



Danmarks  
Nationalbank

Monetary Review  
2nd Quarter

2004

D A N M A R K S  
N A T I O N A L  
B A N K 2 0 0 4



The small picture on the front cover is a section of the national coat of arms as redesigned in 2003 as the motif on the reverse of the 20-krone.

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The Monetary Review is published by Danmarks Nationalbank and is issued quarterly.

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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 February to the middle of May 2004*

### INTERNATIONAL FINANCIAL CONDITIONS

Since February it has become increasingly clear that the international economic upswing is gaining a foothold. This affected the financial markets, where focus was mainly on the employment situation in the USA. The publication of a disappointing US labour-market report in early March led to a fall in long-term US and European bond yields, cf. Chart 1. A subsequent reversal entailed significant rises in interest rates, particularly in the USA since US statistics pointed to increasing employment and inflation.

Commodity prices are still going up. Non-oil commodities began to rise in mid-2003 in response to the improved international economic prospects, and in May the IMF Non-Fuel Commodity Price Index was at the highest level seen since 1997. The oil price went up from May 2003, *inter alia* as a result of growing demand for oil all over the world, notably in

RELEASE OF US LABOUR-MARKET REPORTS AND THE YIELD ON 10-YEAR GOVERNMENT BONDS

Chart 1

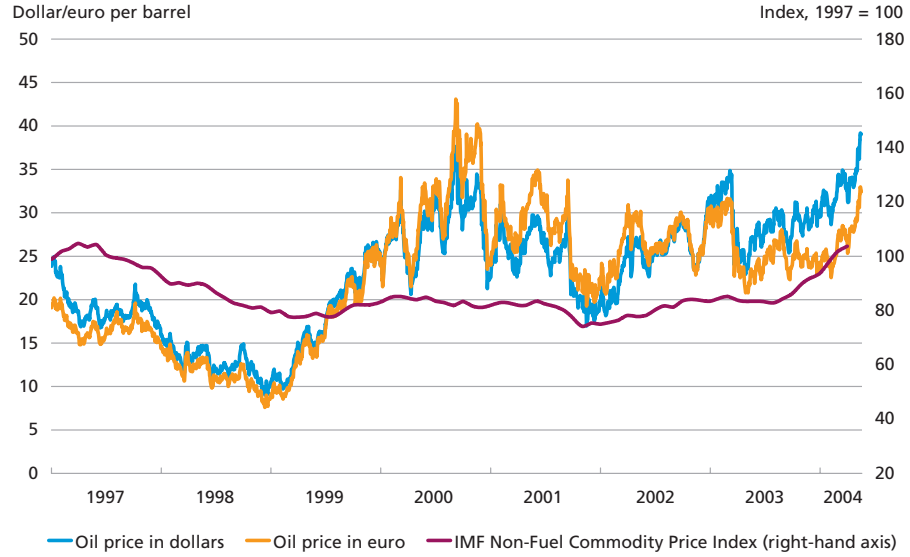


Note: Vertical lines indicate the day when labour-market reports were published.

Source: EcoWin.

COMMODITY PRICES

Chart 2

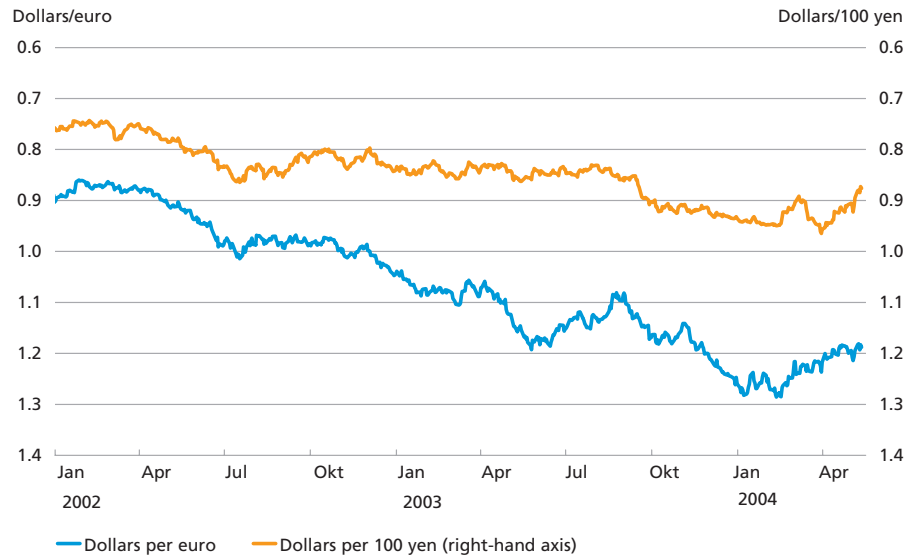


Source: EcoWin.

China, and in mid-May 2004 it was close to 40 dollars per barrel (Brent), the highest price since 2000, cf. Chart 2. The high oil price was supported by modest oil stocks in the USA, continued build-up of the USA's Strategic Petroleum Reserve, and an attempt to limit the supply of oil by re-

DOLLAR VIS-À-VIS EURO AND YEN

Chart 3



Note: An increase is an appreciation of the dollar.

Source: EcoWin.

ducing OPEC's production target. Further increases in commodity prices may dampen the economic upswing.

The communiqué from the G7 meeting in Boca Raton, USA, in February stated that excess volatility and disorderly movements in exchange rates are undesirable for economic growth. After the meeting the dollar ceased to depreciate vis-à-vis the euro and the yen. The exchange rate at the time was just over 1.29 dollars per euro and 0.95 dollars per 100 yen, equivalent to 105 yen per dollar. Subsequently the dollar appreciated against both currencies until mid-May, interrupted by a temporary fall vis-à-vis the yen in April, however, cf. Chart 3. Since mid-March the Bank of Japan has not intervened in the foreign-exchange market to prevent the yen from strengthening.

