



Danmarks
Nationalbank

Monetary Review
1st Quarter

2005

D A N M A R K S
N A T I O N A L
B A N K 2 0 0 5



MONETARY REVIEW 1st QUARTER 2005

The small picture on the front cover is a section of the commemorative coin to mark the wedding of HRH Crown Prince Frederik and Miss Mary Donaldson on 14 May 2004. The wedding portrait was designed by the sculptor Karin Lorentzen.

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The Monetary Review is available on Danmarks Nationalbank's website:
www.nationalbanken.dk under publications.

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This edition closed for contributions on 17 February, 2004.

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SCHULTZ GRAFISK A/S
ISSN 0011-6149
(Online) ISSN 1398-3865

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Recent Economic and Monetary Trends

This review covers the period from the middle of November 2004 to the middle of February 2005

INTERNATIONAL FINANCIAL MARKETS

After a very strong upturn in the global economy, growth subsided in the 2nd half of 2004, but with considerable differences from country to country. While growth in the USA remained robust, the euro area's performance was disappointing. Combined with the large imbalances in the US economy, this had a significant impact on the development in the financial markets during the period.

From September up to the turn of the year, the US dollar weakened from a level of around 1.20 to 1.36 dollars per euro, the weakest level since the euro was introduced on 1 January 1999. Subsequently the dollar strengthened again, to 1.30 dollars per euro in mid-February, cf. Chart 1. Equivalent, but more subdued, development was seen vis-à-vis the Japanese yen. In the period after the introduction of the euro, the

DEVELOPMENT IN EXCHANGE RATES FOR KEY CURRENCIES

Chart 1



Note: The latest observation is from 15 February 2005.

Source: Danmarks Nationalbank.

dollar strengthened against the euro, and from mid-2000 to early 2002 the exchange rate was around 0.9 dollars per euro. From this level the dollar depreciated by 45 per cent up to mid-February. The weakening against the yen was somewhat smaller at approximately 25 per cent. In relation to a number of other currencies, among them several Asian and South and Central American currencies, the weakening of the dollar has been less pronounced or non-existent. This also applies to China, which de facto conducts a fixed-exchange-rate policy vis-à-vis the dollar.

The dollar's weakening up to the turn of the year should be viewed against the background of e.g. the large and rising current-account deficit in the USA, which is attributable especially to a low savings ratio and stronger growth than in the euro area, a major export market for the USA. The US current-account deficit has to a large extent been financed by particularly Asian central banks' purchase of US government securities, and these players have a major impact on the course of the dollar. Several of these countries, as well as Russia, seem to some extent to have converted foreign-exchange reserves from dollar- to euro-denominated securities during the autumn. This increases the demand for euro and thereby strengthens the exchange rate. The strengthening of the dollar since the turn of the year follows the publication of a number of positive key indicators for the US economy.

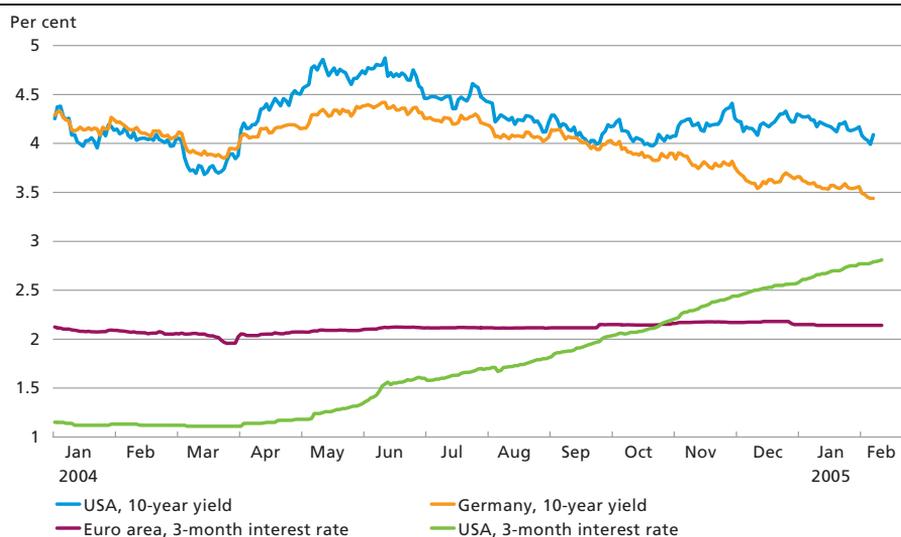
In the autumn, the diverging cyclical patterns in respectively the USA and the euro area led to a temporary decoupling of long-term yields, cf. Chart 2. While the yield on a 10-year US government bond has been around 4.2 per cent for the last six months, the yield in Germany had fallen by approximately 90 basis points to around 3.5 per cent in mid-February. At the short end of the yield curve, the 3-month money-market interest rate in the USA has risen since the spring of 2004 in step with the tightening of monetary policy, while the 3-month interest rate in the euro area has remained unchanged, so that the US short-term interest rates have been higher than the corresponding euro-area interest rates since October.

The US and European stock markets rose in the autumn. In mid-February the S&P 500 index was at the same level as at the turn of the year, while the European Stoxx 600 index was up by 5 per cent. The weak economy in the euro area and the dampened growth expectations have thus not had any significant effect on the European stock markets. One reason is that most large enterprises now have production in many countries, which means that a large proportion of turnover lies outside the euro area.

The price of crude oil in dollars has been rising since the spring and peaked in October at more than 50 dollars per barrel (Brent), which is a

LONG- AND SHORT-TERM INTEREST RATES IN GERMANY AND THE USA

Chart 2



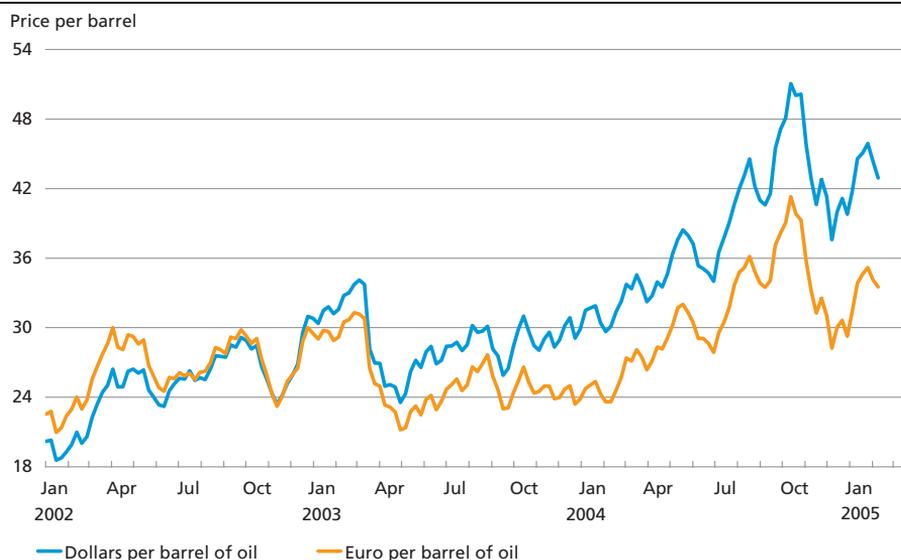
Note: The Chart shows the development in 10-year government bond yields and 3-month money-market interest rates. The latest observation is from 15 February 2005.

Source: Danmarks Nationalbank.

historical high in nominal terms. Since then the oil price has fallen, to just over 42 dollars per barrel in mid-February. Measured in euro, the oil price was also above the level seen in recent years, cf. Chart 3.

PRICE OF CRUDE OIL

Chart 3



Note: Brent. The latest observation is from 15 February 2005.

Source: Danmarks Nationalbank.

The global upswing, including rapidly rising demand from especially China, has also led to price increases for other commodities than oil. Industrial metals, which are particularly cyclically sensitive, have gone up by 55 per cent during the last 18 months. In euro terms the development has been more moderate.

The weakening of the dollar has led some investors to turn to gold as an alternative option. The gold price has risen by 5 per cent during the last six months, and by almost 50 per cent since the beginning of 2002 when the dollar began to weaken.

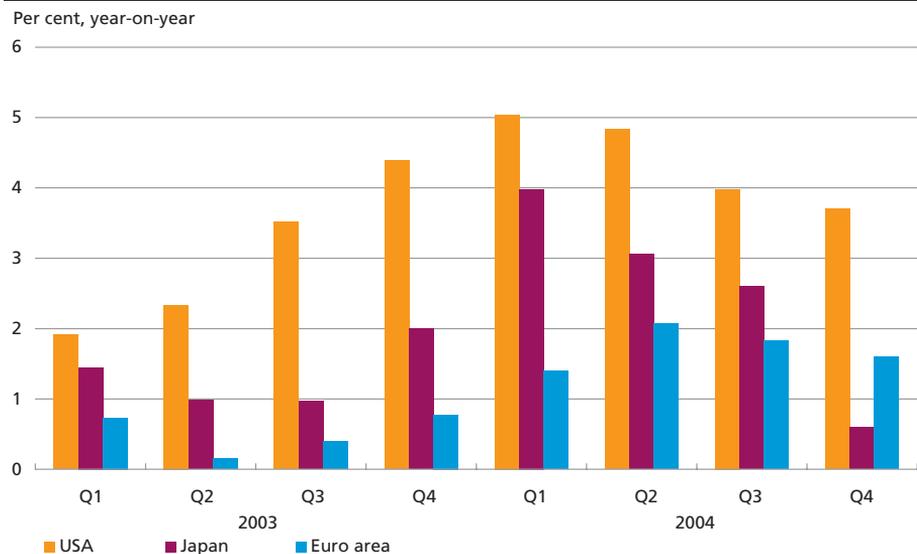
THE INTERNATIONAL ECONOMY

USA

GDP in the USA rose by 0.8 per cent from the 3rd to the 4th quarter, which is slightly lower growth than in the preceding quarter. Growth was driven by private consumption and investments, while exports fell. For 2004 as a whole the US economy grew by 4.4 per cent. Growth is expected to continue at a slightly lower rate in 2005. The January consensus estimate of growth in 2005 is 3.6 per cent, more or less in line with the annual growth rate in the 4th quarter, cf. Chart 4.

The US economy is still troubled by large imbalances. The 2004 budget deficit will probably end at around 4.5 per cent of GDP in spite of the strong growth. This highly expansionary fiscal policy is not sustainable in

GROWTH IN GDP IN THE USA, JAPAN AND THE EURO AREA Chart 4



the longer term. Most of the budget deficit is of a structural nature and therefore cannot be expected to disappear as a result of the favourable economic conditions. With a small public sector and relatively low taxation, the automatic stabilisers are modest in the USA. The most recent draft budget envisages halving the federal deficit up to 2009 via spending cuts in a number of areas.

The imbalances are also reflected in a current-account deficit in excess of 5 per cent of GDP in 2004. This is a considerable deficit, particularly since exports constitute only 10 per cent of the economy. The depreciation of the dollar cannot in itself eliminate the current-account deficit. A higher domestic savings ratio is required.

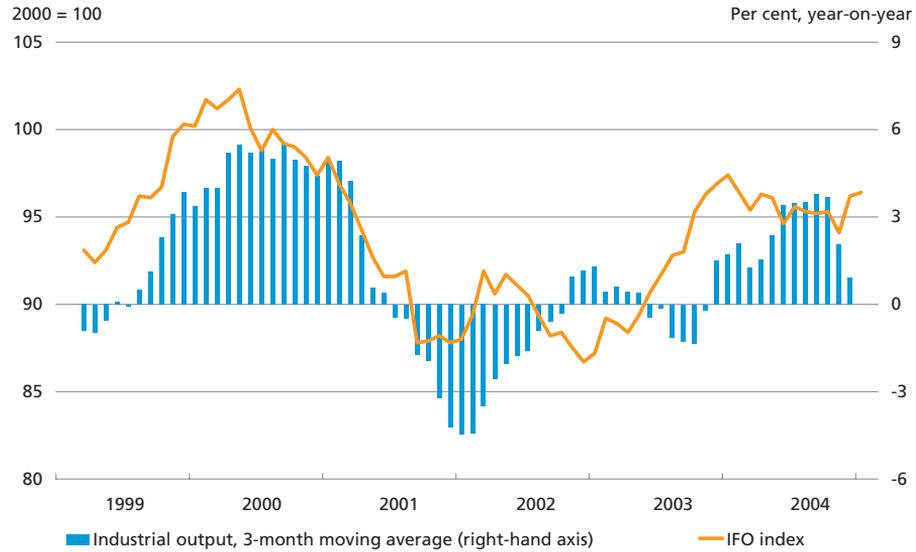
The US upswing was for a time referred to as "jobless" since employment did not initially match growth. This has changed in the last six months or so as the labour market has developed positively with rising employment, primarily in the service sector. On the other hand, the labour force has also increased, one reason being that more people are postponing retirement. This may be a reaction to a sustained period of very low households savings, so that people must stay in the labour market for longer to avoid a substantial drop in their standard of living. Growth in employment has, however, exceeded the increase in the labour force and unemployment had fallen to 5.2 per cent in January. Despite the lower unemployment rate, wage pressure remains low.

The rising energy prices have had a relatively strong impact on US consumer prices, which accelerated during 2004. The year-on-year increase was 3.3 per cent in December. Underlying inflation has also been rising. Consumer prices adjusted for energy and food rose by 2.2 per cent in December, compared to only just over 1.0 per cent at the beginning of 2004. Nevertheless, the level must still be characterised as moderate in view of the cyclical position, and reflects dampened wage increases as well as sustained productivity growth.

The fed funds target rate has been raised on six occasions since May 2004, most recently to 2.5 per cent in February. The rising fed funds target rate reflects a move towards a more normal level of interest rates following a period of highly expansionary monetary policy. In the assessment of the Federal Reserve, monetary policy still supports growth, while inflation and inflation expectations are well contained, cf. the press release from the February meeting. However, the minutes of the December meeting also show a general increasing focus on inflation development. Judging from the forward interest rates, the market expects the Federal Reserve to continue to raise its target rate to a more normal level during 2005. At the meeting of the Federal Open Market Committee in December it was also decided to publish the minutes of

INDUSTRIAL OUTPUT AND BUSINESS CONFIDENCE IN GERMANY

Chart 5



Note: The IFO index is a measure of business confidence. The latest observations are from January 2005.
Source: EcoWin.

the meetings after three weeks so that they are available well in advance of the next meeting.

The euro area

Growth in the euro area remained modest throughout the year with growth rates in the 3rd and 4th quarters of respectively 0.3 and 0.2 per cent on the preceding quarter. The main problem in the euro area is weak domestic demand; especially the development in private consumption has been disappointing. Unemployment remains firmly entrenched, at almost 9 per cent of the labour force, and consumer confidence is relatively low. This uncertainly is reflected in a relatively high savings ratio for the households and thus low consumption.

The low interest rates support investments, but capacity utilisation is still below the average for the last few years. However, business confidence has shown promising tendencies in recent months, and among others the German IFO index rose in both December and January, cf. Chart 5. So far the strengthening of the euro has had only a limited impact on exports, which still contribute to growth. The euro area is relatively open compared to other large economies so exports play a larger role in relation to growth than in the USA and Japan.

Consensus estimates of euro area growth in 2005 are just under 2 per cent, i.e. in step with growth in 2004 and thus considerably lower than

growth expectations for the USA. Whether growth in the euro area really takes off depends on the development in domestic demand rather than in the dollar/euro exchange rate. In the longer term the euro area can be expected to benefit from lower financial imbalances than in the USA.

Throughout most of 2004, the rise in consumer prices in the euro area was slightly higher than the ECB's intermediate target of a rate of price increase below, but close to, 2 per cent. In December, HICP inflation was 2.4 per cent. Higher taxes on tobacco in a couple of euro area member states pushed inflation upwards by 0.3 percentage points. Core inflation, i.e. inflation adjusted for energy, food, alcohol and tobacco, has been stable at just under 2 per cent for the last couple of years. Wage developments have also been dampened. The ECB has not adjusted its minimum bid rate since June 2003 and the market does not expect any increase in the immediate future.

In December the European Commission announced that in view of expected growth in Germany and France of respectively 1.5 and 2.2 per cent in 2005 it deems the fiscal consolidation to be sufficient to bring the budget deficits of the two member states in 2005 below the limit of 3 per cent of GDP stipulated in the EU Treaty. Consequently, the Commission does not at present find it necessary to take further measures against these two member states under the excessive deficit procedure. The Ecofin Council subsequently noted the communication from the Commission.

In July 2004 the Ecofin Council recommended that Greece and Hungary tighten fiscal policy with a view to bringing their budget deficits below the 3-per-cent limit in 2005 and 2008, respectively. Despite a number of budget measures in these two member states, the Ecofin Council in January 2005 concluded that sufficiently effective measures had not been taken. Unless Greece complies with the recommendation from the Ecofin Council, the latter can give notice to Greece to take measures to reduce the deficit. Under the Stability and Growth Pact, such notice should be given within a month after it has been determined that sufficient consolidation has not taken place. In February 2005 the European Commission recommended the Ecofin Council to issue new recommendations for Hungary to correct its excessive deficit. Since Hungary has not joined the euro, it is exempt from the final stage of the excessive deficit procedure concerning notices and sanctions.

The weak economic growth in the euro area is significantly influenced by its largest economy, Germany. Although economic growth at 1.6 per cent in 2004 was at the highest level seen since 2000, growth declined in the 2nd half-year and the prospects for 2005 are only moderately posi-

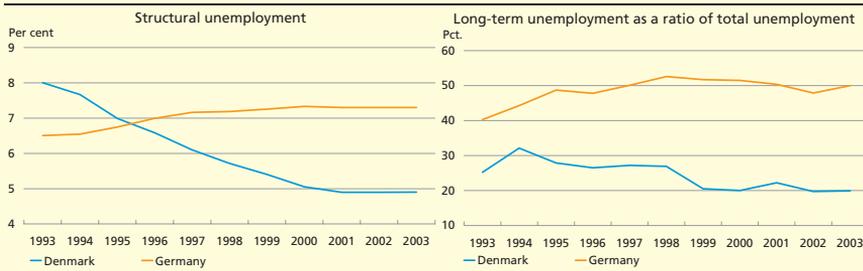
LABOUR-MARKET REFORMS IN GERMANY

Box 1

The German economy is currently struggling with large structural problems, and the OECD and German economic advisors among others have pointed to rigidities in the labour market as a key element of the problems. Unemployment remains firmly entrenched at a high level, while the labour-market reforms in the 1990s reduced unemployment in Denmark. This also applies to structural unemployment, cf. Chart 6, left. However, it should be noted that the high unemployment rate in Germany is chiefly an eastern German phenomenon, while unemployment in the former West Germany is only slightly higher than in Denmark. The rigid German labour market is reflected in e.g. a lower job turnover and a higher rate of long-term unemployment than in Denmark, cf. Chart 6, right.

UNEMPLOYMENT IN DENMARK AND GERMANY

Chart 6

Source: OECD, *Economic Outlook* No. 75.

During the 1990s labour-market policy was tightened in Germany, but immediately after the Schröder government had taken office in 1998 a number of previous measures were repealed. In March 2002 the "Hartz Commission" was set up, however, to

tive. The German labour market is still sluggish. Employment is only rising slightly as a result of government-subsidised part-time jobs, while the number of full-time employees shows a negative tendency. In actual figures, German unemployment exceeded 5 million in January. The seasonally-adjusted unemployment rate was 11.4 per cent, against 10.8 per cent in December, if the national definition is applied. However, the rise is mainly attributable to the fact that with the implementation of the labour-market reform, Hartz IV, a number of welfare-benefit recipients have been reclassified as unemployed, cf. Box 1.

Asia

The Japanese GDP growth of recent years was adjusted downwards in the autumn following Japan's switch to chain indices for compilation of its national accounts. The new figures show that the Japanese economy slowed down considerably in 2004. Growth in exports declined, while imports rose substantially towards the end of the year. Growth in

CONTINUED

Box 1

present proposals to improve the effectiveness of the labour-market policy. The proposals of the Hartz Commission are the basis for the four labour-market reforms, Hartz I-IV, subsequently adopted.

Among the measures introduced in the period 2002-03 are more stringent availability requirements for the unemployed, new rules for activation with individual consulting and programmes, more campaigns aimed at young people, relaxation of the employment protection rules and more rigorous sanctions if a job is rejected. Moreover, from January 2006, the maximum period for receiving unemployment benefit is reduced from 32 to 12 months (18 months, however, for those over 55). After that the unemployed person can receive unemployment benefit II (Hartz IV), provided that he or she is registered as unemployed and is actively seeking a job.

Hartz IV was adopted in 2004. Unemployment benefit and welfare benefit have been merged to one means-tested benefit, unemployment benefit II (ALG II), which is lower than the unemployment benefit, but higher than the welfare benefit. Job seekers are eligible for this benefit after 12 months' unemployment. Under Hartz IV a number of people previously receiving welfare benefits were reclassified as unemployed at the turn of the year. This led to an extraordinary surge in unemployment. Moreover, the lower limit for early retirement will be raised from 60 to 63 years in the period from 2006 to 2008.

With the adoption of the Hartz Acts the German government has in recent years taken serious steps to tackle some of the structural problems in the labour market. This legislation will be implemented in a period of low economic growth and large budget deficits, whereas the Danish reforms in the 1990s were able to work in a favourable economic climate. This is always preferable, although it can be more difficult to achieve political understanding of the need for reform at a time when the economy is sound.

private consumption was negative in both the 3rd and 4th quarters. The households' savings ratio is relatively high, while public savings are significantly negative and the debt is large. The OECD estimates the government deficit at 6.5 per cent of GDP in 2004.

Some progress can be noted in the labour market, where unemployment has been falling during the last year. The unemployment rate was 4.4 per cent in December, but nonetheless wages continued to fall. Inflationary pressure in the Japanese economy is still low, with consumer prices rising by 0.2 per cent year-on-year in December. Adjusted for the prices of fresh food, underlying inflation was marginally negative.

The boom in the Chinese economy continued in 2004 with GDP growth of 9.5 per cent, the highest growth rate since 1996. In the autumn the Chinese authorities tightened credit and monetary policy to avoid overheating of the economy. The foreign-exchange policy has remained unchanged, with the Chinese currency still closely pegged to the US dollar.

At a summit meeting in November, agreements were concluded between China and the ASEAN member countries Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand to establish a free-trade area for goods from 2010. Burma, Cambodia, Laos and Vietnam will participate from 2015. The free-trade area will comprise almost one third of the global population and some of the world's fastest growing economies. Adjusted for purchasing power, the new free-trade area will account for just over 15 per cent of global GDP. Negotiations for Japan, Korea, Australia and New Zealand to be affiliated to the free-trade area will be opened in 2005. India may also join.

UK

After a period of high growth, the economy dampened slightly in the 2nd half of 2004. Growth was underpinned by expansionary fiscal policy and by private consumption that was supported by significantly rising housing prices, which in real terms have doubled since 1998. Since the summer cash prices have been yielding, however, and mortgage lending has fallen substantially. The dampening of UK housing prices, which are highly sensitive to changes in short-term interest rates due to the widespread use of adjustable-rate loans, should be seen against the background of a gradual tightening of monetary policy.

For a number of years, growth in the UK has been higher than in most other industrialised countries, including the euro area. The economy is probably stretched to its capacity limit, and unemployment in absolute terms is at the lowest level since the 1970s. This means that the labour market is tight and the rate of wage increase is rising.

While domestic demand has been strong, exports are affected by weak growth in several important export markets. The result is an increasing current-account deficit.

From August 2004 to mid-February 2005 the pound sterling weakened by more than 4 per cent vis-à-vis the euro, and according to the Bank of England the effective sterling rate has depreciated on the same scale. Like the tight labour market, this exerts upward pressure on prices. However, so far the effect has been limited. The Harmonised Index of Consumer Prices (HICP) rose by 1.6 per cent in January, which is below the government's intermediate target of 2 per cent inflation.

In the expectation that inflation will rise, the Bank of England has raised its base rate by 125 basis points during the past 18 months, to 4.75 per cent. The most recent increase was in August. Long-term yields have fallen less than in the euro area. The 10-year government bond yield was 4.5 per cent at the beginning of February, which means that the UK yield curve is inverse.

Sweden

The Swedish economy is experiencing an upswing driven by private consumption and increasingly also by investments, while the contribution to growth from foreign trade has declined. GDP in constant prices rose by 3.8 per cent year-on-year in the 3rd quarter. The high growth can be assumed to have continued throughout the year, and the prospects for 2005 are good. In 2005 growth is stimulated by tax cuts that are procyclical.

In spite of the current upswing, the labour market has still not turned around. Employment is moving sideways, and adjusted for activation schemes unemployment has seen little change.

Inflation is below the lower margin of Sveriges Riksbank's target zone of 1-3 per cent. The reason is falling prices for many imported goods and low domestic inflation, kept down by e.g. a strong rise in productivity.

Sveriges Riksbank has maintained its repo rate unchanged at 2 per cent since it was lowered by 0.5 per cent in April last year.

Norway

At approximately 3.5 per cent year-on-year, GDP growth in mainland Norway was high in the first nine months of 2004, but according to consensus estimates it is expected to be slightly lower in 2005.

Despite the relatively strong growth, unemployment is approximately 4.5 per cent, which is high by Norwegian standards. Domestic inflationary pressure is low. In January core inflation, measured by the index of consumer prices exclusive of energy and changes in indirect taxes (the KPI-JAE index), rose by 0.7 per cent compared to the same month of the preceding year. This is far below the monetary-policy target of 2.5 per cent inflation. In its latest inflation report, Norges Bank calculates two alternative measures of core inflation. These are slightly higher than the KPI-JAE index, but the development over time is virtually the same. Strong price drops for clothing imported from e.g. China have contributed to the dampened price development, cf. Box 3 on p. 20.

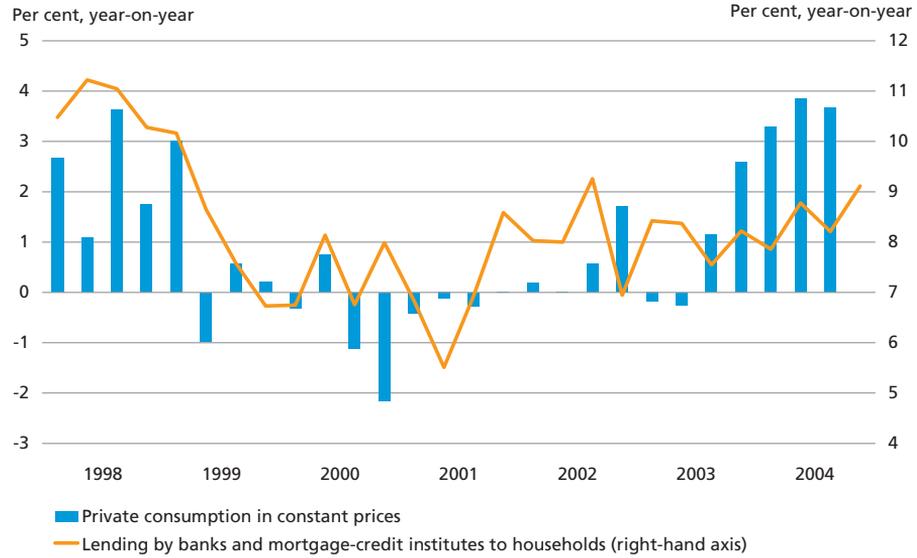
The official interest rate has remained unchanged at 1.75 per cent since March 2004.

DEVELOPMENT IN THE DANISH FINANCIAL MARKETS

The krone was stable vis-à-vis the euro during the period, at a level slightly stronger than its central rate in ERM II of 7.46038 kroner per euro, virtually without intervention in the foreign-exchange market. The foreign-exchange reserve was kr. 223.6 billion at the close of January.

GROWTH IN PRIVATE CONSUMPTION AND LENDING TO HOUSEHOLDS

Chart 7



Source: Statistics Denmark and Danmarks Nationalbank.

Danmarks Nationalbank has not adjusted its interest rates since June 2003, when the lending rate was lowered by 0.5 per cent to 2.15 per cent. The current-account and discount rates are 2 per cent.

The yield on the 10-year Danish government bond has fallen slightly more than the equivalent German yield and was 3.6 per cent in mid-February, just over 80 basis points lower than the level of the summer. The yield spread between the Danish and German benchmark bonds has narrowed, cf. the article on pp. 27ff.

The development in lending by banks and mortgage-credit institutes reflects the domestically driven upturn in the Danish economy. The annual growth in total lending by banks and mortgage-credit institutes rose over the year and was almost 9 per cent in December.

The growth in lending was attributable to e.g. business lending. The higher rate of growth in lending showed a slight time lag in relation to the increase in activity and investments, a pattern that is repeated from previous upswings. The annual growth in lending to households was just over 9 per cent in November, which was in step with the growth rate of recent years, cf. Chart 7.

The banks have gained market shares from the mortgage-credit institutes for lending to households, thus reversing the tendency seen for a number of years. Competition has led to a substantial expansion of the product range within home financing, and the penetration rate of new products in the market seems to be increasing, cf. Box 2.

NEW PRODUCTS FOR HOME FINANCING

Box 2

Within the last decade new home financing options have been introduced at an increasing pace. After the (re)introduction of adjustable-rate loans in 1996, loans with deferred amortisation for up to 10 years were introduced in October 2003, and towards the end of 2004 mortgage-credit institutes began to offer mortgage loans with an embedded cap on interest rates for up to 30 years.¹ In addition, mortgage loans from banks, i.e. bank loans against the home as collateral, have become ever more popular in recent years. The penetration rate for new products seems to be increasing constantly. After just one year, deferred-amortisation loans constituted almost 20 per cent of the outstanding loan volume for owner-occupied housing and summer cottages, cf. Table 1. This is a much faster penetration rate than when the adjustable-rate loans were introduced. The new capped mortgage-credit loans have become a success even more quickly, reaching a volume of almost kr. 50 billion in a few months. A larger product range is positive in itself from the borrowers' point of view, but it also entails an ever-increasing need for independent advisory services in connection with home purchases and remortgaging.

ADJUSTABLE-RATE LOANS AND DEFERRED-AMORTISATION LOANS AS RATIOS OF TOTAL LENDING FOR OWNER-OCCUPIED HOUSING AND SUMMER COTTAGES

Table 1

| End of period | 4th quarter 2003 | | 4th quarter 2004 | |
|--|------------------|------------|------------------|------------|
| | Kr. billion | Percentage | Kr. billion | Percentage |
| Mortgage-credit lending for owner-occupied housing and summer cottages | 826.2 | 100 | 880.7 | 100 |
| Adjustable-rate loans | 289.3 | 35 | 391.6 | 44 |
| Deferred-amortisation loans | 44.4 | 5 | 170.5 | 19 |

Note: Portfolio sizes. Adjustable-rate loans and loans with deferred amortisation for up to 10 years are not mutually exclusive since an adjustable-rate loan can be either with or without deferred amortisation.

Source: Danmarks Nationalbank.

The technical structure of capped loans varies from one mortgage-credit institute to the next. This is one reason that the mortgage-credit bond market over a number of years has developed from a market with a few, standardised products with considerable depth to an ever more heterogeneous market with potentially illiquid series. In practice this is a derived consequence of the expanded product range.

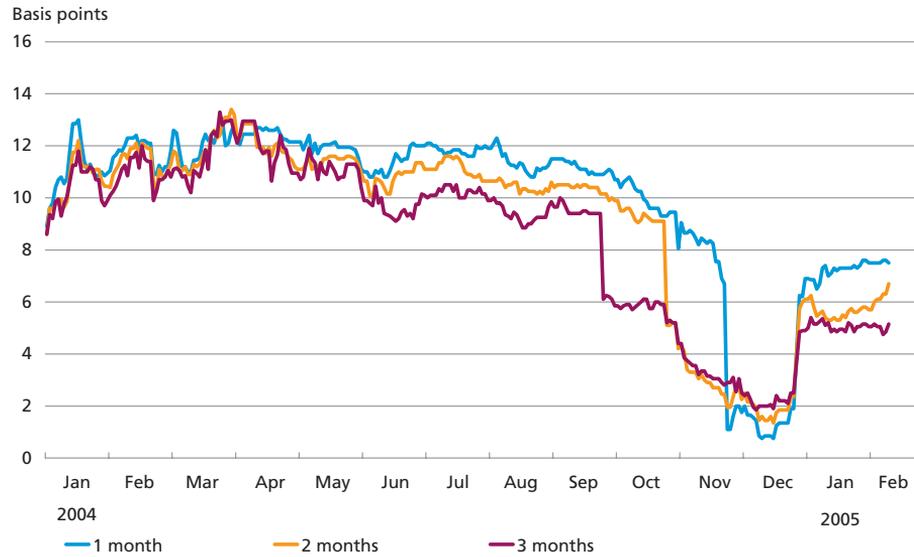
With the new home-financing products households have become increasingly exposed to short-term interest-rate fluctuations. In some cases the banks' mortgage loans are directly linked to an official interest rate, the rate of interest for certificates of deposit, which is adjusted in step with the ECB's interest rates and is a key instrument in the event of pressure on the krone.

¹ Adjustable-rate loans with a cap on interest rates have been on the market for several years via Totalkredit's BoligX loans, but this cap was only active for a few years, while the caps on the new loan type are active for up to 30 years.

On 26 October Realkredit Danmark introduced loans with an embedded cap on the interest rate for up to 30 years. The introduction caused the price of especially the 6 per cent long-term mortgage-credit bonds to

SPREAD BETWEEN MONEY-MARKET INTEREST RATES IN DENMARK AND THE EURO AREA

Chart 8



Note: The latest observations are from 15 February 2005.

Source: Danmarks Nationalbank.

drop by up to one percentage point. The Danish Securities Dealers Association's market-maker scheme collapsed and was suspended for some days. This reaction was due to uncertainty in the market as to whether the new loans would lead to a surge in premature redemptions of existing fixed-rate loans. Subsequently several other mortgage-credit institutes have introduced similar products.

On 1 April 2005 the number of banks participating in the daily fixing of Cibor (Copenhagen Inter-Bank Offered Rate) was increased from 8 to 12, and the number of maturities was raised from 8 to 14. Cibor has primarily been used as a reference interest rate for certain types of bank lending in connection with FRAs and interest-rate swaps. However, Cibor is also used for fixing the rate of interest for some types of mortgage-credit loans.

The spreads between 3-month money-market interest rates in Denmark and the euro area, the Cibor-Euribor spreads, narrowed substantially up to the turn of the year. The spreads were influenced by the fact that a large proportion of the banks in the euro area adjust their balance sheets at year-end. This is reflected in increases in the euro-area money-market interest rates from the day that maturities begin to stretch into the next year, which causes the spread to narrow, cf. Chart 8. A similar impact on euro-area money-market interest rates was seen in preceding years.

Immediately after the turn of the year the spread widened again, although it is still at a narrower level than in 2004.

Danish Ship Finance (DSF), the Ministry of Economic and Business Affairs and Danmarks Nationalbank have concluded an agreement on the restructuring of DSF as a limited liability company, cf. the press release on p. 133f.

THE DANISH ECONOMY

GDP in constant prices stagnated in the 3rd quarter with growth at only 0.1 per cent from the preceding quarter, according to the preliminary national accounts. However, experience shows that the figures may be revised considerably before the final national accounts are presented. Taken as one, GDP rose by 2.0 per cent in the first three quarters compared to the same period of 2003. The weak growth in the 3rd quarter does not significantly alter the view that the Danish economy is experiencing a consumption-driven upturn. This is underpinned by the indicators for the 4th quarter of 2004 and the beginning of 2005.

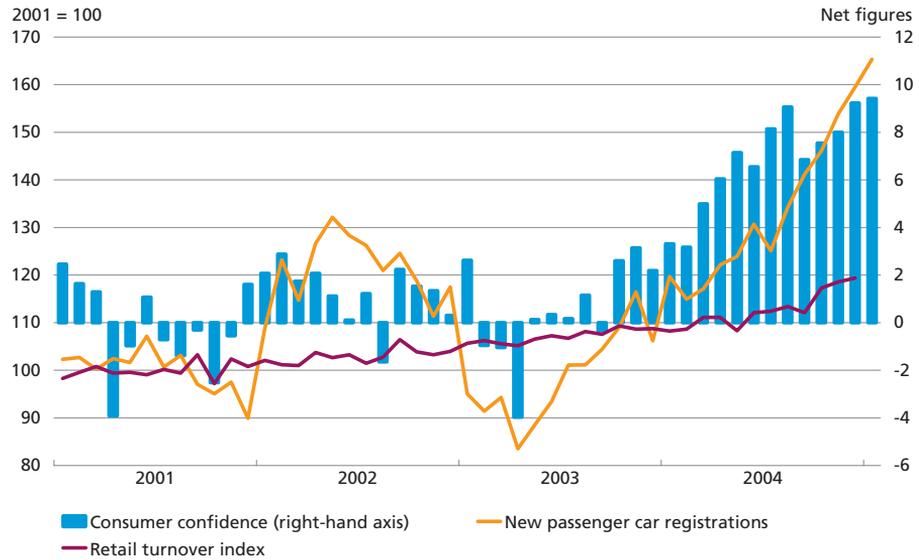
With growth of 1.1 per cent on the preceding quarter private consumption was the main factor driving GDP growth in the 3rd quarter. The number of new passenger car registrations is increasing and approaching the level from the latter half of the 1990s. Fixed gross investments rose by 2.9 per cent from the 2nd quarter, particularly due to growth in investments in machines and transport equipment, as well as software. On the other hand, the increase in residential construction was only moderate, and other building and construction showed a negative growth rate. Public consumption declined marginally in the 3rd quarter and has been virtually unchanged for the last two years.

The reason that GDP stagnated in spite of the strong domestic upturn is that a large proportion of demand was covered by imports. In addition, exports of goods and services fell. External trade taken as one thus made a substantial negative contribution to overall GDP growth.

The indicators point to sustained strong growth in domestic demand in the 4th quarter, cf. Chart 9. Retail turnover has risen at least as strongly as during the upswing in 1993-94, and in the last months of 2004 was almost 10 per cent higher than in the preceding year. Car sales were also increasing, and the most recent consumer confidence indicators show that consumers are optimistic about their own finances as well as Denmark's economy. The confidence indicators for construction and services showed an increasing trend throughout 2004. Industrial output increased slightly up to the turn of the year and the industrial confi-

INDICATORS OF PRIVATE CONSUMPTION

Chart 9



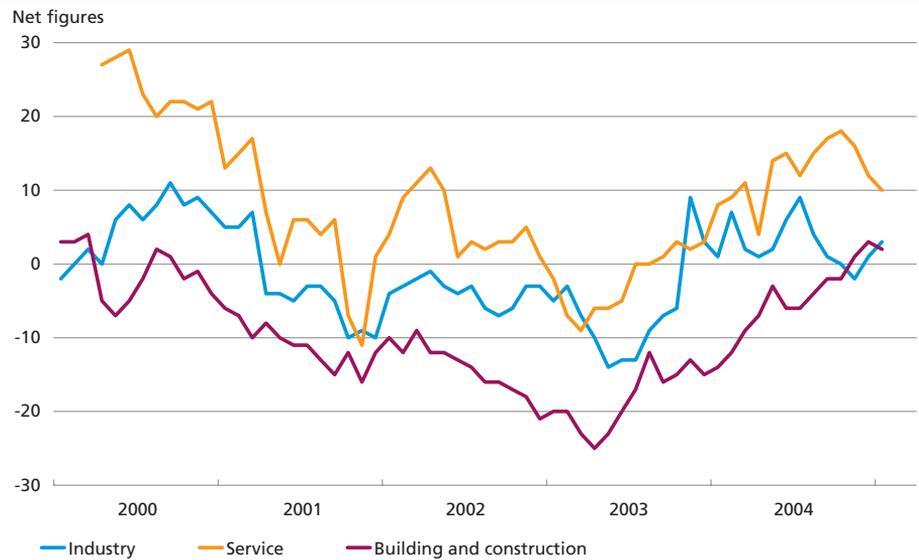
Note: The latest observations are from January 2005 for consumer confidence and car registrations and from December 2004 for retail turnover.

Source: Statistics Denmark.

dence indicator rose in both December and January, but without reaching the level from the summer of 2004, cf. Chart 10. This matches the picture of a domestically driven upturn where the construction and

BUSINESS CONFIDENCE INDICATORS

Chart 10



Note: The latest observations are from January 2005.

Source: Statistics Denmark.

service sectors primarily sell to the domestic market, while manufacturing industry is more export-oriented.

Exports have been affected by the dampened growth in major export markets and the increase in the effective krone rate, mainly as a consequence of the weakening of the dollar. However, the value of energy exports has risen substantially as a result of the high oil prices. On the import side, imports for both consumption and business have shown a marked increase. Overall, the trade surplus was declining throughout 2004, which is normal in a situation with a domestically driven upturn.

The same declining tendency is seen in the current-account surplus. In 2004 the surplus was kr. 35 billion, i.e. 2.4 per cent of GDP, compared to kr. 46 billion in 2003.

Seasonally adjusted employment based on payments to ATP (the Labour Market Supplementary Pension Fund) rose by 4,700 in the 3rd quarter. The increase was seen in the private sector, including the volatile construction sector, while public-sector employment fell slightly. Unemployment fell throughout 2004 and was 6.2 per cent of the labour force in December, compared to 6.6 per cent in December 2003. Much of the decline in unemployment is, however, attributable to a larger number of people in activation schemes. The labour market is thus improving only slowly, and it is doubtful whether the employment targets can be achieved without further measures.

The domestic conditions for the upswing to be sustained in 2005 seem to be present. The level of interest rates is low and disposable incomes are still rising, even though the tax reduction from the summer of 2004 will be stretched across the full year in 2005. Consumption and wealth ratios are high and the current-account surplus is declining. Moreover, the housing market remains strong. Uncertainty primarily relates to external prospects. There are only weak indications of improvement in the euro area, which is the recipient of most of Denmark's exports, and the development in competitiveness is uncertain. The weak dollar has a negative impact on competitiveness. On the other hand, the rate of wage increase in Denmark, which has exceeded that of its competitors for almost a decade, was 2.6 per cent in the 4th quarter and more in step with the level abroad. The wage dampening was particularly evident in manufacturing. The fall in the rate of wage increase is, however, partly related to the fact that pension contributions in several collective bargaining areas were not raised as from 1 July 2004.

The government's net cash surplus was kr. 26 billion in 2004, which is kr. 23 billion higher than estimated in Budget Review 3 from the beginning of December. The large deviation reflects considerable uncertainty in relation to a number of central-government receipts. Undoubtedly,

the forecasts could be improved, but fundamentally the deviation reflects substantial fluctuations in some items from year to year. This is particularly true of the taxation of pension yields where the proceeds are dependent on e.g. share prices and interest rates on a particular date, based on a relatively complex calculation.

Currently expenditure is planned on a medium-term basis, and in this connection it is worth noting the slowdown in public consumption and other public expenditure in recent years. The medium-term fiscal-policy stance focusing on reducing the debt is definitely one of the reasons that the economic imbalances are less pronounced in Denmark than in most other countries. By maintaining this policy it is also possible to avoid large tax increases or substantial public spending cuts in the coming years as the number of old-age pensioners increases substantially.

The cash price of a single-family house rose by 9.2 per cent year-on-year in the 4th quarter, which is an acceleration compared to the preceding quarters. The sustained strong growth in cash prices reflects the low level of interest rates, sound growth in disposable incomes, falling unemployment and generally positive expectations of economic development. To this should be added the effect of the more widespread use of deferred-amortisation mortgage-credit loans, which are considerably less expensive to service in the deferred-amortisation period than conventional mortgage-credit loans.

Whereas housing investments previously meant investing savings in the home in step with amortisation of the loans, the new deferred-amortisation loans entail a higher degree of segregation of the decisions to buy a home and to invest savings. To the extent that this has increased demand for housing, deferred-amortisation loans have pushed cash prices upwards. This impact is most evident in relation to summer cottages and owner-occupied apartments, which have seen particularly high price rises. In these cases many buyers are making their second residential investment. This especially applies to summer cottages, but to some extent also to owner-occupied apartments in cities with many higher educational institutions as parents are investing in apartments on behalf of their student children.

