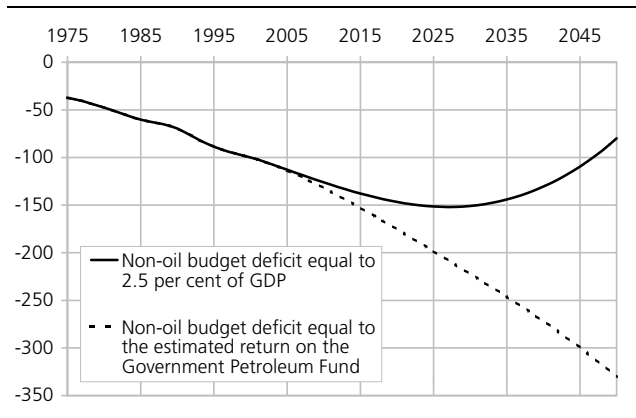
We have tentatively estimated the change in this "net wealth" under two alternative assumptions as to future fiscal policy: non-oil budget deficit equal to 2.5

15 The model is further discussed in Fredriksen (1998a).

16 For the first 50 years, we have, in the first scenario, used the estimates for average real wage growth in the Long-Term Programme, 1.5 per cent per year for the period 2000-2010, 1.8 per cent per year for the next 20 years, and 1.4 per cent per year from 2030-2050. Real wage growth of 1.4 per cent per year is also applied for the next 150 years.

17 In comparison, the Long-Term Programme estimates the present value of government accrued obligations under the national insurance scheme at the beginning of 2001 at about NOK 2800bn.

Figure 11. Change in government "net assets" under two alternative assumptions about fiscal policy and full indexation of the national insurance scheme's basic pension unit per year. Constant prices. Index = 100 in 2000



Sources: Statistics Norway, Ministry of Finance and our own calculations.

per cent of GDP (which is approximately equal to the historical average) and non-oil budget deficit equal to the estimated return on the Government Petroleum Fund. The second fiscal policy rule was proposed by the Petroleum Depletion Commission— see Ministry of Finance (1983) – and recently reintroduced by Cap-pelen (2000) and the Ministry of Finance (2001b). While fiscal policy under the first rule can be characterized as cyclically neutral, the other involves an expansionary fiscal stance many years ahead.

Government petroleum wealth is estimated using the figures for government net cash flow from petroleum activities in the Ministry of Finance (2001a and c), extended to 2070 with a path that implies that most of the estimated remaining petroleum resources will be depleted by that time. Changes in the Government Petroleum Fund are given by the difference between government net cash flow and the return on the Fund, on the one hand, and the non-oil deficit on the other. The change in government “*pension debt*” under the national insurance scheme from one year to the next is estimated as the difference between the “interest costs” of the debt (i.e. the costs that arise as future pension liabilities become increasingly imminent) and “the repayment of debt” in the form of estimated annual pension disbursements. The estimates are based on the MOSART calculations mentioned above.

The result of the calculations is shown in figures 9-11, one for each of the three alternative indexations of future social-security payments. Because we are now primarily concerned with the path over time and not the difference in the level of net assets, this is indexed to -100 in 2000 in all three figures. The figures indicate at least two interesting features:

- First, we observe that, independent of indexing, “net wealth” has fallen over the last 25 years, i.e. that the accumulation of assets and government petroleum wealth has systematically been slower than the rise in pension “debt”.
- Second, we observe that a continuation of a cyclically neutral fiscal policy would lead to very fast growth in government assets. According to our figures, this fiscal policy would result in growth in government “net wealth” as from 1997 with a constant basic amount, from 2015 with real growth in the basic amount of 1 per cent per year, and from about 2030 if the future basic amount follows the wage path in the Long-Term Programme. With such a fiscal policy, the present value of future pension disbursements would gradually have such a large counterpart in the form of net assets and remaining government petroleum wealth that the policy could later be shifted in a more expansionary direction. If on the other hand the non-oil deficit follows the estimated real return on the Petroleum Fund in the future, it is only in the case of a constant basic pension unit that government assets increase faster than pension debt. Hence, this guideline is only sustainable combined with considerable under-indexation or other future changes in the pension system, or with an arrangement where expenditure, excluding pension expenditure, gradually increases more slowly than direct and indirect taxes from mainland Norway.

Closing remarks

Even though future population changes are expected to be relatively favourable, a comparison of calculations suggests that the pension burden may increase considerably faster in Norway than in the EU over the next 50 years, and to a higher level. We have argued that this is primarily due to the assumed growth in the compensation ratio. The considerable potential for higher employment in the EU countries, as a result of today's low labour force participation and high unemployment, also plays a part. On the other hand, Norway at present enjoys a much more favourable financial situation than the EU countries. The Norwegian government has high net assets and considerable petroleum wealth that can be regarded as an implicit partial funding of expected future pension disbursements. With a fiscal stance in line with that announced in the Long-Term Programme, however, one must either implement cuts in the pension system or accept that other types of expenditure will increase more slowly than direct and indirect taxes from mainland Norway.