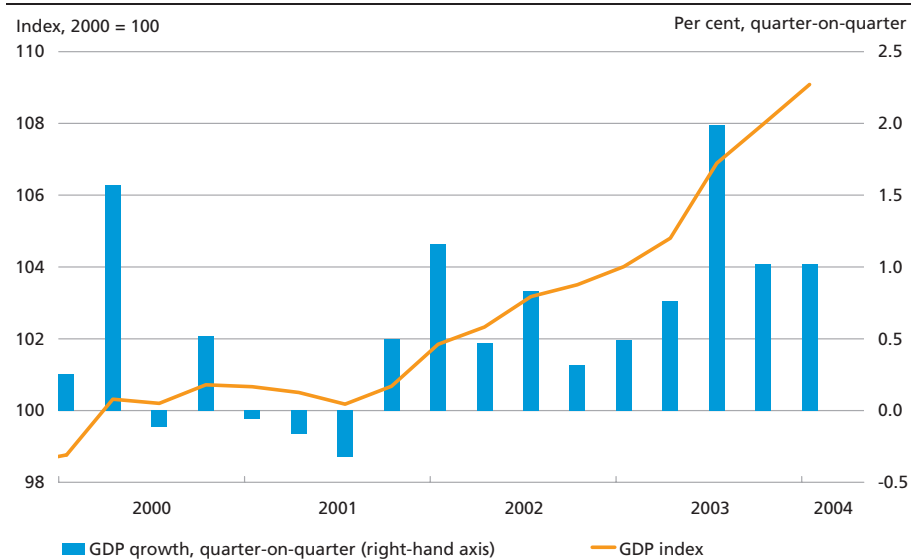
## THE INTERNATIONAL ECONOMY

### USA

At a rate of 3.1 per cent, the USA saw the highest output growth among the major industrialised countries in 2003, and the upswing in the US economy continued into 2004. In the 1st quarter, GDP in constant prices increased by 1.0 per cent over the 4th quarter of 2003, cf. Chart 4. In the last two quarters growth has to a large extent been driven by private consumption and fixed investments, but increasing exports have also contributed significantly.

GDP IN THE USA

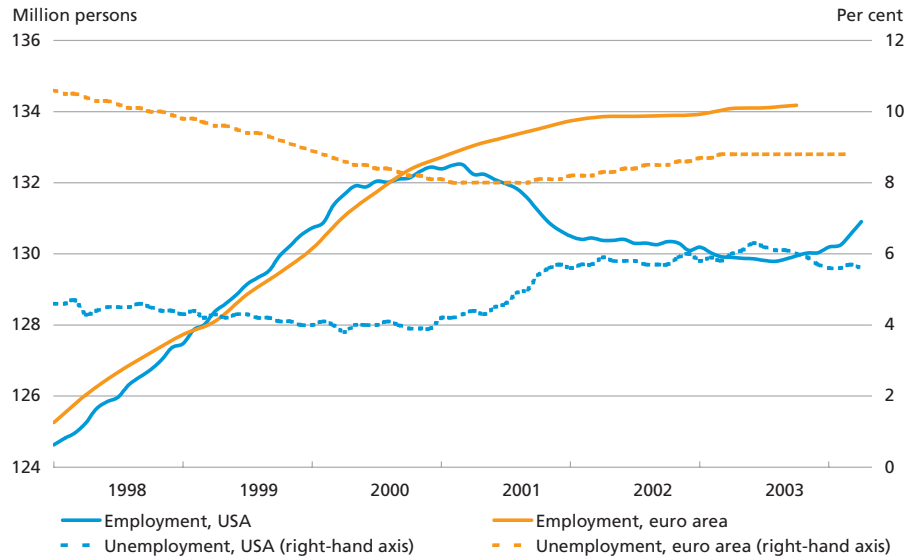
Chart 4



Source: EcoWin.

EMPLOYMENT AND UNEMPLOYMENT IN THE USA AND THE EURO AREA

Chart 5



Note: Employment in the USA is excluding agriculture ("*non-farm payroll*"), seasonally adjusted, calculated on a monthly basis by the Bureau of Labor Statistics. Employment in the euro area is the ECB's quarterly, seasonally adjusted calculation. Unemployment is compiled on a monthly basis by the Bureau of Labor Statistics and Eurostat, respectively.

Source: EcoWin.

The labour-market situation could be decisive for the development in consumption. Employment has been disappointing for a long time since the onset of the upswing, but the March figures were a positive surprise, showing an increase by more than 300,000 persons, and in April employment increased by a further 290,000 persons or so, cf. Chart 5. Higher income and more positive employment expectations may contribute to buoying up private consumption.

The US current-account deficit increased further to 4.9 per cent of GDP in 2003, against 4.6 per cent in 2002. Part of the deficit is attributable to a trade deficit vis-à-vis China, particularly since December 2001 when China joined the WTO. However, there are no indications that the falling employment in the US manufacturing sector is a result of production moving to China, cf. Box 1.

US inflation is still low, but in early 2004 there were signs that it is rising. Core inflation, i.e. price increases excluding energy and food, rose from a trough of 1.1 per cent year-on-year at the end of 2003 to 1.8 per cent in April. The declining trend seen in the past two years has thus been broken. The total consumer-price index rose by 2.3 per cent year-on-year in April.

The Federal Reserve has not changed the Fed funds target rate since it was lowered in June 2003. In terms of the difference between the long-

## ARE THE CHINESE TAKING JOBS AWAY FROM THE AMERICANS?

Box 1

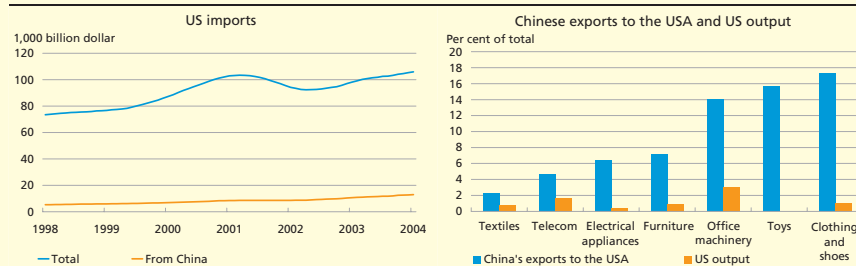
The trade deficit vis-à-vis China accounts for about one fourth of the total US trade deficit, and 18 per cent of the total deterioration of the US trade balance since 1998 is a result of the growing trade deficit vis-à-vis China. This has spurred a debate as to whether the reason for the falling employment in the US manufacturing sector is that the Chinese are taking jobs away from the Americans.

US imports from China have risen considerably in recent years, and the trend is relatively constant unlike the development in the USA's total imports, cf. Chart 6 (left-hand panel). At the beginning of 2000 imports from China constituted 7 per cent of total imports. In 2003 this share had risen to 13 per cent.

In general, the goods imported from China are not manufactured in the USA any longer. These are primarily clothes and shoes, toys and office machinery, which only account for a modest proportion of US output, cf. Chart 6 (right-hand panel). This indicates that the increased imports from China have superseded imports from other countries, e.g. other developing countries in Asia, not US output.

## OUTPUT AND IMPORTS IN THE USA

Chart 6



Note: 12-month moving averages (left-hand chart). Chinese export data are for the first five months of 2003, while the US output figures are for 2002 (right-hand chart).