There are large regional differences in the price development in owner-occupied housing. Outside the Greater Copenhagen area and in certain other urban areas, the real costs of owning and occupying a home are not particularly high in a historical perspective, see the Monetary Review, 1st Quarter 2004, pp. 19-33.

The introduction of new products in the home-financing market, including loans of which amortisation is deferred for a number of years, may, as stated, have increased prices in a market that was already rising.

A similar effect, but in the opposite direction, was seen in the late 1980s after the introduction of compulsory "mixed loans" for home financing with the October 1986 package of economic measures. These loans brought amortisation forward and thus amplified the downward trend in housing prices in excess of the impact of the development in interest rates and incomes. However, the effect proved to be temporary, and this may also be the case at the time that a slowdown sets in, although the present mortgage-credit market differs fundamentally from the market in the late 1980s in many respects. In the longer term, construction costs and the price of land, rather than first-year instalments, are likely to have a decisive impact on cash prices for owner-occupied homes.

Price development

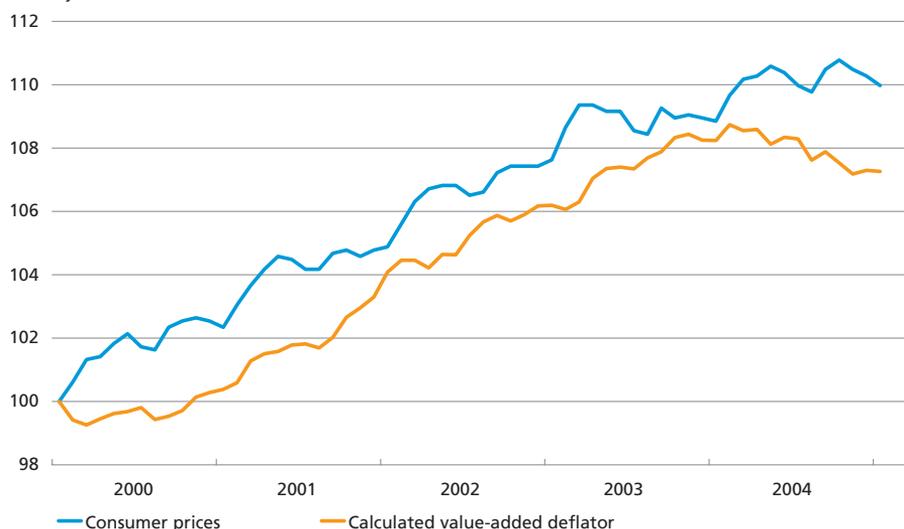
Inflation remains subdued. For the whole of 2004, consumer prices rose by 1.2 per cent, which is the lowest rate of increase since 1958. In January consumer prices were 1.0 per cent higher than in the preceding year.

The annual rate of increase in energy prices remains high, but has been declining in the last few months. Some goods have even gone down in price over the past year. This applies to e.g. clothing, food and communication. Services, on the other hand, have risen by 2.8 per cent. The declining tendency for clothing prices will probably continue for some time, cf. Box 3.

CONSUMER PRICES AND CALCULATED VALUE-ADDED DEFLATOR

Chart 11

January 2000 = 100



Note: The calculated value-added deflator is a measure of the domestic market-determined price development. The latest observations are from January 2005.

Source: Statistics Denmark and Danmarks Nationalbank.

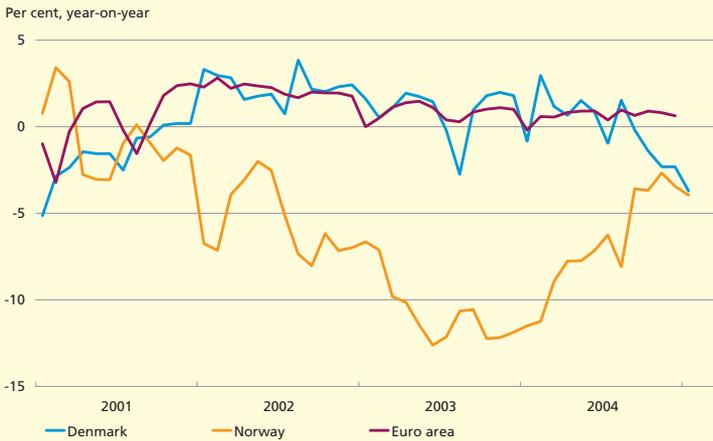
POSSIBLE CONSEQUENCES OF THE LIBERALISATION OF TRADE IN CLOTHING AS FROM 1 JANUARY 2005

Box 3

Industrialised countries have traditionally sought to protect domestic manufacturing against imports from "low-wage countries". This applies particularly to textiles and clothing where e.g. restrictions (quotas) on imports have for many years been exempted from the general rules for international trade. With the Uruguay Round it was, however, decided in 1994 that all quotas in the textiles and clothing sector should be eliminated by 1 January 2005 at the latest. The relaxations in the EU and USA were limited up to that date, which means that competition suddenly intensified substantially from the turn of the year.

PRICE DEVELOPMENT IN CLOTHING AND SHOES IN DENMARK, NORWAY AND THE EURO AREA

Chart 12



Note: The latest observations are from December for the euro area and January for Denmark and Norway. Source: EcoWin.

To assess the possible impact on prices of this market liberalisation it is useful to consider Norway, which is outside the EU, and which already opened its borders for imports of clothing, etc. some years ago. Subsequently, imports of clothing from low-wage countries, notably China, have increased. While China's share of clothing and shoe imports was almost 20 per cent in Denmark, it was 30 per cent in Norway in 2004. This has contributed to diverging price development in the two markets during the past

The calculated value-added deflator has been decreasing since the summer, cf. Chart 11. The reason is that the increase in import prices has not been fully reflected in consumer prices, but has exerted pressure on profit margins, which act as a shock absorber. This pattern has been seen before. Prices are also kept down by sound growth in productivity, cf. the article on pp. 43ff. Overall, this supports the picture of moderate domestic inflationary pressure.

CONTINUED

Box 3

year, cf. Chart 12, with significantly declining clothing prices in Norway¹. Whether the same tendency will be seen in Denmark in the coming years as low-wage countries gain even larger market shares is difficult to say, but it seems likely that increased downward pressure will be exerted on clothing prices.

The agreement to liberalise trade in clothing contains a clause stipulating that restrictions may be reintroduced in the event of serious market disruptions as a consequence of the liberalisation. To prevent this, China voluntarily imposed an export duty on clothing, etc. in the autumn. This will reduce the rate of penetration in the industrialised markets.

Naturally, the liberalisation of trade in textiles and clothing affects not only consumer prices, but potentially also employment in these sectors in the industrialised countries², including Denmark. It is, however, assessed that the consequences in Denmark will be less pronounced than in many other countries since Danish textile manufacturers have already moved considerably up the value chain, while workplaces competing directly with e.g. Chinese seamstresses have to a large extent already been outsourced to abroad.

¹ It should be noted that clothing entails considerable calculation problems in relation to indices of consumer prices since the link between old and new products is difficult.

² Large employment shifts in the clothing industry may also be seen among the low-wage countries.

Inflation measured by the Harmonised Index of Consumer Prices (HICP), which excludes e.g. the housing component, has been around 1.0 per cent in recent months and is thus still below inflation in the euro area overall.

Risks on Settlement of Large Payments

Governor Torben Nielsen

INTRODUCTION

Secure and efficient settlement of payments between the financial institutions is important to financial stability. An important aspect of this security is that participants do not incur credit risks on each other as a consequence of payments settlement. This can be achieved by settling payments via the payments infrastructure, which in this respect differs fundamentally from alternative settlement options such as via accounts with correspondent banks.

Real-time gross settlement (RTGS) systems are used for continuous settlement of large or time-critical payments between financial institutions, primarily banks. Because the payments are settled in real time, the size and duration of the banks' exposure are reduced in RTGS systems. This limits the financial risks incurred by banks on settlement of large or time-critical payments. Banks, central banks and other authorities therefore have a mutual interest in maintaining well-functioning RTGS systems.

RTGS systems are a core element of the payments infrastructure. The widespread use of RTGS systems reflects among other things that the number and value of payments settled between financial institutions has risen substantially. This means that the traditional settlement of large-value payments outside the payments infrastructure is an ever more risk- and resource-intensive task for the banks.

Danmarks Nationalbank develops and maintains the Danish RTGS system, Kronos, in cooperation with the Danish financial institutions. Kronos enables Danish financial institutions to reduce a number of risks related to settlement of payments.¹

RISKS ON SETTLEMENT OF LARGE PAYMENTS

Some banks still settle large payments outside the payments infrastructure. This may, for example, be the current settlement of payments via mutual accounts held by the banks with each other, hereinafter referred

¹ Kronos is described by Thomas Angelius and Astrid Henneberg Pedersen in Danmarks Nationalbank's New Payment System, Kronos, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2002.

to as correspondent accounts. Another option is for the banks to net their mutual payments during the course of the day, so that only the net position is settled via the RTGS system one or more times a day. Irrespective of the method selected, the banks might potentially build up large exposures vis-à-vis other banks, which is not the case if payments are settled on a continuous basis via an RTGS system.

By using correspondent accounts, the banks can reduce their liquidity requirements compared to individual settlement of payments via the RTGS system. However, banks may incur risks that they would not be subject to on settling payments via an RTGS system.

RTGS systems that comply with international standards, such as the Danish RTGS system, Kronos, settle intra-day via accounts at the central bank, i.e. the central bank is the settlement bank for the payment system.¹ Claims on central banks are known as central-bank money and differ from claims on private banks. Central-bank money is risk-free since the central bank cannot go into liquidation, unlike private banks. Claims on the central bank can always be honoured since the central bank can at any time provide liquidity to the financial system. Central-bank money is neutral as the central bank does not discriminate between banks.²

When payments are settled via correspondent accounts instead, no central-bank money is involved. The banks incur the credit risk that the counterparty may have difficulties honouring the bank's claims. Settlement of large payments outside the payments infrastructure can therefore threaten financial stability in a situation where one bank experiences problems.

THE DANISH PAYMENTS INFRASTRUCTURE

The two cornerstones of the Danish payments infrastructure are the Sumclearing and Kronos. The Sumclearing is a system for settlement of retail payments between participants. Danmarks Nationalbank's RTGS system, Kronos, is used for a number of different purposes in relation to settlement of Danish payments, including participation in the pan-European payments system, Target. Kronos is used for settlement of payments in Danish kroner and euro between participants.³

Kronos reduces the risks on settlement of payments, cf. Box 1.

¹ Cf. Tobias Thygesen, *International Standards for Payment Systems*, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2001.

² The use of central-bank money in payment systems is described in more detail in *The role of central bank money in payment systems*, Bank for International Settlements, August 2003.

³ For a more detailed description of the payments systems infrastructure in Denmark, see Danmarks Nationalbank, *Report and Accounts 2003*, Box 8.

RISK MANAGEMENT IN KRONOS

Box 1

A major advantage of settling payments via RTGS systems is that these systems minimise a number of risks. Kronos' structure and procedures ensure that participants do not incur credit risks, while their liquidity risk is minimised on settlement of payments via Kronos. A number of measures have also been implemented to reduce operational risks in Kronos.

In Kronos payments are settled using central-bank money, which means that participants do not incur credit and liquidity risks on the settlement bank. Danmarks Nationalbank gives participants access to intra-day credit against pledged collateral. This facilitates the settlement of payments via Kronos on the settlement date, reducing the risk that participants are short of liquidity at the time of settlement.

Participants in Kronos only have access to view outgoing payments that are awaiting settlement. Combined with the messaging structure in Kronos this ensures that it is not possible to obtain information on incoming payments until they have been finally settled. A payment has been finally settled when it has been settled in the accounts of the recipient and the remitter at Danmarks Nationalbank.

Kronos operates with various queuing functions aimed at limiting the liquidity risk of the participants. For instance, if payments are blocked in Kronos because they are each awaiting settlement of the others (i.e. gridlocks), the gridlock resolution mechanism in Kronos can be used to settle the payments without the accounts of the participants in question being overdrawn.¹ The participants' liquidity management is supported via access to individual liquidity queues that allow e.g. ranking and cancellation of payments awaiting settlement. In addition, participants in Kronos are able to create standing orders, i.e. automated transfer of liquidity for Sumclearing and VP settlement.

It has been sought to minimise operational risks in Kronos, i.e. risks that the system is not functioning for technical reasons. For instance, Kronos is covered by Danmarks Nationalbank's dual-centre operations, which means that the operation of the system can be switched between two independent IT centres.

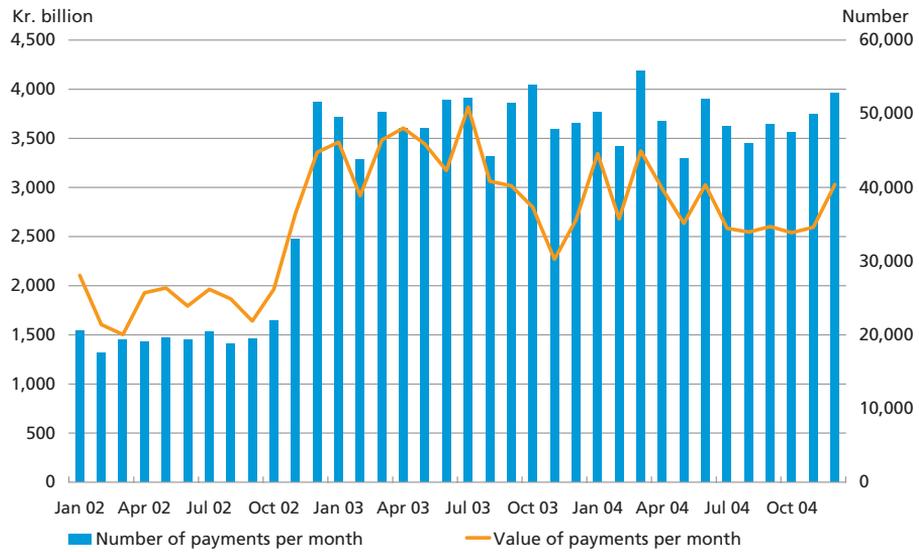
¹ Cf. Morten Linnemann Bech and Kimmo Soramäki, Gridlock Resolution in Payment Systems, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2001.

Chart 1 shows the development in the number and value of payments settled via Kronos. The number of payments doubled in the year after Kronos was commissioned, while the average value of the payments decreased. The reason was that some banks ceased to net payments prior to settlement in Kronos and began to settle payments individually via Kronos. This has given these banks a far greater degree of security than previously on settlement of their payments.

Financial stability in Denmark is enhanced because the banks increasingly settle mutual payments via the payments infrastructure. The Danish payments infrastructure, which the financial institutions help to develop and finance on an ongoing basis, is indeed designed to ensure the secure and effective settlement of payments.

DEVELOPMENT IN THE NUMBER AND VALUE OF DANISH KRONE-DENOMINATED PAYMENTS IN KRONOS FROM JANUARY 2002 TO DECEMBER 2004

Chart 1



Note: The Chart shows the number and value of the total krone-denominated payments settled via Kronos per month.
 Source: Own calculations.

Some banks still settle a considerable proportion of their large-value payments outside the payments infrastructure. One of the reasons is presumably a certain degree of reluctance due to established routines.

From the overall perspective of ensuring effective and secure settlement of payments in order to underpin financial stability in Denmark, Danmarks Nationalbank encourages these banks to reconsider whether a larger proportion of their payments should not take place via the common payments infrastructure.

The 10-Year Yield Spread between Denmark and Germany

Kim Abildgren, Economics, Jacob Lindewald, Financial Markets, and Michal Chr. Nielsen, Market Operations

INTRODUCTION AND SUMMARY

The yield spread between countries is usually calculated on the basis of government bonds with the same maturity. Government bonds are benchmark bonds since they are normally highly liquid and entail only a minimum credit risk.

Traditionally, the 10-year yield spread between Denmark and Germany is measured as the difference between the yields to maturity of government bonds in the 10-year maturity segment in the two countries. The remaining term to maturity of bonds in the 10-year segment in Denmark and Germany is not always exactly 10 years, however, and the remaining term to maturity automatically declines over time. When an "old" 10-year government bond is replaced by a "new" bond as the 10-year benchmark in Denmark or Germany, there may be a leap in the yield level and thus in the traditional yield spread, reflecting the difference in remaining term to maturity between the old and the new benchmark bonds rather than the market development in interest rates.

Such technically based leaps in the yield spread may give rise to misunderstandings. Consequently, it may be necessary to supplement the traditional yield spread with calculations of alternative 10-year yield spreads that are not influenced by benchmark switches. Under certain circumstances, such alternative spreads may give a more true and fair view of the development in interest rates over time, e.g. in connection with general macroeconomic analyses.

This article analyses the pros and cons of alternative methods of calculating the yield spread between Denmark and Germany. No clear-cut answer is given to the question of what the "correct" yield spread is, but the article presents two alternative 10-year government yield spreads which do not include leaps on the switch of benchmark and that may

therefore be useful supplements to the traditional yield spread. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points¹, while the two alternative yield spreads were 3-4 basis points.

Finally, certain yield spreads calculated on the basis of swaps are considered. The 10-year swap rates in Denmark and the euro area always have a maturity of 10 years, but since the swap rates reflect the credit risk on private banks, the spread between swap rates cannot immediately substitute the government yield spread. In some contexts, the yield spread derived from 10-year "asset swap packages" is applied as an alternative to traditional 10-year government yield spreads within the euro area, but this method cannot simply be transferred to spreads between krone-denominated Danish government bonds and euro-denominated German government bonds.

BACKGROUND

Traditionally, the 10-year yield spread between Denmark and Germany is measured as the difference between the yields to maturity of 10-year government bonds in the two countries. This is a spread between yields that can be observed directly in the market and that reflect the actual borrowing conditions for the Danish and German governments, respectively, in the 10-year maturity segment. Therefore this is the yield spread focused on by participants in the financial markets and used in e.g. the EU's convergence criteria².

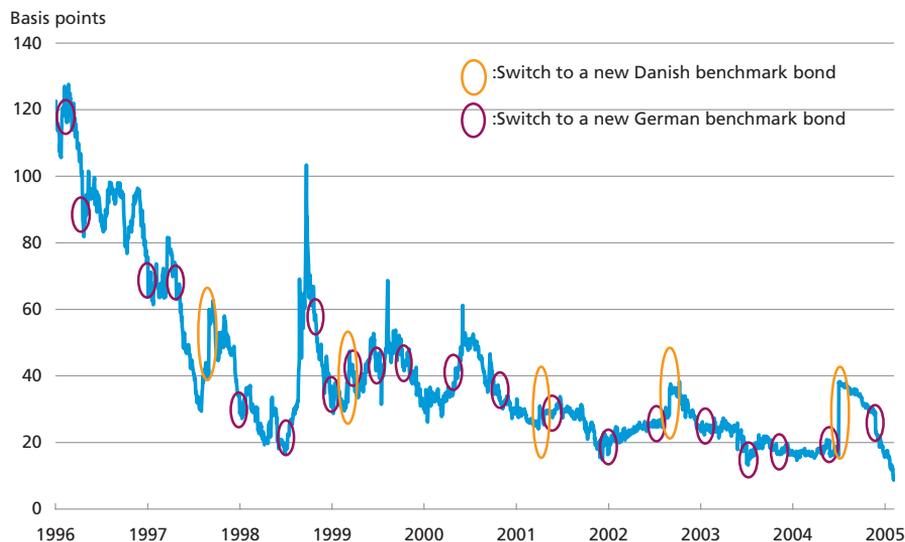
A switch to a new 10-year benchmark bond in either Germany or Denmark may lead to large or small changes in the traditional yield spread that do not reflect the market development in interest rates. The effect on the yield spread of a switch to a new German 10-year benchmark bond is normally limited to around 5 basis points since the difference in the term to maturity between new and old German benchmark series is usually 6 months. A switch to a new 10-year benchmark bond in Denmark may, on the other hand, result in a far greater leap in the yield spread since the difference in the terms to maturity of the old and new 10-year Danish benchmark bonds is usually around 2 years. The latest

¹ One basis point is 0.01 percentage point.

² To join the euro, a member state must meet the "convergence criteria". One criterion relates to the long-term interest rate, which must not exceed the long-term interest rates in the three EU member states with the lowest rate of inflation by more than 2 percentage points. Article 4 of the Protocol (21) on the convergence criteria referred to in Article 121 of the Treaty establishing the European Community states, *inter alia*, that "Interest rates shall be measured on the basis of long term government bonds or comparable securities, taking into account differences in national definitions". In practice convergence assessments are made on the basis of yields on government bonds with a maturity as close as possible to 10 years, cf. Amerini (2004). No adjustments are made for any maturity differences for bonds from different countries.

TRADITIONAL 10-YEAR GOVERNMENT YIELD SPREAD BETWEEN DENMARK AND GERMANY, 1996-2005

Chart 1



Source: Bloomberg and Danmarks Nationalbank.

switch to a new 10-year benchmark bond in Denmark, which took place on 1 July 2004, thus entailed a leap in the yield spread by around 20 basis points. The leaps in connection with previous Danish benchmark switches have been less pronounced, cf. Chart 1.¹

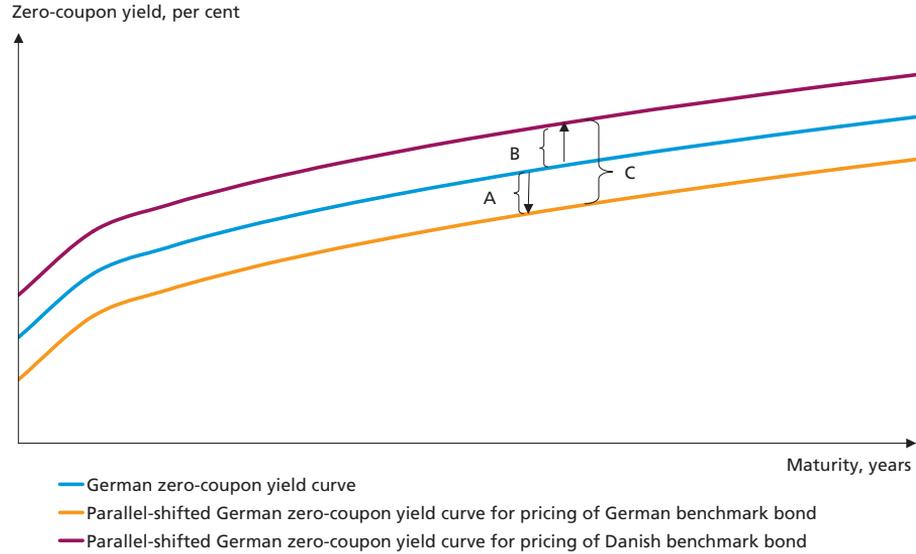
This type of technically based leap in the traditional 10-year yield spread does not reflect the market development in interest rates. In certain contexts, Danmarks Nationalbank's publications therefore include adjustments for the effect of the benchmark switch. This article assesses the pros and cons of two alternative methods of calculating the 10-year government yield spread between Denmark and Germany:

- The yield spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German government zero-coupon yield curve.
- The spread between the 10-year government par yields in Denmark and Germany.

Subsequently two other expressions of the yield spread between countries, calculated on the basis of swaps, are considered.²

¹ An overview of the Danish and German 10-year benchmark government bonds since 1995 is given in Appendix A.

² The different methods are elaborated on in Appendix B, which also presents concrete examples of the calculation methods.



Note: The interest-rate data is purely hypothetical.

SPREAD BETWEEN 10-YEAR BENCHMARK GOVERNMENT BONDS IN DENMARK AND GERMANY CALCULATED RELATIVE TO THE GERMAN GOVERNMENT ZERO-COUPON YIELD CURVE

An alternative to the traditional 10-year yield spread can be found by pricing both the German and Danish 10-year benchmark government bonds relative to the German government zero-coupon yield curve.

This is best illustrated by means of Chart 2. The first step is to determine the number of basis points by which the German zero-coupon yield curve must be parallel-shifted if the theoretical value¹ of the German benchmark bond is to correspond to the actual market value of the German benchmark bond (motion A). The next step is to find the number of basis points by which the German zero-coupon yield curve is to be parallel-shifted if the theoretical value² of the Danish benchmark bond is to correspond to the actual market value of the Danish benchmark bond (motion B). Subsequently, spread C in Chart 2 can be seen as a yield spread between Danish and German government bonds in the 10-year maturity segment.

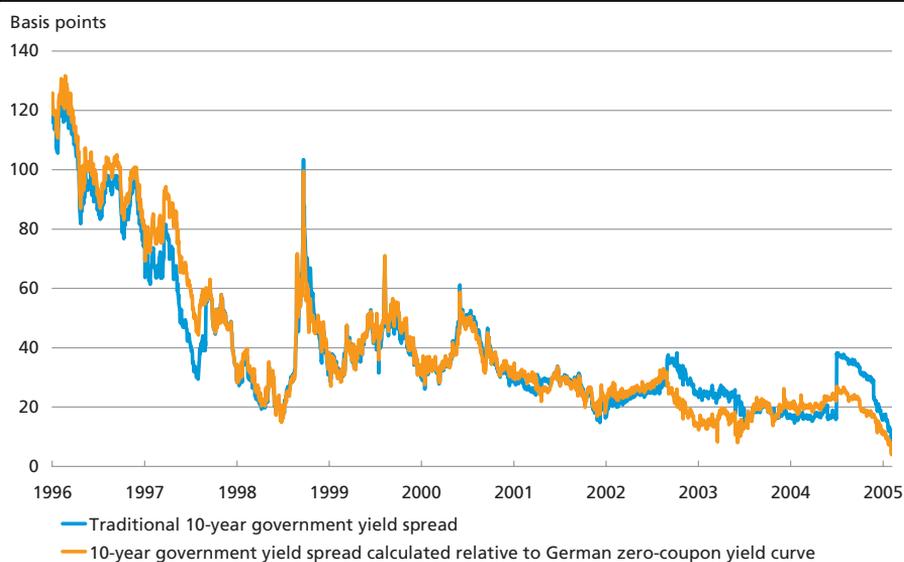
Chart 3 shows the development in this spread (C) since 1996 together with the traditional 10-year government yield spread. When the yield

¹ I.e. the present value of the German bond's cash flow calculated on the basis of the parallel-shifted German zero-coupon yield curve.

² I.e. the present value of the Danish bond's cash flow calculated on the basis of the parallel-shifted German zero-coupon yield curve.

10-YEAR GOVERNMENT YIELD SPREAD BETWEEN DENMARK AND GERMANY CALCULATED RELATIVE TO THE GERMAN GOVERNMENT ZERO-COUPON YIELD CURVE

Chart 3



Source: Bloomberg and Danmarks Nationalbank.

spread is calculated relative to the German zero-coupon yield curve, the effect of a switch to a new benchmark bond in either Denmark or Germany is eliminated.

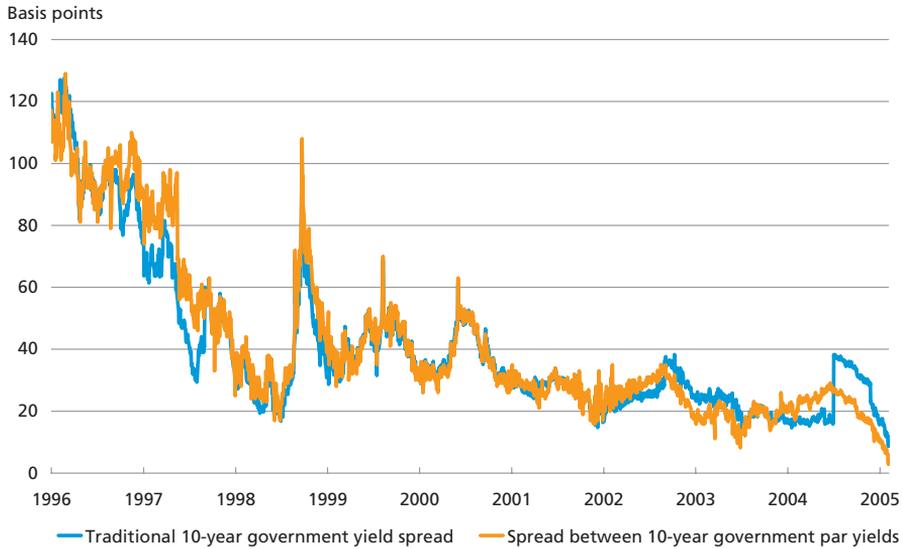
The calculation method maintains the bond-specific element of the yields since the bonds' actual market values and cash flows are used. Therefore this method can be used to illustrate how the market assesses various specific Danish bonds in relation to specific German bonds. Moreover, the method can be transferred directly to the benchmark bonds of other countries, so that for instance their 10-year government yield spreads in relation to Germany can be compared.

Since the Danish and German zero-coupon yield curves cannot be observed directly in the market, they must be estimated on the basis of a statistical model.¹ This can cause "noise" in the series. In addition, the yield spread is to some extent affected by the difference in maturity between the Danish and German benchmark bonds, so that it is not a "pure" 10-year yield spread. The reason is that the magnitudes of the two spreads, A and B, in Chart 2 are each based on the maturity of the respective benchmark bonds.

¹ Cf. e.g. Svensson (1995).

10-YEAR GOVERNMENT PAR-YIELD SPREAD BETWEEN DENMARK AND GERMANY

Chart 4



Source: Bloomberg and Danmarks Nationalbank.

SPREAD BETWEEN 10-YEAR GOVERNMENT PAR YIELDS IN DENMARK AND GERMANY

The difference in maturity between the Danish and German benchmark bonds may be taken into account by considering the spread between the 10-year "par yields".

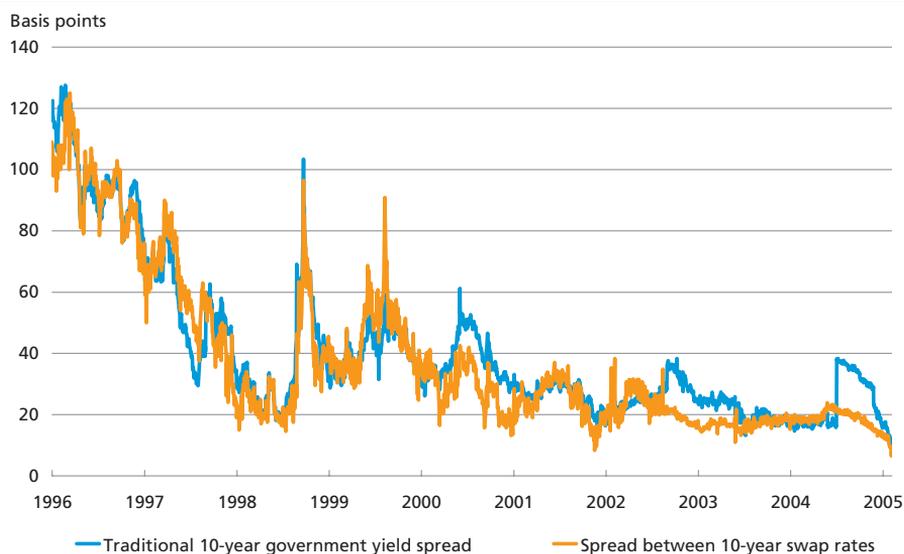
The Danish 10-year par yield is the coupon rate which ensures that a synthetic bullet loan with a maturity of exactly 10 years has a theoretical value of 100 (par), calculated on the basis of the Danish government zero-coupon yield curve. The German 10-year par yield is found in the same way – but using the German government zero-coupon yield curve, however. The resulting par-yield spread is shown in Chart 4.

As a comparison of Charts 3 and 4 will show, the par-yield spread and the yield spread measured in relation to the German zero-coupon yield curve give more or less identical pictures of the development in interest rates. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points, while the two alternative yield spreads were 3-4 basis points.

Like the spread to the German zero-coupon yield curve, the par-yield spread is based on estimated zero-coupon yield curves, with the uncertainty that this entails. Another characteristic of the par-yield spread is that the bond-specific element of the yield spread is eliminated since it is assumed that the two synthetic 10-year bonds are priced on the respective

SPREAD BETWEEN THE 10-YEAR SWAP RATES IN KRONER AND EURO

Chart 5



Note: Before 1999, the euro swap rate is a D-mark swap rate.
 Source: Bloomberg and Danmarks Nationalbank.

zero-coupon yield curves of the two countries. This means that the method cannot be applied to e.g. assessment of various specific Danish government bonds in relation to a specific German government bond. On the other hand, the par-yield method is well suited for comparing the overall development in interest rates in respectively Denmark and Germany.¹

OTHER EXPRESSIONS OF YIELD SPREADS BETWEEN COUNTRIES

Spreads between 10-year swap rates

The 10-year swap rate is the fixed rate of interest in an interest-rate swap where fixed-interest payments are swapped for floating-interest payments over a 10-year period.

When an interest-rate swap is transacted, the swap rate is determined as the value that gives the swap a market value of zero at that time. The difference between the 10-year swap rate in respectively kroner and euro can be seen as a 10-year yield spread between Denmark and the euro area based on interest rates that can be observed directly in the market, cf. Chart 5.

¹ Alternatively, a yield spread might also be calculated directly on the basis of the 10-year government zero-coupon yields in Denmark and Germany. The price sensitivity of a zero-coupon bond with a remaining term to maturity of 10 years is, however, greater than for a bullet loan with an equivalent maturity, and a 10-year zero-coupon yield spread would therefore not necessarily be representative of the Danish and German government bonds in this maturity segment.

In long-term interest-rate swaps denominated in Danish kroner, the floating leg often matches 6-month Cibor, while it usually matches 6-month Euribor for interest-rate swaps denominated in euro. Cibor and Euribor are reference interest rates that reflect the credit risk on a short-term uncollateralised loan to a creditworthy private bank. The fixed rate in the interest-rate swap will thus also reflect this credit risk. Creditworthy private banks typically have a rating of AA/Aa, which is lower than the rating of Danish and German government bonds (AAA/Aaa). The credit-risk element is not necessarily identical for Euribor and Cibor – and not necessarily constant over time either. The spread between the 10-year swap rates in kroner and euro may thus be affected by circumstances that do not necessarily affect the traditional 10-year government bond yield spread between Denmark and Germany in the same way.

The yield spread calculated on the basis of asset swap packages for 10-year government bonds

In the euro area there are examples of yield spreads between two countries being calculated on the basis of "asset swap packages".

An asset swap is an interest-rate swap where the amounts and settlement dates for one leg of the swap are identical to those on an underlying bond, while the other leg is tied to a floating interest rate. If a fixed-yield government bond is combined with an asset swap, the result is a "package" at a floating interest rate, cf. Appendix B.

For instance, an asset swap package may be constructed such that the payments on the fixed leg of the swap exactly match the interest payments on the French 10-year benchmark government bond, and where the floating leg of the swap pays 6-month Euribor with addition of a spread, usually referred to as the "asset swap spread" for the French bond in question. In the same way, an asset swap package may be constructed such that the payments on the fixed leg of the swap exactly match the interest payments on the German 10-year benchmark government bond, and where the floating leg of the swap pays 6-month Euribor with addition of an asset swap spread for the German bond in question. The difference between the floating interest rates thus found can then be seen as a 10-year yield spread between France and Germany. The reason is that Euribor "nets out" when the yield spread is calculated, leaving only the difference between the French and German asset swap spreads. The French government's debt management office applies asset swap packages to comparison of the French government's borrowing terms with those of other government issuers in the euro area, cf. Box 1.

In order to achieve an indication of the French government's borrowing terms compared to other government issuers in the euro area, the French government debt management office calculates an average asset swap spread for the euro area on an ongoing basis.¹ The average spread is calculated on the basis of the asset swap spreads of the individual euro area member states weighted by the circulating volume of government securities for each issuer relative to the total circulating volume of government securities for all issuers in the euro area. Since all asset swap spreads for the euro area member states are calculated relative to Euribor (the issues being euro-denominated), an issuer's borrowing terms relative to the euro-area average can then be calculated as the difference between the asset swap spread for the selected issuer and the average asset swap spread in the euro area.

In December 2004, the difference between the French asset swap spread and the average asset swap spread for the whole euro area was approximately -5 basis points. This can be interpreted to mean that in this month the French government could issue bonds at a yield to maturity that was approximately 5 basis points below the average for the euro area.

¹ See Agence France Trésor (2003) for a technical description, and <http://www.aft.gouv.fr> for current updates of the indicator.

In the euro area, all such asset swap packages for euro-denominated government securities are based on Euribor. For a euro area member state, the yield spread to Germany calculated on the basis of asset swap packages can therefore roughly be interpreted as the difference between the yield to maturity on 10-year bonds in the euro area member state in question and in Germany. Moreover, this yield spread does not leap on the switch to a new 10-year benchmark bond. However, the yield spread is to some extent affected by the difference in maturity between the benchmark bonds in the two countries so that it is not a "pure" 10-year yield spread. It should also be noted that the pricing of asset swap packages is based on the swap zero-coupon yield curve, and that an asset swap package may entail an "up front" payment to the swap counterparty at the time of its transaction, cf. Appendix B. In that case the yield spread will partly reflect the credit risk on private banks and will thus not be based purely on government credit risk, as is the case for a traditional 10-year government yield spread.

In principle it is also possible to calculate a yield spread between Denmark and Germany on the basis of asset swap packages for 10-year bonds in the two countries. However, this would not be a 10-year yield spread. The reason is that the yield spread between Danish krone-denominated government bonds and German euro-denominated government bonds would in that case be based on asset swap packages

calculated in relation to Cibur and Euribor, respectively, which do not "net out" when the yield spread is calculated. For Denmark a yield spread to Germany based on such asset swap packages would therefore be a short-term yield spread, the size of which depends partly on the borrowing terms of the Danish and German governments in the 10-year maturity segment, and partly on the development in the spread between Cibur and Euribor.¹

SUMMARY

Purely technically based leaps may occur in the 10-year government yield spread between Denmark and Germany on a switch to a new benchmark bond. Such leaps are not related to the market development in interest rates and could give rise to misunderstandings. Consequently, it may be necessary to supplement the traditional yield spread with calculations of alternative 10-year yield spreads that are not influenced by benchmark switches.

Two alternative government yield spreads are found that may be useful supplements to the traditional yield spreads in various contexts. With the alternative spreads, leaps in the yield spread are avoided in connection with benchmark changes. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points, while the two alternative yield spreads were 3-4 basis points.

¹ The development in the spread between Cibur and Euribor can at times be influenced by fluctuations in liquidity conditions in the money markets. For instance, it has been observed for a number of years that Euribor is relatively high around the turn of the year, cf. e.g. ECB (2000) and Bindseil, Weller & Würtz (2003).

LITERATURE

Amerini, G. (2004), Long-term interest rates for Acceding Countries, *Eurostat Statistics in Focus*, Theme 2-21.

Agence France Trésor (2003), *A Metric for spreads between government bonds*, 9 October.

Bindseil, U., Weller, B. & Würtz, F. (2003), Central Bank and Commercial Banks Liquidity Management - What Is the Relationship?, *Economic Notes*, Vol. 32(1), pp. 37-66.

ECB (2000), *Monthly Bulletin*, October.

Lando, David (2004), *Credit Risk Modeling: Theory and Applications*, Princeton University Press.

Svensson, L.E.O. (1995), Estimating Forward Interest Rates with the Extended Nelson & Siegel Method, *Sveriges Riksbank Penning- & Valutapolitik*, No. 3, pp. 13-26.

APPENDIX A: BENCHMARK BONDS IN DENMARK AND GERMANY

The benchmark government bond in the 10-year segment in Denmark is determined and published by Government Debt Management following deliberation in the Danish government's Primary Dealer Committee. Prior to the introduction of the Danish government's Primary Dealer system in 2003, the 10-year benchmark government bond in Denmark was determined by the market participants (the Danish Securities Dealers Association).

In Germany, the market participants determine the 10-year benchmark government bond.

The Table below gives an overview of the 10-year Danish and German benchmark government bonds since 1995.

| 10-YEAR BENCHMARK GOVERNMENT BONDS 1995-2004 | | | | | |
|--|---------------|----------------------------|-------------|---------------|----------------------------|
| Denmark | | | Germany | | |
| Coupon rate | Maturity date | Benchmark with effect from | Coupon rate | Maturity date | Benchmark with effect from |
| 7 % | 15 Dec. 2004 | 9 May 1994 | 7.375 % | 3 Jan. 2005 | 30 Dec. 1994 |
| 8 % | 15 Mar. 2006 | 4 Dec. 1995 | 6.875 % | 12 May 2005 | 10 May 1995 |
| 7 % | 15 Nov. 2007 | 1 Sep. 1997 | 6.5 % | 14 Oct. 2005 | 18 Oct. 1995 |
| 6 % | 15 Nov. 2009 | 8 Mar. 1999 | 6 % | 5 Jan. 2006 | 04 Jan. 1996 |
| 6 % | 15 Nov. 2011 | 1 Apr. 2001 | 6 % | 16 Feb. 2006 | 14 Feb. 1996 |
| 5 % | 15 Nov. 2013 | 2 Sep. 2002 | 6.25 % | 26 Apr. 2006 | 24 Apr. 1996 |
| 4 % | 15 Nov. 2015 | 1 Jul. 2004 | 6 % | 4 Jan. 2007 | 08 Jan. 1997 |
| | | | 6 % | 4 Jul. 2007 | 23 Apr. 1997 |
| | | | 5.25 % | 4 Jan. 2008 | 07 Jan. 1998 |
| | | | 4.75 % | 4 Jul. 2008 | 08 Jul. 1998 |
| | | | 4.125 % | 4 Jul. 2008 | 28 Oct. 1998 |
| | | | 3.75 % | 4 Jan. 2009 | 06 Jan. 1999 |
| | | | 4 % | 4 Jul. 2009 | 24 Mar. 1999 |
| | | | 4.5 % | 4 Jul. 2009 | 01 Jul. 1999 |
| | | | 5.375 % | 4 Jan. 2010 | 20 Oct. 1999 |
| | | | 5.25 % | 4 Jul. 2010 | 03 May. 2000 |
| | | | 5.25 % | 4 Jan. 2011 | 18 Oct. 2000 |
| | | | 5 % | 4 Jul. 2011 | 23 May. 2001 |
| | | | 5 % | 4 Jan. 2012 | 02 Jan. 2002 |
| | | | 5 % | 4 Jul. 2012 | 03 Jul. 2002 |
| | | | 4.5 % | 4 Jan. 2013 | 08 Jan. 2003 |
| | | | 3.75 % | 4 Jul. 2013 | 02 Jul. 2003 |
| | | | 4.25 % | 4 Jan. 2014 | 29 Oct. 2003 |
| | | | 4.25 % | 4 Jul. 2014 | 26 May. 2004 |
| | | | 3.75 % | 4 Jan. 2015 | 24 Nov. 2004 |

Note: Bullet loans.

Source: Danmarks Nationalbank and Bloomberg.

APPENDIX B: VARIOUS MEASURES OF THE 10-YEAR YIELD SPREAD

This Appendix elaborates on the calculation methods behind the various yield spreads in the Charts in this article. It also includes concrete calculation examples based on data from 20 January 2005.

The yield spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German government zero-coupon yield curve

Let $y(T_i)$ be the T_i -year zero-coupon yield. Then the theoretical price (P_{TEO}) along the zero-coupon curve for a bond of the bullet loan type with principal F , coupon payments C , and maturity date T_N is given by:

$$P_{TEO} = (1 + y(T_N))^{-T_N} \cdot F + \sum_{i=1}^N (1 + y(T_i))^{-T_i} \cdot C$$

Then let P_{MV} be the observed market price (including accrued interest) of the bond in question. The bond's spread from the zero-coupon yield curve¹ (y_{cs}) is found on the basis of the following expression:

$$P_{MV} = (1 + y(T_N) + y_{cs})^{-T_N} \cdot F + \sum_{i=1}^N (1 + y(T_i) + y_{cs})^{-T_i} \cdot C$$

Intuitively, e.g. y_{cs} to the German zero-coupon curve for a given government bond corresponds to the parallel shift to the German zero-coupon curve required for the theoretical value of the bond along the parallel-shifted German zero-coupon curve to be equal to the observed market value of the bond, cf. Chart 2 in the article.