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Appendix

General government budget over a long-term horizon

If we simplify matters by excluding valuation changes (for example in the form of price gains and losses on securities), the change in general government net assets over time can be expressed by

$$(1) F_{t+1} = (1+r)F_t + S_t.$$

Here F_t is the value of net assets at the beginning of period t , r (the constant) interest rate, and S_t the primary budget surplus during the period, i.e. the difference between revenues excluding wealth income and expenditure excluding wealth expenditure. F and S are measured in constant prices, so that r is the real interest rate. To simplify, we disregard general government net assets aside from the Government Petroleum Fund.¹⁸ If we introduce the discount factor $k=(1+r)^{-1}$, (1) can be rewritten as

$$(2) k^t F_{t+T} = F_t + \sum_{s=t}^{T-1} k^{(s+1-t)} S_s$$

which indicates that the present value of financial wealth T periods into the future must be equal to the sum of the following two items: the value of the assets today and the present value of all budget surpluses up to and including the period $T-1$. It seems reasonable to assume that general government in the long run neither wishes to allow net assets to explode nor is permitted to allow net debt to do the same, so that the present value of net assets in the distant future can be set at zero (i.e. $\lim_{t \rightarrow \infty} k^T \cdot F_{t+T} = 0$). With this additional requirement, the long-term budget constraint is written as

$$(3) F_t = -\sum_{s=t+1}^{\infty} k^{s+1-t} S_s$$

The budget constraint (3) implies that the present value of all future budget deficits must be equal to today's net assets. There is an infinite number of possible paths for the future budget balance that do not fulfil (3), and an infinite number that do. For example, a path where the primary budget deficit is equal to general government net interest income will be clearly viable, because such a path according to (1) will give constant net assets over time. Since not all components in S_t will trend together, however, this is not a formula for a stable use of fiscal policy instruments.¹⁹

¹⁸ With today's budgeting practice, it is reasonable, in any case as an approximation, to include the return on these net assets in the primary budget deficit S .

¹⁹ An interesting example of steady growth over time is that both revenues and expenditure follow GDP growth. Assume that GDP grows at a constant rate g . Then we have $S_s = S_0 (1+g)^s$ so that (3) can be written as $F_t = -\sum_{s=t+1}^{\infty} k_g^{s+1-t} S_s$ where $k_g = (1+g)/(1+r) \approx (1+(r-g))^{-1}$. It follows that $\Delta F_t \approx (r-g) F_t + S_0$, so that a constant primary deficit $-S_0$ approximately equal to $(r-g)F_t$ will result in constant net assets forever.

In Norway, petroleum revenues and pension expenditure, in particular, will change considerably in the future (in a more detailed analysis, however, we should also have taken into consideration other demography related expenditure). Let us therefore distinguish among the following four key items in the budget: government net cash flow from petroleum activities (NCF); direct and indirect tax revenues from mainland Norway (T); current pension disbursements (U); and all other expenditure items (G). This gives us the following definition of the primary balance in period t.

$$(4) S_t = NCF_t + T_t - U_t - G_t$$

The following two equations are assumed to express the relationship between government net cash flow from petroleum activities, compensation for normal costs of government capital in petroleum activities $((r+\delta)K)$, general government revenues in excess of compensation for normal capital costs (petroleum rent, PR) and government gross investment in petroleum activities (J):

$$\begin{aligned} NCF_t &= (r+\delta)K_t + PR_t - J_t \\ K_{t+1} &= (1-\delta)K_t + J_t \end{aligned}$$

where δK_t stipulates the loss in capital value (depreciation) during the period t as proportional to K_t . Substituting for J_t gives the following relationship between net cash flow, petroleum rent, and government capital in the sector:

$$(5) NCF_t = PR_t + rK_t - \Delta K_t = PR_t + (1+r)K_t - K_{t+1}$$

Further insertion of (5) in (4) and of (4) in (3) gives the following equation for total government wealth (W):

$$(6) W_t = F_t + F_t^p + K_t - L_t = - \sum_{s=t}^{\infty} k^{s+1-t} (T_s - G_s)$$

Here $F_t^p = \sum_{s=t}^{\infty} k^{s+1-t} PR_s$ is the value of the government share of petroleum wealth, defined as the present value of all future government petroleum rent.

$L_t = \sum_{s=t}^{\infty} k^{s+1-t} U_s$ is the general government's pension

debt, equal to the present value of all future pension disbursements.

$\sum_{s=t}^{\infty} k^{s+1-t} (T_s - G_s)$ is the present value of all future

non-oil and pension-adjusted primary budget surpluses. We have also utilized that

$\sum_{s=t}^{\infty} k^{s+1-t} [(1+r)K_s - K_{s+1}] = K_t$. The following

relationships apply:

$$(7) \Delta F_t^p = rF_t^p - PR_t, \quad \Delta L_t = rL_t - U_t$$

The first equation in (7) implies that the change in petroleum wealth from one period to the next is given by the difference between the gain from the "reaping" of future petroleum rent coming closer in time and the loss arising because the future rent is reduced by the "harvesting" over the period. The first expression on the right hand side of the equation also defines the permanent revenues from petroleum wealth at the outset of period t, i.e. the maximum consumption that these asset items can support without eroding the wealth itself. Similarly, the other equation in (7) expresses that the change in pension debt over a period is equal to the difference between the costs that arise as future pension liabilities become increasingly imminent and the repayment of debt through pension disbursements over the course of the period.