Source: EcoWin and UBS.

term interest rate and the monetary-policy interest rate, monetary policy has been increasingly expansionary, cf. Chart 7. The statement from the Federal Open Market Committee, FOMC, after its May meeting prepared the markets for a gradual tightening of monetary policy, cf. Box 2, and

## EXCERPTS OF THE PRESS RELEASES FROM THE TWO LATEST FOMC MEETINGS

Box 2

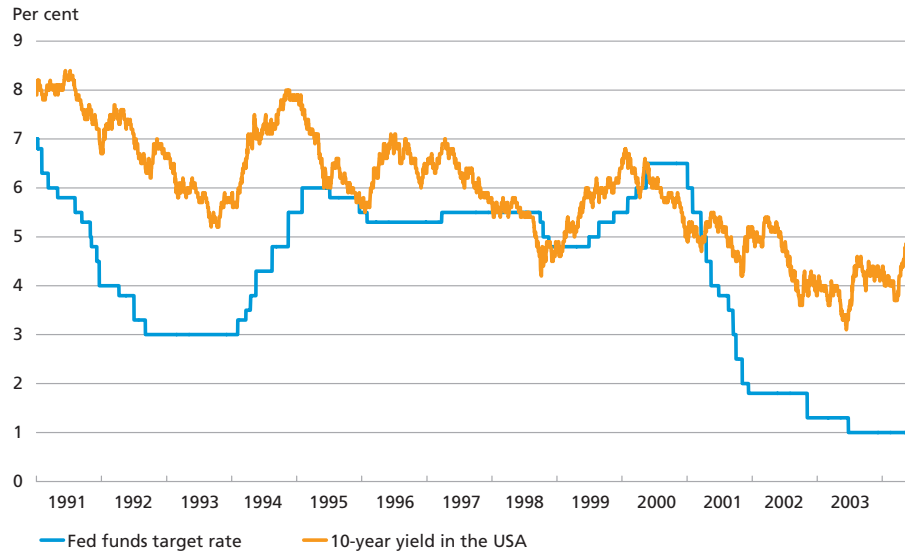
Excerpt of the press release from the FOMC meeting on 16 March: "The probability of an unwelcome fall in inflation has diminished in recent months and now appears almost equal to that of a rise in inflation. With inflation quite low and resource use slack, the Committee believes that it can be patient in removing its policy accommodation."

Excerpt of the press release from the FOMC meeting on 4 May: "...the risks to the goal of price stability have moved into balance. At this juncture, with inflation low and resource use slack, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured."

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**MONETARY-POLICY INTEREST RATE AND LONG-TERM YIELD IN THE USA  
1991-2004**

Chart 7



Source: EcoWin.

the course of the money-market interest rates indicates that the markets expect the Federal Reserve to raise the Fed funds target rate during the summer.

### Japan and the rest of Asia

The trend in Japanese output and demand reversed at the beginning of 2002, and in 2003 GDP increased by 2.7 per cent over the preceding year. This was the highest rate seen since 2000. Growth was driven by exports and investments, but towards the end of 2003 private consumption also rose. The upswing continued into 2004. In the 1st quarter of 2004, GDP was 1.4 per cent higher than in the preceding quarter.

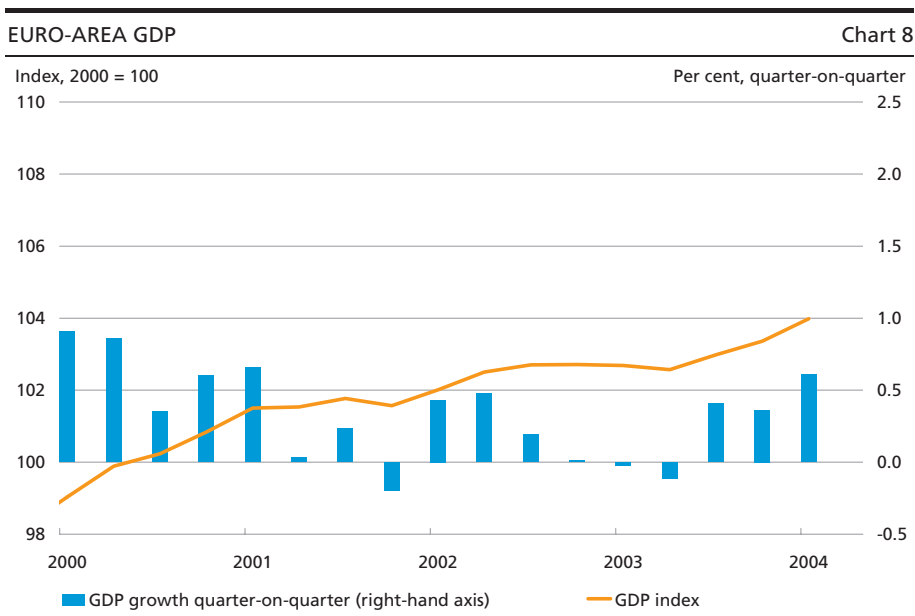
Japanese exports in constant prices rose by 10 per cent in 2003. Half of this increase is attributable to exports to China. In constant prices, exports to China rose by 41 per cent and exports to the EU rose by 14 per cent, while exports to the USA fell by 6 per cent in 2003.

In 2003, non-Japan Asia accounted for 25 per cent of global GDP in terms of purchasing-power parity, corresponding to 10 per cent in terms of current exchange rates, and it accounted for 19 per cent of total global trade in goods and services<sup>1</sup>.

Growth in output and demand in China, India and the rest of non-Japan Asia in 2003 reached the highest level seen since the crisis in 1996-

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<sup>1</sup> IMF, *World Economic Outlook*, April 2004.



Source: EcoWin.

97. In most countries growth was driven by domestic demand as well as exports and supported by expansionary macroeconomic policies and lower effective exchange rates. China's GDP increased by 9 per cent in 2003, and by almost 10 per cent year-on-year in the 1st quarter of 2004. There were indications of overheating, i.e. overinvestment in some sectors, bottlenecks in others and generally rising inflation, albeit from a low level. In India, GDP rose by 7 per cent in 2003.

### The euro area

From mid-2003 there were more marked signs of an upswing in the euro area. GDP rose in both the 3rd and 4th quarters, but in spite of the improvement in the 2nd half of the year, GDP only increased by 0.4 per cent for the year as a whole. While exports were the main factor contributing to growth in the 3rd quarter, the key driver in the 4th quarter was domestic demand, but not private consumption, which remained more or less unchanged. Improved retail sales and consumer confidence at the beginning of 2004 are seen as indications that private consumption is rising, which is a prerequisite of a stronger and more sustained upswing in the euro area. Preliminary figures show an increase in GDP in the 1st quarter of 2004 by 0.6 per cent over the preceding quarter. This is the highest growth rate for several years, cf. Chart 8.