When y_{cs} has been found for both the Danish and German 10-year benchmark government bonds, the Danish-German 10-year government yield spread in relation to the German government zero-coupon yield curve can be calculated as the difference between the two. The time series in Chart 3 of the article is calculated in this way. If the German bond is traded at a higher or lower price than the German zero-coupon yield curve indicates, this will be reflected in the calculated spread.

The trading day 20 January 2005 has been chosen as a concrete illustration of this calculation. On this day, the market price, including accrued interest, of the 10-year Danish benchmark government bond 4 per cent bullet loan 2015 was 103.38. The theoretical value of the bond calculated on the basis of the German zero-coupon yield curve was 104.20.

¹ Often called the "yield curve spread" or the "z spread" in the financial literature.

On this day the German zero-coupon yield curve therefore had to be parallel-shifted upwards by 9 basis points in order to achieve a theoretical value equivalent to the market price. Likewise, the market price of the German 10-year benchmark government bond DBR 3.75 per cent 2015 is found to be 102.08, and the theoretical value 102.07. Consequently, ycs for Germany could be determined at zero basis points. The overall spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German zero-coupon yield curve was thus $9 - 0 = 9$ basis points.

The spread between the 10-year par yields in Denmark and Germany

The par-yield spread is found as the difference between a Danish and a German 10-year government par yield. Using the same notation as in the above example, a T_N -year par yield is given by the solution, C_{PAR} to the following expression:

$$100 = (1 + y(T_N))^{-T_N} \cdot 100 + \sum_{i=1}^N (1 + y(T_i))^{-T_i} \cdot C_{PAR}$$

Intuitively, e.g. the 10-year Danish par yield is given as the coupon rate on a synthetic bullet loan with a remaining term to maturity of exactly 10 years that ensures that the synthetic bond has a theoretical value of 100 (par) when the bond is priced on the basis of the Danish zero-coupon yield structure.

In Chart 4 the par-yield spread is given by the difference between the 10-year Danish government par yield and the 10-year German government par yield. On 20 January 2005 the German par yield was 3.58 per cent and the Danish par yield 3.65 per cent. Consequently the par-yield spread was $3.65 - 3.58 = 7$ basis points.

Spread between 10-year swap rates in kroner and euro

The swap rate (r_{swap}) is the fixed rate in an interest-rate swap where fixed-interest payments are exchanged for floating-interest payments. Table B.1 illustrates the payments in a 10-year krone-denominated interest-rate swap. CB(t_1 ; t_2) is 6-month Cibur between the times t_1 and t_2 , and it is noted that the Cibur coupon is fixed 6 months before the payment is actually exchanged. Payments in a euro-denominated interest-rate swap follow the same pattern – but using Euribor rather than Cibur, however.¹

¹ For simplification, the illustrations in Tables B.1 and B.2 assume that both the floating and the fixed interest are paid biannually. In practice, only the 6-month floating interest is paid biannually, while the fixed interest is paid annually for the types of swaps and bonds discussed.

| CASH FLOWS IN A KRONE-DENOMINATED INTEREST-RATE SWAP | | | | | TABLE B.1 |
|--|--------------------|-------------------------------------|----------------------------------|-----|-------------------------------------|
| | Transaction t=0 | 1st settlement date, t=0.5 years | 2nd settlement date, t=1 year | ... | Last settlement date, t=10 years |
| Fixed leg | 0 | $-r_{\text{swap}}$ | $-r_{\text{swap}}$ | ... | $-r_{\text{swap}}$ |
| Floating leg | 0 | CB(0;0.5) | CB(0.5;1) | ... | CB(9.5;10) |
| Net | 0 | CB(0;0.5) - r_{swap} | CB(0.5;1) - r_{swap} | ... | CB(9.5;10) - r_{swap} |

Usually the interest payments on the two legs of an interest-rate swap are calculated on the basis of the same principal, and it is therefore not necessary to exchange principals on transaction and expiry of the swap. For certain calculations it is, however, convenient to add exchange of principal since the cash flow for one leg thus matches a floating-rate bullet loan, and the cash flow for the other leg matches a fixed-rate bullet loan with a coupon rate matching the swap interest rate.

In a standard interest-rate swap, the swap rate is determined to give the interest-rate swap a market value of zero at the time of its transaction. A floating-rate loan has a market value at par on each settlement date, provided that the principal accrues interest and is discounted using the same yield structure. Consequently, an interest-rate swap will have a market value of zero on its transaction if the swap rate is determined to give the fixed leg a market value at par. The swap rate for a given maturity thus corresponds to the par yield on a synthetic bullet loan that is priced on the basis of the swap zero-coupon yield curve.

On 20 January 2005, the 10-year euro-denominated swap rate was 3.64 per cent, while the 10-year krone-denominated swap rate was 3.75 per cent. Consequently the 10-year yield spread between Denmark and the euro area based on swaps was $3.75 - 3.64 = 11$ basis points.

Yield spread calculated on the basis of asset swap packages

A 10-year asset swap is an interest-rate swap where the fixed leg of the swap exactly mirrors the cash flow for a given 10-year bond, while the interest rate on the other leg floats. If the investor purchases the underlying bond and at the same time transacts an asset swap, a package is created whereby the investor overall receives interest at a floating rate. For a German bond, this is illustrated in Table B.2, where P_{MV} is the market price of the bond, C_{bond} the bond's coupon rate, and $EB(t_1; t_2)$ the 6-month Euribor between the times t_1 and t_2 .

Since the fixed leg of the asset swap reflects the coupon rate of the bond, and thus not the corresponding swap rate, the present value of the fixed leg calculated via the swap zero-coupon yield structure will differ from the par value. If the investor wishes the asset swap to have a

CASH FLOWS IN AN ASSET SWAP PACKAGE FOR A 10-YEAR GERMAN GOVERNMENT BOND

TABLE B.2

| | Conclusion, $t=0$ | 1st settlement date, $t=0.5$ years | 2nd settlement date, $t=1$ year | Last settlement date, $t=10$ years |
|--------------|----------------------|--|---------------------------------------|---------------------------------------|
| Bond | $-P_{MV}$ | C_{bond} | C_{bond} | $C_{bond} + 100$ |
| Asset swap | | | | |
| Fixed leg | | $-C_{bond}$ | $-C_{bond}$ | $-C_{bond}$ |
| Floating leg | $P_{MV} - 100$ | $EB(0;0.5)+a$ | $EB(0.5;1)+a$ | $EB(9.5;10)+a$ |
| Net | -100 | $EB(0;0.5)+a$ | $EB(0.5;1)+a$ | $EB(9.5;10)+a+100$ |

present value of zero, compensation must be made for the yield difference to the swap rate on the fixed leg by adding a spread (which might be negative) to the floating leg. Generally, such a spread is referred to as an "asset swap spread" (cf. "a" in Table B.2). In many asset swap packages, the asset swap spread is determined so that the present value of the total asset swap package is par. This construction is called a "par-par asset swap".¹ If the underlying bond is traded at a premium (discount), the investor borrows (lends) the price difference from (to) the swap counterparty, and the loan is amortised over the maturity of the swap via adjustment of the asset swap spread. This means that the asset swap spread is determined so that the present value of the asset swap matches the premium or discount on the underlying bond.

As stated previously, an asset swap package can be seen as a floating-rate issue. The difference between a calculated floating interest rate for a French asset swap package and a floating interest rate for a German asset swap package thus expresses a 10-year yield spread between France and Germany. The reason is that the asset swap packages for both countries are based on Euribor (since the issues are euro-denominated), which means that the short-term interest rate (Euribor) "nets out" when the yield spread is calculated. What remains is the difference between the French and German asset swap spreads, which can be roughly interpreted as the difference between the yields to maturity on 10-year bonds in France and Germany.

¹ Calculation aspects for this type of asset swap are covered by e.g. Lando (2004).

Wages, Competitiveness and the Balance of Payments

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INTRODUCTION AND CONCLUSION

Danish hourly wage costs are among the highest in the world, and the gap to Denmark's competitors has widened in the last decade. Despite this deterioration in competitiveness, exports have fared well, and in 2004 Denmark had a surplus of more than kr. 70 billion, equivalent to around 5 per cent of GDP, on external trade in goods and services. This is also a large surplus by international standards. The current-account surplus, which in addition to goods and services includes interest on the external debt and unilateral transfers to abroad, showed a surplus of 2.4 per cent of GDP. There are three main explanations for this development.

Firstly, the excess Danish wage increases vis-à-vis competitors have been offset by stronger productivity growth. According to Statistics Denmark, this was particularly evident in manufacturing and in certain services such as marine transport.

Secondly, the increased production of oil and gas from the Danish North Sea fields contributes to the surplus on the balance of goods and services, as does the substantial increase in exports of marine freight.

Thirdly, Denmark's terms of trade have improved as exports have been sold at ever higher prices, while in overall terms import prices for goods and services have stagnated. The opposite is the case in e.g. Sweden and Finland, which also have large current-account surpluses, but have seen their terms of trade deteriorate. This is attributable to the different product composition of Danish exports.

Notwithstanding the high hourly wage costs, there are no general indications of a Danish competitiveness problem at present. So far the economy has been able to adapt to the increasing globalisation of production. In a forward-looking perspective, globalisation will require ongoing innovation and adaptability, and it is uncertain whether Danish enterprises will be able to sustain productivity growth at a higher rate than abroad. If not, growth in Danish wage costs must be brought more in line with the level of Denmark's competitors. Decentralised wage formation in the sectors exposed to competition can help to ensure this.

WAGE DEVELOPMENT IN DENMARK AND ABROAD

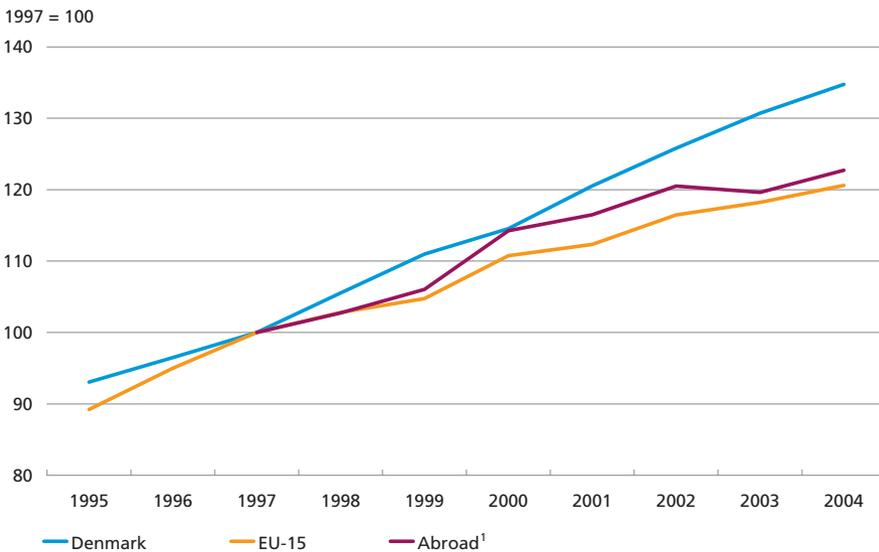
Over the last 10 years, Danish hourly wage costs have increased at a faster rate than those of Denmark's competitors. Precisely how great the difference is depends on the sectors reviewed and the wage concept focused on, and the various sources are not always in agreement. Consequently, the excess wage increase is stated with some uncertainty.

This article operates primarily with a broad wage concept, covering not only disbursed wages before tax, but also all other hourly wage costs to the enterprise, i.e. pension contributions, holidays and personal days, social contributions, etc. This broad wage concept is relevant when assessing the development in the enterprises' international competitiveness.

The sectors reviewed are also significant. Since the mid-1990s average wage growth in manufacturing has been 4½ per cent in Denmark, but just over 3 per cent for a broad group of Denmark's trading partners. For the private sector taken as one, the increase has been somewhat lower, at 3½ per cent, but this has also been the case among Denmark's competitors, where the increase has been 2½ per cent. It can be concluded that wage increases in Denmark have been higher than among its competitors, resulting in a wider wage gap, cf. Chart 1.

WAGE DEVELOPMENT IN MANUFACTURING IN DENMARK AND ABROAD

Chart 1



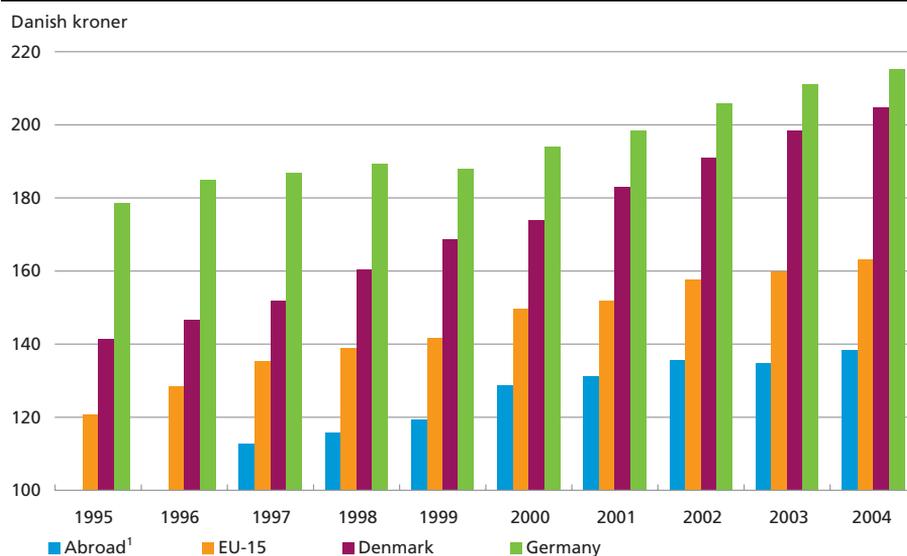
Note: 2004 figures are partly based on estimates.

Source: US Department of Labor, Swedish Employers' Confederation and own calculations.

¹ "Abroad" comprises EU-15, USA, Japan, Canada, Norway, Switzerland, Poland, Hungary and the Czech Republic. Wages are weighed together with the 2002 weights used to calculate the real effective krone rate. Data for "Abroad" is only available from 1997 onwards.

TOTAL HOURLY WAGE COSTS IN MANUFACTURING

Chart 2



Note: In addition to actual wages, the total hourly wage costs include pension contributions, social contributions, etc. 2004 figures are partly based on estimates.

Source: US Department of Labor, Swedish Employers' Confederation and own calculations.

¹ For a definition of "Abroad" see the note to Chart 1.

From the outset, Danish wage costs were already high in an international perspective, cf. Chart 2, which shows total hourly costs in manufacturing in Danish kroner. In 1995 Danish costs per hour were approximately 20 kroner higher than the EU average, but by 2004 this had risen to 40 kroner in actual prices. Among the major industrialised countries, only Germany and Norway today exceed the Danish hourly wage costs of 205 kroner per hour.

This reflects that the Danish labour force is among the most productive in the world. For comparison, hourly wage costs in e.g. the Czech Republic are approximately 25 kroner per hour, calculated on a comparable basis but not adjusted for purchasing-power differences. In many developing countries, such as China, hourly wage costs are even lower.

As stated, the figures in Charts 1 and 2 are based on wage costs in manufacturing. In many ways, this is relevant to describing a country's competitiveness since the manufacturing sector is typically highly export-oriented and thus in direct competition with foreign manufacturers. In addition, the majority of many countries' exports are manufactured goods. However, the wage statistics show that the average hourly income in Denmark does not vary greatly between the manufacturing sector, the public sector, building and construction and the more service-oriented sectors, but in all cases there is a spread within the sector and between different job functions.

The wage-cost figures used apply only to wage-earners, but not to salaried employees. This exaggerates the relative Danish wage level, since the spread between low- and high-income groups is narrower in Denmark than in most other countries. On the other hand, the number of highly-paid salaried employees in the Danish manufacturing sector is relatively high.

THE BALANCE OF PAYMENTS AND THE BALANCE OF GOODS AND SERVICES

For many years, the current account of the balance of payments was the Achilles' heel of the Danish economy. The 1960s, 70s and 80s saw deficits year after year, and a substantial external debt mounted up. Since the beginning of the 1990s the balance of payments has shown a surplus, except in 1998, cf. Chart 3.

Trade in goods and services, which is a major element of the balance of payments, has shown a surplus since the early 1980s. After a dip in the booming economy in the 1990s, the balance of goods and services has improved substantially since 1998, to a surplus of 5.1 per cent of GDP in 2004 as a result of higher growth in exports than in imports.

The surplus on trade in agricultural products is a sound foundation, cf. Table 1, but has been virtually constant. The improvement since 1998 is

BALANCE OF PAYMENTS AND BALANCE OF GOODS AND SERVICES,
1966-2004

Chart 3



Note: Annual series. The latest observation is from 2004.

Source: Adam's data bank, Statistics Denmark and own calculations.

| BALANCE OF PAYMENTS BY SUB-ITEMS | | | | | Table 1 |
|---|-------|-------|-------|-------|------------------|
| Kr. billion, net | 1995 | 1998 | 2000 | 2003 | 2004 |
| Goods, total | 37.3 | 25.3 | 54.1 | 63.9 | 54.7 |
| Manufactured goods..... | -6.6 | -19.1 | -6.6 | 4.8 | -5.2 |
| Agricultural products, etc. | 40.7 | 35.9 | 42.0 | 41.0 | 41.5 |
| Energy | -2.1 | -0.0 | 13,9 | 13,8 | 16.8 |
| Services, total | 4.0 | -2.0 | 22.1 | 22.4 | 18.9 |
| Marine transport | 0.2 | 1.7 | 11.9 | 13.1 | 17.8 |
| Travel | -3.9 | -9.0 | -8.0 | -9.2 | -9.8 |
| Other services | 7.7 | 5.3 | 18.2 | 18.5 | 10.9 |
| Wages and investment income ¹ | -20.9 | -18.4 | -32.8 | -17.1 | -13.6 |
| Current transfers ² | -13.2 | -15.2 | -24.8 | -23.0 | -25.0 |
| Current-account balance | 7.2 | -10.2 | 18.6 | 46.1 | 35.0 |
| As a percentage of GDP | 0.7 | -0.9 | 1.5 | 3.3 | 2.4 ³ |
| Balance of goods and services as a percentage of GDP | 4.1 | 2.0 | 6.0 | 6.2 | 5.1 ³ |

Note: The sub-items under "Goods, total" are from the foreign-trade statistics (SITC classifications), while the rest of the table is based on balance-of-payments statistics. The sub-items under "Goods, total" do not add up to the total since the calculation basis is different in the two statistics. "Manufactured goods" is SITC 5-9, "Agricultural produce, etc." is SITC 0-2 and 4, and "Energy" is SITC 3.

Source: Statistics Denmark.

¹ Interest and dividends to abroad, net.

² Development aid, payments to the EU, net, etc.

³ Partial estimate.

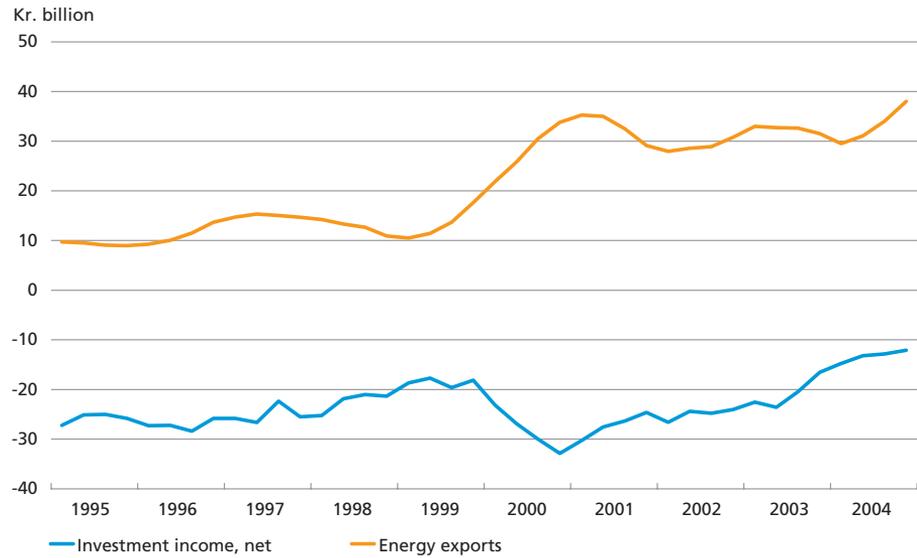
primarily attributable to trade in energy, marine transport and manufactured goods. In all three cases the balance has improved by around kr. 15 billion despite the prolonged period of excess wage increases in Denmark compared to competing countries.

Since the late 1990s the energy item has also shown a sound surplus. This reflects increasing production of oil and gas from the Danish North Sea fields, but also a generally high, but volatile level of energy prices in recent years. While the increasing production of oil and gas has improved the balance of goods and services considerably, the improvement in the balance of payments is smaller since the extracting enterprise, DUC (Dansk Undergrunds Consortium), is partly owned by non-residents. Most of the profits after tax thus fall to owners abroad and have a negative impact on the "wages and investment income" item of the balance of payments, cf. Chart 4. To the extent that the profit is re-invested in Denmark, this has a positive impact on the capital items of the balance of payments.

Due to the sustained surplus on the balance of payments, Denmark's external debt has been falling. At the same time, the level of interest rates has been declining. Consequently, net interest payments have also developed favourably and have thus contributed to the underlying improvement in the balance of payments. However, this article focuses on

ENERGY EXPORTS AND INVESTMENT INCOME, NET

Chart 4



Note: Investment income comprises interest and dividend payments to abroad, net. The series are 4-quarter moving sums. The latest observation is from Q4 2004.

Source: Statistics Denmark.

the balance of goods and services, as well as on wages and competitiveness.¹

The balance of goods and services is determined mainly by Danish domestic demand compared to foreign demand, and by competitiveness. When demand is high in Denmark, imports increase, and the balance of goods and services deteriorates. When competitiveness diminishes, Denmark loses market shares in the export markets.

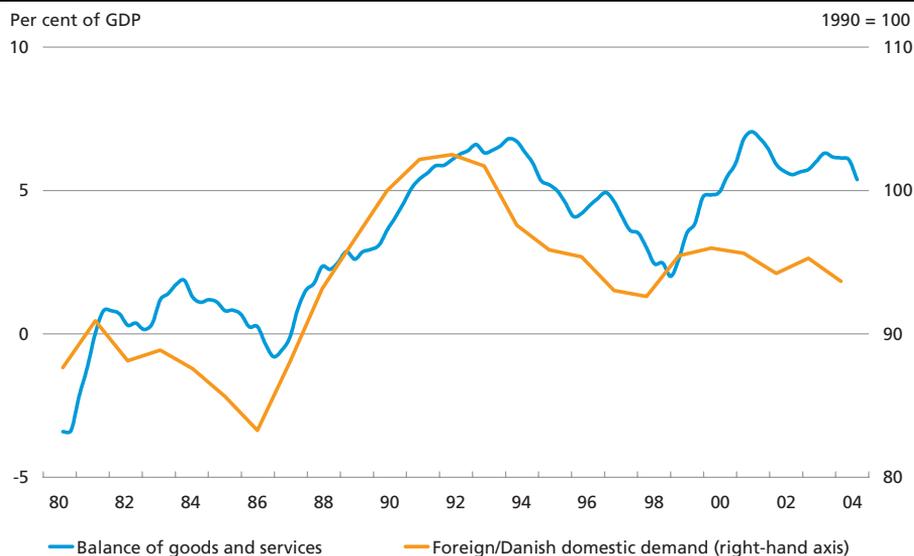
RELATIVE DOMESTIC DEMAND AND THE BALANCE OF GOODS AND SERVICES

During the boom from 1993 to 1998, consumption and investments rose faster in Denmark than abroad, and the balance of goods and services deteriorated, exactly as historical experience would indicate. Subsequently, growth in domestic demand has matched growth in foreign demand, but nonetheless the balance of goods and services has improved, mainly as a result of higher exports. Since 1998 the balance of goods and services has thus tended to be higher for a given relationship between demand in Denmark and abroad, cf. Chart 5.

¹ Pedersen (2003) includes a broad analysis of the balance of payments in terms of e.g. savings and investments, capital flows, etc.

RELATIVE DOMESTIC DEMAND AND THE BALANCE OF GOODS AND SERVICES

Chart 5



Note: Foreign domestic demand covers the largest OECD countries. The balances of goods and services are 4-quarter moving averages converted to annual levels. The latest observation is from Q3 2004. The relative domestic demand is an annual series.

Source: Mona's data bank, OECD, *Economic Outlook* No. 76 and own calculations.

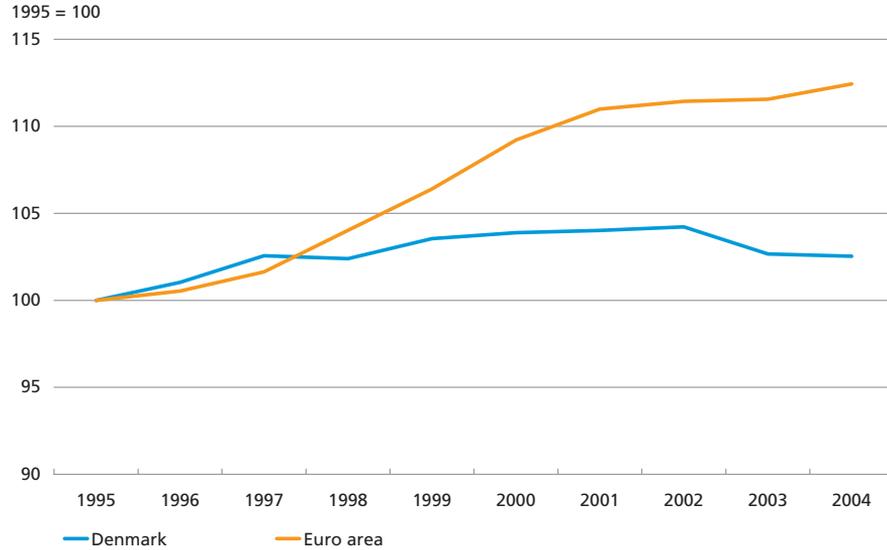
Part of the explanation for the decoupling of relative domestic demand from the balance of goods and services since 1998 is a rise in earnings in the energy sector and parts of the service sector, particularly marine freight, which is not immediately reflected in increased consumption and investments. If this tendency continues, it is equivalent to an improvement in competitiveness in that domestic demand may be higher for a given surplus on the balance of goods and services.

In terms of capacity, the increased exports have not given rise to any problems. Firstly, energy production and marine freight do not require sustained extra domestic production capacity. Secondly, the improvement has taken place since 1998, i.e. a period when growth in domestic demand has been in line with growth in foreign demand, but lower in absolute terms than the growth in the economy's potential. This has left room for increased exports.¹ Finally, continuous improvement in the terms of trade has meant that a given level of export revenue can be achieved with a lower output volume, cf. below on the terms of trade.

¹ One implication of the boost in exports of energy and marine freight is that potential output effects will be reflected for a higher level of the balance of goods and services than previously. Capacity effects are seen when growth in Denmark is high and enterprises are close to their capacity limits and therefore have to choose between producing for the domestic market or the export market. In that case the deterioration in the balance of goods and services stems not only from increased imports, but also from lower exports.

DEVELOPMENT IN PRIVATE-SECTOR EMPLOYMENT

Chart 6



Note: Annual series. The 2004 figures are OECD estimates.
Source: OECD, *Economic Outlook* No. 76.

COMPETITIVENESS AND THE BALANCE OF GOODS AND SERVICES

Competitiveness is immediately related to wage costs. However, competitiveness also depends on a number of other factors: the degree of efficiency and flexibility in production, the ability to brand a product, etc. Some of these factors can collectively be referred to as productivity, but other circumstances also play a role, e.g. the macroeconomic framework for business enterprises, including the fixed-exchange-rate policy.

Since the mid-1990s, Danish private-sector production has developed along the same lines as production among Denmark's trading partners, but private-sector employment has risen less in Denmark than abroad, cf. Chart 6. Nonetheless, Danish unemployment has remained relatively low, which is attributable to relatively lower growth in the Danish labour force and to some extent to growth in public-sector employment. The excess Danish wage increase reflects a tighter labour market with a lower unemployment rate than for many of Denmark's competitors.

The relatively weak employment development in Denmark and the parallel development in production imply a relatively strong increase in Danish productivity, cf. Box 1. The excess Danish wage increase vis-à-vis the euro area is counterbalanced by an excess productivity increase measured on an hourly basis for the entire private sector. Relative unit labour costs, which are a measure of competitiveness, have thus been maintained at an almost unchanged level over the period, cf. Chart 7.

DEVELOPMENT IN PRODUCTIVITY SINCE THE MID-1990s

Box 1

Productivity measures are known to be subject to uncertainty. The results are not unambiguous due to underlying measurement problems and different calculation purposes.

The productivity measure may include the whole economy or only some sectors. The delimitation chosen reflects the purpose of the analysis. If the whole economy is included, i.e. also the non-market-related public sector, the measure is primarily relevant if the focus is on the development in GDP per capital, while it is less appropriate for analysing competitiveness. To assess competitiveness vis-à-vis abroad it is more expedient to include export-oriented sectors only. In the same way, productivity can be calculated per person or per hour. The two calculations will differ to the extent that working hours per person change.

Table 2 shows four measures of annual productivity growth since the mid-1990s for Denmark and the euro area.

In the private sector, productivity growth has been stronger in Denmark than in the euro area, both per person and per hour. The gap to the euro area is narrowest in the latter case. For the whole economy, hourly productivity growth in Denmark is only marginally higher than in the euro area.

The OECD's most recent analysis of the Danish economy apparently reaches the opposite conclusion: hourly productivity growth is higher in the euro area than in Denmark, cf. OECD (2005). The OECD analyses the whole economy and uses another calculation method than that used in Table 2. The OECD calculates euro area productivity growth as an unweighted average of productivity growth in the individual member states, while Table 2 operates with a weighted average where the large euro area member states are weighted higher than the smaller member states. The two calculations reflect different perspectives. Table 2 focuses on Denmark's competitiveness in relation to the anchor currency. In that connection it is important that Germany and France are weighted higher than Luxembourg and Ireland. The OECD focuses on comparing Denmark's productivity development with that of other countries, and in that connection it is just as relevant to compare with small as with large euro area member states.

PRODUCTIVITY GROWTH IN DENMARK AND THE EURO AREA SINCE 1995 Table 2

| Per cent p.a. | Productivity per person | Productivity per hour |
|-----------------------|-------------------------|-----------------------|
| <i>Private sector</i> | | |
| Denmark | 2.0 | 1.9 |
| Euro area | 0.8 | 1.4 |
| <i>Whole economy</i> | | |
| Denmark | 1.5 | 1.4 |
| Euro area | 0.8 | 1.3 |

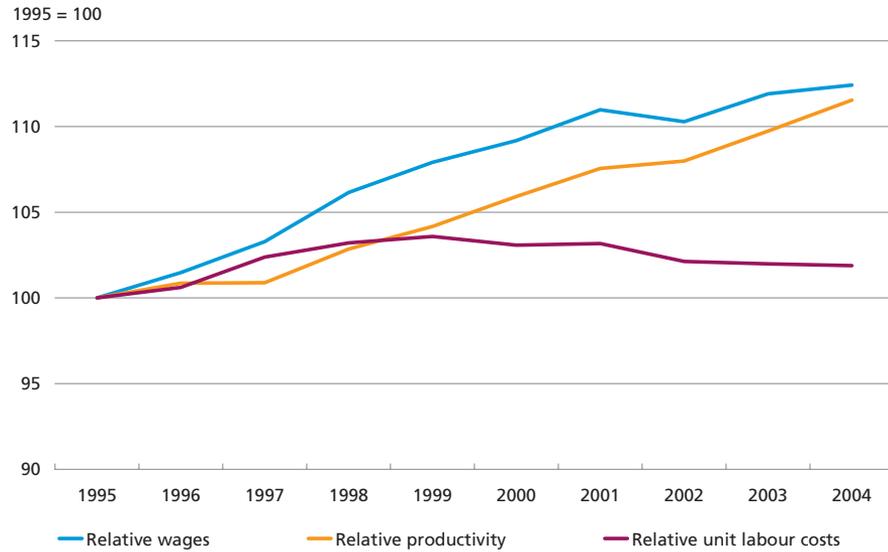
Note: The productivity measure for the euro area is weighted together with the weights for the real effective krone rate.

Source: OECD, *Economic Outlook* No. 75.

This also applies in relation to a broader group of countries. However, caution should be exerted when drawing firm conclusions on the basis of unit labour costs since there are considerable measurement problems in practice.

WAGES, PRODUCTIVITY AND UNIT LABOUR COSTS RELATIVE TO THE EURO AREA

Chart 7



Note: Danish wages, productivity and unit labour costs relative to the euro area for the private sector. Annual series. The 2004 figures are estimates.

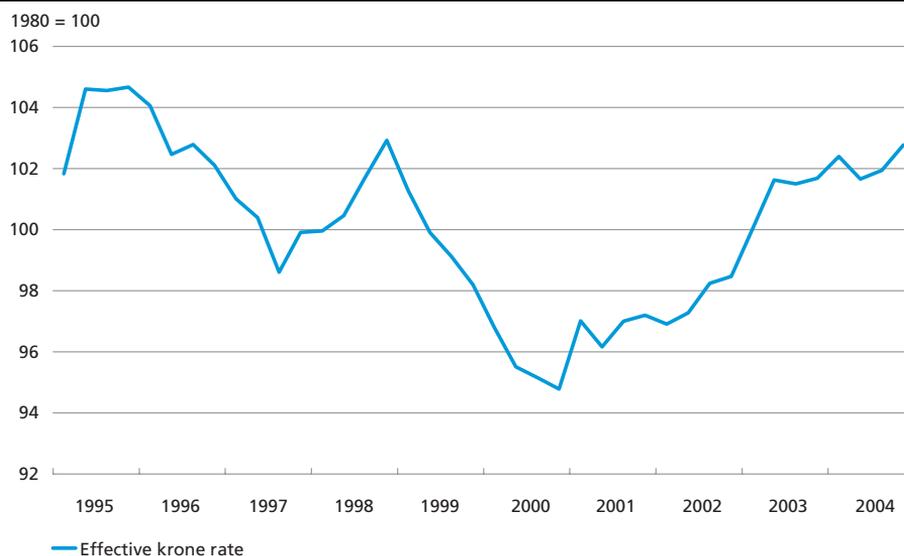
Source: OECD, *Economic Outlook* No. 76.

In relation to countries outside the euro area, the development in exchange rates affects competitiveness. The value of the Danish krone, measured as the effective krone rate, is at around the same level now as in 1998. Overall, the exchange rate has therefore not influenced competitiveness in the period under review. However, there have been significant short-term fluctuations during the period, cf. Chart 8. To a large extent, these fluctuations reflect shifts in the strength of the US dollar vis-à-vis the krone. Exchange-rate fluctuations pass through to the economy with a certain time lag so that the impact of the most recent depreciation of the dollar is not yet fully reflected in production and employment. This depreciation can be expected to constitute a challenge for many enterprises.

One major reason that Danish enterprises have been able to remain competitive is sustained productivity growth. A breakdown of productivity development by sector shows that productivity gains have been greatest in precisely the sectors that have done relatively well in the export markets, cf. Table 3. Highest productivity in the sectors that depend most heavily on exports is an international phenomenon. At approximately 70 per cent, exports as a percentage of production are highest in agriculture and fisheries, raw materials extraction and manufacturing industry, and slightly lower in service-related sectors such as transport and communica-

THE EFFECTIVE KRONE RATE

Chart 8



Note: The rate of the krone vis-à-vis a basket of currencies. Quarterly series. The latest observation is from Q4 2004.
Source: Danmarks Nationalbank.

tion (55 per cent) and wholesaling (46 per cent), cf. the Confederation of Danish Industries (2004). Exports constitute 33 per cent of the whole economy. The Danish economy is thus very open and the fact that exports as a percentage of the whole economy grow over time contributes to relatively high overall productivity growth.

The higher productivity rate in the export sectors is also attributable to higher-than-average capital intensity and the fact that much R&D takes place in these sectors. Productivity is to some extent sensitive to cyclical trends.

Higher productivity makes it possible to produce more with the same resource input. Statistics Denmark has recently introduced "growth

GROWTH RATES FOR LABOUR PRODUCTIVITY BY SECTOR

Table 3

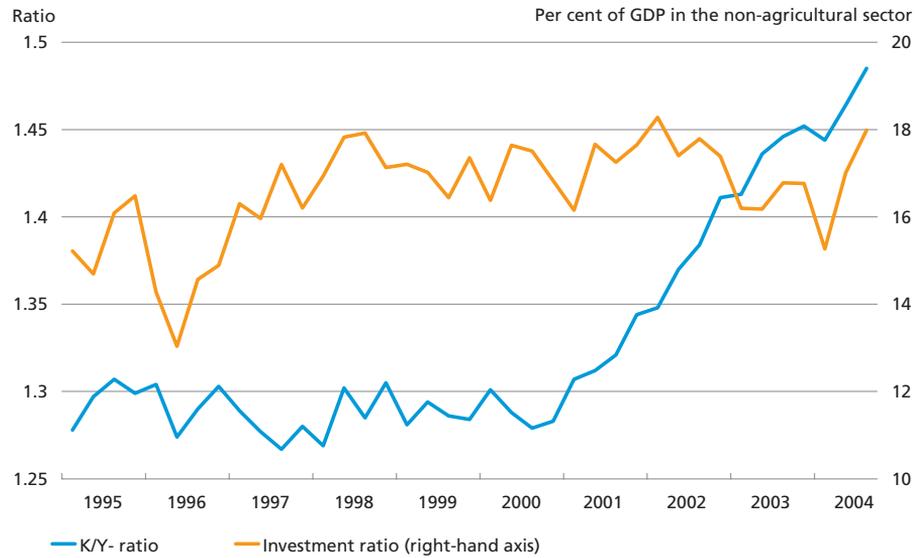
| Per cent p.a. | 1993-1999 | 2000 | 2001 | 2002 | 2003 |
|---|-----------|------|------|------|------|
| Market-related economy, total | 2.4 | 2.0 | 2.1 | 2.1 | 2.3 |
| Agriculture, fisheries and raw materials extraction | 9.1 | 10.9 | 0.8 | -1.0 | 4.4 |
| Manufacturing industry | 3.6 | 2.7 | 1.2 | 3.8 | 4.4 |
| Transport and communication | 5.1 | 11.8 | 6.9 | 5.8 | 1.7 |

Note: Only the sectors of the economy that sell their production on market terms are included. In agriculture, fisheries and raw materials extraction, the annual productivity growth rates are strongly influenced by weather conditions (yields and catches), start-up of new raw-material fields, etc. Productivity development should therefore be seen in a long-term perspective. This also applies to the other sectors.

Source: News from Statistics Denmark, No. 328.

K/Y RATIO IN THE PRIVATE NON-AGRICULTURAL SECTOR AND THE INVESTMENT RATIO

Chart 9



Note: "K" is capital, i.e. machinery, IT equipment, etc. "Y" is output. The "K/Y" ratio is thus a measure of how capital-intensive production is. The "investment ratio" is the non-agricultural sector's investments in equipment as a ratio of gross value added. Quarterly series. The latest observation is from Q3 2004.

Source: Mona's data bank.

accounting" for the Danish economy, cf. Stenbæk and Sørensen (2004). Here the growth in labour productivity is explained by capital input, the level of education of the labour force and a residual component called total factor productivity (TFP). TFP is the part of the increase in labour productivity that cannot be explained by an increased capital or labour input and thus captures technological advances, as well as improvements in the organisation of the production process, improved logistics, etc.

TFP explains most of the productivity growth in the overall market-related economy, i.e. excluding most of the public sector, which does not sell its products in a market.¹ TFP has been particularly high in agriculture, fisheries and raw materials extraction. In manufacturing and services, increased use of capital, including IT investments, also plays a major role. At present, Statistics Denmark's calculations only go as far as the year 2000. However, the national accounts indicate that this development has accelerated in recent years, cf. Chart 9.

As the Chart illustrates, the capital/output ratio in the private non-agricultural sectors, comprising both goods and services, has increased considerably in recent years. The slowdown in production in 2002-03 did

¹ This does not mean that productivity improvements are not also seen in the public, non-market-related sector, but they are not reflected in the national accounts.

not result in an equivalent fall in investments. This could indicate that capital has been substituted for labour so that production has become more capital intensive. Higher capital intensity is a precondition if Danish production is to continue to hold its own in the intensifying international competition resulting from globalisation.

WAGE FORMATION

Over time, wage formation in the private labour market has tended to become more decentralised. Today many wage costs are negotiated at enterprise level. Consequently, the competition that enterprises currently face will play a far more significant role than in the more centralised wage formation process previously seen. In sectors competing directly with abroad, wage differences between countries reflect productivity differences in the slightly longer term. This does not necessarily apply to protected sectors of the economy.

One result of more decentralised wage formation could be that wage development to a higher degree reflects productivity development and thus the level that production can support in each enterprise. At the macro level this is reflected in e.g. a close correlation between the rate of wage increase and the rate of productivity increase. It is a two-way relationship. Large wage increases compel enterprises to be more productive in order to match the competition, so the correlation is not necessarily from productivity to wages. The opposite may also be the case if the least efficient enterprises have to shut down, and this could partly explain why production in Denmark has become ever more capital intensive and thus less labour intensive.

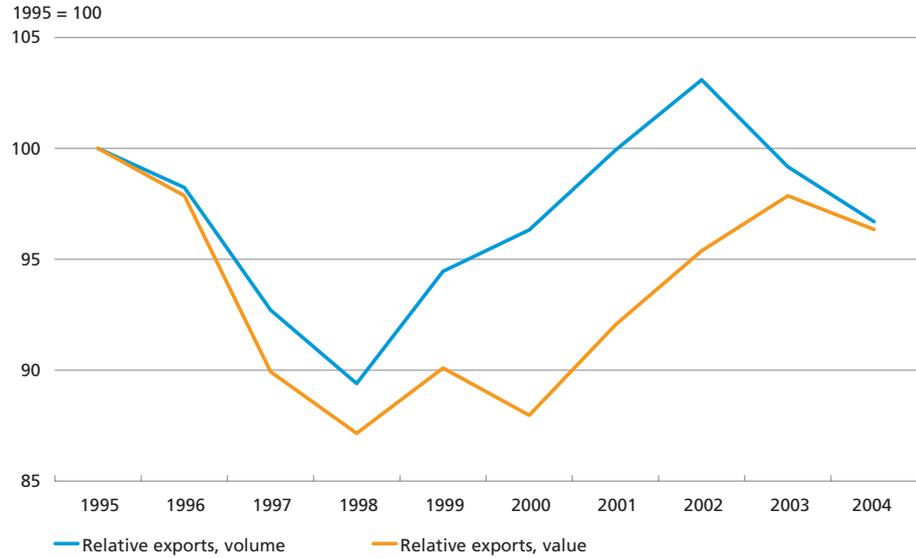
Decentralised, more market-related wage formation can help to ensure macroeconomic balance in the economy. Overall, there do not seem to be any immediate indications of a general competitiveness problem in the Danish economy. As illustrated above, the large surpluses on the balance of goods and services and the current account are driven primarily by rising exports and do not reflect particularly low relative domestic demand. Employment is high, but – despite the rising tendency in the last few quarters – it has risen less than in many other countries. Price rises are small and government finances sound, so all in all the economic development is balanced.

TERMS OF TRADE AND THE BALANCE OF GOODS AND SERVICES

Compared to Denmark's competitors, Danish exports have done well since 1998, cf. Chart 10, which shows relative export trends in volume

RELATIVE EXPORTS IN CURRENT AND CONSTANT PRICES

Chart 10



Note: Total Danish exports in relation to exports from Denmark's competitors (*export performance*). Annual series. The 2004 figures are OECD estimates.

Source: OECD, *Economic Outlook* No. 76.

and value terms. If we consider the balance of goods and services in constant prices (1995 prices), however, the development is less impressive. In fact, the balance in constant prices has been receding in recent years and is now almost back to the 1998 level, while the balance in current prices remains high, cf. Chart 11.