In the same way that (1) implies that the change in net assets is equal to the sum of interest income and the primary budget surplus $(\Delta F_t = rF_t + S_t)$, it follows from (6) that the change in total wealth is equal to the sum of the return on the wealth and the non-oil and pension-adjusted primary budget surplus.

$$(8) \Delta W_t = r(F_t + F_t^p + K_t - L_t) + (T_t - G_t)$$

From (8) and the definition of W_t , we also see that .

$$\begin{aligned} \Delta W_t &= \Delta(F_t + F_t^p + K_t) - \Delta L_t \\ &= r(F_t + F_t^p + K_t) - rL_t + (T_t - G_t) \end{aligned}$$

Combined with (7), this implies that .

$$(9) \Delta(F_t + F_t^p + K_t) = r(F_t + F_t^p + K_t) + (T_t - G_t - U_t)$$

(9) says that the change in "broad" petroleum wealth, i.e. including the capital in the sector and the Government Petroleum Fund, is equal to the sum of the return on this wealth and the non-oil budget deficit.

Using the concepts presented above, it is now relatively simple to illustrate the change in public wealth over time as a result of a number of alternative budget rules.

Rule A: *The non-oil, pension-adjusted budget deficit is equal to the return on wealth.*

This rule implies that $r(F_t + F_t^p + K_t - L_t) = -(T_t - G_t)$. From (8) we see immediately that general government wealth, as we have defined it, will be constant over time if and only if this rule is followed. If the deficit is lower than this, wealth increases over time; if it is greater, wealth is reduced.

Rule B: General government net lending equals zero.

In the national accounts, general government net lending is defined as the sum of the primary budget deficit, net wealth income, and government net direct investment in state enterprises. To simplify, we only include direct investment in state enterprises. With our terminology, the requirement that net lending be equal to zero can thus be expressed as follows:

$$NFI_t = rF_t + S_t + \Delta K_t = 0 \Rightarrow \Delta F_t + \Delta K_t = 0,$$

i.e. that the sum of financial wealth and cumulated direct investment in petroleum activities shall be constant over time. It follows directly from (1), which implies that $\Delta F_t = rF_t + S_t$. As expressed in (6), this further implies that the change in general government wealth will equal the difference between the change in petroleum wealth and the change in pension debt. As long as the remaining petroleum wealth falls and pension debt increases, total wealth will thus inevitably decline over time. The sum of financial wealth and the remaining petroleum wealth, including the government's cumulative direct investment, will also decrease over time.

Rule C: Non-oil budget deficit equals permanent petroleum revenues.

In our setting, the non-oil budget surplus is defined as general government net lending less direct investment in petroleum activities, government net cash flow and the return on the Government Petroleum Fund. If we simplify matters by disregarding that general government net assets do not consist only of investments in the Petroleum Fund,²⁰ the non-oil budget surplus can be written as $NFI_t - \Delta K_t - NCF_t - rF_t = T_t - G_t - U_t$, cf. (4) and the definition of NFI_t . Rule C thus implies that

$$(T_t - G_t - U_t) + r(F_t + F_t^P + K_t) = 0$$

Since $U_t = rL_t - \Delta L_t$, it follows from this rule that $r(F_t + F_t^P + K_t - L_t) + (T_t - G_t) + \Delta L_t = 0$. According to (8), this means that $\Delta W_t = -\Delta L_t$, i.e. that the change in general government net wealth is equal to the change in pension debt. This increases or decreases over time depending on whether "interest loss" rL_t is greater or smaller than "repayment" given by U_t . From the wealth definition (6) it further follows that the sum of the Petroleum Fund and petroleum wealth (including the capital in the sector) under this rule is constant over time.

Rule D: Non-oil budget deficit equals return on the Petroleum Fund.

This rule was first proposed by the Petroleum Depletion Commission (see Ministry of Finance 1983) and recently reintroduced by Cappelen (2000) and the Ministry of Finance (2001a and b). Assuming that general government net assets consist only of investments in the Petroleum Fund, this budget rule can be written as

$$(T_t - G_t - U_t) + rF_t = 0$$

If we combine this with (9), it follows that

$$\Delta W_t = \Delta(F_t + F_t^P + K_t) - \Delta L_t = r(F_t^P + K_t) - \Delta L_t.$$

This means that the change in total general government wealth is given by the difference between the return on petroleum wealth (including the capital in the sector) and the change in pension debt. The rule implies that we gradually phase in all of the permanent income from petroleum activities, including the return on the Petroleum Fund. The time profile for this phasing-in, however, is decided by the time profile of net cash flow and not by some deeper analyses of optimal saving (or the time path for consumption).

²⁰ Alternatively, we could assume that the return on other net assets, which, under today's budgetary practices do not change much over time, are included in the tax amount T .