Contrary to expectations, full-year exports for 2003 remained more or less unchanged, possibly as a result of the strengthening of the euro vis-

In the last three years forecasts for the euro area have generally been too optimistic, and downward adjustment has been necessary from time to time. This also applies to the OECD's forecasts, which were close to the consensus estimates for GDP growth in 2001-03. The detailed OECD forecasts make it possible to find out what went wrong. On the basis of the national accounts, the GDP error can be split into contributions from erroneous estimates of the individual demand components.

The starting point is the OECD's autumn forecast finalised in November of the preced-

ing year. Chart 9 (top) shows that on average the GDP estimate was more than 1 percentage point too optimistic in 2001-03. As the Chart shows, the expected growth contribution from private domestic demand, above all investments, did not materialise. Net exports, on the other hand, were almost as expected.

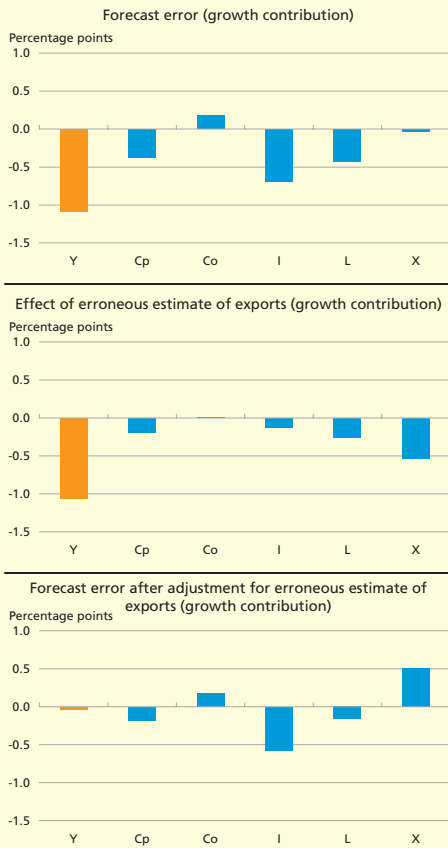
Lower-than-expected investments result in lower imports and thus better net exports. The fact that net exports were as expected while investments and imports were lower implies that exports have actually been disappointing. The impact on GDP, imports and domestic demand of lower exports (corresponding to the difference between the OECD's forecast for exports and the actual development in exports), all other things being equal, is calculated using the macroeconomic model NiGEM and shown in Chart 9 (middle). It is seen that lower-than-expected exports not only result in lower GDP growth, but also lower private consumption and investments.

If this effect is subtracted from the forecast error, we get the error not attributable to the export error, cf. Chart 9 (bottom). It is seen that the disappointing exports fully explain the GDP error. After adjusting for the export error, fixed investments in particular are still overestimated, but

the GDP impact of this error was offset by the lower-than-expected imports, and net exports were therefore estimated at too high a level.

### THE OECD'S FORECAST FOR THE EURO AREA 2001-03

Chart 9



Note: Annual averages. Errors are actual less expected, expressed as percentage points. Blue bars indicate errors in growth contributions from demand components. Y=GDP, Cp=private consumption, Co=public consumption, I=fixed investments, L=stockbuilding, X=net exports.

Source: OECD, Economic Outlook, various issues and own calculations.

à-vis the dollar. Economic forecasts for the euro area have been too optimistic for the last three years. An analysis of the OECD's forecasts for 2001-03 shows that the reason is partly that expected exports were overestimated and partly that the investment estimates were on the optimistic side, cf. Box 3.

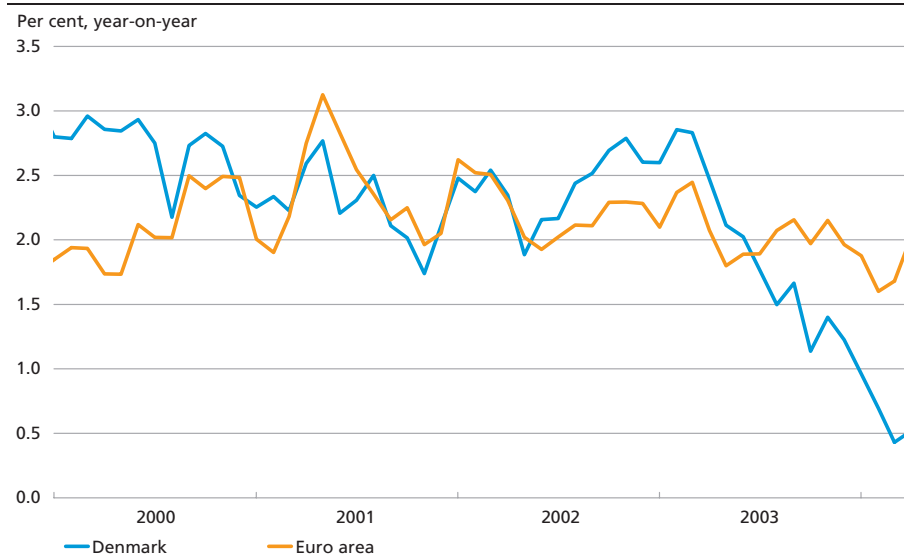
During the slowdown in the past three years, the euro-area employment curve has been relatively flat, and unemployment has risen by approximately 0.5 percentage points. In comparison, 2.5 million jobs were lost in the USA, 0.5 million of which have been regained since the beginning of 2004, and unemployment has risen by 2 percentage points, cf. Chart 5. The flat employment curve in the euro area may indicate that owing to e.g. legislation and labour-market structures employment does not react in the same way as in the USA. Business enterprises have retained their employees even though output has stagnated. The impact of an upswing on employment may turn out to be equivalently limited.

In early 2004 unemployment rose in Germany, but remained more or less unchanged in the other major euro area member states. The weak labour market means that the prospects of growth in domestic demand are only moderately positive.

According to the European Commission's spring forecast, the group of euro area member states exceeding the budget-deficit limit of 3 per cent of GDP stipulated in the EU Treaty will be expanded to include France, Greece, the Netherlands, Italy, Portugal and Germany in 2004. A decision

INFLATION IN THE EURO AREA AND DENMARK

Chart 10



Note: Indices are the Harmonised Index of Consumer Prices, HICP.

Source: EcoWin.

by the European Court of Justice concerning the excessive deficit procedure for Germany and France in 2002 is expected in mid-2004<sup>1</sup>.

Euro area inflation, measured as the annual growth in HICP, increased to 2.0 per cent in April, cf. Chart 10. Core inflation was 1.9 per cent year-on-year and has been stable at around this level since mid-2003. The ECB aims for inflation below, but close to 2.0 per cent. The ECB has not changed its monetary-policy interest rate since it was lowered in June 2003, and money-market interest rates do not indicate that market participants expect monetary-policy changes in the coming months.