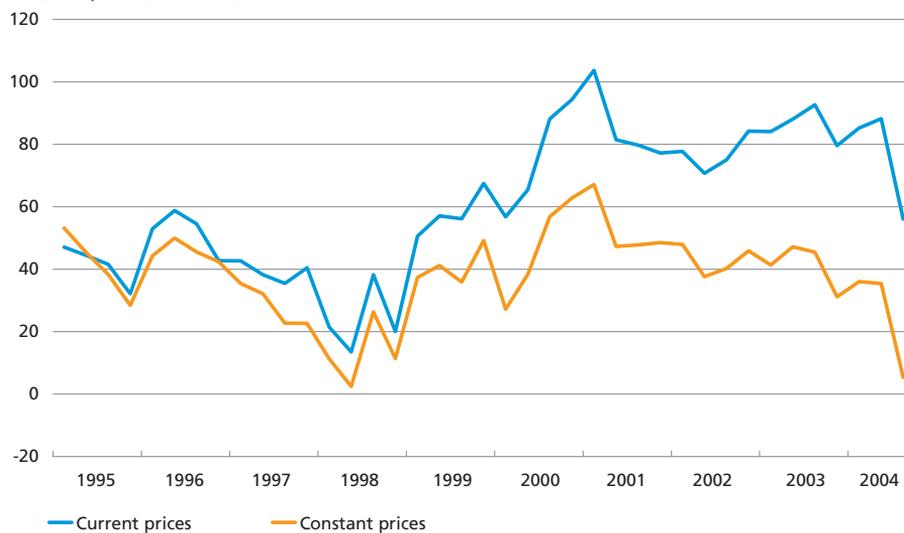
The diverging development in the balance of goods and services in constant and current prices reflects that the prices of exported goods have risen over time, while the prices of imported goods have fallen, i.e. the terms of trade have improved, cf. Chart 12. Improved terms of trade augment real income in society. The development in domestic production and employment is, however, more closely linked to the balance in constant prices, and its slightly falling tendency is in line with the weak development in private-sector employment, cf. above.

The improvement in the terms of trade applies only to goods, while the terms of trade for services in general have been deteriorating since the early 1990s, except in recent years when particularly the high freight rates for marine transport have reversed the trend. One reason for the deteriorating terms of trade may be that the productivity development for transport has led to a gradual price drop per unit transported over a number of years. In volume terms, exports of services have grown significantly since 1998, cf. Chart 13, and generally exports of services contribute strongly to the surplus on the balance of goods and services.

BALANCE OF GOODS AND SERVICES IN CURRENT AND CONSTANT PRICES

Chart 11

Kr. billion, billion 1995 kroner



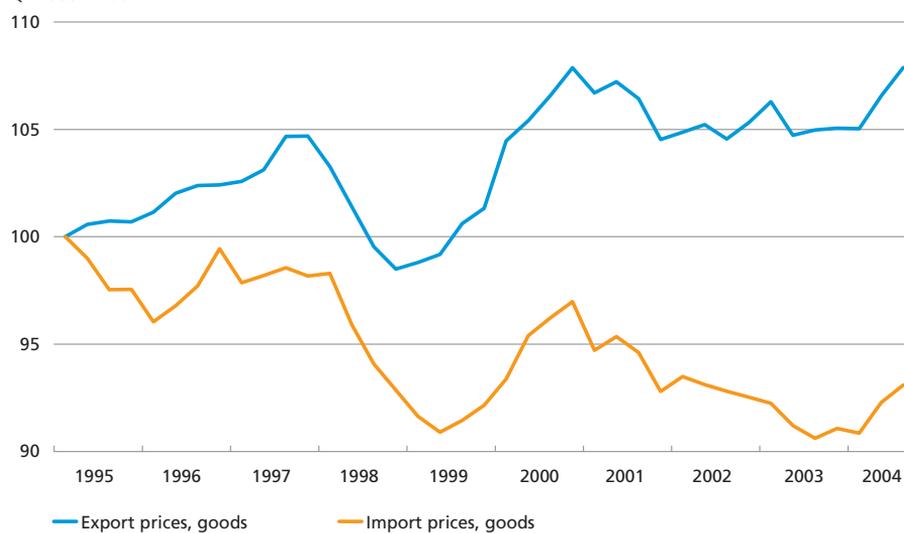
Note: Balance of goods and services according to the national accounts. Quarterly observations projected to annual levels. The latest observation is from Q3 2004.

Source: Mona's data bank.

EXPORT AND IMPORT PRICES, GOODS

Chart 12

Q1 1995 = 100



Note: Export and import prices are deflators from the national accounts. Quarterly series. The latest observation is from Q3 2004.

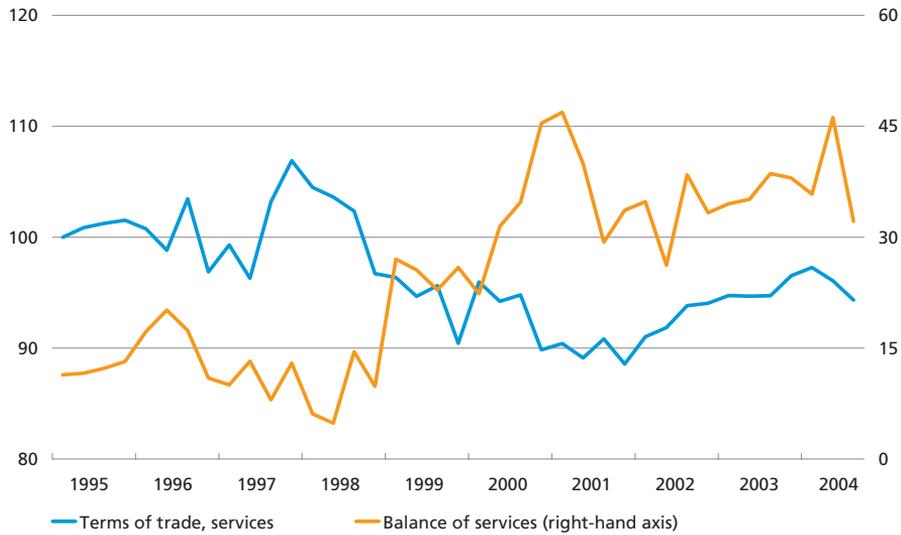
Source: Mona's data bank.

TERMS OF TRADE FOR SERVICES AND THE BALANCE OF SERVICES AT CONSTANT PRICES

Chart 13

Q1 1995 = 100

Billion 1995 kroner



Note: The terms of trade are the index of export prices divided by the index of import prices (deflators from the national accounts). The balance of services is quarterly observations projected to annual levels. The latest observation is from Q3 2004.

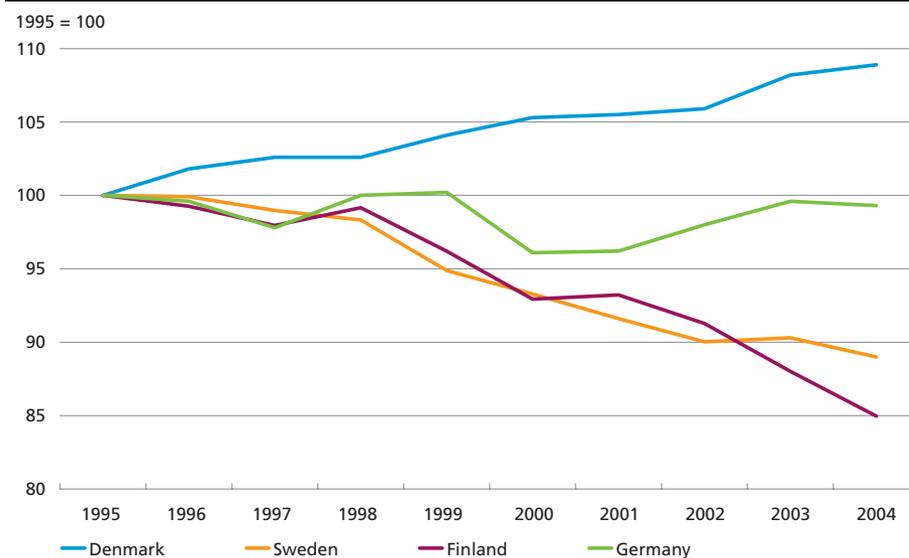
Source: Mona's data bank.

A significant factor contributing to the improved terms of trade for goods is the composition of Denmark's imports and exports. On the imports side, Denmark enjoys cheap goods, e.g. clothing, produced in low-wage countries such as China and Eastern Europe, and goods that are falling in price, e.g. computers. On the export side, knowledge-intensive sectors are gaining ground, notably pharmaceutical products, which account for an increasing share of Danish exports of goods. In addition to the diverging composition of Danish imports and exports, there are indications that within certain sectors Danish enterprises are able to sell at prices that are higher than those of their competitors, cf. the Confederation of Danish Industries (2004). According to this survey, such up-market products constitute 40 per cent of goods exports, which is a high ratio in an international perspective. The product mix in Danish external trade is thus generally good despite high agricultural exports at stagnating prices.

The breakdown of exports on countries has initially been less favourable, with a stagnating German market as the largest recipient of Danish exports. However, Danish enterprises appear to have been good at cultivating new, high-growth markets. Such diversification of exports makes the Danish economy less vulnerable to unfavourable market conditions in a single market, but naturally not to global cyclical trends.

TERMS OF TRADE FOR DENMARK, SWEDEN, FINLAND AND GERMANY

Chart 14



Note: The terms of trade are the index of export prices divided by the index of import prices (deflators from the national accounts). Annual series. The latest observation is from 2004. The 2004 figures are OECD estimates.

Source: OECD, *Economic Outlook* No. 76.

The Swedish, Finnish and German export sectors have also done well in recent years, with large productivity increases and sound current-account surpluses, but it is interesting to note that, unlike Denmark's case, the terms of trade have not been improving in these countries. Sweden and Finland have seen significant deterioration, cf. Chart 14. This is attributable to a different product composition of Danish exports compared to Sweden and Finland. The latter have mainly been strong in the telecom sector where prices have been declining.

Globalisation must be expected to continue unabated in the coming years, see also the Confederation of Danish Industries (2004) and the Economic Council of the Labour Movement (2004). One characteristic of globalisation is a continued division of work among countries and thus more international trade. Goods from less cost-intensive countries than Denmark can be expected to gain market shares in certain categories. Examples include clothing, where trade was fully liberalised at the turn of the year. If Denmark is to remain one of the most affluent countries in the world, it must be ready to adapt and able to constantly develop knowledge-intensive products aimed at growth markets. If this is achieved, the historical improvement in the terms of trade can continue since imports will to a large extent comprise products from countries with a lower wage level than Denmark.

LITERATURE

Economic Council of the Labour Movement (2004), Globalisation – Scope, Effects and Challenges (in Danish).

Confederation of Danish Industries (2004), The Global Challenge. The Case of Denmark.

OECD (2005), *OECD Economic Surveys*, Denmark.

Pedersen, Erik Haller (2003), The Balance of Payments – from Sustained Deficit to Sound Surplus, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter.

Stenbæk, Niels and Henrik S. Sørensen (2004), Productivity Development in Denmark 1988-2000 (in Danish), Statistics Denmark.

Sterilised and Non-Sterilised Intervention in the Foreign-Exchange Market

Kim Abildgren, Economics

INTRODUCTION AND SUMMARY

Intervention is the term used to describe a central bank's purchase or sale of foreign exchange in the market in order to influence the exchange rate.

In economic literature, the issue of sterilised and non-sterilised interventions is discussed. This article looks at the distinctions between these concepts.

In practice most central banks today apply a short-term interest rate as their monetary-policy instrument or operational target. Whether intervention in the foreign-exchange market is sterilised or not should therefore normally be assessed on the basis of the impact on the money-market interest rates. If the intervention has no impact on the short-term interest rate, it is sterilised. If the short-term interest rate is affected, the intervention is non-sterilised.

Non-sterilised intervention may impact the exchange rate through various channels. It may work through an interest-rate channel, but also via the signals that the intervention gives about future monetary and exchange-rate policy. Finally, non-sterilised intervention may work via the effect of the central bank's intervention order on the foreign-exchange dealers' bid and offer prices. By definition, sterilised intervention does not influence the exchange rate via an interest-rate channel, but it may have a signal effect, as well as a potential effect via changes in the portfolio composition of the private sector.

In periods when the foreign-exchange market is stable, Denmark's Nationalbank's intervention is best described as sterilised, while it is non-sterilised in periods of turbulence in the foreign-exchange market.

WHAT IS INTERVENTION?

Intervention is traditionally defined as a central bank's purchase or sale of foreign exchange in the market in order to influence the exchange rate.¹

¹ Cf. e.g. Sarno & Taylor (2002) or Humpage (2003).

In a country with a fixed exchange rate as the intermediate target of monetary policy, intervention in the foreign-exchange market may be used as an instrument to stabilise the development in the exchange rate. In the short term, Danmarks Nationalbank can influence the rate of the krone vis-à-vis the euro by selling or purchasing foreign exchange against Danish kroner through intervention in the foreign-exchange-market. When Danmarks Nationalbank sells foreign exchange (and purchases kroner), the krone will have a tendency to strengthen. When Danmarks Nationalbank purchases foreign exchange (and sells kroner), the krone will have a tendency to weaken. If Danmarks Nationalbank has regularly e.g. sold foreign exchange and purchased kroner for a prolonged period, this is an indication that the interest-rate spread between Denmark and the euro area is too narrow. In that case, Danmarks Nationalbank must raise its interest rates relative to those of the ECB.¹

Intervention is also a "classic" monetary- and foreign-exchange-policy instrument in countries that do not maintain a fixed-exchange-rate regime. For instance, Heikensten & Borg (2002) describe the following main motives for intervention in the foreign-exchange market in a country with an inflation target:

- A supplement to the interest-rate instrument in the management of the inflation rate. This can be particularly relevant in situations with a nominal interest rate close to zero.
- Influencing the exchange rate in situations where it deviates significantly from "equilibrium".
- The functionality and stability of the foreign-exchange market.

ARE ALL DANMARKS NATIONALBANK'S NET PURCHASES OF FOREIGN EXCHANGE AGAINST KRONER² INTERVENTIONS?

Not all Danmarks Nationalbank's transactions in foreign exchange against Danish kroner are related to intervention in the foreign-exchange market.

Part of Danmarks Nationalbank's purchase and sale of kroner against foreign exchange is related to its role as banker to the central government, in which capacity it effects payments related to foreign-exchange-denominated central-government debt and other central-government foreign-exchange transactions (e.g. central-government foreign-exchange

¹ For a detailed description of monetary policy in Denmark, see Danmarks Nationalbank (2003).

² In connection with management of the foreign-exchange reserve, Danmarks Nationalbank also concludes transactions in the foreign-exchange market that do not involve kroner and therefore do not have any impact on the exchange rate. In addition to euro, Danmarks Nationalbank's foreign-exchange reserve includes placements in dollars, pounds sterling and Swedish kronor. In view of the fixed-exchange-rate policy they have virtually all been converted to euro via forward contracts.

disbursements as aid to developing countries or receipts under the EU's Common Agricultural Policy). When the central government receives foreign exchange, e.g. when raising a foreign-exchange loan, Danmarks Nationalbank purchases the foreign-exchange proceeds, which then become part of the foreign-exchange reserve. The equivalent amount in kroner is credited to the central government's account at Danmarks Nationalbank. Likewise, when the central government effects payments in foreign exchange, e.g. interest and redemptions on its foreign debt, the central government purchases the required foreign exchange from Danmarks Nationalbank. In a given year, Danmarks Nationalbank normally purchases foreign exchange in the market to cover the central government's net current foreign-exchange expenditure, while redemptions on the central government's foreign debt are normally refinanced via government borrowing in foreign exchange.¹

In addition, Danmarks Nationalbank may purchase Danish kroner against foreign exchange directly from a foreign central bank (i.e. an "off-market" transaction). For instance, the Central Bank Agreement on ERM II² states that the ECB and the national central banks in the euro area must contact Danmarks Nationalbank beforehand if they wish to conduct transactions in Danish kroner in excess of an agreed limit. In such cases, Danmarks Nationalbank and the central bank in question may settle the transaction in full or in part on a bilateral basis outside the foreign-exchange market to avoid undesirable impacts on the krone rate.

In the "Foreign Exchange and Liquidity" press release issued by Danmarks Nationalbank on the 2nd banking day of each month, Danmarks Nationalbank's net purchases of foreign exchange are stated as the change in the foreign-exchange reserve excluding value adjustments and net government borrowing in foreign exchange. In addition to interventions in the foreign-exchange market for Danish kroner, the net purchase of foreign exchange thus also includes transactions related to the central government's net current foreign-exchange expenditure, "off-market" currency transactions in kroner with foreign central banks, and the yield on the foreign-exchange reserve.

In principle, Danmarks Nationalbank can also intervene in the foreign-exchange market for Danish kroner by purchasing or selling foreign exchange against kroner on forward terms. Unlike intervention in the

¹ For a detailed description of the central government's borrowing in foreign exchange, see the annual publication *Danish Government Borrowing and Debt*, Danmarks Nationalbank.

² Cf. the Central Bank Agreement on ERM II of 1 September 1998 with subsequent amendments, concluded between the ECB and the non-euro area central banks. The Agreement can be downloaded from Danmarks Nationalbank's website, www.nationalbanken.dk under Monetary Policy, Exchange Rate Mechanism/ERM II.

spot market, such transactions have no immediate liquidity impact and are therefore not included in the net purchase of foreign exchange until the time that the forward transactions are settled. Denmark's Nationalbank has not used intervention in the forward krone market for some years, however.

STERILISED VERSUS NON-STERILISED INTERVENTION

Economic literature often draws a distinction between sterilised and non-sterilised intervention in the foreign-exchange market. Sterilised intervention is characterised as not having any impact on conditions in the money market. It is thus a pure "foreign-exchange-policy" operation. Non-sterilised (or unsterilised) intervention, on the other hand, is intervention that influences conditions in the money market. It is thus a combined monetary-policy and foreign-exchange-policy operation.

The concept of "conditions in the money market" depends on the choice of monetary-policy instrument¹:

- If interest-rate targeting is applied in monetary policy, the intervention is normally said to be sterilised if the transaction in itself does not influence the short-term interest rate. If the short-term interest rate is affected, the intervention is non-sterilised.
- If liquidity targeting is applied in monetary policy, the intervention is normally said to be sterilised if the transaction in itself does not influence the net liquidity position of the monetary-policy counterparties vis-à-vis the central bank. If liquidity is affected, the intervention is non-sterilised.

The difference between sterilised and non-sterilised intervention can also be summarised as follows: if liquidity targeting is applied in monetary policy, the central bank must take active balance-sheet measures to sterilise the intervention, while non-sterilised intervention does not require any follow-up on the part of the central bank. If, however, interest-rate targeting is applied in monetary policy, non-sterilised intervention requires deliberate monetary-policy action, while the intervention is sterilised automatically if the monetary-policy stance remains unchanged.

In practice most central banks today apply a short-term interest rate as their monetary-policy instrument or operational target. Whether inter-

¹ Cf. e.g. Bofinger (2001) or Craig & Humpage (2001). A more general definition of sterilised intervention, which can be seen to include the two definitions below as special cases, is found in the Jürgensen report from 1983: "As long as monetary targets are being met (whether or not these relate to the monetary base), the monetary effects of interventions can be considered in some sense as having been neutralised".

vention in the foreign-exchange market is sterilised or not should therefore normally be assessed on the basis of the impact on the money-market interest rates.

HOW DOES INTERVENTION AFFECT THE EXCHANGE RATE?

It is useful to draw a distinction between sterilised and non-sterilised intervention when assessing the impact of intervention on the exchange rate.

Non-sterilised intervention

As stated, non-sterilised intervention in the foreign-exchange market is characterised by influencing interest rates in the money market. For instance, if the central bank purchases foreign exchange against the domestic currency, liquidity increases, and downward pressure is exerted on the short-term interest rate, which will tend to weaken the domestic currency. This is normally referred to as the "interest-rate channel" or "monetary channel" for the impact of intervention on the exchange rate.

In addition to the interest-rate channel, non-sterilised intervention might affect the exchange rate via a "signalling channel" or "expectations channel". The reason is that the intervention may give indications of the future monetary and foreign-exchange policy that will make the market revise its expectations of the future exchange rate.¹ If a central bank e.g. purchases foreign exchange against the domestic currency, this might indicate that the central bank is willing to weaken the domestic currency via future non-sterilised interventions or a future easing of monetary policy.

If the central bank announces that it is intervening in the foreign-exchange market, which typically takes place with a certain time lag, it would seem natural that the central bank's intervention sends a signal. However, secret intervention may also have a signal value. The reason is that the market makers² in the foreign-exchange market determine their prices on the basis of order flows. If the central bank e.g. intervenes by purchasing foreign exchange against the domestic currency, the "order" from the central bank may contribute to weakening the domestic currency if the market maker sees the central bank's order as new information on the future monetary and exchange-rate policy.

¹ This argument is based on an assumption of asymmetrical information (the central bank knows more about the future monetary and foreign-exchange policy than the private sector).

² Market makers are foreign-exchange dealers, typically banks, that quote binding two-way prices in various foreign-exchange-market products for certain amounts with a fixed maximum spread between bid and offer prices.

Intervention may also have a temporary impact via the immediate effect of the intervention order on supply and demand in the foreign-exchange market (the "inventory adjustment channel").¹ In this case the central bank's intervention is seen as an "order" just like any other order. The market makers always adjust their prices for purchasing foreign exchange for or selling foreign exchange from their "inventories" to match purchase and sales orders in the foreign-exchange market. In this way the market maker ensures that its inventory is not undesirably large or small. An overweight of purchase orders pushes prices up, while they are reduced if there is an overweight of sales orders.

Finally, the literature on intervention in the foreign-exchange market also points to a "noise trader" channel in connection with intervention. Here the line of reasoning is that there are a number of agents in the foreign-exchange market that trade on the basis of technical analyses or the like. If the intervention by the central bank influences the exchange rate in a particular direction, certain market participants may "jump on the bandwagon" and thereby amplify the exchange-rate effect of the intervention.

Sterilised intervention

Sterilised intervention in the foreign-exchange market has no impact on the money-market interest rate, which means that the intervention has no effect via the "interest-rate channel".

On the other hand, sterilised intervention may influence the exchange rate via the "signalling channel" since intervention may give indications of the future monetary and foreign-exchange policy, cf. the description under non-sterilised intervention.

The literature on intervention in the foreign-exchange market also refers to the "portfolio balance channel" in relation to sterilised intervention. The intervention influences the relative distribution of domestic and foreign assets in the private sector's portfolio. Assume that the central bank intervenes by purchasing foreign exchange and selling domestic currency. Furthermore, assume that the central bank places the foreign exchange in foreign bonds and sterilises the intervention by sale of domestic bonds. If the private sector had a portfolio equilibrium prior to the intervention by the central bank, it will seek to re-establish a portfolio equilibrium by selling domestic bonds, converting the sales proceeds into foreign exchange and purchasing foreign bonds. If the domestic

¹ The correlation between the microstructure of the foreign-exchange market and intervention is discussed in e.g. Lyons (2001) and Dominguez (2003).

and foreign bond yields are assumed to be unaffected by the intervention¹, this will tend to weaken the domestic currency until a new portfolio equilibrium has been achieved.² It has, however, been difficult to find empirical support for the portfolio balance channel, cf. e.g. the assessment in Chiu (2003).

ARE DANMARKS NATIONALBANK'S INTERVENTIONS STERILISED OR NON-STERILISED?³

Danmarks Nationalbank conducts monetary policy in Denmark by managing the 14-day interest rate. The monetary-policy counterparties have access to two facilities at Danmarks Nationalbank:

- Current-account deposits on a day-to-day basis. A ceiling (the "current-account limit") of around kr. 20 billion is imposed on the total current-account deposits of the counterparties at the close of the day. The current-account limit is broken down as individual current-account limits for the counterparties.
- Ordinary weekly market operations in which the monetary-policy counterparties can freely borrow by pledging securities as collateral (monetary-policy loans) or make deposits by purchasing certificates of deposit. The maturity of these transactions is normally 14 days.

The significance of Danmarks Nationalbank's interventions in the foreign-exchange market to the money-market interest rates and the liquidity⁴ of the monetary-policy counterparties can be illustrated by considering four different cases that are discussed further below, cf. also Table 1.

¹ The reason might be that they are determined solely by fundamental economic conditions such as long-term expectations of inflation and real interest rates (for long-term bonds), or that the short-term yield is unchanged due to sterilisation (for short-term bonds).

² Assume that the market expects the exchange rate one year ahead to match the rate prior to the intervention. In that case, the new portfolio equilibrium is achieved when the spot rate for the domestic currency has depreciated so much vis-à-vis the foreign currency that the expected future appreciation of the domestic currency is sufficiently large for the market to be "satisfied" with the holding of more domestic bonds and fewer foreign bonds. The portfolio balance channel is based on an assumption that investors see domestic and foreign bonds as imperfect substitutes. If domestic and foreign bonds are perfect substitutes, a sterilised intervention has no impact via the portfolio balance channel. The argument for a portfolio balance channel also presumes that there is no "Ricardian equivalence" so that the change in the "foreign-exchange exposure" of the central bank as a result of the intervention does not "offset" the change in the foreign-exchange exposure of the private sector.

³ The impact on the krone rate of Danmarks Nationalbank's interventions in the foreign-exchange market is analysed in the article on pp. 73ff.

⁴ In the following, "liquidity" should be taken to mean deposits in kroner in current accounts with Danmarks Nationalbank. In this connection liquidity may also be referred to as "current-account liquidity" or "krone liquidity".

OUTLINE OF DANMARKS NATIONALBANK'S INTERVENTIONS IN THE FOREIGN-EXCHANGE MARKET

Table 1

| | | Direction of intervention | |
|--|----------------|--|--|
| | | Purchase of foreign exchange (sale of kroner) | Sale of foreign exchange (purchase of kroner) |
| State of the foreign-exchange market | Stable | Case A: Sterilised | Case B: Sterilised |
| | Turbu- lent | Case D: Non-sterilised | Case C: Non-sterilised |

Case A: Danmarks Nationalbank intervenes by purchasing foreign exchange against kroner in a stable foreign-exchange market

The intervention will increase the liquidity of the monetary-policy counterparties and thus tend to exert downward pressure on the overnight interest rate in the money market. However, the current-account interest rate constitutes the lower limit of the day-to-day interest rate since the counterparties can always place their excess liquidity in their current accounts with Danmarks Nationalbank, provided that the current-account limit is not exceeded. If the counterparties do not wish to hold the extra current-account liquidity, they can purchase certificates of deposit in the next ordinary weekly market operation.

If the purchase of foreign exchange by Danmarks Nationalbank entails a risk that the current-account deposits of the counterparties exceed the current-account limit, Danmarks Nationalbank will also be open for extraordinary sale of certificates of deposit. In this way the excess liquidity as a result of the intervention is placed at the 14-day interest rate. If the counterparties do not purchase certificates of deposit and the current-account limit is exceeded, an automatic sale will take place under the rules regulating the current-account-limit system.

Provided that the spread between the interest rate for certificates of deposit and the current-account interest rate is modest, an intervention purchase of foreign exchange in a stable foreign-exchange market will have only a limited impact on the money-market interest rates for a few days before the situation "normalises" around Danmarks Nationalbank's interest rates. In this case the intervention is best described as sterilised.

Case B: Danmarks Nationalbank intervenes by selling foreign exchange against kroner in a stable foreign-exchange market

The intervention will reduce the liquidity of the monetary-policy counterparties and thus tend to exert upward pressure on the day-to-day interest rate in the money market. There is no immediate ceiling on

the overnight interest rate in the money market, but in the first succeeding ordinary weekly market operation at the latest the counterparties can raise liquidity so that conditions in the money market can be normalised.

If the settlement of Danmarks Nationalbank's sale of foreign exchange entails a risk that the current-account deposits of the counterparties fall to a level that is so low that it impedes the functioning of the money market, Danmarks Nationalbank will be open for extraordinary buy-back of certificates of deposit. This will implicitly impose a limit on the increase in the day-to-day interest rate.

Overall, an intervention sale of foreign exchange in a stable foreign-exchange market will have only a limited impact on money-market interest rates for a few days before the situation "normalises" around Danmarks Nationalbank's interest rates. In this case, too, the intervention is best described as sterilised.

Case C: Danmarks Nationalbank intervenes by selling foreign exchange against kroner in a turbulent foreign-exchange market

In the event of sustained downward pressure on the krone, intervention is not normally sufficient to maintain a stable krone rate. Monetary-policy tightening is therefore necessary, and consequently intervention in the foreign-exchange market in these circumstances is normally non-sterilised. In such a case Danmarks Nationalbank might therefore choose via extraordinary market operations to provide just the amount of liquidity required to prevent current-account deposits for the sector taken as one from being too low (where it would have been more "generous" in providing liquidity in a stable foreign-exchange market). This exerts upward pressure on money-market interest rates and thus dampens the pressure against the krone.

Monetary policy can also be tightened by raising the official interest rates.

In special cases it might also be relevant to adjust the monetary-policy instruments so that e.g. the normal "open window" in ordinary market operations is replaced by liquidity rationing (e.g. allocation of liquidity by auctions, as was the case during the currency crisis in 1993).

In a turbulent foreign-exchange market Danmarks Nationalbank's interventions thus normally go hand in hand with changed conditions in the money market (higher money-market interest rates) caused by explicit monetary-policy deliberations and possibly actions by Danmarks Nationalbank. Consequently, Danmarks Nationalbank's intervention to sell foreign exchange in a turbulent foreign-exchange market with downward pressure against the krone is best described as non-sterilised.

Case D: Danmarks Nationalbank intervenes by purchasing foreign exchange against kroner in a turbulent foreign-exchange market

The intervention will increase the liquidity of the monetary-policy counterparties and thus exert downward pressure on the day-to-day interest rate, but as stated previously the current-account interest rate constitutes the lower limit for the money-market interest rate. Sustained upward pressure against the krone will require a reduction of the interest-rate spread between Denmark and the euro area in order to maintain a stable krone. Consequently it will be necessary for Danmarks Nationalbank to lower its official interest rates.

Under these circumstances, Danmarks Nationalbank's intervention purchase of foreign exchange is best described as non-sterilised.

SUMMARY

In practice most central banks today apply a short-term interest rate as their monetary-policy instrument or operational target. Whether intervention in the foreign-exchange market is sterilised or not should therefore normally be assessed on the basis of the impact on the money-market interest rates. If the intervention has no impact on the short-term interest rate, it is sterilised. If the short-term interest rate is affected, the intervention is non-sterilised.

In periods when the foreign-exchange market is stable, Danmarks Nationalbank's intervention is best described as sterilised, while it is non-sterilised in periods of turbulence in the foreign-exchange market.

LITERATURE

Bofinger, P. (2001), *Monetary Policy. Goals, Institutions, Strategies, and Instruments*, Oxford: Oxford University Press.

Chiu, P. (2003), Transparency versus constructive ambiguity in foreign exchange intervention, *BIS Working Papers*, No. 144, October.

Craig, B. & Humpage, O. F. (2001), Sterilized Intervention, Nonsterilized Intervention, and Monetary Policy, *Federal Reserve Bank of Cleveland Working Paper*, No. 01-10.

Danmarks Nationalbank (2003), *Monetary Policy in Denmark*, 2nd edition.

Dominguez, K. M. E. (2003), The market microstructure of central bank intervention, *Journal of International Economics*, Vol. 59, pp. 25-45.

Humpage, O. F. (2003), Government Intervention in the Foreign Exchange Market, *Federal Reserve Bank of Cleveland Working Paper*, No. 03-15.

Heikensten, L. & Borg, A. (2002), The Riksbank's foreign exchange interventions – preparations, decision and communication, *Sveriges Riksbank Economic Review*, Vol. I, pp. 25-45.

Lyons, R. K. (2001), Microstructure and Central Bank Intervention, Chapter 8 in Lyons, R. K., *The Microstructure Approach to Exchange Rates*, Massachusetts: MIT Press 2001.

Sarno, L. & Taylor, M. P. (2002), Official intervention in the foreign exchange market, Chapter 7 in: Sarno, L. & Taylor, M. P., *The economics of exchange rates*, Cambridge: Cambridge University Press 2002.

Working Group on Exchange Market Intervention Established at the Versailles Summit of the Heads of State and Government June 4, 5 and 6, 1982, *Report of the Working Group on EXCHANGE MARKET INTERVENTION*, March 1983 (the Jürgensen report).

Exchange-Rate Impact of Danmarks Nationalbank's Interventions in the Foreign-Exchange Market

Allan Bødskov Andersen, Economics

INTRODUCTION

From time to time Danmarks Nationalbank intervenes in the foreign-exchange market in order to stabilise the exchange rate vis-à-vis the euro. This article analyses the impact on the exchange rate of Danmarks Nationalbank's interventions during the period from 1 January 1999 to 15 September 2004 with daily observations based on an event analysis.

The economic literature does not show consensus regarding the effect of sterilised interventions,¹ and the analyses generally suffer from a lack of sufficiently detailed intervention data. For instance, Obstfeld and Rogoff (1996) conclude: "In any event, governments plainly believe that sterilised intervention has its uses, for they continue to practice it despite the lack of any hard evidence that it is consistently and predictably effective". On the other hand, Sarno and Taylor (2002): "... [we] conclude cautiously that official intervention can be effective, especially if the intervention is publicly announced and concerted and provided it is consistent with the underlying stance of monetary and fiscal policy". Fatum and Hutchison (2003): "... we find strong evidence that sterilised intervention systematically affects the exchange rate in the short run".

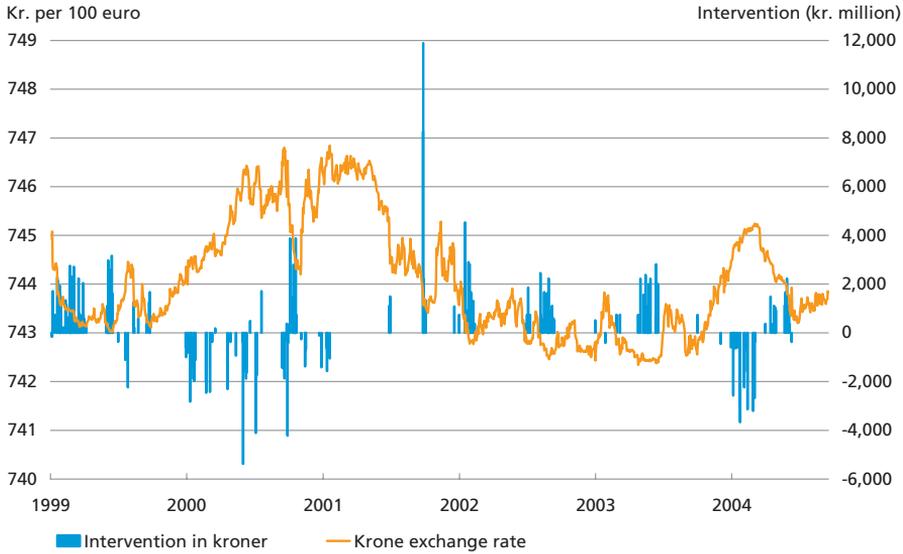
The result of the analysis in this article is that during the period under review Danmarks Nationalbank's interventions have been effective in the efforts to achieve the desired impact on the exchange rate. This is not least due to the fact that the said period has been characterised by stable conditions in the foreign-exchange market.

Danmarks Nationalbank's management of the exchange rate is not based exclusively on intervention since it also makes use of unilateral interest-rate adjustments (i.e. interest-rate adjustments that affect the spread between the official interest rates in respectively Denmark and

¹ The distinction between sterilised and non-sterilised intervention under Danish conditions is described in the article Sterilised and Non-Sterilised Intervention in the Foreign-Exchange Market, pp. 61ff.

INTERVENTIONS BY DANMARKS NATIONALBANK SINCE 1999

Chart 1



Note: Daily observations. The period is 1 January 1999 to 15 September 2004. A positive (negative) intervention amount indicates purchase (sale) of foreign exchange against Danish kroner.

Source: Danmarks Nationalbank.

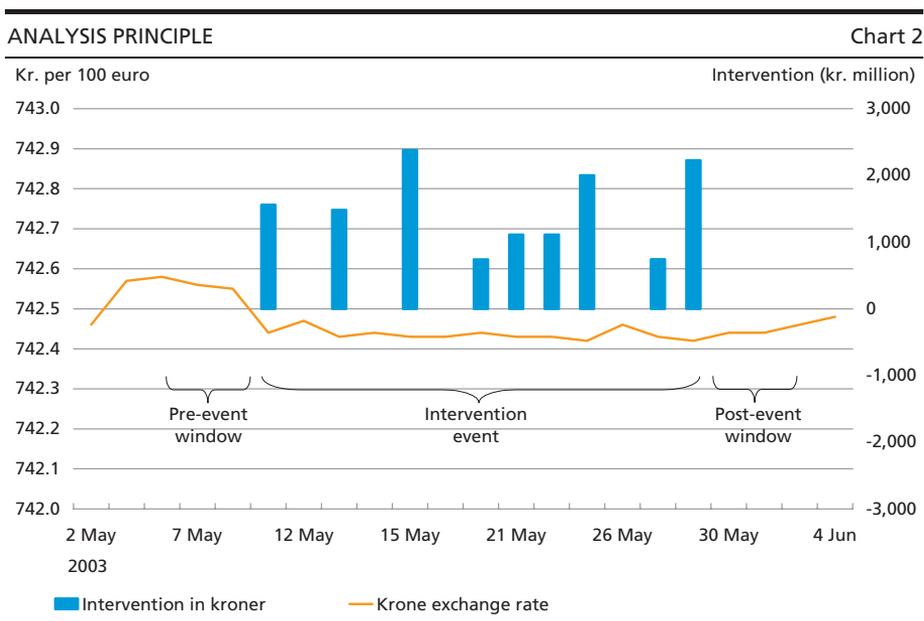
the euro area). Unilateral interest-rate adjustments are the key instrument to influence overall fluctuations in the exchange rate, while intervention is used to stabilise the exchange rate in the short term. The significance of unilateral interest-rate adjustments to the statistical results in the present analysis is not considered explicitly in view of the modest statistical basis for the period under review. However, it is argued that the interest-rate adjustments do not affect the qualitative results of the analysis, cf. below.

THE PRINCIPLES FOR THE ANALYSIS OF DANMARKS NATIONALBANK'S INTERVENTIONS

Inspired by Fatum and Hutchison (2003), an event analysis is applied to interventions since 1999.¹

The starting point is that periods of varying length without intervention are followed by periods of intervention on a daily basis, or with intervals of a few days. This observation also fits Danish conditions, cf. Chart 1. There are shorter or longer periods without intervention, while intervention is rarely a one-off event.

¹ See MacKinlay (1997) for a description of event analysis.



This tendency for intervention "clustering" is an argument for not directly analysing the effect of the individual foreign-exchange purchases and sales, since the exchange rate in the adjacent periods (hours or days) will often be affected by a combination of market conditions that require intervention, and other interventions. Instead, a range of interventions in a given period is perceived as an *intervention event*. The effect on the exchange rate is studied by comparing the exchange-rate development before and after the intervention event. Below, these periods will be called respectively pre- and post-event windows. The principle is illustrated in Chart 2.

There is a degree of latitude in determining the length and nature of the pre- and post-event windows, as well as the intervention event itself. If the pre- and post-event windows are too long, relatively more of them will overlap, which means that they cannot be part of the analysis. There is also a risk of including periods that are influenced by other factors than those triggering the intervention decision. In the same way, a period that is too short is also problematic since there is a risk of omitting relevant patterns in the windows. Based on Danish intervention experience, as well as the consideration of the share of the total number of intervention days that is included in the intervention events, the results of the analysis are presented below for pre- and post-event windows of two days. The results are robust towards this selection.

With regard to the intervention event itself, the choice lies in determining the number of consecutive intermediary non-intervention days

that may still be part of the same intervention event. Here the choice is not obvious either: if the number of days chosen is too high, too few events are identified, while there will be too many events if an insufficient number of days is chosen.

The analysis is conducted with various definitions of intervention event, permitting at most one, two or three consecutive non-intervention days. In the analysis with e.g. one day, an intervention event thus ends on the last intervention day before two consecutive non-intervention days. Again, the results of the analysis are robust towards this choice of maximum number of non-intervention days in an intervention event, cf. below.

The choices relating to the length of the pre- and post-event windows and the highest number of non-intervention days in an intervention event are discussed in the Appendix.

Success criterion for intervention

The analysis focuses on two possible success criteria for intervention, which are taken from Fatum and Hutchison (2003).

The first (and most stringent) is a *direction criterion*, i.e. the criterion relates to whether the krone fluctuates in the direction in which the intervention, in isolated terms, is effective. If Danmarks Nationalbank on a net basis sells foreign exchange in the intervention event, the intervention is a success if the krone is strengthened in the post-event window. On the other hand, if Danmarks Nationalbank is a net purchaser of foreign exchange in an intervention event, the intervention is a success if the krone is weakened in the post-event window. In formal terms, the intervention is a success if

$$(I_i > 0 \text{ and } \Delta s_{i+} > 0) \text{ or } (I_i < 0 \text{ and } \Delta s_{i+} < 0),$$

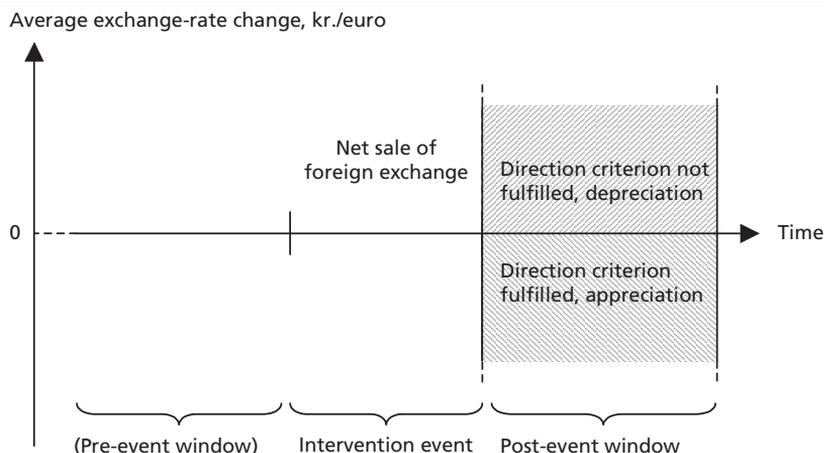
where I_i is Danmarks Nationalbank's net purchase of foreign exchange in the intervention event i , and Δs_{i+} is the change in the krone rate in the post-event window after the intervention event i . ($\Delta s > 0$ corresponds to depreciation of the krone).

Fatum and Hutchison (2003) state that in many situations this will be a stringent criterion. Often the objective of intervention is not to achieve a specific krone-rate direction, but rather to dampen a given movement in the exchange rate. Therefore a *stabilisation criterion* is defined as follows: an intervention is a success if it either fulfils the direction criterion or if

$$(I_i > 0 \text{ and } \Delta s_{i+} > \Delta s_{i-}) \text{ or } (I_i < 0 \text{ and } \Delta s_{i+} < \Delta s_{i-}),$$

DIRECTION CRITERION ON SALE OF FOREIGN EXCHANGE

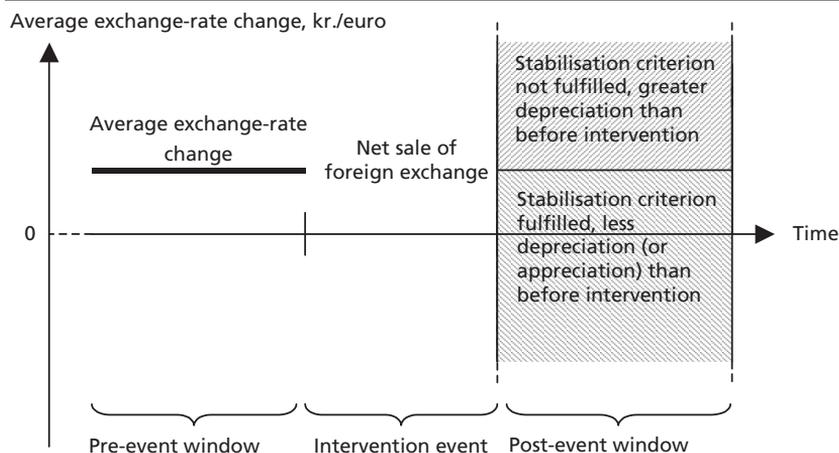
Chart 3



Note: In the example, Danmarks Nationalbank intervenes by net sale of foreign exchange in the intervention event. The direction criterion is fulfilled if the krone subsequently appreciates, i.e. a negative change in the krone rate. The direction criterion is not dependent on the exchange rate in the pre-event window.

STABILISATION CRITERION ON SALE OF FOREIGN EXCHANGE

Chart 4



Note: In the example Danmarks Nationalbank intervenes by net sale of foreign exchange in the intervention event and the krone depreciates in the pre-event window, i.e. a positive change in the krone rate. The intervention is a success in relation to the stabilisation criterion if the krone subsequently depreciates less or appreciates.

where Δs_{t-} is the change in the krone rate in the pre-event window. If the krone e.g. appreciates less in the post-event window than in the pre-event window ($0 > \Delta s_{t+} > \Delta s_{t-}$), the intervention (net purchase of foreign exchange) has broken the exchange-rate trend, but without leading to

depreciation. This is naturally a less rigid requirement than the direction criterion, which relates to the specific sign of the change in the krone rate, but the stabilisation criterion is probably a reasonable description of successful intervention in the Danish case, especially in the current period where the krone rate has been far from the official intervention limits in the ERM II system.

Examples of successful interventions according to the two criteria are presented in Charts 3 and 4, respectively.

Leaning with or against the wind?

"Leaning with the wind" interventions are defined as intervention to support the current movement in the krone rate, e.g. on purchase of foreign exchange in a situation where the krone is already depreciating in the pre-event window, i.e. ($I_i > 0$ and $\Delta s_{i-} > 0$) or ($I_i < 0$ and $\Delta s_{i-} < 0$). In such cases both the direction and stabilisation criteria are inappropriate. In the example the intervention will be a success according to both criteria for as long as the depreciation continues in the post-event window, even if the depreciation may be less than before the intervention. If there are many such "leaning with the wind" interventions, intervention will be successful according to the above criteria regardless of the actual effect of the interventions.

This is taken into account by also conducting the analysis exclusively for "leaning against the wind" interventions, i.e. where ($I_i > 0$ and $\Delta s_{i-} < 0$) or ($I_i < 0$ and $\Delta s_{i-} > 0$). By far the majority of the intervention events identified are of the "leaning against the wind"-type, cf. the above definition. The results are moreover split into respectively purchase and sale of foreign exchange. Finally, an estimate is given of the average exchange-rate impact per intervention krone in the period since 1999.

RESULTS

Table 1 presents simple descriptive statistics for the interventions from 1 January 1999 to 15 September 2004. During the period there were 216 intervention days, of which 145 days with purchase of foreign exchange

INTERVENTIONS BY DANMARKS NATIONALBANK
1 JANUARY 1999 – 15 SEPTEMBER 2004

Table 1

| | Purchase of foreign exchange | Sale of foreign exchange | Total purchase and sale |
|---------------------------------------|------------------------------|--------------------------|-------------------------|
| Number of intervention days | 145 | 71 | 216 |
| Average amount (kr. million) | 1,297 | 1,324 | 1,306 |
| Standard deviation (kr. million)..... | 1,362 | 1,125 | 1,286 |

SUCCESSFUL INTERVENTION SHARES

Table 2

| | Intervention events | Direction criterion OK | | Stabilisation criterion OK | |
|---|---------------------|------------------------|-------------|----------------------------|-------------|
| | | Number | Per-centage | Number | Per-centage |
| <i>Permit = 1</i> | | | | | |
| <i>Total</i> | 49 | 32 | 65.3 | 45 | 91.8 |
| of which net purchase of foreign exchange | 27 | 20 | 74.1 | 26 | 96.3 |
| of which net sale of foreign exchange | 22 | 12 | 54.5* | 19 | 86.4 |
| <i>"Leaning against the wind"</i> | 45 | 29 | 64.4 | 42 | 93.3 |
| of which net purchase of foreign exchange | 25 | 18 | 72.0 | 24 | 96.0 |
| of which net sale of foreign exchange | 20 | 11 | 55.0* | 18 | 90.0 |
| <i>Permit = 2</i> | | | | | |
| <i>Total</i> | 49 | 32 | 65.3 | 45 | 91.8 |
| of which net purchase of foreign exchange | 27 | 20 | 74.1 | 25 | 92.6 |
| of which net sale of foreign exchange | 22 | 12 | 54.5* | 20 | 90.9 |
| <i>"Leaning against the wind"</i> | 48 | 31 | 64.6 | 44 | 91.7 |
| of which net purchase of foreign exchange | 26 | 19 | 73.1 | 24 | 92.3 |
| of which net sale of foreign exchange | 22 | 12 | 54.5* | 20 | 90.9 |
| <i>Permit = 3</i> | | | | | |
| <i>Total</i> | 48 | 31 | 64.6 | 45 | 93.8 |
| of which net purchase of foreign exchange | 26 | 19 | 73.1 | 25 | 96.1 |
| of which net sale of foreign exchange | 22 | 12 | 54.5* | 20 | 90.9 |
| <i>"Leaning against the wind"</i> | 48 | 31 | 64.6 | 45 | 93.8 |

Note: The results in the Table are for a length of the pre- and post-event windows of two days. "Permit" is the highest number of consecutive non-intervention days in an intervention event. * denotes that the p-value for whether the ratio is significant is approximately 30 per cent (i.e. insignificant) with random walk assumption for the exchange rate in the control group, cf. the main text. In all other cases the p-value is below 2 per cent with the random walk assumption. In all cases the p-value is 1 per cent or below 1 per cent assessed with the empirical distribution for the criteria in the control group. P-values are calculated by approximating the binomial distribution with the normal distribution, which is a precise approach for the current number of events.

for an average amount of kr. 1,297 million, and 71 days with sale of foreign exchange for an average amount of kr. 1,324 million. However, these average values conceal considerable variation, cf. the stated standard deviations.

Share of successful interventions

The share of successful interventions in terms of the stabilisation criterion and the direction criterion is compiled on an overall basis and for net purchase and net sale of foreign exchange in an intervention event. The analysis is also performed conditional on the intervention being of "leaning against the wind"-type. In one of the cases considered (maximum three consecutive non-intervention days in an intervention event) all of the intervention events identified are "leaning against the wind" interventions. The results are presented in Table 2.

It is seen that e.g. in the case of maximum one non-intervention day in an intervention event 74.1 per cent of the intervention events with net purchase of foreign exchange are successful in terms of the direction

criterion and 96.3 per cent are successful with regard to the stabilisation criterion.

To assess whether such values are significant, the probability that respectively the direction criterion and the stabilisation criterion are fulfilled without intervention is calculated by omitting all observations that relate to an intervention event or a pre- or post-event window. In the remaining sample, the probability of observing a change of direction or stabilisation is calculated. These probabilities can be compiled as respectively almost 30 per cent and slightly above 60 per cent and are almost independent of the highest permitted number of consecutive non-intervention days in an intervention event. With these values the success ratios in Table 2 can be assessed in the relevant binomial distribution and p-values can be calculated.

In all cases the p-values are 1 per cent or lower. The success rate for the stabilisation criterion is around 90 per cent across the various specifications. The success rate for the direction criterion is somewhat lower, reflecting that Danmarks Nationalbank will often be "satisfied" with the exchange-rate development if the krone-rate trend on the days up to the interventions is broken.

It can be contested that the control sample still also includes a potential exchange-rate impact of the interventions outside the intervention events. However, intervention days are less than 5 per cent of the observations in the control sample. It is most reasonable to assume that these do not dominate. In all circumstances the interventions in the control sample should mean that too many cases are observed where the direction and/or stabilisation criterion was fulfilled in the control sample. All other things being equal, this will make it more difficult for the identified intervention events to be significant. Applying a medical analogy, if some patients in the control group also receive the medication it will be more difficult for the medication to appear significantly effective in the experiment group. It is therefore reasonable to assume that the analysis is robust towards the remaining interventions in the control group.¹

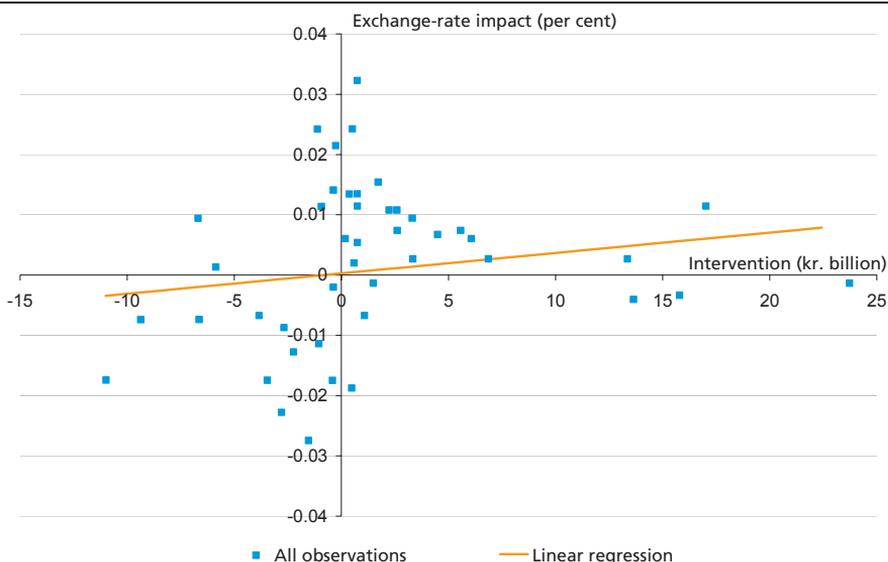
If there is still fear of bias due to remaining interventions, the ratios in Table 2 can be assessed on the basis of a fixed probability of 50 per cent that the direction criterion is fulfilled. This corresponds to the exchange rate following a random walk.² With this assumption the p-value for the direction criterion to be fulfilled in the case of net sale of foreign

¹ If the analysis is performed on the basis of probabilities calculated after windows with remaining interventions in the control sample have been deleted, all p-values corresponding to Table 2 are still below 2 per cent.

² This is a popular description of exchange rates, but due to the fixed-exchange-rate policy in the Danish case at most be considered an approximation that is applicable in the very short run. Since it is the short run that is in focus here, the calculation is considered informative.

INTERVENTION AMOUNTS AND EXCHANGE-RATE IMPACT

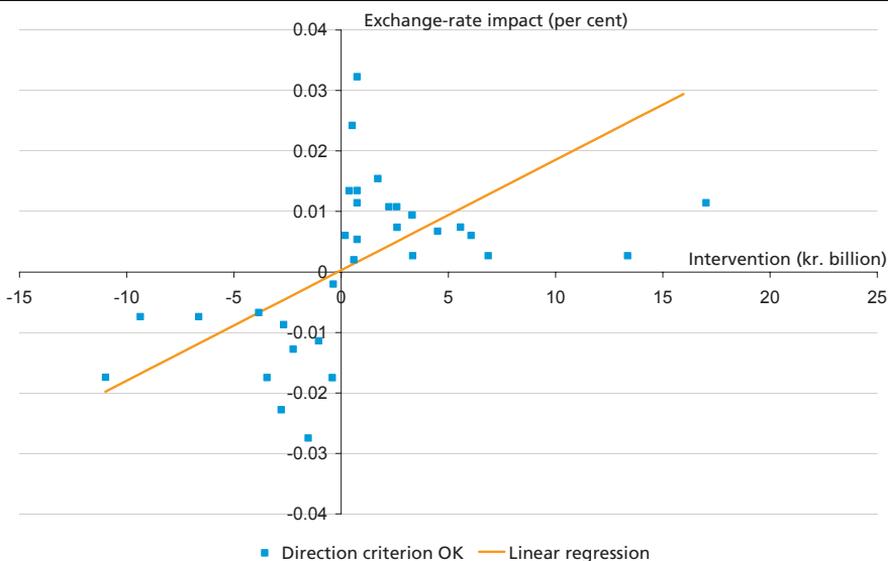
Chart 5



exchange increases to approximately 30 per cent. In all other cases the p-value is below 2 per cent with the alternative specification. However, the insignificant results fall in the cases with the lowest number of observations, so that the power of the test is also low. In general it is therefore safer to conclude on the basis of the total number of intervention events rather than on the basis of the breakdown of interventions in respectively net purchases and net sales.

INTERVENTION AND EXCHANGE-RATE IMPACT, DIRECTION CRITERION OK

Chart 6



The conclusion is that Danmarks Nationalbank's interventions have had a highly significant impact on the exchange rate measured in terms of both the direction criterion and the stabilisation criterion in the period under review. By far the majority of the interventions can be identified as "leaning against the wind".

EXCHANGE-RATE IMPACT PER INTERVENTION KRONE

The exchange-rate development in the post-event windows is compared with the related intervention amounts in Chart 5. Chart 6 shows the equivalent picture for the interventions that were successful in terms of the direction criterion.¹

When all observations are included, a positive relation between the size of the amount and the exchange-rate impact can be discerned. The size of the amount is not significant, i.e. the slope of the line of regression in Chart 5 does not differ significantly from 0.

Focusing only on the events that are successful in terms of the direction criterion, a positive relation becomes a little clearer and the slope of the line of regression is significant with a t-value of 3.7. The slope is equivalent to an average foreign-exchange purchase requirement of approximately kr. 5.5 billion to move the exchange rate by 0.01 percentage point. This corresponds to approximately kr. 0.075 per 100 euro calculated on the basis of the central rate. Kr. 0.10 (e.g. from kr. 746.00 per 100 euro to kr. 746.10 per 100 euro) thus on average requires purchase of foreign exchange for approximately kr. 7.3 billion. These calculations should naturally be regarded as estimates subject to considerable uncertainty since the relation is not perfect, cf. the Chart, and is conditional on the intervention fulfilling the direction criterion.

CONSEQUENCES OF UNILATERAL INTEREST-RATE ADJUSTMENTS TO THE RESULTS

Besides intervention, Danmarks Nationalbank also manages the exchange rate via unilateral interest-rate adjustments, i.e. interest-rate adjustments that change the spread between the official interest rates in Denmark and the euro area. This is not taken into account in this analysis. It should be noted that the unilateral interest-rate adjustments would not affect the conclusions of the event analyses since unilateral interest-rate adjustments only coincide with intervention events in a

¹ The analysis is conducted for at most two consecutive non-intervention days in an intervention event, but again the overall results are robust.

couple of cases. Unilateral interest-rate adjustments are triggered by sustained depreciation or appreciation of the krone and thus do not necessarily coincide with intervention. Moreover, the absence of the effects of unilateral interest-rate adjustments will tend to cause the interventions in the analysis to appear less effective. This is because, as a rule, any exchange-rate impact from unilateral interest-rate adjustments is included in the control sample, which all other things being equal makes it more difficult for interventions to significantly affect the exchange rate, cf. the medical analogy above.

In the analysis of the exchange-rate impact per intervention krone the problems regarding unilateral interest-rate adjustments are potentially greater. However, there do not seem to be serious problems with large outliers in Charts 5 and 6. In Chart 6 the two largest foreign-exchange purchases (approximately kr. 13 and 17 billion) with little exchange-rate impact do coincide with unilateral interest-rate adjustments, while the two largest foreign-exchange sales (approximately kr. 9 and 11 billion) do not. If the largest foreign-exchange purchases in Chart 6 are deleted, the average exchange-rate impact increases marginally.

CONCLUSION

Intervention by Danmarks Nationalbank has been effective in the efforts to achieve the desired impact on the exchange rate. There is also a (weak) correlation between the size of intervention amounts and the subsequent course of the exchange rate. This underlines that interventions cannot stand alone, as intervention for considerable amounts would be required in order to achieve a more extensive impact on the exchange rate.

The results can furthermore be attributed to the fact that in the period under review exchange-rate fluctuations have been relatively moderate, among other reasons because the foreign-exchange market itself has contributed to stabilising the exchange rate. There is thus no guarantee that the results will hold in periods when the foreign-market is more turbulent.

APPENDIX: CHOICE OF WINDOW LENGTH AND NUMBER OF NON-INTERVENTION DAYS IN AN INTERVENTION EVENT

The choice of exact definition of an intervention event and the length of the pre- and post-event windows are significant to the share of intervention days included in the analysis. If the length of the pre- and post-event window is set at two days, at least four non-intervention days must pass for the windows not to overlap. If the window length is three days, at least six days must pass, and so on. The longer the windows, and the lower the permitted number of consecutive non-intervention days in an intervention event, the greater the problem.

Table A1 states the number of intervention events and the share of the total number of intervention days in the period that is included in the intervention events (coverage) for different choices of pre- and post-event window length and highest number of non-intervention days in an intervention event. The appurtenant average lengths of the intervention events and the average number of intervention days per intervention event are also stated.

As stated, the choice of highest number of non-intervention days in an intervention event and window length that best match Danish condi-

VARIOUS CHOICES OF WINDOW LENGTH AND MAXIMUM NUMBERS OF CONSECUTIVE NON-INTERVENTION DAYS IN INTERVENTION EVENTS

Table A1

| Window length | Maximum number of non-intervention days in an intervention event | | | |
|---------------|--|--|--|--|
| | 0 | 1 | 2 | 3 |
| 2 | Events: 49 Av. length: 1.7 Av. interv.: 1.7 Coverage: 38 pct. | Events: 49 Av. length: 2.9 Av. interv.: 2.5 Coverage: 57 pct. | Events: 49 Av. length: 3.9 Av. interv.: 3.1 Coverage: 70 pct. | Events: 48 Av. length: 4.9 Av. interv.: 3.5 Coverage: 78 pct. |
| 3 | Events: 37 Av. length: 1.8 Av. interv.: 1.8 Coverage: 31 pct. | Events: 37 Av. length: 3.0 Av. interv.: 2.7 Coverage: 46 pct. | Events: 37 Av. length: 3.7 Av. interv.: 3.0 Coverage: 51 pct. | Events: 36 Av. length: 4.8 Av. interv.: 3.5 Coverage: 58 pct. |
| 5 | Events: 29 Av. length: 1.6 Av. interv.: 1.6 Coverage: 21 pct. | Events: 29 Av. length: 2.7 Av. interv.: 2.4 Coverage: 32 pct. | Events: 29 Av. length: 3.6 Av. interv.: 2.8 Coverage: 38 pct. | Events: 28 Av. length: 4.4 Av. interv.: 3.1 Coverage: 41 pct. |

Note: For the given window lengths and highest numbers of non-intervention days in an intervention event "Events" is the number of intervention events in the analysis, "Av. length" is the average number of days in the intervention events, "Av. interv." is the average number of intervention days in the intervention events, and "coverage" is the share of intervention days included in the intervention events.

tions is not given beforehand. Therefore coverage is also taken into account so that as many intervention days in the period as possible end up being included in the analysis. This ensures that the tests have as much power as possible, and leaves fewer intervention days in the periods without intervention events. This is important since these periods are used in the assessment of whether the exchange-rate impact of the intervention events is significant.

On the basis of coverage the window length should be set at two, and the highest number of consecutive non-intervention days in an intervention event of either two or three days should be chosen. These two cases have significantly higher coverage than the others, namely respectively 70 and 78 per cent. However, the highest number of non-intervention days in an intervention event of two or three days may be a little on the large side based on a more subjective perception of Danmarks Nationalbank's intervention behaviour. Therefore results are reported for at most one, two and three non-intervention days in an intervention event. The length of the pre- and post-event window is maintained at two days as the number of identified events falls quite significantly even on an increase to three days.

LITERATURE

Fatum, Rasmus and Michael M. Hutchison (2003), Is Sterilised Foreign Exchange Intervention Effective After All? An Event Study Approach, *The Economic Journal*, 113 (April), pp. 390 – 411.

MacKinlay, A.C. (1997), Event Studies in Economics and Finance, *Journal of Economic Literature*, vol. 35, pp. 13 – 39.

Obstfeld, Maurice and Kenneth Rogoff (1996), *Foundations of International Macroeconomics*, MIT Press.

Sarno, Lucio and Mark P. Taylor (2002), *The Economics of Exchange Rates*, Cambridge University Press.

Relations Between Stock Prices and Bond Yields

Jakob Lage Hansen, Market Operations

INTRODUCTION AND SUMMARY

The stock and bond markets are closely related and the covariation between stock prices and bond yields is an indicator of the factors driving the financial markets. The degree of covariation is furthermore important for investors wishing to diversify their portfolios.

This article describes the historical development in the covariation and focuses on investors' assessment of risk in the financial markets, as well as on the interaction between economic activity, inflation and monetary policy.

During the past 40 years, the covariation in the USA has been predominantly negative, i.e. stock prices have typically been falling when bond yields have been rising. The explanation could be that, all other things being equal, higher interest rates reduce stock values.

In recent years, however, the covariation between stock prices and bond yields has been positive in e.g. the USA and Denmark. The reason may be that several events have led to changes in investors' assessment of risk in the financial markets, thereby creating substitution between stocks and bonds.

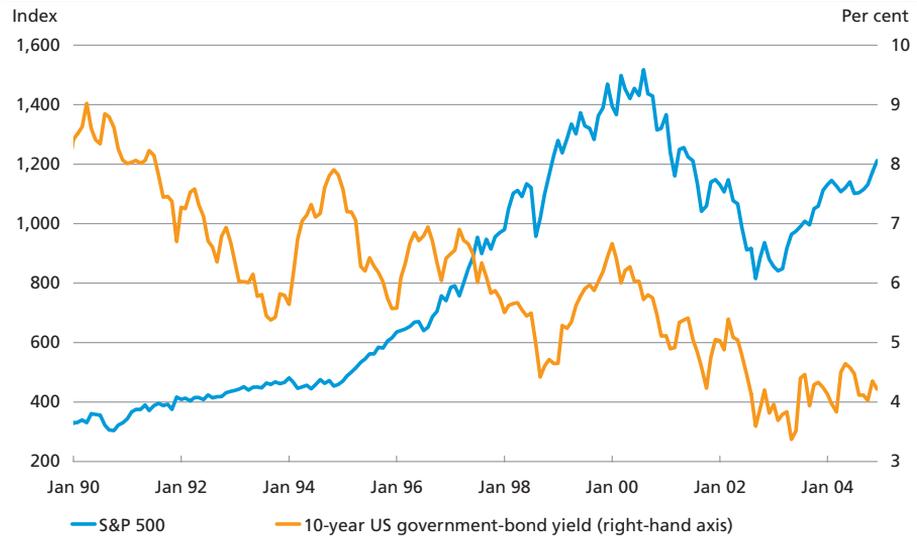
The covariation drew close to zero in 2004, when investors' risk assessment was apparently stable. The covariation remained positive, however. The reason may be that both inflation and market players' inflation expectations fluctuate less than was previously the case. In a regime with low and stable inflation the official interest rates will to a great extent match the development in general economic activity and thereby in business earnings.

DEVELOPMENT IN THE COVARIATION BETWEEN STOCK PRICES AND BOND YIELDS

During the 1990s there was a tendency for stock prices in the USA to rise when bond yields were falling, cf. Chart 1. At the same time, the development in stock prices was often negative, or less positive, when bond

US STOCK PRICES AND BOND YIELDS

Chart 1

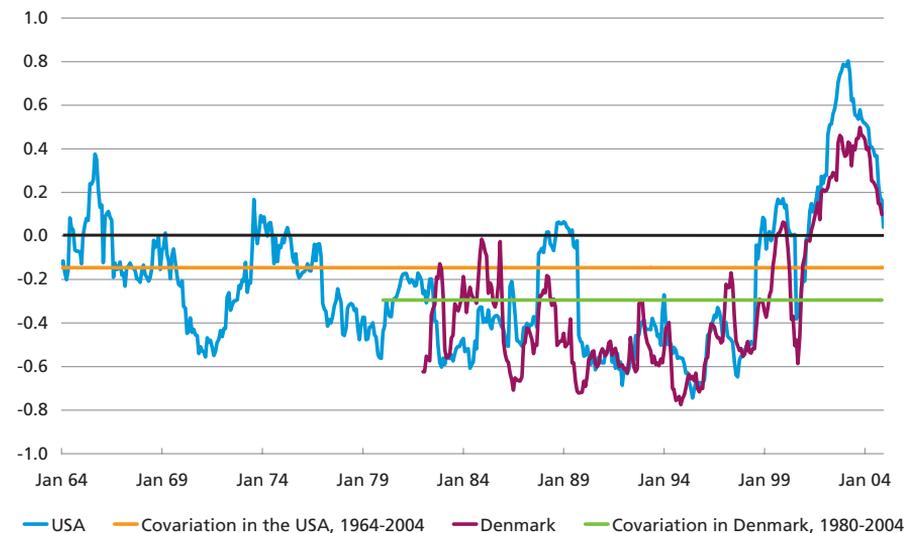


Note: Monthly observations.
Source: Bloomberg.

yields were rising. The covariation between stock prices and bond yields was thus negative, whereas for the last four years there has been a tendency for stock prices and bond yields to fluctuate in the same direction.

COVARIATION BETWEEN STOCK PRICES AND BOND YIELDS

Chart 2



Note: S&P 500 is the stock index used for the USA. Global Financial Data's all-share-index is used for Denmark. 10-year government-bond yields are used. The covariation (correlation) is calculated as the two-year moving correlation for monthly, relative changes. A correlation of 1 indicates perfect positive covariation. A correlation of -1 indicates perfect negative covariation. A correlation of 0 indicates no covariation.

Source: Bloomberg and Global Financial Data Inc.

THE VIX INDEX

Box 1

The VIX index is the implicit volatility on options based on the S&P 500 index. Implicit volatility indicates the expected volatility (the expected relative fluctuations). This is calculated on the basis of the price of a number of call and put options. Call options give the purchaser the right, but not the obligation, to buy an asset at a given price. Put options give the buyer the right, but not the obligation, to sell an asset at a given price. The greater the fluctuation in the price of the asset expected by an investor, the greater the value of an option, in view of the increase in the probability of realising the option at a profit. The implicit volatility of the options therefore expresses the expected fluctuations in S&P 500. A high VIX index value is thus equivalent to large expected fluctuations in S&P 500 and thereby a considerable risk for investors.

In both the USA and Denmark the covariation over a longer period has been negative, cf. Chart 2. The high positive covariation characterising the last four years is thus unusual in a more long-term perspective. The considerable fluctuations in the covariation reflect that some factors have a positive effect on the covariation, while others have a negative effect, and that the various factors are dominant at different times.

In recent years the development in the covariation between stock prices and bond yields has been uniform across geographical markets. This reflects that the stock and bond markets fluctuate synchronously, due to the greater integration of the global economy, among other factors, cf. Obstfeld and Taylor (2001).

ASSESSMENT OF RISK AND RISK WILLINGNESS

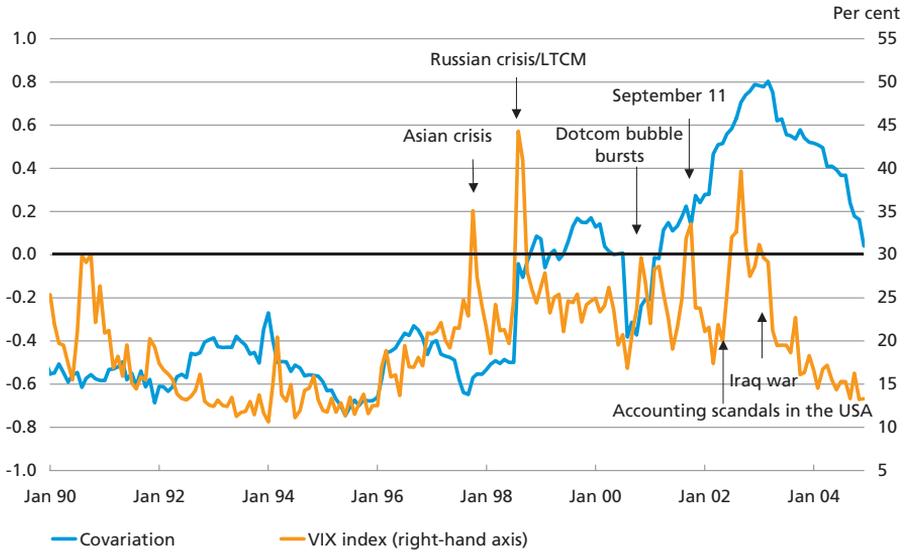
During the past eight years several events have changed investors' assessment of risk in the financial markets. An often used measure of risk is the VIX index, described in Box 1. During the periods marked, the VIX index has risen and has therefore been subject to considerable fluctuation, cf. Chart 3. To a great extent the fluctuations in the VIX index coincide with the shift from negative to positive covariation between stock prices and bond yields. It is therefore natural to analyse whether the fluctuations in the risk assessment can contribute to explaining the shift in the covariation.

Investment in stocks is typically considered to entail greater risk than investment in bonds. On placing funds in bonds, the bond's nominal yield to maturity is known to the investor and the investor will always receive the principal of the bond on its maturity¹. In contrast, the ongoing dividend payments on a stock, and the future price of the stock, are

¹ The credit risk on bonds is disregarded. The credit risk on government bonds from e.g. Denmark, the USA and Germany is low.

COVARIATION BETWEEN US STOCKS AND BOND YIELDS, AND THE VIX INDEX

Chart 3



Note: The covariation is calculated as the two-year moving correlation on monthly relative changes in S&P 500 and the 10-year US government-bond yield. The VIX index is stated as monthly observations.
 Source: Bloomberg.

not known beforehand. If investors' assessment of risk in the financial markets increases, this can lead to greater demand for bonds rather than stocks. This is often termed a "flight to quality", causing stock prices and bond yields to fall (while bond prices rise). If investors assess risk to be diminishing, this will have the opposite effect, so that stock prices and bond yields will rise. Periods when the assessment of risk is subject to considerable fluctuation may therefore lead to substitution between stocks and bonds, and thereby positive covariation between stock prices and bond yields. The same will apply on a change in investors' willingness to take risk.

Connolly, Stivers and Sun (2004) show that changes in the VIX index, and thereby in investors' assessment of risk, lead to positive covariation between stock prices and bond yields.

All other things being equal, an increase in bond yields reduces the value of stocks, since the discounted value of the stock dividends diminishes, cf. Box 2. This creates a negative covariation between stock prices and bond yields, which has also been observed over longer horizons, cf. Chart 2. It therefore seems probable that changes in the risk assessment are the primary factor behind the positive covariation during the past four years.

Investors' assessment of risk was stable in 2004, cf. Chart 3, which may explain the decrease in covariation. However, the covariations calculated

THE VALUE OF A STOCK

Box 2

The theoretical value of a stock can be calculated using the discounted dividend model (Fuller and Hsia 1984, Saabye 2003). Here the stock price is expressed as the expected present value of the future dividends, cf. equation (1).

$$(1) \quad S_1 = E \left[\sum_{t=1}^{\infty} \left(\frac{D_t}{(1 + i_{1,1} + ERP_1)(1 + i_{1,2} + ERP_1) \dots (1 + i_{1,t} + ERP_1)} \right) \right]$$

S_1 is the expected (E) present value of the stock for an investor at the start of period 1. The stock gives the owner the right to the future flow of dividends (D_t , where D_t is disbursed at the end of the period t), and the value of the stock therefore depends on the expected dividends. The denominator reflects the investor's required return on the stock. This depends on the annual (nominal) return on an alternative investment expected by the investor at the start of period 1, and a risk premium for any additional risk on the stock investment (ERP_t). If the alternative investment is 1-year government bonds that are reinvested annually, the alternative return is the annual yields ($i_{1,t}$) that are expected. The risk premium is normally positive since stocks, as described above, are considered to entail a greater risk than bonds. As the dividends depend on the company's earnings, an equivalent valuation method is to calculate the present value of the company's future earnings, cf. Danmarks Nationalbank (2003b). The formula can also be an average for a stock index such as S&P 500.

If the risk assessment increases, or investors' risk willingness decreases at time 1, ERP_t increases. The value of the stocks hereby declines. This can lead to substitution to bonds and thereby falling yields (rising bond prices).

Equation (1) also shows that, all other things being equal, an increase in the expected yields reduces the value of the stocks. This gives rise to a negative covariation between stock prices and bond yields.

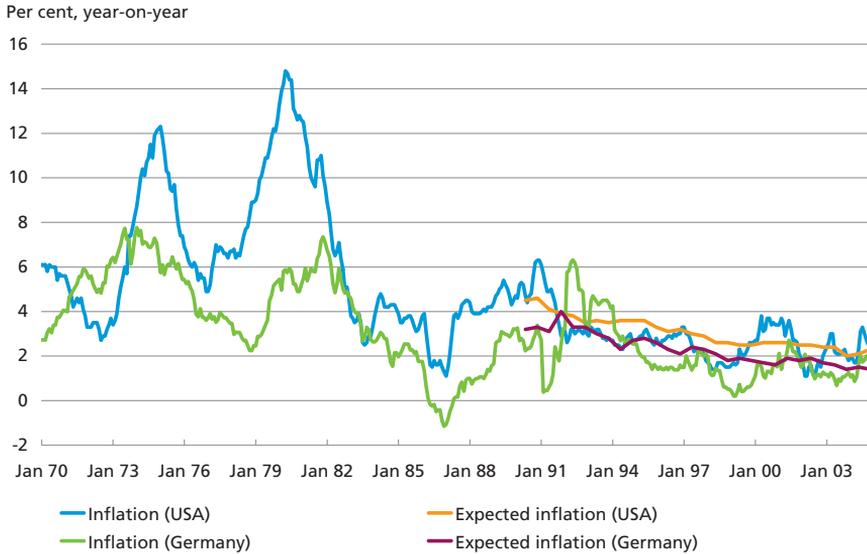
for the USA, Germany and Denmark in 2004 are still predominantly positive¹. This indicates that other factors besides changes in the risk assessment have played a role for the development in covariation in recent years.

ECONOMIC ACTIVITY, INFLATION AND MONETARY POLICY

Development in inflation

In the 1970s and early 1980s inflation was high and volatile in most countries, including the USA and to some extent Germany, cf. Chart 4. Since then inflation has fallen to a lower, more stable level, and infla-

¹ The correlation between US stock prices (S&P 500) and the 10-year government-bond yield was -0.06 calculated on a monthly basis, 0.35 calculated on a weekly basis and 0.09 calculated on a daily basis. The correlation between German stock prices (DAX) and the 10-year government-bond yield was 0.25 calculated on a monthly basis, 0.30 calculated on a weekly basis and 0.25 calculated on a daily basis. The correlation between Danish stock prices (KFX) and the 10-year government-bond yield was 0.03 calculated on a monthly basis, 0.02 calculated on a weekly basis and 0.12 calculated on a daily basis.



Note: The inflation expectation at a given time in year t is the expected inflation in the calendar year $t+2$. Inflation is stated as monthly observations, while the inflation expectations are stated as biannual observations.

Source: Bloomberg, Global Financial Data Inc. and Consensus Economics Inc.

tion expectations have stabilised. At the beginning of the 1990s inflation expectations were falling, whereas since 1998 they have been virtually constant or slightly declining in both Germany and the USA. This may be related to the greater weight given to price stability by many central banks, cf. Danmarks Nationalbank (2003a).

This stabilisation of inflation expectations occurs simultaneously with the increase in the covariation between stock prices and bond yields. It may therefore contribute to explaining the positive covariation, also in 2004 when the assessment of risk in the stock market was stable.

Expectations of dividends and yields

Two key factors affecting expectations of yields and dividends are expectations of economic activity and inflation expectations. These expectations are affected by a number of factors such as key economic indicators, the financial statements of business enterprises, announcements by central banks and forecasts from various organisations.

Economic activity and inflation are related, but the relation is complex. In the economic literature it is often assumed that higher economic activity leads to greater inflationary pressure in the longer term, for instance due to the increased wage pressure resulting from lower unemployment. Inflation is also affected by other factors such as the development in exchange rates. On the other hand, high inflation

THE VALUE OF A BOND

Box 3

A bond's value is calculated as the discounted payments to which the bond entails a right. For a government bond these are normally the coupon payments over the maturity of the bond, as well as the principal on maturity of the bond.

The value of a bond can also be expressed as the nominal yield guaranteed to the owner over the maturity of the bond. As an alternative to a bond with a term to maturity of n years, the bond holder may place the funds in a bond with a term to maturity of one year and for the following $n-1$ years reinvest in 1-year bonds. If the two investments are to be equally attractive, the average annual yield ($i_{n,1}$) for the maturity of the long-term bond (n) at the start of the period 1 must correspond to the expected (E) 1-year yields ($i_{1,t}$, where $t = 1, 2, \dots, n$) plus any risk premium ($BRP_{n,1}$) for investing over a longer horizon, cf. equation (2).

$$(2) \quad (1 + i_{n,1})^n = E[(1 + i_{1,1} + BRP_{n,1})(1 + i_{1,2} + BRP_{n,1}) \dots (1 + i_{1,n} + BRP_{n,1})]$$

The central bank determines the official interest rate, which affects the short-term yield. All other things being equal, an increase in the official interest rate will increase the long-term yield via the effect on the short-term yield. The longer the term to maturity of the bond, the smaller the effect on the long-term yield.

Expectations of the future monetary policy also affect the long-term yields via the impact on the expected short-term yields.

The risk premium on bonds is e.g. affected by the inflation expectations. Higher inflation typically means that inflation will show greater fluctuation. Expectations of higher inflation therefore increase uncertainty concerning the real bond yield, which can increase the risk premium required by investors for holding long-term bonds.

has a negative impact on economic activity, cf. Pedersen and Wagener (2000).

Higher economic activity may affect expectations of business earnings, and thereby dividends, positively. If business earnings match the general development in prices, expectations of higher inflation will also increase expectations of corporate dividends.

Central banks are typically expected to react to higher economic activity or higher inflation by tightening monetary policy. If higher economic activity or inflation is expected, expectations of the future official interest rates will therefore increase, which will typically lead to increases in long-term yields, cf. Box 3. At the same time, expectations of higher inflation will normally increase the risk premium that investors require for holding long-term bonds. This also exerts upward pressure on long-term yields.

If higher yields and higher dividends are expected at the same time, the impact on stock prices is not unequivocal, cf. equation (1). In general, factors leading to larger changes in interest rates than in

expected dividends will create negative covariation between stock prices and bond yields, while factors affecting dividend expectations more than yield expectations will create positive covariation.

Monetary-policy reaction to economic activity and inflation

The Taylor rule has become a standard generally applied to describing the behaviour of central banks, cf. Taylor (1993). The rule dictates that the official interest rate is raised by more than one percentage point if inflation increases by one percentage point, and that the official interest rate is raised by less than one percentage point if GDP growth increases by one percentage point. The Taylor rule is also perceived by many authors as a description of the actual behaviour of central banks.¹

If the market players assess that the central bank sets the official interest rate according to a Taylor rule, a change in the assessment of economic activity will affect the expected dividends more strongly than the expected yields. This will tend to create positive covariation between stock prices and bond yields, cf. equation (1). On the other hand, a change in inflation expectations will tend to affect the expected yields more than the expected dividends, which tends to create negative covariation. The covariation can therefore indicate the degree to which an event has affected the market players' expectations of economic activity in relation to inflation expectations, cf. the examples in Box 4.

On the basis of the above, the positive covariation between stock prices and bond yields in 2004 may reflect that the valuation of stocks and bonds has been affected by shifting expectations of economic activity rather than changes in inflation expectations². This is in harmony with the apparent stability of inflation expectations, cf. Chart 4³.

OTHER FACTORS THAT CAN AFFECT THE COVARIATION

Many factors affect the covariation between stock prices and bond yields. This article focuses on assessment of risk in the financial markets, as well as the interaction between economic activity, inflation and monetary policy, as these are considered to be particularly significant.

¹ Taylor (1999) for instance finds that the Federal Reserve reacted as described in the period 1987-1997. Clarida, Galí and Gertler (1998) show that in the period 1979-1993/1994 the Bundesbank and the Bank of Japan also reacted according to a variant of the Taylor rule.

² Results from other studies concur that the development in inflation and inflation expectations has influenced the covariation between stock prices and bond yields. Ilmanen (2003) finds a negative relation between inflation and the covariation between S&P 500 and the US 20-year yield in the period 1928-2001. An equivalent relation is found in Japan and Germany. Li (2002) concludes that a decreasing risk of high inflation increased the covariation between stock prices and bond yields in the G7 countries in the 1990s.

³ Central banks' greater focus on price stability will theoretically result in greater variation in economic activity, cf. Christensen and Hansen (2003).

EXAMPLES OF REACTIONS TO KEY INDICATORS AND ANNOUNCEMENTS

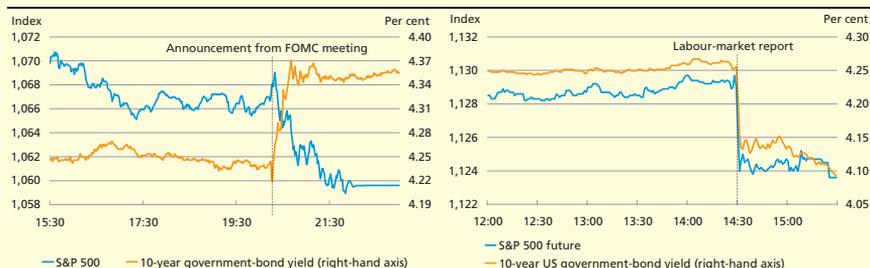
Box 4

Reaction to FOMC meeting

Negative covariation was seen between stock prices and bond yields after the Federal Open Market Committee Meeting on 9 December 2003, cf. Chart 5, left. The reaction indicates that the market players' inflation expectations were influenced more than their expectations of economic activity. This accords with the Federal Reserve's upward adjustment of its inflation assessment at the FOMC meeting.

REACTION TO THE FOMC MEETING ON 9 DECEMBER 2003 AND TO THE LABOUR MARKET REPORT ON 9 JANUARY 2004

Chart 5



Note: Danish timing. The S&P 500 future is used in the right-hand graph as the release took place before the US stock markets opened.

Source: Bloomberg.

Reaction to the labour market report

In 2004 market participants focused e.g. on the development in US employment. As the monthly labour market report in January showed a lower increase in the number of employed than expected, both stock prices and bond yields fell, cf. Chart 5, right. This may indicate that this event affected market players' assessment of economic activity, rather than their assessment of inflation.

This section gives examples of other factors that can influence the covariation.

A change in investment requirements can create negative covariation. For example, demographic factors can increase savings and thereby the investment requirement. This can increase demand for both stocks and bonds, and push stock and bond prices up (and yields down). The growing proportion of middle-aged people in parts of the western world in the 1990s, and this group's greater propensity to save, may thus have contributed to negative covariation between stock prices and bond yields, cf. Davis and Li (2003).

Expectations of future business earnings can be affected by other factors than the general economic activity. Shifts in the remuneration of the production factors may thus affect expected dividends. For example, a higher profit ratio will make stocks relatively more attractive than bonds, which can have a positive impact on both stock prices and bond yields.

Institutional factors can also amplify a positive covariation between stock prices and bond yields. In a scenario with falling stock prices and falling bond yields, pension schemes with extensive guarantees will increasingly impose limitations on the pension companies' choice of investment strategy. This was the case in the autumn of 2001, when returns on investment were affected negatively by falling stock prices, while the falling interest rates contributed to increasing insurance provisions, and thereby the solvency requirements of pension companies. Therefore some Danish pension companies sold stocks and purchased bonds, cf. Danmarks Nationalbank (2002).

CONCLUDING REMARKS

Stock-exchange commentaries for various days may often appear to contradict each other. On some days they report how positive key indicators drove up stock prices and bond yields. On others, apparently similar events are stated to have pushed bond yields up and stock prices down. More detailed analysis can often explain the fluctuations. As the article describes, many factors influence the financial markets and the interaction between them. Comparison of developments in various financial markets can often give considerable insights from an analytical perspective on the factors driving the financial markets.