## **UK**

The UK economy performed better than expected towards the end of 2003 with sound growth in all demand components, including exports. Preliminary figures show GDP growth of 0.6 per cent in the 1st quarter of 2004 compared to the preceding quarter.

From mid-April the pound sterling depreciated vis-à-vis the euro, but in mid-May it was nevertheless just over 3.5 per cent higher than at the start of the year. In relation to the dollar, sterling already started to depreciate in mid-February, and in mid-May it had returned to the level at the beginning of the year, while the effective exchange rate was just over 3 per cent higher.

According to the Treasury, the UK exceeded the budget-deficit limit of 3 per cent of GDP stipulated in the EU Treaty in the fiscal year 2003-04.

Inflation in housing prices continues to be high and in April the Halifax index stood 21 per cent higher than a year earlier. On 6 May the Bank of England raised its interest rate by 0.25 per cent to 4.25 per cent with reference to increasing pressure on the economy and thus increasing risk of higher inflation in the future. Inflation in terms of HICP has been on the low side of 1.5 per cent year-on-year in the past year and fell to 1.2 per cent in April. The target is 2 per cent.

In April the Treasury was due to publish an updated assessment of whether the UK meets the British government's five tests for euro area membership, but it was decided to postpone the assessment until next year.

## **Sweden**

GDP growth in Sweden was 1.7 per cent in 2003. The rise in output and demand accelerated towards the end of the year, mainly driven by private consumption. For the full year 2003 exports also rose fairly substantially, at an average of just over 6 per cent in volume terms.

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<sup>1</sup> Cf. the article The Stability and Growth Pact – Status 2004, pp. 69ff.

The UN1X consumer-price index excluding energy rose by 0.8 and 0.9 per cent year-on-year in March and April, respectively, against 1.1 per cent in January. Sveriges Riksbank lowered its repo rate by 0.5 per cent to 2.0 per cent on 7 April since there were indications that inflation would otherwise fall below the 2-per-cent target in two years.

### **Norway**

GDP growth in mainland Norway was 0.7 per cent in 2003. Towards the end of the year growth increased in both private consumption and exports of traditional goods excluding oil.

Consumer prices were falling, i.e. inflation was negative, at the beginning of 2004. However, the fall subsided in March, and in April prices were 0.4 per cent higher than in the preceding year. Core inflation, excluding energy and indirect taxes, was 0.2 per cent in April. Norges Bank lowered its sight-deposit rate by 0.25 per cent to 1.75 per cent on 12 March to prevent inflation from falling below the 2.5-per-cent target in two years.

### **The new EU member states**

Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia joined the EU on 1 May. The economies of these 10 countries are characterised by sound growth in output and demand in spite of the sluggishness in the EU. Overall GDP growth in the new EU member states was 3.6 per cent in 2003, primarily driven by an upswing in the largest economy, Poland.

In nearly all the new member states the upswing goes hand in hand with increasing balance-of-payments deficits, in several cases from an already high level. This development partly reflects strong domestic demand, particularly high investments, partly weak demand in the new member states' export markets, primarily the "old" EU, where they are, nevertheless, still gaining market shares.

Most of the new member states have seen expansionary fiscal policy and increasing budget deficits in recent years and are now trying to reverse this development. Inflation is either low or falling in most of the new member states. In Hungary, however, inflation rose until February, but has subsequently declined a little, to 6.9 per cent year-on-year in April.

After the accession of the 10 new member states to the EU, some of them can be expected to apply for membership of the Exchange Rate Mechanism, ERM II, in the near future<sup>1</sup>.

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<sup>1</sup> Cf. the article The 2004 enlargement of the EU, pp. 23ff.

## DANISH FINANCIAL CONDITIONS

The krone strengthened marginally vis-à-vis the euro in March and April, and in mid-May the exchange rate was kr. 7.44 per euro, slightly stronger than the central rate of kr. 7.46038 per euro. In January and February, Danmarks Nationalbank sold foreign exchange for kr. 16.8 billion with a view to cushioning the fluctuations in the krone rate. In March and April, Danmarks Nationalbank purchased foreign exchange for kr. 1.8 billion.

The krone-rate fluctuations and Danmarks Nationalbank's interventions are mainly attributable to purchases of securities by residents and non-residents. The weakening of the krone in the first months of 2004 should be seen in the light of significant net purchases of foreign securities by Danish investors, primarily pension companies. The first months of 2004 also saw net sales of Danish krone-denominated bonds by non-residents. Subsequently, this trend reversed and net purchases were seen.

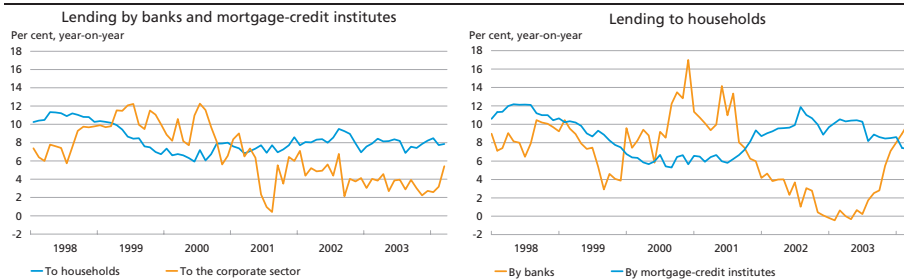
Danmarks Nationalbank has not changed its interest rates since June last year, when the lending rate was lowered to 2.15 per cent, 0.15 percentage points above the ECB's minimum bid rate. The current-account rate and discount rate are 2.0 per cent. In mid-May the interest-rate differential between Denmark and the euro area in the money market, irrespective of maturity, was 10-15 basis points, i.e. close to the differential between the monetary-policy interest rates in Denmark and the euro area.

Throughout the period Danish bond yields have been 17-19 basis points higher than the German ones, measured as the yield on 10-year government bonds.

Lending by banks and mortgage-credit institutes to households has shown an annual growth rate of approximately 8 per cent since the end of 2001, cf. Chart 11. This is somewhat stronger than the growth in con-

LENDING BY BANKS AND MORTGAGE-CREDIT INSTITUTES

Chart 11



Note: Including lending by foreign branches of banks.

Source: Danmarks Nationalbank.

sumption, implying an expansion of liquidity. Growth in the money stock, measured as M2, has been around 8-9 per cent in recent months. Thanks to the households' sound liquidity and rising disposable incomes it will not be a problem to finance increased private consumption in the near future.

Lending by banks and mortgage-credit institutes to the corporate sector, including lending to non-financial corporations, which account for most of the business investments, increased by more than 5 per cent year-on-year in March after having risen by 2-4 per cent since end-2002.