LITERATURE

Christensen, Anders Møller and Niels Lynggård Hansen (2003), Volatility in Inflation and Economic Activity in the Nordic Countries, Danmarks Nationalbank, *Monetary Review*, 4th Quarter.

Clarida, Richard, Jordi Galí and Mark Gertler (1998), Monetary policy rules in practice: Some international evidence, *European Economic Review*, 42.

Connolly, Robert, Chris Stivers and Licheng Sun (2004), Commonality in the Time-variation of Stock-Bond and Stock-Stock Return Comovements. *Working Paper*, University of Georgia.

Danmarks Nationalbank (2002), *Financial Stability*.

Danmarks Nationalbank (2003a), *Monetary Policy in Denmark*, 2nd edition.

Danmarks Nationalbank (2003b), *Financial Stability*.

Davis, E. Philip and Christine Li (2003), Demographics and Financial Asset Prices in the Major Industrial Economies, *Working Paper*, Brunel University.

Fuller, Russell J. and Chi-Cheng Hsia (1984), A Simplified Common Stock Valuation Model, *Financial Analysts Journal*, September-October.

Ilmanen, Antti (2003), Stock-Bond Correlations, *The Journal of Fixed Income*, September.

Li, Linfeng (2002), Macroeconomics Factors and the Correlation of Stock and Bond Returns, *Working Paper*, Yale University.

Obstfeld, Maurice and Alan M. Taylor (2001), Globalization and Capital Markets, *Working Paper*, NBER, October.

Pedersen, Erik Haller and Tom Wagener (2000), Macroeconomic Costs and Benefits of Price Stability, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter.

Saabye, Niki (2003), The Equity Risk Premium, Danmarks Nationalbank, *Monetary Review*, 1st Quarter.

Taylor, John. B. (1993), Discretion versus policy rules in practice, *Carnegie-Rochester Conference Series on Public Policy*, 39.

Taylor, John B. (1999), A Historical Analysis of Monetary Policy Rules, in Taylor, John B. (ed.), *Monetary Policy Rules*, Chicago.

Hedge Funds in Denmark and Internationally

Jesper Ulriksen Thuesen, Financial Markets

INTRODUCTION AND SUMMARY

At the end of 2004, the Danish government presented a bill to create a legal and supervisory basis for establishing "hedge associations" in Denmark. According to the bill, hedge associations will be the Danish equivalent of hedge funds. Like hedge funds abroad, hedge associations will have full freedom to determine their risk profile and investment strategy.

A substantial rise in the number of hedge funds and the capital they manage has led to increased international focus on the significance of hedge funds to the financial markets and financial stability. On the one hand, hedge funds increase liquidity and efficiency in capital markets, but on the other hand they can increase the risk of financial instability.

It is not assessed that hedge associations in Denmark will have negative consequences for the Danish capital markets and the stability of the Danish financial system.

HEDGE FUNDS AND THEIR PREVALANCE

There is no clear, generally accepted definition of a hedge fund. The term covers a large number of different investment funds with very different risk profiles and investment strategies. Often they are private companies where a manager invests capital contributed by wealthy private individuals and in some cases institutional investors. In the USA, the following definition has been proposed:

*"Although it is not statutorily defined, the term encompasses any pooled investment vehicle that is privately organized, administered by professional investment managers, and not widely available to the public."*¹

The ECB recently presented a slightly more extensive definition:

¹ President's Working Group (1999).

"A hedge fund can be defined as a fund whose managers receive performance-related fees and can freely use, and do use, various active investment strategies to achieve positive absolute returns involving any combination of financial leverage, long and short positions in securities, derivatives or any other assets in a wide range of markets. ... Hedge funds represent a flexible business model rather than an alternative asset class"¹.

It is evident that neither of these suggested definitions is particularly precise. One way of describing what hedge funds are is to see them in relation to more narrowly defined and regulated investment schemes, e.g. investment associations. Box 1, p. 102, lists the typical characteristics of hedge funds compared with the corresponding characteristics of investment associations. It is seen that there are a number of significant differences, e.g. in their objectives and their opportunities to freely take positions in the markets.

The hedge funds' freedom to select their own strategy is reflected in the fact that in practice the various hedge funds have opted for highly diverging investment strategies in order to utilise their options to e.g. short-sell² in the market. Box 2, p. 103, groups some of these investment strategies. The various investment strategies on the face of it entail different levels of risk. However, an investment strategy entailing less risk may be combined with high gearing³, so the choice of investment strategy does not necessarily in itself give a true and fair view of the risk profile of a given hedge fund.

Since hedge funds are typically registered in offshore financial centres⁴ where they are not subject to reporting requirements, it is not known how many funds there are, nor how much capital they manage. Qualified estimates⁵ are:

- There are 8-9,000 funds in total, more than 6,000 of which operate in the USA.
- The funds manage total assets of around USD 1,000 billion.⁶

¹ ECB (2004). For further examples of definitions, see Vaughan (2003).

² Short-selling means to sell assets that are not in the seller's portfolio at the time of sale. For a more detailed description of short-selling (in Danish), see e.g. Plesner (2003).

³ The gearing of a hedge fund typically expresses the size of the capital contributed by the investors (and the manager) compared to the size of the total balance sheet of risk-related assets and liabilities. Typically hedge funds achieve gearing by using financial instruments such as repos, futures, forward contracts and other derivatives where positions can be taken by making margin payments instead of paying the full nominal value of the positions, cf. e.g. Financial Stability Forum (2000).

⁴ The Cayman Islands, the British Virgin Islands, Bermuda and the Bahamas seem to be the offshore financial centres that attract most registrations of hedge funds.

⁵ Sources: ECB (2004), IMF (2004), Donaldson (2003) and – as regards hedge fund activities in the Nordic countries – Eidolf (2004).

⁶ For comparison, the value of the total global volume of shares and bonds is estimated to be more than USD 83,000 billion at end-2003. Source: IMF (2004).

ANNUAL PERCENTAGE YIELDS IN HEDGE FUNDS COMPARED WITH SHARES AND BONDS

Table 1

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-------------------|------|------|-------|-------|------|------|
| Hedge funds | 40.3 | 8.4 | 6.3 | 0.1 | 18.6 | 7.7 |
| Shares | 21.0 | -9.1 | -11.9 | -22.1 | 28.7 | 10.9 |
| Bonds | -0.8 | 11.6 | 8.4 | 10.3 | 4.1 | 4.3 |

Note: The yield is stated as the yield calculated on the basis of S&P 500 (for shares), Lehman Brothers Aggregate Bond Index (for bonds) and Van Global Hedge Fund Index (for hedge funds). This index is constructed on the basis of information on more than 6,000 hedge funds in and outside the USA.

Source: Van Hedge Fund Advisors International (2005).

- In the last 10 years, the assets managed have increased by more than 25 per cent per year on average.
- In the Nordic countries (primarily Sweden) hedge funds have existed since 1996 and there are around 80 funds, managing total assets of more than kr. 50 billion.

During the last 10 years, the managed capital of the hedge fund sector has only decreased in a few quarters, e.g. after the crisis relating to Long-Term Capital Management¹ at the end of 1998. Growth continued unabated in 2003 and into 2004, although the yields reported in this period were relatively modest, cf. Table 1.

There are a number of possible explanations for the strong growth in the number of hedge funds and the assets managed.

One major reason is presumably the added value to portfolios that placements in hedge funds have been able to contribute. In a long-term perspective, portfolios with hedge funds have often performed better than more traditional portfolios². Hedge funds may have a relatively low covariation with the market in general and may therefore be used effectively for diversification of portfolio risks. Finally, targets for absolute yields and good opportunities to short-sell in the market may provide better protection of the capital in declining markets.

¹ The hedge fund Long-Term Capital Management (LTCM) experienced difficulties in the autumn of 1998. The potential negative effects on the financial markets of forced liquidation caused the Federal Reserve to actively call for a solution, after which LTCM was taken over by other private financial enterprises.

² It is often problematic to apply traditional risk measures directly to investments in hedge funds, so that comparisons with traditional investments in e.g. shares and bonds should be interpreted with caution. One reason is that yield profiles for hedge funds may follow other distributions than those traditionally used for calculation of risk-adjusted yields. Another problem is that the data available about the yields of hedge funds could be biased. Funds with very high yields may have an incentive to "keep a low profile" if the investors want discretion. Funds with very low yields have an incentive not to report if they are concerned about potential new investors. Moreover, data from hedge funds that close due to unsuccessful investments is not included. Finally, some hedge funds differ from more traditional investments in that the manager need not manage the capital in periods when there are not deemed to be sufficiently attractive placement options within the strategy chosen by the hedge fund in question. In such cases the contributions are simply returned to the investors until the manager again sees investment opportunities.

| | Typical hedge fund | Typical investment association |
|--|---|---|
| Target | Absolute yield (positive yield irrespective of market development). | Relative yield (in relation to a benchmark). |
| Choice of investment strategies and instruments | Extensive freedom. Use of derivatives, gearing and short-selling. | Limited freedom. Limited opportunities to use derivatives, gearing and short-selling. |
| Liquidity | Restrictions on deposits and withdrawals, e.g. only once a month or quarter. | Investment certificates can be bought and sold on an ongoing basis. |
| Managers | May be non-registered or registered and subject to supervision. Often based in international financial centres such as New York and London. | Registered and subject to supervision. |
| Regulation | Typically legally domiciled in offshore financial centres with limited regulation and supervision. No or few reporting and transparency requirements. | Legally domiciled in ordinary national jurisdictions. Regulated and under supervision. Reporting and transparency requirements. |
| Incentive structure | Manager fee: typically 1-2 per cent of assets plus 15-25 per cent of performance above certain threshold values. The manager is a co-investor. | Manager fee: fixed fee, e.g. fixed percentage of assets. The manager is the investors' agent, but not a co-investor. |
| Marketing | Restrictions on marketing to the general public. | Opportunities for broad marketing to the general public. |

Source: ECB (2004), Plesner (2004), Investment Associations, Special-Purpose Associations and Other Collective Investment Schemes Act, Directive 2001/108/EC of the European Parliament and of the Council, SEC Staff Report (2003).

Another explanation for the growth in hedge funds is presumably that the number of "high net worth individuals"¹ has increased. This group

¹ According to Merrill Lynch/Cap Gemini Ernst & Young World Wealth Report 2004, high net worth individuals (defined as individuals with financial assets exceeding USD 1 million) at end-2003 had total assets of around USD 28,800 billion, and this is expected to continue to rise by around 7 per cent up to 2008.

EXAMPLES OF DIFFERENT INVESTMENT STRATEGIES APPLIED BY HEDGE FUNDS

Box 2

1. Market trend strategies

These strategies utilise broad market fluctuations/trends. This can be in shares, interest rates, currencies or goods. Examples:

- Macro: taking positions on the basis of analyses of macroeconomic developments, e.g. in exchange rates.
- Long/short: utilising assumed imbalances in relative prices within the same class of assets. For instance, a hedge fund might buy a corporate bond that it believes to be priced too low and short-sell a corporate bond that it believes to be priced too high. The overall position may be neutral in relation to the market, so that the yield does not depend on changes in the level of interest rates, but only on changes in the relative prices of the two bonds selected. The classic hedge fund is an equity long/short fund, i.e. with short and long positions in shares within the same category, e.g. the same industry. This is still the type of strategy applied by most hedge funds, possibly around half of all hedge funds. They are not always market neutral and may rapidly shift from being net long to being net short.

2. Event-driven strategies

These strategies utilise price fluctuations in connection with liquidations, mergers and acquisitions. Examples:

- Distressed securities: long- or short-selling on unusual price formation in connection with liquidations and company restructuring.
- Risk/merger arbitrage: long-selling in an enterprise that will be acquired/taken over, combined with short-selling in the purchasing enterprise.

3. Arbitrage strategies

These strategies utilise price differences between closely related assets. Arbitrage strategies are deemed to be the strategies entailing the least risk and to have the most frequent positive impact on market efficiency and liquidity. Examples:

- Convertible arbitrage: arbitrage on the basis of differences between the prices of an enterprise's preferred capital (convertible bonds, preferred stock, warrants, etc.) and the prices of the same enterprise's normal shares.
 - Fixed income arbitrage: utilising the small yield differences that may exist between almost identical bonds. For instance, a new government bond that has just become an on-the-run issue may have a slightly higher yield than an existing government bond with a large outstanding volume and virtually the same term to maturity.
 - Statistical arbitrage: arbitrage on the basis of assumptions that prices will converge to a historical norm that the fund's own model is expected to be better at predicting than the market.
-

Note: There is no unequivocal or generally accepted way of grouping hedge funds by investment strategy. Various analysis units and databases operate only partly with the same groupings. The above grouping is mainly inspired by the SEC Staff Report (2003).

has traditionally accounted for a large proportion of the investments in hedge funds.

A third reason may be the low nominal level of interest rates and the development in the share markets. This may have led e.g. pension funds,

which are bound by commitments to their policyholders on the liabilities side, to seek higher risk-weighted yields in alternative placements.

HEDGE FUNDS AND FINANCIAL STABILITY

The growing importance of hedge funds in the international financial markets has given rise to discussion, particularly within the last year, of the significance of hedge funds to financial stability. This discussion can be complex at times. Firstly, it can be difficult to conduct analyses covering the entire population of hedge funds. The reason is the many different types of hedge funds and that the various hedge funds vary greatly in terms of both risk profiles and strategies. Secondly, most types of hedge funds could potentially have both a stabilising and a destabilising impact on the capital markets. Thirdly, hedge funds are typically neither subject to reporting nor transparency requirements imposed by the authorities. The data available about transactions, positions and yields therefore mainly comprises voluntary disclosure by parts of the hedge fund sector.

Hedge funds' contribution to well-functioning markets and spread of risks

By taking positions actively and trading frequently, hedge funds can contribute to liquidity in capital markets. In addition, the strategies, and thereby the analysis methods, of some hedge funds are aimed at utilising even small price imbalances in the market via arbitrage. This can contribute to reducing market imperfections and improving price formation.

Yields on investments in hedge funds have proved to be significantly less correlated with yields in the share and bond markets than e.g. yields in the share and bond markets with each other. The possibility of placements in different types of hedge funds can therefore increase investors' opportunities to diversify their portfolios. This has become increasingly valuable in step with the global financial integration, whereby the covariation between many other asset classes has increased, and the opportunities for effective diversification have therefore been curtailed.

It has also been pointed out that hedge funds can contribute to reducing market volatility. Their absolute yield targets could make them less inclined to buy in rising markets and sell in falling markets (i.e. momentum trading)¹. Moreover, assets in hedge funds are often tied for rela-

¹ An example of a stabilising effect: when an index rises, index trackers, i.e. investors that benchmark themselves in relation to the index, are increasingly exposed in the index, and particularly in the securities that rise the most. Hedge funds aiming to achieve absolute yields (i.e. not relative yields) will leave the index as it rises (basically, they do not want to change their exposure in the index). The opposite is the case when the index falls.

PRIME BROKERAGE

Box 3

Prime brokers are the investment banks that service hedge funds in connection with their activities in capital markets. Hedge funds may work with several prime brokers at the same time. Prime brokers may e.g. offer one or more of the following services:

- Trading transactions.
- Clearing and settlement. A prime broker can handle clearing and settlement of transactions by the prime broker itself on behalf of a hedge fund, as well as transactions by other securities dealers used by the hedge fund in question.
- Securities lending.
- Margin lending.
- Intermediation, i.e. the prime brokers arrange contact between the hedge fund managers and potential investors.
- Start-up assistance for hedge funds. Prime brokers can assist new managers in relation to e.g. office premises, technical infrastructure, risk management systems, reporting systems, sales material and contacts with competent legal advisors and accountants.
- Reporting. This could be ongoing reporting for the manager's supervision of the portfolio of the hedge fund, or generation of the information passed on to investors by the manager.
- Analyses. Prime brokers can give managers access to their own analyses of markets and/or individual securities performed in connection with their own position-taking and client advisory services.

Source: SEC Staff Report (2003), Bank of England (2004:1) and (2004:2).

tively long periods and can only be withdrawn on e.g. a monthly or quarterly basis.

Finally, it has been pointed out that hedge funds have also contributed to greater risk diversification via the development of better risk-management tools and by providing liquidity for new and specialised markets.

Risks in relation to prime brokerage

Prime brokers are the investment banks that service hedge funds in connection with their activities in the capital markets. Some of the typical prime broker services are described in Box 3. A prime broker may be exposed to hedge funds both in terms of income from the services provided and in terms of the positions taken by the prime broker as counterparty to hedge funds.

Due to the growing importance of the hedge fund sector, prime brokerage has become a substantial business area for several of the large international investment banks. The competition for this market has intensified, which could lead to a change in the revenue basis of particu-

larly the banks that have dominated the market so far¹. The increased competition may also entail that hedge funds will be able to negotiate more favourable credit terms, which could contribute to exposing prime brokers further.

The investment banks' professional management of counterparty risks vis-à-vis hedge funds, including the use of improved risk management tools, is the best possible protection against financial instability as a consequence of hedge funds. The investment banks must be assumed to be the most competent players in the market when it comes to comprehending the sometimes complex investment strategies of hedge funds and the associated risks. However, a given hedge fund may use several prime brokers, in which case the individual prime broker does not necessarily have access to full details of the overall positions of the hedge fund.

Risks in relation to the markets and hedge funds' gearing

There are indications that some of the large banks are now willing to increase their risks and to some extent adopt strategies resembling those of hedge funds for some parts of their own portfolios. This could amplify negative development tendencies in the markets, particularly if a large number of hedge funds and investment banks have similar positions that they want to close at the same time². Whether such risks will materialise depends on e.g. the extent to which the various market players have similar positions, how highly the various hedge funds are geared and the hedge fund investors' opportunities to withdraw their investments. In practice the lack of statistical data on hedge funds, among other things, makes it very difficult to draw any conclusions in this respect.

Risks in relation to investors: private individuals and pension funds

High net worth individuals account for a large proportion of the placements in hedge funds. In recent years, however, pension companies – and to a lesser extent insurance companies – have placed an increasing share of their assets in hedge funds. The explanations are the opportunity to diversify portfolios by means of hedge funds and a tendency to seek higher yields via alternative placements, known as "hunt for yield". Compared to the total assets of the pension companies, placements in hedge funds are still small, however.

¹ It is estimated that for some prime brokers income from prime brokerage makes up 25-40 per cent of the total revenue from trading and fees. Source: ECB (2004).

² This was the case when Long-Term Capital Management experienced difficulties, cf. an earlier footnote.

The increasing interest in hedge funds on the part of pension companies may have both positive and negative effects on financial stability. On the one hand, market-based "self-regulation" may be strengthened since pension companies to a greater extent than e.g. high net worth individuals must be assumed to have the resources to understand the strategies of the various hedge funds and to manage their own counterparty risks. In the longer term, pension companies may also contribute to greater transparency in the hedge fund sector since they are large individual investors and therefore carry more weight vis-à-vis hedge funds and are therefore in a position to request more detailed information. On the other hand, the increasing interest in hedge funds on the part of pension companies can lead to an increase in the number of large hedge funds if pension companies wish to make large single placements in order to reduce the administrative costs of monitoring and risk management in relation to the individual hedge funds¹.

The relatively high costs of assessing the risks and monitoring the often complex investment strategies of hedge funds may also limit the size of the total placements that pension companies and other institutional investors will make in hedge funds.

The emergence of "funds-of-funds", i.e. hedge funds investing in other hedge funds, may have helped to increase the placements of e.g. pension companies in hedge funds. Depending on the specific investments made in each fund-of-fund, such funds can be used to spread the risks on investments in hedge funds. It should, however, be taken into account that on top of the considerable fees payable to hedge funds, cf. Box 1, fees must also be paid to managers of funds-of-funds.

Supervision

The growth in the hedge fund sector means that an increasing proportion of the total assets is managed by units that are subject to neither reporting obligations nor supervision². This makes it more difficult for supervisory authorities and central banks to monitor the market and to see whether there are any indications of emerging instability. The incomplete statistical data concerning the hedge fund sector may also inhibit the markets' ability to regulate themselves.

A possible future path to more systematic collection of data on hedge funds might be reporting from prime brokers.

¹ This also depends on whether the markets offer sufficient business opportunities for large hedge funds.

² ... or are subject to supervision in offshore financial centres.

Various assessments of hedge funds and financial stability

In the USA, where most of the existing hedge funds operate, there has been intense discussion of the potential effects of the funds on the market. After the difficulties involving LTCM in 1998, the "President's Working Group" was set up, comprising *inter alia* Alan Greenspan, Chairman of the Federal Reserve Board, and William H. Donaldson, Chairman of the U.S. Securities and Exchange Commission (SEC).¹ While Mr Greenspan has repeatedly emphasised the positive effects of the hedge funds on the market in terms of increased liquidity and market efficiency and has spoken against increased regulation of hedge funds, Mr Donaldson has been more concerned, particularly because the authorities have little opportunity to monitor the hedge funds. In October 2004, the SEC adopted a new set of rules entailing that from 2006 hedge fund managers (not the hedge funds) must register with the SEC and report the number of hedge funds and the size of the capital assets managed.

Hedge fund managers operating outside the USA are primarily concentrated in London. The Bank of England regularly discusses the issue of hedge funds and financial stability. Its latest statements seem to call for some degree of caution. For instance, the Bank of England questions whether the yield expectations of hedge fund investors are moderated as the markets become more efficient, *inter alia* as a result of the increasing activity of the hedge fund sector², making it more difficult to profit from the utilisation of market imperfections.

In its *Financial Stability Review* from December 2004 the ECB also discusses the issue of hedge funds without drawing any final conclusions. The positive impact of hedge funds on the markets is emphasised, as well as the development of more sophisticated risk-management systems. Moreover, the ECB points out that even though the overall hedge fund sector has been expanding significantly, the concentration on a few large funds has been reduced in relation to e.g. the situation at the time of the LTCM affair in 1998, and it looks as though today the gearing of hedge funds is lower.

HEDGE FUNDS IN DENMARK

Until now the establishment of actual hedge funds has not been permitted under Danish legislation. Among other things, the taxation aspects have been unclear. Since 1 January 2004 it has been possible to establish "other collective investment schemes". Unlike investment asso-

¹ The other two members were John Snow (Secretary of the Treasury) and James Newsome (Chairman of the Commodity Futures Trading Commission)

² Bank of England (2004:2).

ciations, these do not have limitations to their gearing and short-selling options. "Other collective investment schemes" must be registered with the Danish Financial Supervisory Authority, but the latter must neither license nor approve the schemes. Various constructions have been set up that have been referred to as hedge funds in the press, but in fact these have so far only been products wrapped in more or less complex bond structures and/or products reserved for pension savings for which the tax system is simpler.

Several elements of the Danish financial sector have expressed a wish to be able to establish regulated, supervised hedge funds under clearer and more internationally competitive tax conditions.

Bill on hedge associations

On 15 December 2004 the Danish government presented a bill to provide a legal and supervisory basis for hedge associations in Denmark. According to the bill, hedge associations will be the Danish equivalent of hedge funds and will be set up as associations according to the Danish model. The bill primarily relates to amendments to the Investment Associations, Special-Purpose Associations and Other Collective Investment Schemes Act, but also to the Financial Business Act and various tax acts. At the time of presentation of the bill it was expected that the new act would enter into force on 1 July 2005.

The bill does not envisage legal restrictions to the hedge associations' choice of investment policy and risk profile. It is up to the board of each individual association to determine its risk framework. As with hedge funds abroad, they will have unlimited opportunities for gearing and short-selling. Consumer protection will mainly consist in investors and the general public being able to familiarise themselves with the investment policy and risk profile of the association via its statutes and prospectus. If the board of a hedge association decides to adjust its risk framework, investors must be notified within five working days.

The bill does not include a definition of a hedge association. Hedge associations receiving funds from a broad group of investors or from the general public must be approved by the Financial Supervisory Authority. Other hedge associations may voluntarily seek approval by the Financial Supervisory Authority. Approved associations will have an exclusive right – and an obligation – to use the term "hedge association" in their names.

The Financial Supervisory Authority will supervise the approved associations. The funds of a hedge association must be managed and held by a custodian company, approved by the Financial Supervisory Authority, that must be a bank domiciled in Denmark, or a Danish branch of a for-

oreign credit institution domiciled in the EU¹. The custodian company must ensure that the association complies with its own risk framework. If it is exceeded, this must be reported immediately to the Financial Supervisory Authority.

The bill enables the Financial Supervisory Authority to lay down more detailed rules on hedge associations' publication of information, and rules on hedge associations' compilation of risks. These rules are not yet known.

The importance of hedge associations to financial stability in Denmark

In a narrow Danish perspective, there are no indications that the future hedge associations will entail a risk to financial stability. The size of the capital to be managed by Danish hedge associations is expected to be modest in relation to the overall Danish capital market. Likewise, the significance of prime brokerage will be limited. Investors are already able to gear and short-sell on an individual basis. Hedge associations will make it possible to do so via associations.

From a Danish perspective, any risk from international hedge funds would stem from rub-off effects from the international capital markets, where international hedge funds might amplify potential future crises. Such effects on the Danish financial market would, *inter alia*, depend on the volume of Danish assets held by international hedge funds. The existence of Danish hedge associations is not considered likely to reinforce any consequences for financial stability in Denmark.

¹ Or in a country with which the EU has concluded an agreement in the financial area.

LITERATURE

Bank of England, *Financial Stability Review*, December 2004.

Bank of England, *Financial Stability Review*, June 2004.

Donaldson, William H., The Long and Short of Hedge Funds: Effects on Strategies for Managing Market Risk, Before the Financial Services Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises, United States House of Representatives, May 2003.

ECB, *Financial Stability Review*, December 2004.

Eidolf, Erik: Hedge funds – a question of confidence (in Danish), Danish Shareholders Association, *Aktiehåndbog* 2004.

Directive 2001/108/EC of the European Parliament and of the Council (the UCITS Directive).

Financial Stability Forum, Report of the Working Group on Highly Leveraged Institutions, April 2000.

Bill to amend the Investment Associations, Special-Purpose Associations and Other Collective Investment Schemes Act, the Financial Business Act, the Securities Trading, etc. Act, the Act on ATP (the Labour Market Supplementary Pension Fund) and the Act on LD (the Employees' Capital Pension Fund) (Hedge Associations) and the explanatory notes to the Bill. Presented to the Folketing (Parliament) on 15 December 2004 by the Minister of Economic and Business Affairs.

International Monetary Fund, *Global Financial Stability Report*, September 2004.

Investment Associations, Special-Purpose Associations and Other Collective Investment Schemes Act.

Plesner, Søren, Hedge funds (in Danish), *FinansInvest*, June 2003.

Plesner, Søren 2004, Hedge funds versus investment associations (in Danish), *Aktionæren*, June 2004.

President's Working Group, Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management, Report of the President's Working Group on Financial Markets, April 1999.

Securities and Exchange Commission Staff, Implications of the Growth of Hedge Funds, Staff Report to the United States Securities and Exchange Commission, September 2003.

Van Hedge Fund Advisors International, van Hedge Fund Indices, Global, U:S: and Offshore, December 2004, Press Release of 14 January 2005. www.hedgefund.com/news/press/press.htm.

Vaughan, David, Selected Definitions of "Hedge Fund", Comments for the U.S. Securities and Exchange Commission, Roundtable on Hedge Funds, May 14-15, 2003.

Proposal for a Directive on New Capital-Adequacy Rules (Basel II)

Lisbeth Borup and Dorte Kurek, Financial Markets

INTRODUCTION

On 7 December 2004 the Economic and Financial Affairs Council reached political agreement on the European Commission's proposal for a directive on new capital-adequacy rules for credit institutions and investment firms¹. The proposed directive is in step with the Basel Committee's revised recommendations for the capital requirements² imposed on credit institutions by supervisory authorities, better known as Basel II. The recommendations now comprise more than 200 pages, while Basel I was 28 pages. The proposed directive will be read in the European Parliament in 2005 and is expected to be finally adopted by the Council and the European Parliament in the 2nd half of 2005.

The directive is expected to enter into force in member states at end-2006, but credit institutions will be able to apply the existing capital-adequacy rules until end-2007. However, credit institutions applying the most advanced methods for calculation of their minimum capital requirements may not apply the new rules until 2008. In Denmark, the directive will be implemented via an amendment to the Financial Business Act.

The directive sets minimum requirements, i.e. more stringent national requirements may be introduced if this is deemed appropriate in certain areas.

Since 1999 the European Commission has worked in parallel with the Basel Committee to update the capital-adequacy rules. Several consult-

¹ Re-casting Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions and Council Directive 93/6/EEC of 15 March 1993 on the capital adequacy of investment firms and credit institutions, COM(2004), 486 final. The proposed directive can be found on the home page of the European Commission, europa.eu.int.

² Basel Committee, *International Convergence of Capital Measurement and Capital standards: a Revised Framework*. The document can be downloaded from www.bis.org. The content is elaborated on in Lisbeth Borup and Morten Lykke, *New Capital-Adequacy Rules for Credit Institutions*, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2003. The Basel Committee, whose secretariat is at the Bank for International Settlements, BIS, was set up in 1975 with the purpose of strengthening the stability of the international financial system. The following countries are represented on the Committee: Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, Netherlands, Spain, Sweden, Switzerland, UK and USA.

ations have been held and data has been compiled for calculation of the consequences. The Danish Financial Supervisory Authority, the Ministry of Economic and Business Affairs, Danmarks Nationalbank and professional organisations representing Danish banks, mortgage-credit institutes and investment firms have discussed and assessed the consultative papers on an ongoing basis and submitted joint consultation responses.

With the new capital-adequacy rules, the existing uniform capital-adequacy rules are replaced by more institution-specific rules, whereby the capital requirement to a greater extent reflects the risks incurred by each individual institution. The Basel Committee has laid down an overall objective of an unchanged global capital level on introduction of the new rules. Furthermore, credit institutions are encouraged to optimise risk management, e.g. by utilising the new option to apply their internal risk models to calculating the minimum capital requirement. Overall, these methods may lower the capital requirements for the individual credit institution.

This article describes the general content of the proposed directive and the future work. A simple estimate points to relaxation of the capital requirements for Danish banks as a result of the new rules.

CONTENTS OF THE PROPOSED DIRECTIVE

Like the recommendations of the Basel Committee, the proposed EU directive is based on three pillars. Pillar 1 is the minimum capital requirement to cover credit and market risk and, as a new element, operational risk. Under Pillar 2, the credit institutions must assess their own need for capital, and the supervisory review process is strengthened. This means that the supervisory authorities must supervise that the credit institutions' capital base is sufficient to support their risks and encourage the credit institutions to optimise internal risk management and control. Pillar 3 lays down a number of requirements for credit institutions as regards disclosure of more detailed information on risks, capital structure and capital adequacy, risk management, etc. with the purpose of increasing transparency and strengthening market discipline. The pillars are interdependent and complement each other with a view to ensuring that the calculated capital requirement reflects the risks incurred by the credit institutions.

Pillar 1

The minimum capital requirement in Pillar 1 is calculated as the sum of the minimum capital requirements for operational risk, market risk and credit risk. As under the existing rules, the total minimum capital

requirement constitutes 8 per cent of the risk-weighted items and should as a general rule also be met at institutional level.

Operational risk comprises a broad range of risks, including IT failure, legal risk, human errors, fraud, etc. The credit institutions have a choice of three calculation methods, including use of a sophisticated internal model. Most Danish institutions are expected to apply the simplest approach, the basic indicator approach, where the capital requirement for operational risk is stated as 15 per cent of an income indicator.

Compared to the existing capital-adequacy rules (Basel I), only few changes are made to the market-risk provisions.

The credit-risk provisions, on the other hand, have been extended considerably. The credit institutions will have a choice of three approaches to calculating the capital requirement for credit risk with varying degrees of complexity, i.e. two internal ratings-based approaches utilising the credit institutions' own knowledge of its credit risk, and one standardised approach.

The three approaches to calculation of credit risk are based on the concept that the capital requirement is linked to different rating classes for the exposures. The rating classes may be externally defined, as is the case when applying the standardised approach, or defined by the credit institutions themselves in a more or less sophisticated manner. Credit institutions applying the internal ratings-based approaches must thus link the exposures in their lending portfolios to different rating classes on the basis of their internal assessments of credit risk. On the basis of the risk classes, the risk weight and subsequently the capital requirement for an exposure can be determined.

It is expected that most small and medium-sized Danish banks will opt for the standardised approach, which is the simplest and is based on the calculation method under Basel I, but with more rating classes with fixed weights for exposures. Exposures with lower risk entail lower capital requirements. As a new element, external ratings by credit-rating agencies may be applied, but in Denmark – as in a number of other EU member states – there is no tradition for external ratings for business enterprises. Under Basel II enterprises with no rating will have a risk weight of 100 per cent, as is the case today. For lending to private individuals and to certain small and medium-sized enterprises, the risk weights and thus the capital requirements have been reduced compared to the existing rules.

With the permission of the supervisory authorities, credit institutions may apply their internal credit-risk models to calculating the minimum capital requirement for credit risk under the internal ratings-based approaches (IRB). There are two IRBs: a foundation approach and an

advanced approach. The latter provides greater scope for applying own estimates. It is expected that 5-10 large Danish credit institutions will apply the internal ratings-based approaches to calculation of credit risk when the new capital-adequacy rules come into force.

Internal credit-risk models are primarily used by large, international banks today, and experience with such models is still limited. The credit-risk models are inspired by the models for calculation of market risk, but an inherent problem is that the banks have only few observations of default – particularly for lending with low credit risk – compared to the extensive volume of market data. Against this background, the Basel Committee has prepared a relatively simple model based on conservative assumptions.

To calculate the capital requirement for institutions on the basis of the IRB approaches, three basic parameters should be applied: the probability of default on a loan in the coming year (PD), the loss given default (LGD) and the expected exposure value at the time of default (EV). When multiplied ($PD \times LGD \times EV$), these parameters give the expected loss on the loan. For credit institutions applying the advanced IRB approach, all parameters must be estimated by the credit institutions themselves, while only PD must be estimated by those applying the foundation IRB approach. Risk weights are calculated by inserting PD and LGD into the formulas prepared by the Basel Committee¹. In this way a continuous relation is achieved between PD and risk weights, unlike in the standardised approach, cf. Chart 1. The minimum capital requirement can then be calculated as 8 per cent of the risk weight multiplied by EV ($0.08 \times \text{risk weight} \times \text{EV}$).

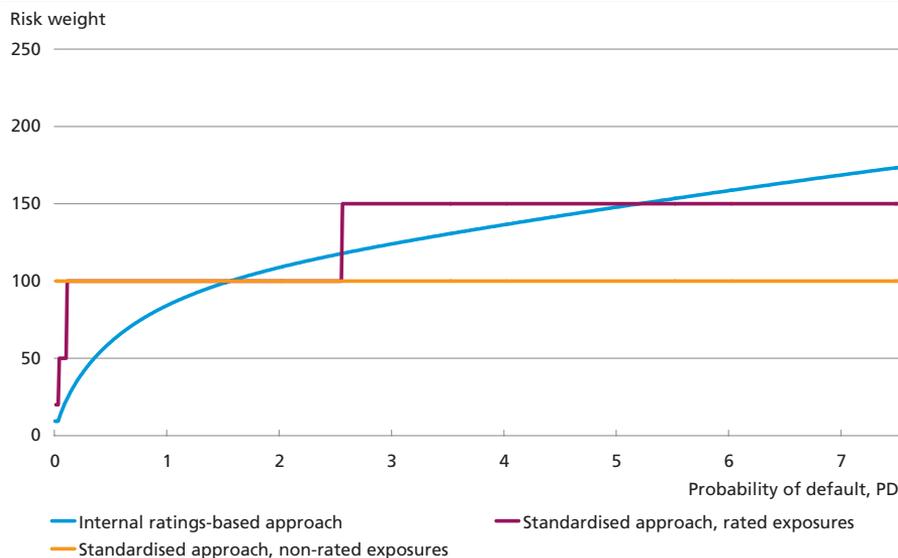
The proposed directive is very broad in terms of requirements for the IRB approaches. The reason is that the use of credit models is a new area without any established best practice. Several parties have expressed concerns as to whether the credit institutions' design of the rating system may have an impact on the stability and sensitivity to the economic cycle of the minimum capital requirement in terms of rating classes, definition of default, time horizon, etc.

As regards the time horizon, a point-in-time system, where a borrower's ability to service its debt is assessed in relation to the immediate future, will be more sensitive to the economic cycle than a through-the-cycle system, where a whole economic cycle is taken into account. The latter is more ambitious and requires extensive volumes of data, covering an entire economic cycle as a minimum. The proposed directive

¹ For lending to central governments, credit institutions and enterprises, adjustments must also be made for maturity.

RISK WEIGHTS FOR EXPOSURES TO CORPORATES USING THE INTERNAL RATINGS-BASED APPROACH AND THE STANDARDISED APPROACH

Chart 1



Note: The risk weights for the internal ratings-based approach are stated for ordinary exposures to corporates with LGD of 45 per cent. The risk weights for the standardised approach are for ordinary exposures to corporates. For rated exposures under the standardised approach, risk weights are linked to Moody's probabilities of default on a best-effort basis and must therefore be interpreted with caution.

Source: Re-casting Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions, COM(2004), 486 final, Basel Committee, International Convergence of Capital Measurement and Capital Standards, 2004, Michael K. Ong (editor), The Basel Handbook, 2004 and Kristian Sparre Andersen and Anders Matzen, The Use of Ratings in the European Capital Markets, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 1998.

includes several provisions aimed at ensuring a stable capital requirement, including the following:

- credit institutions applying the IRB approaches must stress test their internal rating system in a mild recession scenario in order to assess the need for an extra capital buffer compared to the minimum capital requirement.
- credit institutions applying the advanced IRB approach must use an LGD estimate that, as a minimum, reflects conditions during an economic downturn.
- the European Commission must, in cooperation with the member states and with assistance from the ECB, monitor whether the new capital-adequacy rules affect the economy significantly.

The minimum capital requirement is intended to cover unexpected losses, while expected losses on loans and guarantees are to be covered by write-downs and provisions. If the expected losses deviate from the credit institution's actual write-downs and provisions, the difference must be adjusted for in the capital base. This affects the solvency ratio.

Pillar 2

The board and management of the individual credit institution is responsible for ensuring that the credit institution has adequate capital in relation to its risks. Under Pillar 2, the credit institution shall have a process for an ongoing and forward-looking assessment of its capital need. It is the task of supervisory authorities to ensure that the strategies, procedures, routines, etc. of the credit institutions are in accordance with the provisions of the directive, and to assess the risks of the credit institution. Furthermore, the supervisory authorities must assess whether the credit institution's capital base and strategies, procedures, routines, etc. are adequate in relation to its risks. The supervisory authorities' assessment of the credit institution's capital need must take place in dialogue with the credit institutions and on the basis of the credit institutions' own assessments.

The proposed directive gives the supervisory authorities a number of tools that can be applied vis-à-vis credit institutions that are not in compliance with the directive's provisions. For instance, the supervisory authorities may impose requirements concerning arrangements and strategies, limitation of business or reduction of risks inherent in specific activities, products or systems, or require a specific provisioning policy and require credit institutions to hold capital in excess of the minimum capital requirement.

The proposed directive envisages that each credit institution assesses its need for capital on a consolidated basis for the group within each country. More stringent national requirements may be determined so that the assessment of capital need and any additional capital requirements must take place at institutional level.

The proposed directive is very brief as regards the elements to be included in the credit institutions' ongoing assessment of their need for capital and the supervisory authorities' evaluation thereof. Compared with Pillar 1, there is a relatively large scope for interpretation in relation to the capital required to cover specific risks. Under the proposed directive, supervisory authorities should not only consider risks covered by Pillar 1, but also risks not covered, or only partly covered, by the calculation under Pillar 1 when assessing credit institutions' capital need. This will include e.g. liquidity and concentration risk, interest-rate risk on the banking book and handling of collateral. For credit institutions applying the IRB approaches, the stress tests used must be assessed.

In the Anglo-Saxon countries it has been customary for supervisory authorities to impose additional capital requirements on credit institutions. In Denmark, the credit institutions shall calculate their own capital need as from 1 January 2005. This is inspired by Pillar 2 of Basel II. The

explanatory notes to the Act state that the board and management of the credit institution must assess the control environment and capital need. As a minimum, the business profile, risk concentration, growth in lending, growth expectations, funding opportunities, dividend policy, control environment and sensitivity to the economic cycle must be taken into account. In addition, the effect of the transition to the new IAS-compatible accounting rules as of 1 January 2005 must be considered. Among other things, these rules entail lower provisions and write-downs and thus higher equity capital, even though the risk profile of the credit institution remains unchanged.

If the Danish Financial Supervisory Authority deems the board and management's assessment of the capital need to be insufficient, it may require the credit institution to raise it. The credit institution is not obliged to publish its assessment of the capital need. When the full set of Basel II rules is implemented, the assessment should be published.

Pillar 3

To supplement the first two pillars, Pillar 3 lays down a number of requirements of credit institutions with regard to disclosure of more detailed information on risks, capital structure and capital adequacy, risk management, etc. with the purpose of increasing transparency and tightening market discipline.

Particularly for credit institutions applying the advanced approaches, the reporting requirements in relation to risks are expanded. Under the proposed directive, the disclosure requirements must as a minimum be met on a consolidated pan-EU basis, and on an annual basis. A credit institution may omit to meet certain disclosure requirements if the information is not deemed to be significant, or if disclosure conflicts with confidentiality obligations.

Compared to the existing Danish rules, the reporting requirements are extended, in terms of both quantitative statements and detailed policy descriptions – particularly as regards credit risk. Among other things, the quantitative requirements entail that the minimum capital requirement must be calculated for the three risk types: credit, market and operational risk. For credit risk, the exposures must be broken down by rating class, geography and sector. Credit institutions applying the IRB approaches must also report e.g. exposure-weighted LGDs and risk weights for rating classes within the individual exposure classes. Qualitative requirements e.g. include descriptions of the credit institution's risk-management process and strategy for each risk type, the scope and nature of risk reporting, consolidation methods, and approach to its own assessment of the need for capital. Credit institutions applying the

IRB approaches must also prepare detailed descriptions of the rating system, control mechanisms, etc. Under operational risk, credit institutions opting for the advanced approach must include a description of the model applied.

CONSEQUENCES FOR DANISH BANKS

The introduction of Basel II can be expected to reduce the capital requirements for Danish credit institutions. In an analysis of the macro-economic consequences of the transition to the new capital-adequacy rules by PriceWaterhouseCoopers (the PWC report), the total decrease in the capital requirements for Denmark is thus expected to be considerable¹. For the EU taken as one, the PWC report shows that particularly credit institutions applying the IRB approaches will see extensive capital relaxations, which is as expected. Credit institutions applying the standardised method will see unchanged or slightly rising capital requirements, e.g. because the new capital requirement for operational risk more than offsets the decrease in the capital requirement for credit risk.

For Danish banks applying the standardised approach it cannot be ruled out, however, that the capital requirement will be reduced in most cases, cf. the estimate in Box 1. The reason is that the Danish banks have a particularly high volume of lending to private individuals and to small and medium-sized enterprises. For such loans, the new capital-adequacy rules will reduce the capital requirement. The estimate is based on simple assumptions and should therefore be interpreted with caution.

The proposed directive includes transitional provisions for credit institutions applying the advanced approaches to ensure that the capital requirement does not fall unintentionally in the first years after the introduction of the new rules. Among other things, the provisions impose a limit on the decrease in the capital requirement in relation to the existing capital-adequacy rules in the first years after implementation.

In Denmark it may also be relevant to introduce a transitional scheme for credit institutions applying the standardised approach, since their capital requirements are also expected to fall. When Basel I was introduced in Denmark in 1991, a transitional 5-year reduction of the capital requirement was applied. Denmark was one of the countries that had more stringent capital-adequacy rules prior to the introduction of the Basel recommendations.

¹ The report can be found on the home page of the European Commission, http://europa.eu.int/comm/internal_market/regcapital/docs/studies/2004-04-basel-impact-study_en.pdf

ESTIMATES FOR BANKS APPLYING THE STANDARDISED APPROACH

Box 1

For Danish banks applying the standardised approach, the capital relaxation arises from downward adjustments of the risk weights on retail exposures (from 100 to 75 per cent) and small and medium-sized enterprises (SMEs) (from 100 to 75 per cent), as well as exposures secured by residential real estate (from 50 to 35 per cent). The new capital requirement for operational risk will only partly offset the lower capital requirement for credit risk. The impact within the individual institution depends on the composition of the lending portfolio. The greater the volume of particularly retail and SME exposures, the greater the capital relaxation.

A lower risk weight for SME exposures is new compared with the existing capital-adequacy rules. Under Basel II, the credit institutions can apply this risk weight if the total exposure to the individual enterprise is lower than 1 million euro. In addition, the credit institution must have a sufficient number of SME exposures with the same characteristics so that the risk is spread within the portfolio and thus reduced.

For credit institutions in the Danish Financial Supervisory Authority's categories 2 and 3, respectively approximately 25 per cent and approximately 50 per cent of exposures to corporates is assumed to be below 1 million euro and thus to meet one of the criteria for inclusion at the low risk weight¹. An estimate of the effect of Basel II, where these loans are included at the lower SME risk weight, shows that the average minimum capital requirement calculated using the standardised approach under Pillar 1 is equivalent to 7.7 per cent for category 2 and 7.4 per cent for category 3, compared to the present 8-per-cent requirement, cf. the Table. The new capital requirement for operational risk thus does not fully offset the lower capital requirement for

EFFECT OF TRANSITION FROM BASEL I TO BASEL II, STANDARDISED APPROACH

| | Category 2 | | Category 3 | |
|--|------------|------|------------|------|
| | 25% | 0% | 50% | 0% |
| Ratio of exposures to corporates included as SME lending | | | | |
| Average change in capital requirement, percentage points | -0.3 | -0.1 | -0.6 | -0.1 |
| - of which relates to credit risk | -1.0 | -0.8 | -1.5 | -1.0 |
| - of which relates to exposures to corporates | -0.3 | 0.0 | -0.5 | 0.0 |
| - of which relates to exposures secured by residential real estate | -0.0 | 0.0 | -0.1 | -0.1 |
| - of which relates to other retail exposures | -0.7 | -0.7 | -0.9 | -0.9 |
| - of which new operational-risk requirement | 0.7 | 0.7 | 0.9 | 0.9 |
| Number of credit institutions with change in capital requirement of: | | | | |
| > 0 percentage point | 0 | 5 | 0 | 8 |
| < 0 percentage point | 15 | 10 | 29 | 21 |

Note: The change in the capital requirement is calculated as the change in the capital requirement as a percentage of the risk-weighted assets under the existing capital-adequacy rules. The change in the capital requirement is the sum of the minimum capital requirement for credit risk and operational risk under Pillar 1 less the applicable capital requirement to cover credit risk. Capital requirements for market risk are assumed to be unchanged in the calculation. Exposures to corporates is not assumed to be rated. Other assumptions are stated in the text. Due to rounding, the sum of the individual figures may vary slightly from the total amounts stated.

Source: Re-casting Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions, COM(2004), 486 final.

credit risk, and all institutions will see a fall in the capital requirement. In fact, no exposures to corporates can be weighted as SME lending if categories 2 and 3 are to have unchanged overall capital requirements under the new rules. It should be noted that the estimate takes neither the credit institution's assessment of its need for capital nor any additional capital requirement under Pillar 2 into account.

The calculation is based on 15 credit institutions in the Danish Financial Supervisory Authority's category 2 and 29 in category 3. It is assumed that all credit institutions apply the standardised approach for credit risk and the basic indicator approach for operational risk². Any collateral, etc. is not included in the calculation. No distinction is made between guarantee types, so all guarantees are weighted as lending. It is assumed that 10 per cent of retail exposures are secured by residential real estate.

For the Danish banking sector, which comprises many small and medium-sized banks, the 1-million-euro limit is high. In previous proposals for directives there was a requirement that the credit institution's total exposure to an individual enterprise must not exceed 0.2 per cent of the credit institution's total retail and SME exposures. The 0.2 per cent limit is very low by Danish standards, but for the individual credit institution it may be relevant to apply a similar approach when calculating capital adequacy under the new rules.

The calculation example points to a lower capital requirement for many Danish banks using the standardised approach on transition to Basel II. This is due to the portfolio composition.

¹ For the purpose of these calculations, the Danish Financial Supervisory Authority has made an amounts-based compilation of lending by categories 2 and 3 broken down by balance size.

² The minimum capital requirement for operational risk is calculated as 15 per cent of the average net interest and fee income, value adjustments and ordinary income for 2001-03.

FURTHER WORK ON THE PROPOSED DIRECTIVE

The adoption of the proposed directive by the Council and the European Parliament in 2005 will provide the framework for the new capital-adequacy rules. The more technical provisions, mainly found in the appendices to the proposed directive, may still be amended by the European Commission following consultation with the European Banking Committee, EBC, which is made up of representatives from the member states. This applies to e.g. the definition of capital base, due to amended accounting standards as a result of the IAS regulation that entered into force on 1 January 2005, changes in risk weights and formulas to calculate the minimum capital requirement, permitted set-off of collateral, etc., as well as disclosure requirements.

To ensure a well-functioning single market with uniform competition rules for credit institutions across national borders, it is important to ensure uniform implementation of the directive and to work towards convergence in its practical enforcement by the supervisory authorities. In the Committee of European Banking Supervisors, CEBS, supervisory

authorities and central banks are already preparing common guidelines, standards and recommendations. CEBS has recommended a number of specific limitations to the national discretions in the proposed directive and prepared draft principles for the credit institutions' assessment of their need for capital and the role of the supervisory authorities in this respect, a framework for comparable capital-adequacy information published by the supervisory authorities, and guidelines for the definition of capital base on presenting accounts in accordance with the International Accounting Standards, IAS. For further information, see the CEBS home page¹.

CEBS has also begun to specify the proposed directive's requirements of the credit institutions' internal models for calculation of the minimum capital requirement. This e.g. includes recommendations concerning stress tests, data, definition of default, short-term models versus full-cycle models, contents of the credit institutions' internal management processes, the supervisory authorities' approval process, and models for operational risk.

In addition, CEBS is looking into the distribution of responsibility between the national supervisory authorities with a view to approval of models for cross-border groups.

¹ www.c-ebs.org

Speech by Governor Bodil Nyboe Andersen at the Annual Meeting of the Danish Bankers Association on 1 December 2004

At all recent annual meetings of the Danish Bankers' Association the various speakers have commented on the Basel framework. This framework sets the international standards for the capital adequacy of the banking organisations.

In the 1970s the G-10 countries set up the Basel Committee, whose secretariat is at the Bank for International Settlements (BIS). Located in Basel, BIS is often called the central bank to central banks.

In the 1980s the Basel Committee started its work of formulating international standards for the capital adequacy of banking institutions. In 1988 this resulted in the Basel framework – now called the Basel I framework. This is still the basis for the requirements of the size and structure of the capital of banking organisations in more than 100 countries all over the world.

The strong expansion and increasing complexity of the financial markets and banking organisations since the Basel I framework was drawn up have made it necessary to formulate a more sophisticated framework. The Basel Committee therefore took on the drafting of new international standards, and the first proposal was put forward in 1999.

This work has proved to be more complex than expected. The Committee has on several occasions issued consultative papers inviting the financial world, authorities and other stakeholders to comment on the drafts put forward.

This process has been quite comprehensive, but also highly valuable, since it has given all countries and parties the opportunity to table suggestions and constructive criticism. In this way, a number of special circumstances could be taken into consideration.

The consultations have by no means made the process less protracted, nor have they simplified the proposal. Nonetheless, on 26 June 2004, the Basel Committee closed the file and reached a decision on the new international standards. The framework now fills more than 200 pages, while Basel I comprised 30 pages.

On the basis of these standards the European Commission has put forward a draft directive for a new capital adequacy framework. The directive is expected to be adopted in 2006, and to come into force in 2007-2008.

The new standards are of course considerably more complicated than the 1988 framework. A noteworthy departure from the current framework is that individual banks will be able to choose between two different principles for compiling the capital required to cover credit risks. Larger banks may base their capital requirement on an internal risk model, while others may opt for a simpler standard method closer to the current principles.

The purpose is to allow for the differences between small local banks and large international institutions that apply sophisticated risk management tools.

As always, the bank's board and management are responsible for capital adequacy, including a necessary buffer to ensure sound operations. Basel II sets out firmly and clearly the principle that the supervisory authorities must perform an overall evaluation of each individual bank's need for capital. The board and management's assessment of the need for capital must be discussed with the supervisory authority, which in the end may require the bank to hold more capital than the equivalent of the minimum requirement of 8 per cent.

Finally, the Basel II framework also includes standards for the disclosure of information relating to risk and capital adequacy.

The idea behind the disclosure requirement in the set of standards is that the soundness of banking institutions is evaluated not only by the supervisory authorities, but also by market participants. Monitoring by the authorities and the market in combination enhances the certainty that signs of weakness will be spotted in time, avoiding potential crises. Avoiding financial crises is, of course, the whole purpose of the exercise.

The banks play an exceptional, central role in society. This is the background to the extensive regulation of banking activities.

One sometimes hears the remark that regulation by the authorities is a special burden imposed on the banks. This leads to the argument for uniform international regulations, to ensure a level playing field. This is the purpose of the Basel framework.

Often the banks also point out that the authorities should remember that banks are business enterprises that need some scope for manoeuvre in order to be competitive.

One could pose the theoretical question of how the banks would behave in the absence of regulation by the authorities.

In our time, this question is so hypothetical that there is no clear answer. However, it is thought-provoking that back in the days when the banks were not subject to any regulation – before the first Danish banking act in 1919 – capital adequacy was generally far higher than today. Around the mid-19th century capital and reserves were approxi-

mately 40 per cent of the balance-sheet total, and by around 1900 a good 20 per cent. In the 1920s this had fallen to around 12 per cent. Today, the banks' net capital is an average of approximately 6 per cent of the balance-sheet total.

A comparison of this nature should naturally not be taken too literally, although it may lead to the realisation that regulation should not be perceived as a burden, but perhaps a valuable asset!

On 1 January 2005 the EU's new accounting regulation comes into force. It introduces the international accounting standards (IAS) and will also affect the banks' financial statements. The fact that – in the special EU version – it also poses some particular problems for mortgage-credit institutes should also be mentioned here.

With IAS, the previous Danish accounting principle for financial enterprises to state securities at market value will no longer apply in every case. Danmarks Nationalbank regrets that under the new rules some elements of a securities portfolio can be subject to cost measurement.

So far there has been agreement in Denmark that market value is the most regular principle. However, this now has to defer to the need for uniform rules within the EU, where the market valuation of securities has not been consistently applied.

The interplay between the IAS rules and Basel II is especially significant for Danish banks. So far, we have applied a prudent principle to the compilation of losses and provisions. Instead, the IAS rules introduce a neutrality principle for the assessment of the provision requirement.

The term itself states the case: the banks must no longer be quite so prudent in their evaluation of the need for provisions. This may require substantial provisions to be carried back, reducing the banks' buffer against potential losses. To put it another way, the change of principle may release substantial funds in Danish banks.

Added to this, on the introduction of the Basel II rules a reduction of the capital requirements of Danish banks can be expected, since loans to households as well as to small and medium-sized enterprises are subject to a lower risk weighting under the new framework. These loans weigh relatively heavily in Denmark.

In overall terms, this is a considerable relaxation of the capital requirements and provisions. So it is important that the boards and managements of the various banks consider carefully how much capital they need in order to ensure an appropriate buffer in case of unforeseen adverse events.

In order to promote this process, the current bill for a Financial Business Act anticipates the Basel II framework. Already in 2005 the requirement is introduced that the banks must assess their need for

capital and engage in dialogue with the Danish Financial Supervisory Authority in this respect. The Bill does not require the disclosure of the results of these deliberations. Since these are provisional rules prior to the full implementation of the Basel II framework there can be arguments against disclosure. The few years involved can be perceived as a running-in period during which the previous dialogue between the banks and the Authority concerning provisions is supplemented by a dialogue on capital adequacy.

Danmarks Nationalbank would like to emphasise, however, that the assessment of the need for capital should be disclosed when the full Basel II framework is implemented.

The financial markets and the financial products are becoming more and more technically advanced and sophisticated. New products are constantly appearing to match customers' changing needs and preferences.

In overall terms this is good for both business enterprises and households. Choice is always a good thing – so that everyone's needs can be catered for. For large groups of especially households it can be very difficult, however, to pinpoint exactly what is needed, and even harder to understand the various products and the risks they entail, and make the right choice. This applies especially to life's major financial decisions, not least financing the purchase of a home and choosing the right pension scheme.

This is where advisory services come into play. Bank employees devote a lot of effort to advising households. It is, however, important that clients understand that there is no certain answer to the question of how e.g. interest rates and share prices will develop in the future. The adviser may have certain expectations, but nobody can know for sure.

Today many banks do a lot to emphasise that they are profit-driven commercial enterprises. This means that their employees must be good at selling their products. For this reason, some banks have incentive structures to reward successful salespeople.

Undoubtedly the interests of the bank and the private client may coincide, but it is hard to believe that this is always the case. This applies to many types of professional advisers – from insurance brokers to pharmacies, opticians and banks.

Denmark is now harvesting the fruits of more than 20 years' stability-oriented economic policy during which major structural reforms have been implemented.

As a result, we have favourable growth, low inflation, a large current-account surplus and a surplus on government finances. Unemployment is low in international terms. After rising for two years the curve seems to

be on the way down as the unemployment level has stabilised, or is dropping slowly, depending on whether people in job creation schemes are included or not. The krone is extremely stable against the euro and both short-term and long-term interest rates are only marginally above the euro interest rates.

So what are the challenges to economic policy? Although no short-term economic measures are called for, significant structural challenges are waiting in the medium and long term. Our life expectancy is longer, which is good news, even though it is often presented as a problem. Nonetheless, the consequence is that the demand for welfare benefits will rise. Greater affluence will also make us demand more in terms of the quality of these services.

Moreover, in years to come more people will retire from than join the labour force, while many groups would like more time away from work. There is no obvious way of reconciling these aspirations. The government has therefore set up a Welfare Commission to investigate all of these issues.

Before the Commission's reports are published I would like to take this opportunity to express the hope that all groups of society: the business community, stakeholder organisations, politicians and ordinary citizens, will read the reports with an open mind towards discussing the issues raised. We need a serious debate without avoiding or skirting these issues. Pointing to other countries that face even bigger problems is not the solution either.

At a time when the economy is flourishing and no short-term measures are required it is important that we make a start on debating the long-term economic structures.

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Press releases

24 NOVEMBER: NEW 1,000-KRONE BANKNOTE – NEW SECURITY FEATURES, BUT THE SAME MOTIFS

On 25 November 2004, Danmarks Nationalbank issues a new and more secure 1,000-krone banknote. As something new, the banknote bears a hologram and fluorescent colours. The hologram and the fluorescent colours are security features to make the Danish banknotes even harder to counterfeit.

The motifs on the 1,000-krone banknote remain unchanged. There is still a double portrait of the artists Anna and Michael Ancher on the face of the banknote and a tournament scene on the reverse.

Hologram and fluorescent colours

The motifs in the new hologram are the number "1000", a painter's palette and the Roman numeral for "1000", an "M".

Fluorescent colours, which are visible under ultraviolet light, are printed on the face and reverse of the banknote. On the face a knight appears when the banknote is exposed to ultraviolet light. On the reverse, the orange colour lights up, especially in the number "1000" and in the ring on the right-hand side of the banknote.

Old banknotes are still legal tender

The old 1,000-krone banknotes remain legal tender, but will be gradually withdrawn from circulation. The two versions of the 1,000-krone banknote will be in parallel circulation for a period of time.

Upgrading continues

Now there is only one banknote denomination left – the 50-krone banknote – before the entire banknote series bears the new security features. A new 50-krone banknote will be issued in summer 2005.

For more information

For more information, please go to Danmarks Nationalbank's website at www.nationalbanken.dk and select Notes and coins. The folder "New Banknote security" can also be seen here. Pictures of the new security features are available at [Press room/Photogallery/Danish banknotes](#).

29 NOVEMBER: NEW FAROESE 500-KRONE BANKNOTE

Tomorrow Danmarks Nationalbank issues a new 500-krone Faroese banknote. The banknote is the fourth in the new Faroese banknote series.

The face of the new 500-krone banknote shows a fragment of a shore crab. The shore crab can be found on every Faroese coast. The motif of the shore crab is printed in intaglio. The background to the shore crab is a reproduction of a watercolour of the sandy seabed viewed through water. The motif on the reverse is a watercolour of Hvannasund. The watercolours are both by Zacharias Heinesen.

The new 500-krone banknote measures 155 x 72 mm and its main colour is dusty green.

Security features

The 500-krone banknote, like the 100 and 200-krone banknotes, has a hologram. With the other security features – e.g. the watermark and security thread with colour change – this will help protect the banknotes from counterfeiting.

The new banknote series

The final banknote in this new series – the 1,000-krone banknote – is expected to be issued in summer 2005.

Old banknotes are still legal tender

The old 500-krone banknotes remain legal tender, but will be gradually withdrawn from circulation.

For more information

A folder on the new banknote will be distributed to every household in the Faroe Islands from 2 December 2004. For further information, visit www.nationalbanken.dk under Notes and coins.

17 JANUARY: RESTRUCTURING OF DANISH SHIP FINANCE AS A LIMITED LIABILITY COMPANY

In 1960-61 Danmarks Nationalbank participated in the establishment of Danish Ship Finance, and since then has been one of its guarantors. Danish Ship Finance, the Danish Ministry of Economic and Business Affairs and Danmarks Nationalbank have now concluded an agreement to restructure Danish Ship Finance as a limited liability company.

Danmarks Nationalbank's participation in Danish Ship Finance should be seen against the background of its involvement during the 1950s and

1960s in the establishment of a number of specialist institutions for financing industry, agriculture, housing and shipbuilding. This was done in response to a requirement at that time to strengthen the capital markets, and because there was a need for specialised institutions.

These institutions were set up as foundations, which make it difficult for them to adapt to market conditions. Consequently, they have, one by one, been restructured as limited liability companies.

Danish Ship Finance has been an important instrument in relation to financing and subsidising shipbuilding in Denmark, e.g. via interest-subsidy schemes for ship finance, which were discontinued in 1993. Since then it has granted loans on market terms.

Until 1984, Danish Ship Finance made a profit in connection to borrowers prepayments of interest-subsidised loans. Recognising that the profit from such prepayments would have accrued to the government if the latter itself had handled these lending activities, the parties have agreed to compensate for this profit in connection with the modernisation of Danish Ship Finance. Consequently, Danmarks Nationalbank and the Danish government will receive a total of DKK 1,610 million.

Like the other guarantors, Danmarks Nationalbank will acquire shares in the limited liability company. These shares cannot be sold for at least five years.

The agreement is subject to the Danish Parliament (Folketing) passing the necessary legislation, and to approval of the agreement by the Board of Representatives of Danish Ship Finance and the Committee of Directors of Danmarks Nationalbank.

For further details about the agreement, reference is made to Danish Ship Finance and the Danish Ministry of Economic and Business Affairs.

20 JANUARY: DANMARKS NATIONALBANK SELLS ITS SHARES IN GRØNLANDSBANKEN A/S TO THE GREENLAND HOME RULE

Danmarks Nationalbank has been a shareholder of GrønlandsBANKEN A/S since its foundation in 1967. At that time the establishment of a bank in Greenland was considered an important task for society.

It is not normally the role of Danmarks Nationalbank to be a co-owner of a private bank, and Danmarks Nationalbank has gradually reduced its ownership interest over the years.

Today Danmarks Nationalbank has concluded an agreement with the Greenland Home Rule to transfer Danmarks Nationalbank's total shareholding in GrønlandsBANKEN A/S, nominally DKK 24,666,000. This shareholding constitutes 13.7 per cent of the share capital of GrønlandsBANKEN A/S and is denominated as 246,660 shares of DKK 100 each.

The agreement is subject to the approval of the Home Rule's acquisition of the shares by the Danish Financial Supervisory Authority.

The agreed purchase sum is DKK 89,044,260, equivalent to DKK 361 per share.

27 JANUARY: LANDET CHURCH ADORNS NEW THEMATIC COIN

On 28 January 2005, Danmarks Nationalbank issues the sixth in its series of thematic 20-krone coins with specially chosen Danish towers as the motif on the reverse.

Seen through chestnut leaves from the grave of Elvira Madigan and Sixten Sparre, the tower of Landet Church on the island of Tåsinge reaches towards the sky on the reverse of the new thematic coin. Landet Church is a traditional Danish village church, built around 1150-1200 in the Age of the Valdemars, with the tower and porch added later. The church tower was built in 1634.

The sculptor *Øivind Nygaard* is the artist behind the tower motif from Landet Church. The hearts and pistol that Øivind Nygaard has woven into the chestnut leaves around the tower symbolise the tragic love story of Elvira Madigan and Sixten Sparre. "In addition to showing a Danish church tower, the pictorial metaphors seen on the coin, combined with the view of the tower of Landet Church, are intended to tell a story and interpret the history and mythology of the church," Øivind Nygaard explains.

The Landet Church tower coin is issued as a 20-krone coin in an edition of 1.2 million. It is of the same size and alloy as the ordinary 20-krone coin in circulation. The face of the coin shows a profile of the Queen by the sculptor, Professor Mogens Møller.

The new thematic coin can be purchased from banks and Danmarks Nationalbank from 28 January 2005. The next tower coin is expected to be issued in the autumn of 2005.

Pictures can be downloaded from www.nationalbanken.dk – Press room, Photogallery.

3 FEBRUARY: THEMATIC COINS WITH HANS CHRISTIAN ANDERSEN'S FAIRY TALES

To mark the bicentenary of Hans Christian Andersen, Danmarks Nationalbank is issuing a new series of thematic coins. The first in the series is issued on 31 March 2005 and is a 10-krone coin in three different editions – a gold coin, a fine silver coin and an ordinary 10-krone coin. The gold and silver coins are issued to meet a demand in the collector

market. These coins will be sold at a price exceeding the face value, a practice that was customary in Denmark until 1986 and is now standard international practice.

On the reverse of the first Hans Christian Andersen coin, an adult swan is studying its reflection in the lake at Bregentved Manor, where Hans Christian Andersen was inspired to write his famous fairy tale "The Ugly Duckling". The artist is the sculptor Hans Pauli Olsen.

The face of the Hans Christian Andersen coins shows a profile of the Queen by the sculptor, Professor Mogens Møller.

The gold coin will be issued in an edition not exceeding 7,000, while the silver coin will be issued in an edition of up to 75,000. The ordinary 10-krone coin will be issued in an edition of 1.2 million. All Hans Christian Andersen coins are legal tender and can be exchanged at Danmarks Nationalbank at face value.

The Hans Christian Andersen thematic coins can be purchased from banks and coin dealers as from 31 March 2005. Some banks and coin dealers already take orders. The recommended retail prices including Danish VAT are kr. 2,000 for the gold coin and kr. 200 for the silver coin. The coins will also be sold from 31 March 2005 from Danmarks Nationalbank, Banking Services, between 10 am and 1 pm on week-days.

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Symbols and Sources

0 Magnitude nil or less than one half of unit employed.

... Data not available or of negligible interest.

Some of the most recent statistics may be provisional. Due to rounding-off there may be small differences between the sum of the individual figures and the totals stated.

Date of going to press: 22 March 2005.

The Tables section of this publication is thus based on more recent information than the equivalent section of the Danish edition.

Danmarks Nationalbank is the source for Tables 1-14, 16-18 and 23-24, while the Copenhagen Stock Exchange is the source for series of bond yields and the share-price index in Table 1. Statistics Denmark is the source for Tables 15 and 19-22. The calculations in Tables 20 and 24 have been made by Danmarks Nationalbank on the basis of data from Statistics Denmark and OECD.

INTEREST RATES AND SHARE-PRICE INDEX

Table 1

| Effective end-of-year/ from | The Nationalbank's interest rates | | | The ECB's minimum bid rate | End of period | Inter-bank interest rate, 3-months uncollateralized | Bond yields | | The Copenhagen Stock Exchange share-price index KFX | |
|--------------------------------|-----------------------------------|-------------------------------------|--------------------|----------------------------|---------------|---|---------------------------------|------------------------------|---|--------------------|
| | Discount rate | Lending and certificates of deposit | Per cent per annum | | | | 10-year central-government bond | 30-year mortgage-credit bond | | Per cent per annum |
| | | | | | | | | | | |
| | | | | | | | | | 3.7.89 =100 | |
| 2000 | 4.75 | 5.40 | 4.75 | 2000 | 5.33 | 5.20 | 7.30 | 313.90 | | |
| 2001 | 3.25 | 3.60 | 3.25 | 2001 | 3.54 | 5.15 | 6.55 | 272.45 | | |
| 2002 | 2.75 | 2.95 | 2.75 | 2002 | 3.00 | 4.45 | 5.47 | 199.49 | | |
| 2003 | 2.00 | 2.15 | 2.00 | 2003 | 2.16 | 4.46 | 5.45 | 244.35 | | |
| 2004 | 2.00 | 2.15 | 2.00 | 2004 | 2.16 | 3.87 | 5.07 | 286.66 | | |
| 2002 6 Dec | 2.75 | 2.95 | 2.75 | Aug 04 | 2.14 | 4.41 | 5.28 | 267.18 | | |
| 2003 7 Mar | 2.50 | 2.70 | 2.50 | Sep 04 | 2.17 | 4.32 | 5.24 | 281.86 | | |
| 23 May | 2.50 | 2.65 | 2.50 | Oct 04 | 2.15 | 4.18 | 5.21 | 272.18 | | |
| 6 Jun | 2.00 | 2.15 | 2.00 | Nov 04 | 2.16 | 4.02 | 5.14 | 282.88 | | |
| | | | | Dec 04 | 2.16 | 3.87 | 5.07 | 286.66 | | |
| 2005 22 Mar ... | 2.00 | 2.15 | 2.00 | Jan 05 | 2.15 | 3.67 | 5.00 | 291.02 | | |
| | | | | Feb 05 | 2.13 | 3.77 | 5.05 | 311.96 | | |

SELECTED ITEMS FROM THE NATIONALBANK'S BALANCE SHEET

Table 2

| End of period | The foreign-exchange reserve (net) | Notes and coin in circulation | The central government's account with the Nationalbank | The banks' and the mortgage-credit institutes' net position with the Nationalbank | | | |
|---------------|------------------------------------|-------------------------------|--|---|----------------------------|-------|--------------------|
| | | | | Certificates of deposit | Deposits (current account) | Loans | Total net position |
| Kr. billion | | | | | | | |
| 2000 | 117.5 | 44.8 | 37.7 | 51.9 | 8.1 | 25.3 | 34.6 |
| 2001 | 148.4 | 47.3 | 43.5 | 113.6 | 3.7 | 63.4 | 53.9 |
| 2002 | 193.2 | 47.7 | 50.3 | 160.7 | 10.1 | 81.2 | 89.6 |
| 2003 | 224.2 | 49.7 | 44.0 | 157.3 | 12.9 | 48.0 | 122.2 |
| 2004 | 217.6 | 52.0 | 60.8 | 160.4 | 6.9 | 72.6 | 94.6 |
| Sep 04 | 225.0 | 49.7 | 120.2 | 137.1 | 11.0 | 105.1 | 43.1 |
| Oct 04 | 221.2 | 49.7 | 118.0 | 119.4 | 11.8 | 91.4 | 39.8 |
| Nov 04 | 217.6 | 50.4 | 75.9 | 128.2 | 13.2 | 63.5 | 77.8 |
| Dec 04 | 217.7 | 52.0 | 58.0 | 160.4 | 7.1 | 72.6 | 94.8 |
| Jan 05 | 223.6 | 50.8 | 65.8 | 163.6 | 13.9 | 84.3 | 93.2 |
| Feb 05 | 224.1 | 50.7 | 50.6 | 187.2 | 9.6 | 87.6 | 109.3 |

FACTORS AFFECTING THE BANKS' AND THE MORTGAGE-CREDIT
INSTITUTES' NET POSITION WITH THE NATIONALBANK

Table 3

| | Central-government finance | | | Net purchase of foreign exchange by the National- bank | The National- bank's net bond purchases | Other factors | The banks' and the mortgage-credit institutes' net position with the Nationalbank | |
|--------------|--|---|---------------------|---|--|------------------|---|------------------|
| | Domestic gross financing require- ment | Sales of domestic central- govern- ment securities | Liquidity effect | | | | Change in net position | End of period |
| | | | | | | | | |
| 2000 | 62.3 | 65.7 | -3.4 | -37.7 | 2.1 | 0.4 | -38.7 | 34.6 |
| 2001 | 81.2 | 87.7 | -6.5 | 28.4 | 1.0 | -3.6 | 19.3 | 53.9 |
| 2002 | 115.5 | 121.9 | -6.4 | 45.4 | -0.9 | -2.4 | 35.7 | 89.6 |
| 2003 | 99.7 | 94.1 | 5.6 | 31.0 | -1.0 | -3.1 | 32.5 | 122.2 |
| 2004 | 75.5 | 92.6 | -17.1 | -6.4 | -2.6 | -1.2 | -27.3 | 94.6 |
| Sep 04 | -0.5 | 13.9 | -14.4 | 0.0 | -0.5 | 0.3 | -14.6 | 43.1 |
| Oct 04 | 11.4 | 13.0 | -1.6 | 0.0 | -0.5 | -1.1 | -3.2 | 39.8 |
| Nov 04 | 35.0 | -2.9 | 37.9 | 0.6 | 0.6 | -1.1 | 38.0 | 77.8 |
| Dec 04 | 24.0 | 6.0 | 18.0 | 0.1 | -0.7 | -0.3 | 17.0 | 94.8 |
| Jan 05 | 3.0 | 10.8 | -7.7 | 6.0 | -0.2 | 0.3 | -1.6 | 93.2 |
| Feb 05 | 11.7 | -3.5 | 15.2 | 0.4 | 0.8 | -0.2 | 16.1 | 109.3 |

SELECTED ITEMS FROM THE CONSOLIDATED
BALANCE SHEET OF THE MFI SECTOR

Table 4

| End of period | Total balance | Assets | | | | Liabilities | | Foreign assets, net ¹ |
|--|---------------|------------------|----------------|---------------------|--------------|-------------------|--------------------|----------------------------------|
| | | Domestic lending | | Domestic securities | | Domestic deposits | Bonds, etc. issued | |
| | | Public sector | Private sector | Bonds, etc. | Shares, etc. | | | |
| | | Kr. billion | | | | | | |
| 2000 | 2,806.8 | 68.1 | 1,690.6 | 114.2 | 43.1 | 649.2 | 1,019.2 | 46.3 |
| 2001 | 2,932.1 | 75.0 | 1,850.9 | 133.1 | 37.0 | 686.3 | 1,048.7 | -57.0 |
| 2002 | 3,201.5 | 79.9 | 1,944.6 | 142.8 | 36.5 | 723.3 | 1,125.9 | -63.9 |
| 2003 | 3,359.0 | 89.6 | 2,062.0 | 123.3 | 43.3 | 754.7 | 1,157.9 | -70.7 |
| 2004 | 3,683.4 | 97.5 | 2,246.2 | 100.8 | 46.3 | 848.9 | 1,222.1 | -66.9 |
| Aug 04 | 3,535.4 | 91.5 | 2,181.3 | 125.7 | 45.5 | 912.3 | 1,165.9 | -58.6 |
| Sep 04 | 3,604.8 | 92.5 | 2,202.6 | 133.6 | 45.8 | 901.4 | 1,183.1 | -46.0 |
| Oct 04 | 3,656.1 | 93.4 | 2,210.6 | 131.4 | 45.9 | 923.5 | 1,175.8 | -69.8 |
| Nov 04 | 3,716.9 | 93.3 | 2,230.0 | 107.8 | 46.2 | 895.5 | 1,182.2 | -73.6 |
| Dec 04 | 3,683.4 | 97.5 | 2,246.2 | 100.8 | 46.3 | 848.9 | 1,222.1 | -66.9 |
| Jan 05 | 3,712.9 | 99.5 | 2,275.2 | 102.9 | 49.1 | 889.6 | 1,223.1 | -83.3 |
| Change compared with previous year, per cent | | | | | | | | |
| 2000 | ... | 14.5 | 11.5 | -9.2 | -5.7 | 0.1 | 0.1 | ... |
| 2001 | ... | 10.2 | 9.5 | 16.6 | -14.0 | 5.7 | 2.9 | ... |
| 2002 | ... | 6.6 | 5.1 | 7.3 | -1.4 | 5.4 | 7.4 | ... |
| 2003 | ... | 12.1 | 6.0 | -13.7 | 18.6 | 4.3 | 2.8 | ... |
| 2004 | ... | 8.8 | 8.9 | -18.2 | 7.0 | 12.5 | 5.5 | ... |
| Aug 04 | ... | 6.7 | 8.3 | -20.1 | 11.7 | 11.6 | 4.5 | ... |
| Sep 04 | ... | 6.6 | 8.0 | -15.2 | 11.4 | 12.5 | 2.2 | ... |
| Oct 04 | ... | 6.4 | 8.7 | -13.4 | 8.7 | 12.1 | 6.1 | ... |
| Nov 04 | ... | 6.5 | 9.2 | -11.7 | 9.2 | 13.9 | 6.4 | ... |
| Dec 04 | ... | 8.8 | 8.9 | -18.2 | 7.0 | 12.5 | 5.5 | ... |
| Jan 05 | ... | 11.4 | 9.9 | -18.6 | 12.0 | 9.5 | 6.4 | ... |

Note: The MFI sector includes Danish monetary financial institutions, i.e. banks and mortgage-credit institutes, other credit institutions, money-market funds and Danmarks Nationalbank.

¹ The net foreign assets of the MFI sector has been compiled as the difference between all assets and liabilities vis-a-vis non-residents.

MONEY STOCK

Table 5

| End of period | Bank- notes and coin in circula- tion | Deposits on demand | M1 | Time deposits with original maturity =<2 years | Deposits at notice with original maturity =< 3 months | M2 | Repur- chase agree- ments | Bonds, etc. issued with original maturity =< 2 years | M3 |
|--|--|--------------------------|-------|--|---|-------|------------------------------------|---|-------|
| | Kr. billion | | | | | | | | |
| 2000 | 37.4 | 349.2 | 386.6 | 101.7 | 6.9 | 495.2 | 3.3 | 8.6 | 507.1 |
| 2001 | 39.2 | 375.6 | 414.9 | 102.7 | 9.9 | 527.4 | 4.0 | 15.0 | 546.4 |
| 2002 | 39.0 | 392.1 | 431.0 | 105.0 | 15.8 | 551.8 | 7.1 | 45.8 | 604.7 |
| 2003 | 41.0 | 428.2 | 469.2 | 112.2 | 19.2 | 600.5 | 2.7 | 77.3 | 680.6 |
| 2004 | 43.7 | 492.8 | 536.6 | 119.2 | 21.0 | 676.7 | 2.0 | 20.2 | 699.0 |
| Aug 04 | 41.7 | 477.3 | 518.9 | 151.4 | 19.6 | 689.9 | 7.2 | 98.8 | 796.0 |
| Sep 04 | 41.9 | 464.6 | 506.4 | 144.1 | 19.8 | 670.4 | 6.3 | 97.4 | 774.1 |
| Oct 04 | 42.3 | 486.5 | 528.9 | 143.6 | 20.4 | 692.8 | 4.7 | 88.7 | 786.3 |
| Nov 04 | 42.6 | 496.9 | 539.5 | 144.7 | 22.3 | 706.6 | 4.5 | 76.4 | 787.5 |
| Dec 04 | 43.7 | 492.8 | 536.6 | 119.2 | 21.0 | 676.7 | 2.0 | 20.2 | 699.0 |
| Jan 05 | 43.2 | 502.0 | 545.2 | 135.1 | 21.3 | 701.6 | 4.9 | 6.7 | 713.1 |
| Change compared with previous year, per cent | | | | | | | | | |
| 2000 | ... | ... | 2.3 | ... | ... | -1.3 | ... | ... | -3.1 |
| 2001 | ... | ... | 7.3 | ... | ... | 6.5 | ... | ... | 7.7 |
| 2002 | ... | ... | 3.9 | ... | ... | 4.6 | ... | ... | 10.7 |
| 2003 | ... | ... | 8.8 | ... | ... | 8.8 | ... | ... | 12.5 |
| 2004 | ... | ... | 14.4 | ... | ... | 12.7 | ... | ... | 2.7 |
| Aug 04 | ... | ... | 9.5 | ... | ... | 11.1 | ... | ... | 14.2 |
| Sep 04 | ... | ... | 9.8 | ... | ... | 10.7 | ... | ... | 14.3 |
| Oct 04 | ... | ... | 10.1 | ... | ... | 9.5 | ... | ... | 9.4 |
| Nov 04 | ... | ... | 12.0 | ... | ... | 12.5 | ... | ... | 9.5 |
| Dec 04 | ... | ... | 14.4 | ... | ... | 12.7 | ... | ... | 2.7 |
| Jan 05 | ... | ... | 13.5 | ... | ... | 9.5 | ... | ... | -6.1 |

SELECTED ITEMS FROM THE BALANCE SHEET OF THE BANKS

Table 6

| End of period | Assets | | | | | | Liabilities | |
|--|---------------|-----------------|------------------|------------------|-------------------------|------------------------|-----------------|----------|
| | Total balance | Lending to MFIs | Domestic lending | | | Holdings of securities | Loans from MFIs | Deposits |
| | | | Total | of which: | | | | |
| | | | | Households, etc. | Non-financial companies | | | |
| Kr. billion | | | | | | | | |
| 2000 | 1,685.8 | 427.8 | 526.2 | 239.0 | 186.4 | 456.1 | 579.9 | 684.3 |
| 2001 | 1,798.8 | 353.0 | 588.0 | 253.3 | 228.8 | 579.3 | 627.5 | 718.0 |
| 2002 | 2,040.1 | 419.8 | 599.2 | 253.5 | 231.3 | 620.9 | 685.6 | 764.7 |
| 2003 | 2,204.4 | 468.7 | 663.0 | 271.6 | 285.7 | 764.4 | 823.8 | 795.2 |
| 2004 | 2,417.8 | 495.1 | 754.8 | 324.8 | 309.6 | 780.3 | 823.1 | 908.0 |
| Aug 04 | 2,266.8 | 466.5 | 708.8 | 292.2 | 295.1 | 809.9 | 804.1 | 887.4 |
| Sep 04 | 2,359.8 | 502.1 | 723.7 | 302.8 | 302.0 | 830.9 | 880.1 | 874.7 |
| Oct 04 | 2,372.1 | 510.5 | 725.9 | 305.1 | 302.0 | 795.5 | 850.1 | 903.5 |
| Nov 04 | 2,436.3 | 510.8 | 738.6 | 306.1 | 310.8 | 789.2 | 802.0 | 947.9 |
| Dec 04 | 2,417.8 | 495.1 | 754.8 | 324.8 | 309.6 | 780.3 | 823.1 | 908.0 |
| Jan 05 | 2,465.4 | 510.4 | 774.2 | 321.8 | 316.1 | 830.9 | 867.0 | 935.9 |
| Change compared with previous year, per cent | | | | | | | | |
| 2000 | ... | 10.1 | 31.6 | 17.0 | 59.0 | 6.6 | 24.5 | 0.9 |
| 2001 | ... | -17.5 | 11.7 | 6.0 | 22.8 | 27.0 | 8.2 | 4.9 |
| 2002 | ... | 18.9 | 1.9 | 0.1 | 1.1 | 7.2 | 9.3 | 6.5 |
| 2003 | ... | 10.7 | 2.5 | 7.1 | 3.1 | 21.8 | 18.8 | 3.9 |
| 2004 | ... | 5.6 | 13.8 | 19.6 | 8.4 | 2.1 | -0.1 | 14.2 |
| Aug 04 | ... | 6.1 | 11.2 | 16.5 | 6.0 | 2.3 | 0.8 | 9.0 |
| Sep 04 | ... | 19.6 | 10.2 | 15.9 | 6.8 | 11.6 | 16.6 | 10.0 |
| Oct 04 | ... | 25.9 | 12.5 | 18.1 | 10.6 | 2.2 | 14.4 | 12.3 |
| Nov 04 | ... | 22.4 | 14.1 | 19.2 | 12.2 | 2.1 | 8.6 | 17.7 |
| Dec 04 | ... | 5.6 | 13.8 | 19.6 | 8.4 | 2.1 | -0.1 | 14.2 |
| Jan 05 | ... | 12.8 | 17.0 | 21.3 | 12.9 | 9.9 | 16.3 | 11.8 |

Note: Excluding Danish banks' units abroad. As from 2003 the lending is affected by an addition to the group of banks. The calculation of the rate of increase has been amended accordingly.