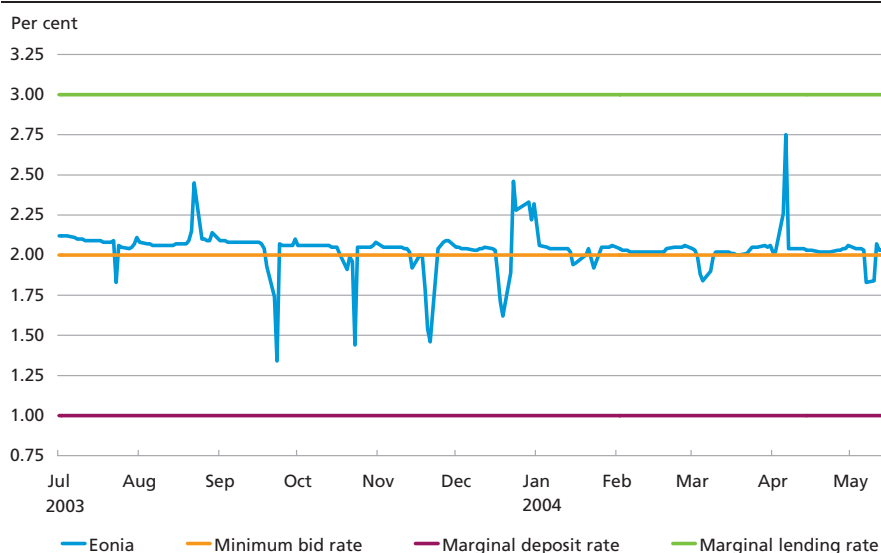
Growth in lending by mortgage-credit institutes to households has for some years been higher than growth in lending by banks to households, but in recent months growth in the banks' lending to households has exceeded that of the mortgage-credit institutes, cf. the right-hand panel of Chart 11. New loan products are a contributing factor.

At the end of the 1st quarter of 2004 private individuals' deferred-amortisation loans from mortgage-credit institutes amounted to kr. 86 billion, equivalent to approximately 10 per cent of their total mortgage-credit loans. Most of the deferred-amortisation loans are adjustable-rate loans.

On 9 March 2004 the ECB switched to loans with a maturity of 7 days in its weekly main refinancing operations. The transition to the shorter maturity of the monetary-policy loans did not cause any problems, and

THE ECB'S INTEREST RATES AND THE OVERNIGHT INTEREST RATE IN THE EURO AREA

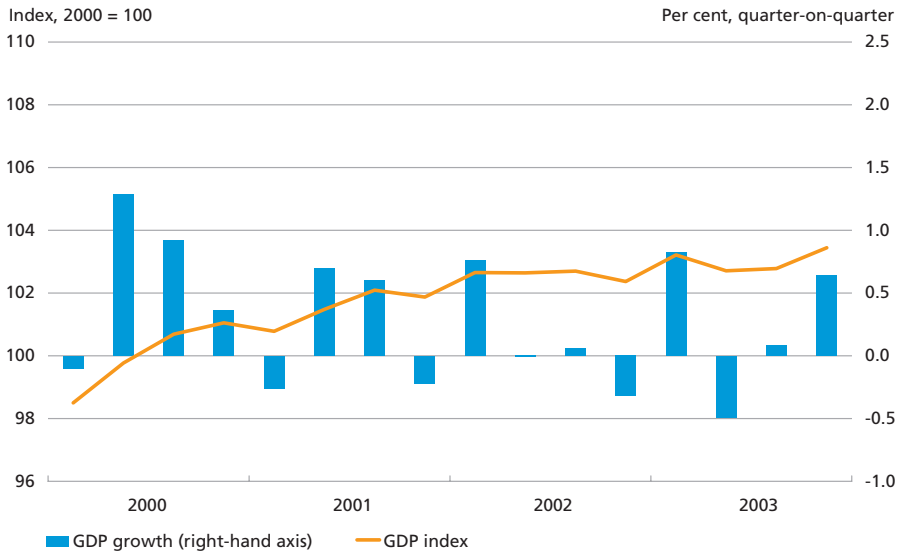
Chart 12



Source: EcoWin.

## GDP IN DENMARK

Chart 13



Source: EcoWin.

the euro overnight index average (Eonia) remained close to the minimum bid rate after the transition, cf. Chart 12. In early April Eonia was briefly somewhat higher than the minimum bid rate in connection with the expiry of the reserve maintenance period, but such fluctuations are normal<sup>1</sup>. Fluctuations are, however, limited by the interest-rate corridor, consisting of the ECB's marginal deposit and lending facilities. The change in the ECB's lending instruments has not given rise to any change in the Danish instruments, cf. Danmarks Nationalbank, Report and Accounts 2003, p. 34.

## THE DANISH ECONOMY

The revised national accounts for Denmark showed an increase in GDP by 0.4 per cent in 2003. GDP decreased in the 2nd quarter, but rose in the 3rd quarter and particularly the 4th quarter, cf. Chart 13. Activity was fuelled by domestic demand, with private consumption accelerating towards the end of the year to an increase in the 4th quarter of 1.9 per cent over the preceding quarter after lower increases in the 2nd and 3rd quarters.

<sup>1</sup> The reason why Eonia deviates from the minimum bid rate at the end of the reserve maintenance period is that the overnight interest rate after the last weekly liquidity allotment in a reserve maintenance period varies with the liquidity conditions in the money market.

Exports of goods and services in constant prices were more or less unchanged in 2003. The rise in imports became more marked in the 4th quarter of 2003, at 2.6 per cent quarter-on-quarter. Foreign-trade statistics show that particularly imports for the corporate sector have increased strongly since the spring of 2003, and this trend has continued into 2004. Imports for consumption excluding cars were flat throughout most of 2003, but began to rise towards the end of the year, and this trend has continued into 2004.

The indications of a current upswing are supported by the development in unemployment figures, which showed a fall by 5,400 from end-2003 to March 2004 (seasonally adjusted). This is partly a result of activation of the unemployed, but presumably also reflects increasing employment.

The upswing in the Danish economy came later than expected, as was the case in the euro area. The reason is slow development in both private consumption and exports. Exports were negatively affected by weak demand in the euro area, but also by the strengthening of the effective exchange rate of the krone and by Danish wage increases, which have for some years been more than 1 per cent higher than in our trading partner countries.