SELECTED ITEMS FROM THE BALANCE SHEET OF
THE MORTGAGE-CREDIT INSTITUTES

Table 7

| End of period | Assets | | | | | | Liabilities | |
|--|---------------|-----------------|------------------|------------------|-------------------------|------------------------|-----------------|--------------------|
| | Total balance | Lending to MFIs | Domestic lending | | | Holdings of securities | Loans from MFIs | Bonds, etc. issued |
| | | | Total | of which: | | | | |
| | | | | Households, etc. | Non-financial companies | | | |
| Kr. billion | | | | | | | | |
| 2000 | 1,341.1 | 53.7 | 1,095.9 | 830.2 | 225.6 | 163.7 | 36.2 | 1,212.9 |
| 2001 | 1,579.5 | 88.3 | 1,191.8 | 907.6 | 246.8 | 280.7 | 55.3 | 1,421.3 |
| 2002 | 1,721.8 | 77.3 | 1,285.1 | 988.0 | 259.2 | 338.5 | 58.9 | 1,584.2 |
| 2003 | 1,863.8 | 100.9 | 1,394.6 | 1,072.1 | 284.4 | 342.6 | 32.6 | 1,729.0 |
| 2004 | 2,097.4 | 91.2 | 1,489.9 | 1,141.3 | 307.9 | 481.2 | 26.1 | 1,952.5 |
| Aug 04 | 1,674.6 | 40.3 | 1,466.2 | 1,125.1 | 301.6 | 135.2 | 20.3 | 1,564.5 |
| Sep 04 | 1,721.9 | 79.8 | 1,472.1 | 1,125.7 | 305.7 | 141.4 | 27.8 | 1,588.9 |
| Oct 04 | 1,721.1 | 56.7 | 1,478.8 | 1,130.8 | 308.0 | 152.6 | 37.5 | 1,590.5 |
| Nov 04 | 1,760.6 | 57.5 | 1,487.2 | 1,137.5 | 309.1 | 176.1 | 42.7 | 1,623.7 |
| Dec 04 | 2,097.4 | 91.2 | 1,489.9 | 1,141.3 | 307.9 | 481.2 | 26.1 | 1,952.5 |
| Jan 05 | 1,713.1 | 68.9 | 1,499.7 | 1,147.7 | 311.1 | 117.4 | 17.3 | 1,618.9 |
| Change compared with previous year, per cent | | | | | | | | |
| 2000 | ... | 10.5 | 4.2 | 5.6 | 1.2 | 38.8 | 63.8 | 8.7 |
| 2001 | ... | 64.6 | 8.8 | 9.3 | 9.4 | 71.5 | 52.6 | 17.2 |
| 2002 | ... | -12.5 | 7.8 | 8.9 | 5.0 | 20.6 | 6.7 | 11.5 |
| 2003 | ... | 30.6 | 8.5 | 8.5 | 9.7 | 1.2 | -44.8 | 9.1 |
| 2004 | ... | -9.6 | 6.8 | 6.5 | 8.3 | 40.4 | -19.9 | 12.9 |
| Aug 04 | ... | -35.2 | 7.1 | 6.7 | 8.3 | -8.1 | -12.2 | 4.3 |
| Sep 04 | ... | -16.8 | 7.0 | 6.3 | 9.1 | -4.3 | 66.9 | 3.6 |
| Oct 04 | ... | 23.7 | 7.0 | 6.4 | 9.4 | 23.2 | 157.7 | 8.4 |
| Nov 04 | ... | 2.9 | 7.1 | 6.4 | 9.2 | 39.3 | 217.4 | 8.9 |
| Dec 04 | ... | -9.6 | 6.8 | 6.5 | 8.3 | 40.4 | -19.9 | 12.9 |
| Jan 05 | ... | 40.2 | 6.8 | 6.1 | 9.1 | 22.9 | 5.6 | 8.8 |

LENDING TO RESIDENTS BY THE BANKS AND THE MORTGAGE-CREDIT INSTITUTES Table 8

| End of period | Total lending | | | The banks' lending | | | The mortgage-credit institutes' lending | | |
|--|---------------|------------------|----------|--------------------|------------------|----------|---|------------------|----------|
| | Total | Households, etc. | Business | Total | Households, etc. | Business | Total | Households, etc. | Business |
| | Kr. billion | | | | | | | | |
| 2000 | 1,688.3 | 1,069.2 | 561.0 | 592.4 | 239.0 | 329.7 | 1,095.9 | 830.2 | 231.4 |
| 2001 | 1,814.4 | 1,161.0 | 594.7 | 622.6 | 253.3 | 342.3 | 1,191.8 | 907.6 | 252.4 |
| 2002 | 1,917.0 | 1,241.6 | 619.2 | 631.8 | 253.5 | 353.0 | 1,285.1 | 988.0 | 266.2 |
| 2003 | 2,087.7 | 1,343.7 | 683.1 | 693.2 | 271.6 | 392.3 | 1,394.6 | 1,072.1 | 290.9 |
| 2004 | 2,276.0 | 1,466.1 | 741.0 | 786.0 | 324.8 | 426.8 | 1,489.9 | 1,141.3 | 314.2 |
| Aug 04 | 2,205.4 | 1,417.4 | 727.1 | 739.3 | 292.2 | 419.3 | 1,466.2 | 1,125.1 | 307.7 |
| Sep 04 | 2,226.3 | 1,428.6 | 734.7 | 754.2 | 302.8 | 422.9 | 1,472.1 | 1,125.7 | 311.8 |
| Oct 04 | 2,236.0 | 1,435.9 | 736.9 | 757.2 | 305.1 | 422.8 | 1,478.8 | 1,130.8 | 314.1 |
| Nov 04 | 2,257.0 | 1,443.6 | 748.7 | 769.8 | 306.1 | 433.4 | 1,487.2 | 1,137.5 | 315.2 |
| Dec 04 | 2,276.0 | 1,466.1 | 741.0 | 786.0 | 324.8 | 426.8 | 1,489.9 | 1,141.3 | 314.2 |
| Jan 05 | 2,305.1 | 1,469.5 | 765.4 | 805.4 | 321.8 | 448.1 | 1,499.7 | 1,147.7 | 317.3 |
| Change compared with previous year, per cent | | | | | | | | | |
| 2000 | 7.3 | 8.0 | 6.6 | 13.3 | 17.0 | 13.1 | 4.3 | 5.6 | -1.6 |
| 2001 | 7.5 | 8.6 | 6.0 | 5.1 | 6.0 | 3.8 | 8.8 | 9.3 | 9.1 |
| 2002 | 5.7 | 6.9 | 4.1 | 1.5 | 0.1 | 3.1 | 7.8 | 8.9 | 5.5 |
| 2003 | 6.1 | 8.2 | 2.7 | 1.5 | 7.1 | -1.7 | 8.5 | 8.5 | 9.3 |
| 2004 | 9.0 | 9.1 | 8.5 | 13.4 | 19.6 | 8.8 | 6.8 | 6.5 | 8.0 |
| Aug 04 | 8.3 | 8.6 | 7.8 | 10.7 | 16.5 | 7.6 | 7.1 | 6.7 | 8.0 |
| Sep 04 | 7.9 | 8.2 | 7.3 | 9.8 | 15.9 | 6.2 | 7.0 | 6.3 | 8.7 |
| Oct 04 | 8.7 | 8.7 | 8.8 | 12.1 | 18.1 | 8.7 | 7.0 | 6.4 | 9.0 |
| Nov 04 | 9.2 | 8.8 | 9.7 | 13.6 | 19.2 | 10.3 | 7.1 | 6.4 | 8.8 |
| Dec 04 | 9.0 | 9.1 | 8.5 | 13.4 | 19.6 | 8.8 | 6.8 | 6.5 | 8.0 |
| Jan 05 | 9.9 | 9.1 | 11.0 | 16.2 | 21.3 | 12.4 | 6.8 | 6.1 | 8.9 |

Note: Including lending in Danish banks' units abroad. As from 2003 the banks' lending is affected by an addition to the group of banks. The calculation of the rate of increase has been amended accordingly.

THE MORTGAGE-CREDIT INSTITUTES' LENDING BROKEN DOWN BY TYPE

Table 9

| End of period | Index-linked lending | Fixed-rate lending | Adjustable-rate lending | | Total | of which: | |
|---------------|----------------------|--------------------|-------------------------|-------------------|---------|-----------------------------|--------------------------------------|
| | | | Total | of which =<1 year | | Lending in foreign currency | Instalment-free lending ¹ |
| | | | | | | | |
| 2000 | 113.1 | 882.4 | 99.8 | 79.0 | 1,095.4 | 15.5 | ... |
| 2001 | 109.6 | 836.5 | 245.7 | 151.5 | 1,191.8 | 54.5 | ... |
| 2002 | 103.6 | 816.0 | 365.0 | 200.4 | 1,284.6 | 82.5 | ... |
| 2003 | 99.5 | 795.0 | 499.0 | 250.0 | 1,393.5 | 85.7 | 44.4 |
| 2004 | 94.6 | 737.6 | 656.1 | 378.4 | 1,488.4 | 84.9 | 170.5 |
| Aug 04 | 97.9 | 748.5 | 618.8 | 359.6 | 1,465.2 | 87.2 | ... |
| Sep 04 | 97.9 | 745.2 | 627.8 | 362.5 | 1,470.9 | 87.6 | 138.7 |
| Oct 04 | 97.9 | 744.0 | 635.9 | 363.4 | 1,477.8 | 87.6 | ... |
| Nov 04 | 97.3 | 744.8 | 644.0 | 361.7 | 1,486.1 | 87.2 | ... |
| Dec 04 | 94.6 | 737.6 | 656.1 | 378.4 | 1,488.4 | 84.9 | 170,5 |
| Jan 05 | 94.8 | 724.8 | 677.8 | 424.7 | 1,497.3 | 85.2 | ... |

Note: The Table includes the mortgage-credit lending to residents only, whereas Tables 7 and 8 include the institutes' total lending to residents.

¹ The mortgage-credit institutes' instalment-free lending to owner-occupied dwellings.

THE BANKS' EFFECTIVE INTEREST RATES

Table 10

| | Lending | | | | Deposits | | | |
|--------------|-------------|------------------|-------------------------|---------------------|-------------|------------------|-------------------------|---------------------|
| | All sectors | Households, etc. | Non-financial companies | Financial companies | All sectors | Households, etc. | Non-financial companies | Financial companies |
| | | | | | | | | |
| Q1 03 | 5.8 | 8.2 | 5.8 | 3.4 | 2.2 | 1.7 | 2.4 | 2.7 |
| Q2 03 | 5.8 | 8.1 | 5.6 | 3.2 | 2.0 | 1.6 | 2.1 | 2.5 |
| Q3 03 | 5.4 | 7.6 | 5.2 | 2.8 | 1.5 | 1.1 | 1.7 | 2.1 |
| Q4 03 | 5.4 | 7.5 | 5.0 | 2.9 | 1.5 | 1.1 | 1.7 | 2.1 |
| Q1 04 | 5.3 | 7.3 | 4.9 | 2.9 | 1.6 | 1.1 | 1.7 | 2.1 |
| Q2 04 | 5.2 | 7.2 | 4.8 | 2.9 | 1.6 | 1.1 | 1.7 | 2.1 |
| Q3 04 | 5.2 | 7.1 | 4.8 | 2.8 | 1.5 | 1.2 | 1.7 | 2.0 |
| Q4 04 | 5.1 | 6.9 | 4.8 | 2.8 | 1.6 | 1.2 | 1.7 | 2.1 |
| Aug 04 | 5.2 | 7.0 | 4.8 | 2.9 | 1.5 | 1.2 | 1.7 | 2.0 |
| Sep 04 | 5.2 | 7.1 | 4.9 | 2.8 | 1.6 | 1.2 | 1.7 | 2.1 |
| Oct 04 | 5.1 | 7.0 | 4.8 | 2.8 | 1.6 | 1.2 | 1.7 | 2.0 |
| Nov 04 | 5.1 | 6.9 | 4.8 | 2.8 | 1.6 | 1.2 | 1.7 | 2.1 |
| Dec 04 | 5.1 | 6.8 | 4.8 | 2.8 | 1.6 | 1.2 | 1.7 | 2.1 |
| Jan 05 | 5.1 | 6.8 | 4.7 | 2.8 | 1.6 | 1.3 | 1.7 | 2.1 |

SELECTED ITEMS FROM THE BALANCE SHEET OF
THE INVESTMENT ASSOCIATIONS

Table 11

| End of period | Assets | | | Liabilities | | | |
|-------------------------------------|------------------|---------------------------|-----------------|--|---|--------------------|--------|
| | Total balance | Holdings of securities | | Certificates issued by investment associa- tions by owner | | | |
| | | Bonds, etc. | Shares, etc. | House- holds, etc. | Insurance compa- nies and pension funds | Other residents | Abroad |
| Kr. billion | | | | | | | |
| 2000 | 258.1 | 100.5 | 147.3 | 140.8 | 56.8 | 49.0 | 10.4 |
| 2001 | 282.8 | 135.4 | 137.1 | 143.4 | 62.2 | 66.9 | 9.6 |
| 2002 | 288.9 | 180.8 | 89.5 | 153.6 | 68.9 | 52.7 | 8.9 |
| 2003 | 367.1 | 237.2 | 108.7 | 188.2 | 103.2 | 60.4 | 12.3 |
| 2004 | 574.2 | 326.5 | 164.6 | 213.1 | 163.4 | 180.1 | 15.3 |
| Q4 03 | 367.1 | 237.2 | 108.7 | 188.2 | 103.2 | 60.4 | 12.3 |
| Q1 04 | 481.3 | 282.9 | 135.3 | 199.5 | 120.7 | 145.0 | 12.9 |
| Q2 04 | 478.5 | 277.5 | 138.8 | 199.6 | 120.8 | 143.4 | 12.8 |
| Q3 04 | 497.4 | 292.1 | 139.4 | 205.6 | 125.6 | 150.2 | 13.5 |
| Q4 04 | 574.2 | 326.5 | 164.6 | 213.1 | 163.4 | 180.1 | 15.3 |
| Quarterly transactions, kr. billion | | | | | | | |
| Q4 03 | ... | 18.9 | 4.1 | 5.4 | 10.8 | -0.7 | 1.0 |
| Q1 04 | ... | 40.0 | 17.1 | 7.5 | 12.6 | 80.0 | 0.6 |
| Q2 04 | ... | 1.2 | 5.1 | 5.1 | 2.8 | 0.0 | 0.1 |
| Q3 04 | ... | 10.0 | 1.9 | 4.0 | 2.5 | 3.9 | 0.3 |
| Q4 04 | ... | 36.3 | 19.2 | 3.1 | 31.1 | 24.6 | 1.5 |

SECURITIES ISSUED BY RESIDENTS BY OWNER'S HOME COUNTRY

Table 12

| End of period | Bonds, etc. | | | | | | Shares | |
|---------------------------|-------------|--------|-------------------------------|--------|-----------------------|--------|---------|--------|
| | Total | | of which: | | | | | |
| | | | Central-government securities | | Mortgage-credit bonds | | | |
| | Denmark | Abroad | Denmark | Abroad | Denmark | Abroad | Denmark | Abroad |
| Market value, kr. billion | | | | | | | | |
| 2000 | 1,659.5 | 336.8 | 455.1 | 214.6 | 1,090.3 | 118.2 | 634.0 | 255.2 |
| 2001 | 1,787.7 | 414.6 | 443.7 | 217.1 | 1,231.8 | 194.5 | 480.5 | 231.1 |
| 2002 | 1,999.8 | 414.7 | 479.8 | 222.9 | 1,411.6 | 189.6 | 384.3 | 162.3 |
| 2003 | 2,124.2 | 419.6 | 488.2 | 210.0 | 1,523.9 | 207.9 | 488.1 | 208.6 |
| 2004 | 2,370.0 | 452.2 | 496.7 | 224.7 | 1,759.8 | 224.8 | 592.1 | 244.5 |
| Sep 04 | 2,002.2 | 463.6 | 502.8 | 264.3 | 1,387.3 | 196.9 | 568.5 | 239.6 |
| Oct 04 | 2,032.5 | 437.2 | 520.5 | 254.4 | 1,398.6 | 180.3 | 551.8 | 233.2 |
| Nov 04 | 2,018.7 | 449.5 | 485.4 | 255.8 | 1,419.1 | 191.1 | 580.3 | 245.3 |
| Dec 04 | 2,370.0 | 452.2 | 496.7 | 224.7 | 1,759.8 | 224.8 | 592.1 | 244.5 |
| Jan 05 | 2,007.8 | 446.5 | 514.4 | 210.4 | 1,382.7 | 233.5 | 610.7 | 238.0 |
| Feb 05 | 2,052.5 | 451.6 | 513.3 | 211.5 | 1,427.3 | 237.4 | 647.1 | 252.2 |

HOUSEHOLDS' FINANCIAL ASSETS AND LIABILITIES

Table 13

| End of period | Assets | | | | | Liabilities | | |
|---------------|----------------------------------|-------------|---|---|-------|-------------|----------------------|-------|
| | Currency and bank deposits, etc. | Bonds, etc. | Shares and certificates issued by investment associations, etc. | Life-insurance and pension-scheme savings, etc. | Total | Loans, etc. | Net financial assets | Total |
| | | | | | | | | |
| 1999 | 509 | 219 | 260 | 811 | 1,798 | 1,153 | 646 | 1,798 |
| 2000 | 528 | 214 | 307 | 865 | 1,913 | 1,226 | 687 | 1,913 |
| 2001 | 551 | 199 | 286 | 890 | 1,927 | 1,316 | 611 | 1,927 |
| 2002 | 579 | 191 | 285 | 931 | 1,986 | 1,401 | 585 | 1,986 |
| 2003 | 619 | 182 | 361 | 1,002 | 2,163 | 1,505 | 658 | 2,163 |
| Q3 03 | 606 | 167 | 342 | 981 | 2,097 | 1,437 | 660 | 2,097 |
| Q4 03 | 619 | 182 | 361 | 1,002 | 2,163 | 1,505 | 658 | 2,163 |
| Q1 04 | 618 | 178 | 381 | 1,040 | 2,217 | 1,493 | 724 | 2,217 |
| Q2 04 | 660 | 167 | 387 | 1,043 | 2,257 | 1,555 | 703 | 2,257 |
| Q3 04 | 668 | 164 | 401 | 1,045 | 2,280 | 1,571 | 709 | 2,280 |

COMPANIES' FINANCIAL ASSETS AND LIABILITIES

Table 14

| End of period | Assets | | | | Liabilities | | | | |
|---------------|--|-------------|---|-------|-------------|--------------------|---------------------|----------------------|-------|
| | Currency, bank deposits, and granted credits, etc. | Bonds, etc. | Shares and certificates issued by investment associations, etc. | Total | Debt | | | Net financial assets | Total |
| | | | | | Loans, etc. | Bonds, etc. issued | Shares, etc. issued | | |
| Kr. billion | | | | | | | | | |
| 1999 | 437 | 145 | 488 | 1,069 | 889 | 62 | 954 | -837 | 1,069 |
| 2000 | 468 | 152 | 662 | 1,282 | 1,032 | 79 | 1,122 | -951 | 1,282 |
| 2001 | 516 | 139 | 703 | 1,358 | 1,141 | 95 | 1,032 | -910 | 1,359 |
| 2002 | 528 | 139 | 628 | 1,295 | 1,111 | 114 | 909 | -838 | 1,296 |
| 2003 | 623 | 139 | 627 | 1,390 | 1,125 | 122 | 1,079 | -937 | 1,390 |
| Q3 03 | 549 | 131 | 645 | 1,326 | 1,110 | 128 | 1,076 | -987 | 1,326 |
| Q4 03 | 623 | 139 | 627 | 1,390 | 1,125 | 122 | 1,079 | -937 | 1,390 |
| Q1 04 | 597 | 142 | 654 | 1,394 | 1,125 | 134 | 1,121 | -986 | 1,394 |
| Q2 04 | 544 | 142 | 654 | 1,341 | 1,159 | 135 | 1,067 | -1,020 | 1,341 |
| Q3 04 | 541 | 144 | 680 | 1,365 | 1,154 | 136 | 1,095 | -1,019 | 1,366 |

Note: Companies are defined as non-financial companies.

CURRENT ACCOUNT OF THE BALANCE OF PAYMENTS (NET REVENUES)

Table 15

| | Goods (fob) | Services | Goods and services | Wages and property income | Current transfers | Total current account |
|-----------------------|----------------|----------|-----------------------|---------------------------------|----------------------|-----------------------------|
| | Kr. billion | | | | | |
| 2000 | 54.1 | 22.1 | 76.2 | -32.8 | -24.8 | 18.6 |
| 2001 | 61.7 | 25.0 | 86.7 | -25.0 | -21.6 | 40.1 |
| 2002 | 60.7 | 17.6 | 78.3 | -24.6 | -23.3 | 30.3 |
| 2003 | 63.9 | 22.4 | 86.2 | -17.1 | -23.0 | 46.1 |
| 2004 | 55.5 | 18.4 | 73.9 | -13.1 | -25.0 | 35.8 |
| Feb 03 - Jan 04 | 63.7 | 23.3 | 87.0 | -17.0 | -22.8 | 47.2 |
| Feb 04 - Jan 05 | 54.1 | 18.4 | 72.5 | -12.5 | -29.4 | 30.6 |
| Aug 04 | 3.7 | 1.7 | 5.4 | -1.0 | -2.1 | 2.4 |
| Sep 04 | 6.1 | 1.3 | 7.4 | -0.8 | -2.8 | 3.8 |
| Oct 04 | 5.4 | 1.0 | 6.4 | -1.5 | -2.2 | 2.7 |
| Nov 04 | 5.6 | 0.7 | 6.4 | -5.2 | -1.6 | -0.5 |
| Dec 04 | 3.2 | 0.4 | 3.6 | -0.5 | -2.4 | 0.8 |
| Jan 05 | 2.0 | 0.7 | 2.7 | -1.3 | -2.5 | -1.1 |

Note: As of 2005 the compilation is based on new sources and methodologies resulting in breaks in data.

PRINCIPAL ITEMS OF THE BALANCE OF PAYMENTS
(NET PAYMENTS FROM ABROAD)

Table 16

| | Current account | Capital import | | | | Other ¹ | Increase in the foreign-exchange reserve |
|-----------------------|-----------------|--------------------|--------------------|-----------------------|----------------------|--------------------|--|
| | | Direct investments | | Portfolio investments | Other capital import | | |
| | | Danish abroad | Foreign in Denmark | | | | |
| Kr. billion | | | | | | | |
| 2000 | 18.6 | -202.7 | 266.8 | -145.8 | 64.3 | -44.2 | -43.0 |
| 2001 | 40.1 | -107.9 | 92.5 | -35.3 | 7.8 | 30.3 | 27.5 |
| 2002 | 30.3 | -44.9 | 52.3 | 1.2 | 21.3 | -14.8 | 45.4 |
| 2003 | 46.1 | -8.0 | 17.8 | -98.3 | 72.5 | 0.7 | 30.8 |
| 2004 | 35.8 | 66.8 | -63.1 | -87.7 | -23.2 | 65.2 | -6.2 |
| Feb 03 – Jan 04 | 47.2 | -6.0 | 21.2 | -100.3 | 50.3 | 6.9 | 19.3 |
| Feb 04 – Jan 05 | 30.6 | 66.3 | -73.8 | -101.2 | 41.4 | 45.8 | 9.2 |
| Aug 04 | 2.4 | -0.8 | -2.2 | -21.1 | 22.3 | -0.1 | 0.5 |
| Sep 04 | 3.8 | 1.2 | 1.9 | -15.8 | 0.1 | 5.2 | -3.5 |
| Oct 04 | 2.7 | -3.6 | 7.1 | -28.6 | 4.8 | 13.7 | -3.8 |
| Nov 04 | -0.5 | 1.7 | 7.4 | -14.9 | 6.2 | -3.4 | -3.5 |
| Dec 04 | 0.8 | 0.9 | 1.0 | 15.2 | -26.7 | 8.9 | 0.1 |
| Jan 05 | -1.1 | -0.6 | -4.5 | -16.8 | 33.2 | -4.2 | 6.0 |

¹ Including capital account, errors and omissions and until end-December 2004 unrecorded trade credits.

PORTFOLIO INVESTMENTS OF THE BALANCE OF PAYMENTS
(NET PAYMENTS FROM ABROAD)

Table 17

| | Danish securities | | | Foreign securities | | Total |
|--------------|-------------------------------|--|--------|--------------------|--------|--------|
| | Krone-denominated bonds, etc. | Foreign currency denominated bonds, etc. | Shares | Bonds, etc. | Shares | |
| | | | | | | |
| 2000 | -21.3 | 47.7 | 19.3 | -78.7 | -112.8 | -145.8 |
| 2001 | -17.7 | 97.7 | 6.6 | -86.2 | -35.8 | -35.3 |
| 2002 | 8.5 | 24.0 | 4.9 | -34.8 | -1.4 | 1.2 |
| 2003 | -30.3 | 66.3 | 9.1 | -121.5 | -21.9 | -98.3 |
| 2004 | -5.6 | 56.2 | 9.7 | -104.8 | -43.2 | -87.7 |
| Aug 04 | -7.8 | -3.2 | -0.5 | -8.7 | -0.9 | -21.1 |
| Sep 04 | 5.4 | -4.2 | 0.6 | -16.7 | -0.9 | -15.8 |
| Oct 04 | -15.4 | -16.7 | 0.8 | 4.5 | -1.8 | -28.6 |
| Nov 04 | -6.0 | 15.0 | 0.9 | -22.4 | -2.4 | -14.9 |
| Dec 04 | 18.5 | 14.7 | -1.0 | -4.4 | -12.6 | 15.2 |
| Jan 05 | 13.8 | 0.9 | -1.7 | -22.1 | -7.7 | -16.8 |

Note: A negative sign (-) indicates residents' net purchase of foreign securities, or non-residents' net sale of Danish securities.

DENMARK'S INTERNATIONAL INVESTMENT POSITION

Table 18

| End of period | Direct investments | | Portfolio investments | | Other investment | The foreign-exchange reserve | Total |
|--------------------|--------------------|--------------------|-----------------------|-------------|------------------|------------------------------|-------|
| | Danish abroad | Foreign in Denmark | Shares, etc. | Bonds, etc. | | | |
| Kr. billion | | | | | | | |
| Assets | | | | | | | |
| 1999 | 358 | 22 | 387 | 151 | 603 | 225 | 1,747 |
| 2000 | 557 | 29 | 454 | 229 | 667 | 121 | 2,056 |
| 2001 | 624 | 35 | 403 | 317 | 598 | 152 | 2,130 |
| 2002 | 584 | 30 | 254 | 359 | 758 | 197 | 2,180 |
| 2003 | 579 | 32 | 310 | 446 | 747 | 228 | 2,342 |
| Q3 03 | 589 | 31 | 279 | 409 | 838 | 234 | 2,382 |
| Q4 03 | 579 | 32 | 310 | 446 | 747 | 228 | 2,342 |
| Q1 04 | 573 | 32 | 349 | 465 | 781 | 219 | 2,419 |
| Q2 04 | 515 | 32 | 352 | 470 | 767 | 229 | 2,364 |
| Q3 04 | 511 | 32 | 343 | 508 | 812 | 228 | 2,433 |
| Liabilities | | | | | | | |
| 1999 | 19 | 333 | 160 | 611 | 718 | 58 | 1,899 |
| 2000 | 26 | 564 | 218 | 646 | 816 | 3 | 2,274 |
| 2001 | 33 | 602 | 201 | 749 | 766 | 4 | 2,355 |
| 2002 | 34 | 553 | 146 | 759 | 913 | 4 | 2,408 |
| 2003 | 42 | 555 | 186 | 770 | 964 | 3 | 2,520 |
| Q3 03 | 40 | 567 | 176 | 823 | 1,004 | 3 | 2,613 |
| Q4 03 | 42 | 555 | 186 | 770 | 964 | 3 | 2,520 |
| Q1 04 | 42 | 550 | 202 | 828 | 963 | 1 | 2,586 |
| Q2 04 | 42 | 481 | 208 | 851 | 947 | 1 | 2,529 |
| Q3 04 | 42 | 478 | 220 | 839 | 1,023 | 2 | 2,603 |
| Net assets | | | | | | | |
| 1999 | 338 | -311 | 227 | -459 | -115 | 167 | -152 |
| 2000 | 531 | -535 | 236 | -418 | -150 | 117 | -218 |
| 2001 | 591 | -567 | 203 | -432 | -168 | 148 | -224 |
| 2002 | 550 | -523 | 107 | -400 | -155 | 193 | -227 |
| 2003 | 537 | -524 | 124 | -323 | -217 | 224 | -178 |
| Q3 03 | 550 | -536 | 104 | -413 | -166 | 231 | -231 |
| Q4 03 | 537 | -524 | 124 | -323 | -217 | 224 | -178 |
| Q1 04 | 532 | -519 | 146 | -363 | -182 | 218 | -168 |
| Q2 04 | 474 | -449 | 144 | -381 | -180 | 228 | -165 |
| Q3 04 | 469 | -446 | 123 | -331 | -211 | 226 | -170 |

Note: As a key principle, the market value has been used for the compilation.

GDP BY TYPE OF EXPENDITURE

Table 19

| | Final domestic demand | | | | | | Exports of goods and services | Imports of goods and services |
|--|-----------------------|---------------------|--------------------------------|-------------------------------|-----------------------|---------|-------------------------------|-------------------------------|
| | GDP | Private consumption | General-government consumption | Gross fixed capital formation | Change in inventories | Total | | |
| | | | | | | | | |
| 2000 | 1,279.0 | 610.5 | 323.4 | 258.1 | 10.9 | 1,202.8 | 563.4 | 487.2 |
| 2001 | 1,325.5 | 624.5 | 343.3 | 271.0 | 1.3 | 1,240.0 | 591.5 | 506.0 |
| 2002 | 1,360.7 | 641.9 | 358.5 | 282.7 | 0.7 | 1,283.8 | 602.7 | 525.8 |
| 2003 | 1,396.6 | 659.3 | 371.8 | 280.4 | -1.0 | 1,310.5 | 594.8 | 508.7 |
| 2004 | 1,448.5 | 694.4 | 383.7 | 294.5 | 4.0 | 1,376.6 | 628.3 | 556.4 |
| Q4 03 | 367.0 | 174.0 | 95.8 | 78.5 | -3.1 | 345.2 | 154.3 | 132.6 |
| Q1 04 | 347.8 | 167.8 | 92.6 | 66.6 | 3.0 | 330.0 | 146.7 | 128.9 |
| Q2 04 | 362.8 | 171.2 | 95.9 | 73.1 | 1.0 | 341.0 | 159.1 | 137.3 |
| Q3 04 | 358.7 | 169.9 | 96.0 | 73.0 | 3.2 | 342.2 | 159.6 | 143.1 |
| Q4 04 | 379.2 | 185.6 | 99.2 | 81.8 | -3.2 | 363.4 | 162.9 | 147.1 |
| Real growth compared with previous year, per cent | | | | | | | | |
| 2000 | 2.8 | -0.7 | 0.9 | 6.9 | ... | 2.4 | 13.5 | 13.5 |
| 2001 | 1.6 | -0.2 | 2.7 | 4.9 | ... | 1.0 | 4.4 | 3.5 |
| 2002 | 1.0 | 0.6 | 2.1 | 4.5 | ... | 1.9 | 4.8 | 7.3 |
| 2003 | 0.4 | 0.9 | 1.0 | 0.4 | ... | 0.6 | -1.6 | -1.4 |
| 2004 | 2.0 | 4.2 | 0.2 | 4.6 | ... | 3.7 | 3.8 | 7.6 |
| Q4 03 | 1.4 | 2.6 | 0.6 | 6.5 | ... | 2.8 | -2.2 | 0.5 |
| Q1 04 | 1.7 | 3.3 | 0.2 | 0.9 | ... | 2.1 | 0.7 | 1.6 |
| Q2 04 | 2.5 | 4.0 | 0.1 | 7.7 | ... | 3.5 | 6.7 | 9.3 |
| Q3 04 | 1.8 | 3.9 | 0.0 | 6.3 | ... | 5.5 | 3.9 | 12.2 |
| Q4 04 | 2.2 | 5.4 | 0.5 | 3.7 | ... | 3.7 | 3.9 | 7.5 |
| Real growth compared with previous quarter (seasonally adjusted), per cent | | | | | | | | |
| Q4 03 | 0.4 | 1.6 | 0.0 | 3.6 | ... | 2.2 | 0.1 | 3.0 |
| Q1 04 | 1.0 | 0.5 | 0.0 | -4.2 | ... | 0.4 | 1.3 | 0.1 |
| Q2 04 | 0.3 | 0.9 | 0.3 | 3.6 | ... | 0.2 | 4.9 | 5.6 |
| Q3 04 | 0.1 | 1.0 | -0.2 | 3.1 | ... | 2.6 | -2.3 | 2.8 |
| Q4 04 | 0.7 | 2.9 | 0.5 | 0.7 | ... | 0.4 | 0.3 | -1.0 |

DEVELOPMENT IN CONSUMER PRICES AND NET RETAIL PRICES

Table 20

| | Consumer-price index | | Index of net retail prices | Energy | Imports | Domestic prices | | | | |
|-------------------------------|----------------------|-----|----------------------------|--------|---------|-----------------|-------------|-------|-----------------|-------|
| | | | | | | Total | Food stuffs | Rent | Public services | IMI |
| | HICP | CPI | Weights | | | | | | | |
| | | | 1.000 | 0.080 | 0.157 | 0.764 | 0.128 | 0.232 | 0.034 | 0.370 |
| Year-on-year growth, per cent | | | | | | | | | | |
| 2000 | 2.7 | 2.9 | 3.1 | 19.5 | 4.3 | 1.7 | 2.4 | 3.1 | 3.7 | 0.1 |
| 2001 | 2.3 | 2.4 | 2.4 | -0.9 | 2.4 | 2.7 | 3.4 | 3.0 | 3.3 | 2.1 |
| 2002 | 2.4 | 2.4 | 2.5 | 0.9 | 0.4 | 3.0 | 2.0 | 2.9 | 4.5 | 3.2 |
| 2003 | 2.0 | 2.1 | 2.3 | 1.8 | 0.4 | 2.6 | 1.8 | 2.7 | 7.9 | 2.2 |
| 2004 | 0.9 | 1.2 | 1.4 | 5.0 | 0.8 | 1.2 | -0.6 | 2.2 | 4.4 | 0.6 |
| Q1 02 | 2.5 | 2.5 | 2.7 | -0.7 | 0.1 | 3.4 | 3.4 | 3.1 | 3.9 | 3.6 |
| Q2 02 | 2.1 | 2.3 | 2.3 | -0.3 | 0.5 | 2.8 | 1.6 | 3.1 | 4.5 | 2.9 |
| Q3 02 | 2.4 | 2.3 | 2.5 | -0.2 | 0.5 | 3.0 | 1.4 | 2.8 | 4.2 | 3.6 |
| Q4 02 | 2.7 | 2.6 | 2.6 | 5.1 | 0.8 | 2.7 | 1.5 | 2.6 | 5.1 | 2.9 |
| Q1 03 | 2.8 | 2.8 | 2.8 | 10.9 | 1.3 | 2.4 | 1.6 | 2.7 | 8.1 | 1.8 |
| Q2 03 | 2.2 | 2.3 | 2.4 | -0.4 | 0.8 | 2.9 | 1.7 | 2.7 | 8.6 | 2.7 |
| Q3 03 | 1.6 | 1.8 | 2.0 | -0.8 | 0.0 | 2.5 | 1.8 | 2.7 | 8.3 | 1.9 |
| Q4 03 | 1.3 | 1.5 | 1.9 | -2.3 | -0.6 | 2.7 | 2.2 | 2.7 | 6.8 | 2.3 |
| Q1 04 | 0.7 | 0.9 | 1.2 | -5.8 | -0.3 | 2.1 | 0.2 | 2.4 | 4.5 | 2.2 |
| Q2 04 | 0.8 | 1.1 | 1.4 | 5.2 | 0.0 | 1.4 | -0.3 | 2.2 | 4.0 | 1.0 |
| Q3 04 | 1.0 | 1.2 | 1.5 | 9.3 | 1.2 | 0.9 | -0.8 | 2.2 | 3.9 | 0.3 |
| Q4 04 | 1.2 | 1.4 | 1.4 | 12.5 | 2.6 | 0.3 | -1.6 | 2.2 | 5.0 | -0.9 |

Note: Weighting basis of December 2002.

The index of net retail prices is the consumer price index adjusted for indirect taxes, duties and subsidies for general price reductions.

"IMI" is a measure of domestic market-determined inflation. "IMI" is normally larger than the increase in the index of net retail prices due to an overweight of services, for which the price development is typically stronger than for other commodities.

HICP is the Harmonised Index of Consumer Prices.

SELECTED MONTHLY ECONOMIC INDICATORS

Table 21

| | Unemployment Per cent of labour force | Quantity index | | Forced sales of real property | New passen- ger car registra- tions | Con- sumer confi- dence indicator | Composite cyclical indicator for | | |
|---------------------|--|---|-----------------------------|--|---|---|-------------------------------------|--------------------------------------|---------|
| | | Manu- facturing industry ¹ 2000=100 | Retail trade 2000=100 | | | | Manu- facturing industry | Building and construc- tion | Service |
| | | | | | | | | | |
| 2000 | 5.4 | 100.0 | 100.0 | 2,584 | 113,634 | 2 | 5 | -1 | 2 |
| 2001 | 5.2 | 101.9 | 100.6 | 2,682 | 96,114 | 0 | -3 | -11 | 5 |
| 2002 | 5.2 | 102.9 | 103.6 | 3,041 | 111,598 | 1 | -4 | -14 | 5 |
| 2003 | 6.2 | 102.5 | 107.8 | 3,039 | 96,502 | 1 | -6 | -18 | -2 |
| 2004 | 6.4 | 102.1 | 113.4 | 2,640 | 122,543 | 7 | 3 | -5 | 13 |
| Seasonally adjusted | | | | | | | | | |
| Sep 04 | 6.3 | 102.0 | 113.1 | 216 | 10,864 | 7 | 1 | -2 | 17 |
| Oct 04 | 6.3 | 97.9 | 116.7 | 184 | 11,357 | 7 | 0 | -2 | 18 |
| Nov 04 | 6.2 | 100.5 | 118.4 | 197 | 11,600 | 8 | -2 | 1 | 16 |
| Dec 04 | 6.2 | 102.8 | 120.2 | 179 | 11,672 | 9 | 1 | 3 | 12 |
| Jan 05 | 6.1 | 102.7 | 116.1 | 176 | 12,281 | 10 | 3 | 2 | 10 |
| Feb 05 | ... | ... | ... | 177 | 11,028 | 10 | 4 | 2 | 16 |

¹ Excluding shipbuilding.

SELECTED QUARTERLY ECONOMIC INDICATORS

Table 22

| | Employment | | Hourly earnings | | | Property prices (purchase sum, one-family dwellings) As a percentage of property value 1995 |
|--|---------------|---------|-------------------------------|-----------------------------------|-------------------------------|---|
| | Total | Private | All sectors in Denmark, total | Manufacturing industry in Denmark | Manufacturing industry abroad | |
| | 1,000 persons | | 1996=100 | | | |
| 2000 | 2,736 | 1,917 | 118.7 | 118.3 | 113.9 | 153.0 |
| 2001 | 2,746 | 1,922 | 123.7 | 123.4 | 117.3 | 162.0 |
| 2002 | 2,741 | 1,907 | 128.5 | 128.4 | 120.7 | 168.0 |
| 2003 | 2,720 | 1,885 | 133.3 | 133.7 | 124.3 | 173.3 |
| 2004 | 2,723 | 1,886 | 137.4 | 138.0 | 127.6 | ... |
| Seasonally adjusted | | | | | | |
| Q4 03 | 2,719 | 1,883 | 135.1 | 135.6 | 125.5 | 175.2 |
| Q1 04 | 2,715 | 1,875 | 136.0 | 136.5 | 126.5 | 179.8 |
| Q2 04 | 2,727 | 1,884 | 136.4 | 137.4 | 127.4 | 186.6 |
| Q3 04 | 2,730 | 1,895 | 138.2 | 138.5 | 127.7 | 191.1 |
| Q4 04 | 2,720 | 1,889 | 138.9 | 139.7 | 128.6 | ... |
| Change compared with previous year, per cent | | | | | | |
| 2000 | 0.6 | 0.9 | 3.6 | 3.5 | 3.5 | 6.4 |
| 2001 | 0.4 | 0.3 | 4.2 | 4.3 | 3.0 | 5.9 |
| 2002 | -0.2 | -0.8 | 3.9 | 4.0 | 2.9 | 3.7 |
| 2003 | -0.7 | -1.2 | 3.7 | 4.2 | 3.0 | 3.1 |
| 2004 | 0.1 | 0.1 | 3.0 | 3.2 | 2.6 | ... |
| Q4 03 | -0.5 | -1.1 | 3.5 | 3.9 | 2.7 | 3.4 |
| Q1 04 | -0.5 | -1.0 | 3.3 | 3.5 | 2.7 | 6.0 |
| Q2 04 | 0.3 | 0.2 | 3.1 | 3.4 | 2.8 | 7.8 |
| Q3 04 | 0.6 | 0.8 | 2.9 | 3.1 | 2.5 | 9.1 |
| Q4 04 | 0.0 | 0.3 | 2.8 | 3.0 | 2.5 | ... |

EXCHANGE RATES

Table 23

| | EUR | GBP | SEK | NOK | USD | JPY | CHF |
|--------------|----------------------|----------|-------|-------|--------|--------|--------|
| | Kroner per 100 units | | | | | | |
| | Average | | | | | | |
| 2000 | 745.37 | 1,223.33 | 88.26 | 91.89 | 809.03 | 7.5081 | 478.68 |
| 2001 | 745.21 | 1,197.74 | 80.58 | 92.60 | 831.88 | 6.8522 | 493.47 |
| 2002 | 743.04 | 1,182.10 | 81.12 | 99.03 | 788.12 | 6.2969 | 506.47 |
| 2003 | 743.07 | 1,074.99 | 81.45 | 93.03 | 658.99 | 5.6840 | 488.88 |
| 2004 | 743.98 | 1,096.69 | 81.54 | 88.90 | 598.93 | 5.5366 | 481.96 |
| Sep 04 | 743.81 | 1,091.77 | 81.81 | 88.97 | 608.82 | 5.5307 | 482.03 |
| Oct 04 | 743.79 | 1,075.73 | 82.08 | 90.32 | 595.65 | 5.4703 | 482.17 |
| Nov 04 | 743.13 | 1,063.74 | 82.59 | 91.28 | 572.11 | 5.4609 | 488.39 |
| Dec 04 | 743.32 | 1,070.97 | 82.80 | 90.46 | 555.13 | 5.3456 | 484.06 |
| Jan 05 | 744.05 | 1,065.01 | 82.24 | 90.60 | 567.20 | 5.4866 | 481.00 |
| Feb 05 | 744.27 | 1,079.16 | 81.92 | 89.46 | 571.96 | 5.4512 | 480.15 |

EFFECTIVE KRONE RATE

Table 24

| | Nominal effective krone rate | Consumer-price indices | | Real effective krone rate based on consumer prices | Real effective krone rate based on hourly earnings | Consumer-price index in the euro area |
|--|------------------------------|------------------------|--------|--|--|---------------------------------------|
| | | Denmark | Abroad | | | |
| Average | 1980=100 | | | | | 1996=100 |
| 2000 | 95.6 | 219.3 | 208.3 | 100.6 | 98.6 | 106.0 |
| 2001 | 96.9 | 224.4 | 213.5 | 101.8 | 101.2 | 108.5 |
| 2002 | 97.7 | 229.9 | 217.1 | 103.5 | 103.3 | 110.9 |
| 2003 | 101.2 | 234.7 | 220.9 | 107.5 | 108.2 | 113.2 |
| 2004 | 102.2 | 237.4 | 224.4 | 108.1 | 109.8 | 115.7 |
| Sep 04 | 102.0 | 238.1 | 225.4 | 107.8 | 109.9 | 116.1 |
| Oct 04 | 102.3 | 238.8 | 225.9 | 108.1 | ... | 116.5 |
| Nov 04 | 102.8 | 238.1 | 225.6 | 108.3 | ... | 116.4 |
| Dec 04 | 103.2 | 237.7 | 226.1 | 108.2 | 110.1 | 116.9 |
| Jan 05 | 102.8 | 237.0 | 225.8 | 107.6 | ... | 116.2 |
| Feb 05 | 102.5 | 239.4 | ... | ... | ... | 116.6 |
| Change compared with previous year, per cent | | | | | | |
| 2000 | -4.1 | 2.9 | 2.3 | -3.5 | -4.0 | 2.1 |
| 2001 | 1.3 | 2.4 | 2.5 | 1.2 | 2.6 | 2.3 |
| 2002 | 0.9 | 2.4 | 1.7 | 1.6 | 2.0 | 2.2 |
| 2003 | 3.6 | 2.1 | 1.7 | 3.9 | 4.8 | 2.1 |
| 2004 | 1.0 | 1.2 | 1.7 | 0.4 | 1.5 | 2.1 |
| Sep 04 | 0.7 | 1.1 | 1.8 | 0.0 | 1.0 | 2.1 |
| Oct 04 | 0.7 | 1.7 | 2.1 | 0.3 | ... | 2.4 |
| Nov 04 | 1.4 | 1.3 | 2.0 | 0.5 | ... | 2.2 |
| Dec 04 | 1.0 | 1.2 | 2.0 | 0.0 | 0.9 | 2.4 |
| Jan 05 | 0.2 | 1.0 | 1.8 | -0.8 | ... | 1.9 |
| Feb 05 | -0.1 | 1.3 | ... | ... | ... | 2.1 |

Note: The nominal effective krone rate index is a geometric weighting of the development in the Danish krone rate against currencies of Denmark's 27 most important trading partners. However, only 25 countries are included in the calculation of consumer prices abroad and the real effective krone rate based on consumer prices and hourly earnings, respectively.

The weights are based on trade in manufactured goods in 2002.

An increase in the index reflects a nominal or a real appreciation of the krone.

Danmarks Nationalbank's Statistical Publications

Periodical publications (electronic publications)

Upon compilation of financial statistics, Danmarks Nationalbank releases these to the public in electronic publications. The publication of new statistics on a specific topic comprises 3 elements:

- **E-mail** with a brief summary, including selected key figures and links to the below-mentioned publications on the Nationalbank's website.
- **"Nyt" (News)** with text and charts to illustrate key development trends, as well as a 1-2 page tables section. The contents of the "Nyt" publications will also include in-depth commentary in order to give users greater scope to interpret and apply the statistics.
- **Tabeltillæg (Tables Supplement)** containing tables with detailed specifications and descriptions of the sources and methodologies applied in the compilation of the statistics.

The text of all tables and charts as well as the descriptions of the sources and methodologies are translated into English.

Statistics database

A statistics database supplements the above statistical publications, and comprises all time series included in the financial statistics. When a topic is published the corresponding time series are updated, and they include data as far back in time as possible.

Special Reports

In Special Reports are published statistics of a thematic character that are not prepared on a regular basis.

Release calendar

A release calendar for the statistical publications, covering the current month and the following quarter, is shown on the website.