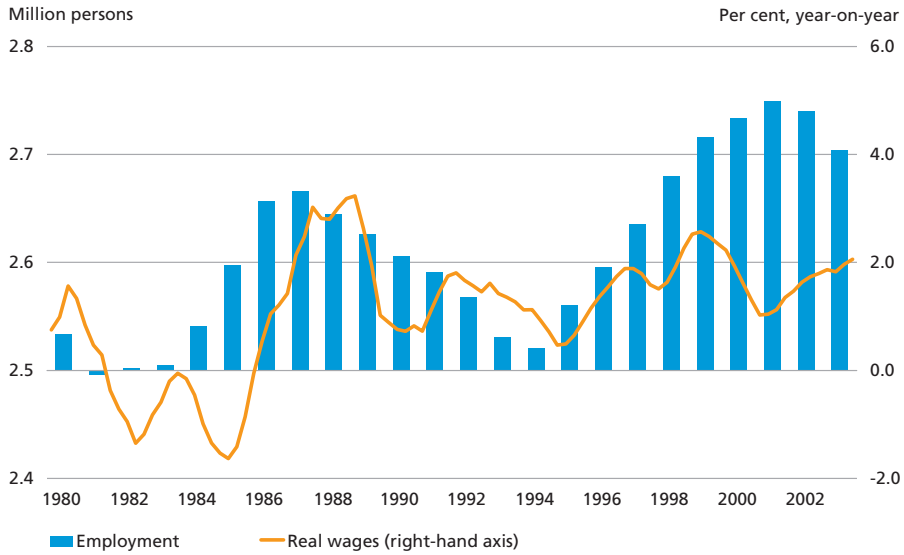
New 3-year collective agreements have been concluded for the major part of the private labour market. It cannot be said with certainty how wage costs will develop, since this will mainly depend on the local wage negotiations in the individual workplaces. Assessed on the basis of the collective agreements that include wage rates, the so-called normal wage area, wage increases will be lower than in recent years, presumably in the interval 3-3.5 per cent annually.

Since the mid-1980s real wages have risen by approximately 1.5 per cent annually on average, almost irrespective of the job situation, cf. Chart 14. Higher real wages give business enterprises an incentive to substitute capital for labour, and the effect on employment will typically lag. The expected more subdued wage development may boost employment in the years to come.

On 16 March the Danish government presented a number of measures to ensure higher employment, known as the spring package. The key elements of the government initiative were: suspending the special pension contributions in 2004 and 2005, bringing forward income-tax cuts from 2005-07 to the current year, bringing forward government investments, and launching initiatives to activate the unemployed. Suspending the special pension contributions initially lowers private savings and increases the households' disposable income after pension contributions. At the same time, the tax base is increased, which partially finances the

EMPLOYMENT AND INCREASE IN REAL WAGES IN DENMARK 1980-2003

Chart 14



Note: Real wages are quarterly, 8-month moving averages.  
Source: EcoWin.

other elements of the spring package. The effect of the package on the government budget is therefore expected to be limited, while the impact on activity will depend on the extent to which the increased disposable income is spent on consumption. Denmark's Nationalbank's comments on the spring package appear from Box 4 and from Governor Bodil Nyboe Andersen's speech at the annual meeting of the Association of Danish Mortgage Banks on 29 April. The speech can be found on pp. 135ff.

A delegation from the IMF visited Denmark in March in connection with the regular consultations. In its concluding statement the delegation emphasised, *inter alia*, that discretionary counter-cyclical policy should be kept as an exceptional response to avoid creating an expectation of fine tuning and short-term fixes that could weaken the effectiveness of the medium-term fiscal framework. The delegation expressed its satisfaction with the medium-term orientation of economic policy in Denmark<sup>1</sup>.

### Prices

Since mid-2003 inflation, measured as the annual increase in the Harmonised Index of Consumer Prices, HICP, has been lower in Denmark

<sup>1</sup> The conclusions can be found at Denmark's Nationalbank's website: [www.nationalbanken.dk](http://www.nationalbanken.dk).

than in the euro area. Until March inflation showed a falling trend, but April saw an increase in inflation to 0.5 per cent year-on-year, 1.5 percentage points below the inflation in the euro area, cf. Chart 10.

Core inflation in Denmark, measured as the consumer-price index excluding energy, food, tobacco and alcohol, has been declining since mid-2003, but is still higher than in the euro area. The index is affected by import prices and indirect taxes and does not necessarily give a clear indication of the domestically determined price pressure. The latter is also known as domestic market-determined inflation, IMI. For a definition of IMI, see Box 5. IMI reflects Danish consumer prices stripped of indirect taxes, so-called exogenous factors and import prices. In recent months IMI has been relatively stable with increases on the high side of 2 per cent year-on-year, but it fell to 1.5 per cent in April. Currently there is thus no significant price pressure of domestic origin in the economy.

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DANMARKS NATIONALBANK'S COMMENTS ON THE SPRING PACKAGE

Box 4

At the press conference on 17 March in connection with the publication of Danmarks Nationalbank's Report and Accounts 2003 Governor Bodil Nyboe Andersen said:

"As can be seen from the Report and Accounts, Danmarks Nationalbank finds that there is no pressing need to implement measures to adjust economic developments. Fiscal policy is already slightly expansionary, interest rates are historically low, and most observers share the view that an upswing is in the making.

Although the unemployment rate is still low, both by international comparison and in a historical Danish perspective, it is on the increase.

The widespread political view is therefore that further relaxation of fiscal policy is needed.

Denmark's economic situation is robust with a government surplus, a considerable current-account surplus, a stable exchange rate of the krone and low inflation. Against this background we have to acknowledge that today the economic scope for relaxing fiscal policy exists.

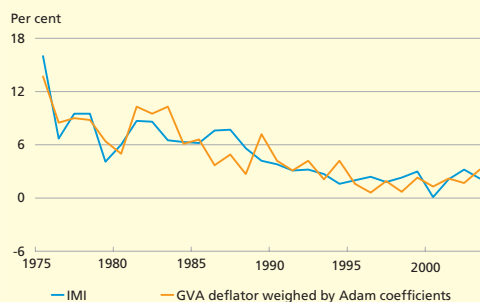
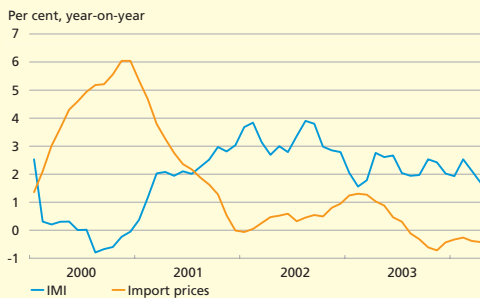
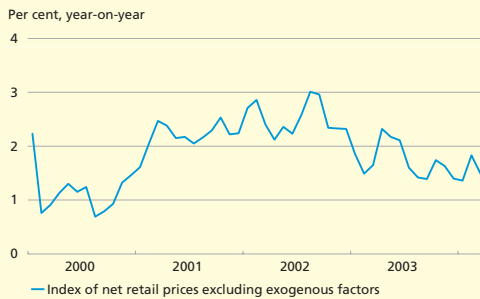
The government's plan may turn out to be too expansionary – it is too early to assess. However, especially in this light it is important that the plan applies a combination of temporary measures and bringing-forward of already adopted relaxations. It is essential to maintain the medium-term objective of expanding the supply of labour, limit the increase in public expenditure and reduce the government debt."

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The starting-point for determining domestic market-determined inflation in Denmark is the index of net retail prices, i.e. the consumer-price index adjusted for indirect taxes and subsidies. By removing components which are not fully determined by conditions in the domestic market, e.g. food and energy, from the index of net retail prices, we get an expression of Danish core inflation: the index of net retail prices excluding exogenous factors.

INDEX OF NET RETAIL PRICES,  
IMPORT PRICES, GVA DEFLATOR  
AND IMI

Chart 15



Source: EcoWin, Statistics Denmark and own calculations.

*inter alia*, indirect taxes, exogenous factors and import prices, i.e. the index resembles the deflator for gross value added, GVA, applied in the national accounts, cf. the co-variation between the IMI and the GVA deflators for the sectors supplying goods and services for private consumption, cf. Chart 15 (bottom).

ogenous factors. The development in this index is shown in Chart 15 (top).

The index of net retail prices less exogenous factors such as food and energy is affected by changes in import prices, which may play a relatively important role in the price developments of a small, open economy such as the Danish one. To get an impression of the underlying inflation that we have brought about "ourselves" an index of the domestic market-determined inflation, IMI, is calculated. This is done by eliminating the impact of import prices from the index of net retail prices excluding exogenous factors using input/output coefficients. The residual describes the domestic market-determined prices. The development in IMI is shown in Chart 15 (middle), and is compared with the development in import prices.

As a result of fluctuating import prices and sluggishness in net retail prices, the IMI is more volatile than the index of net retail prices. Fluctuations in import prices initially have the opposite impact on the IMI since business enterprises lower their profits in the short term. The impact on domestic prices is not really seen until some months later.

The IMI index reflects Danish consumer prices stripped of,

## DEVELOPMENT OF THE PAN-EUROPEAN PAYMENT SYSTEM - TARGET2

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The preparation of the new pan-European payment system is approaching the phase in which its functionality will be determined and decided upon. At a meeting with the European banking sector on 1 April 2004 the proposed functionality of the new system, which the central banks of France, Italy and Germany have offered to develop, was discussed. As a follow-up on this meeting the banks were asked to submit any comments and requests for new or changed functionality by 31 May 2004.

### Background

The current Target came into force on 1 January 1999 and was established in order to ensure swift and safe cross-border payments in euro between the EU member states, including handling the ECB's monetary-policy transactions. The system is primarily intended for transfers of large-value payments, but is also widely used for retail payments. To save time, a fully decentralised solution was chosen rather than a centralised system designed from scratch. The solution chosen consisted in linking the existing national real-time gross settlement (RTGS) systems via an interlinking module. In an RTGS system, payments are settled individually and instantly.

Ever since the launch of Target, various models for a second-generation Target have been discussed. However, it proved to be difficult to reach agreement on a specific model since the central banks took very different approaches to the degree of centralisation.

At a meeting in October 2002, the ECB's Governing Council made a strategic decision on the elements of the next-generation Target, known as Target2. The background to this decision was, *inter alia*, that users perceive the services offered under the current decentralised structure as very heterogeneous across national borders. In addition, cost-effectiveness is low for the system as such. Finally, it is doubtful whether the current system will be able to meet the future challenges, including the enlargement of the EU.

### Target2

The strategic decision entails that the continuing national subsystems will be supplemented with a common platform which central banks, including those in the non-euro area member states, may choose to use. In the first three years of Target2, this will be the only common platform. After this period, the individual central banks may decide to continue with their own platforms, join the existing common platform, or

create a new platform that can be shared with other central banks. The common platform will be structured in such a way that each national central bank joining this platform can maintain its customer relations with its "own" credit institutions in connection with e.g. monetary-policy operations.

Target2 will provide a far more harmonised service level than the current structure. A wide range of core services to be offered by all central banks must be defined. These standard services will have a common price structure for both domestic and cross-border payments. The common price will be defined on the basis of the national RTGS system entailing the lowest costs per transaction, and any subsidy going beyond an acceptable public-good factor must be phased out by the end of the fourth year after the commissioning of Target2.

To ensure that Target2 meets the users' requirements, a statement of the principles for and structure of Target2 was published for public consultation in December 2002.

In July 2003 the central banks of Germany, Italy and France announced that they would jointly develop a new system as the new common platform for Target2, to be implemented on 1 January 2007. The proposal represents a compromise between two extremes, viz. constructing a new system from scratch and using an existing system. The aim is thus to integrate elements of each of the three central banks' current RTGS systems, i.e. the building-block principle. The advantages are that costs are kept low and that the development time for the common platform is shortened.

### **The common platform**

The common platform will have a modular structure, which is also seen in other systems, including Denmark's Nationalbank's own RTGS system, Kronos. Some modules will be mandatory for the participating central banks, while others will be optional. Direct or indirect participation in the platform will be possible. Direct participants will have an RTGS account on the platform, from which payments are effected. Indirect participation in the common platform will be possible via a direct participant, including a central bank. Indirect participants will be registered on the platform, but will not have their own RTGS accounts. All communication between the direct participants and the common platform will take place via SWIFT. Ancillary systems such as VP and the Sumclearing may opt to settle participants' positions on the common platform. This will be possible via a special interface allowing a choice of different settlement models. Collateral handling will still be a national issue.

The common platform will offer participants a wide range of facilities for liquidity management, including prioritisation of payments, reservation of liquidity and setting of bilateral and multilateral limits vis-à-vis other participants. Participants will also be able to determine a specific time or period when a given payment is to be effected. There will be a queue for each type of prioritisation. The system will operate with various liquidity-saving mechanisms that will continuously attempt to settle queued payments taking into account the reservations and limits imposed.

The common platform will include an information and control module via which participants can monitor liquidity on their RTGS accounts, view ingoing and outgoing payments in the queues and change priorities, reservations and limits, etc.

The common platform will be operated in Germany and Italy on a rotation basis. Presumably the region will be changed every six months. The region not operating the system will act as the back-up region. In each of the two regions a primary and a secondary operations centre will be established, and the two operations centres will have real-time data mirroring. Interregional real-time data mirroring cannot be guaranteed owing to the geographical distance. If both centres in a region fail, operations are scheduled to be resumed within two hours.

### **The future work**

In principle there may be other candidates for the common platform, but it is taken for granted that the proposal from the three central banks will also be the final bid for a common platform. The common platform has extensive support from the other EU central banks, and it is likely that they will all join the platform and thus phase out their respective national RTGS systems as regards euro payments. Target2 will thus become a single-platform system.

As mentioned above, the three central banks expect the platform to be ready by 1 January 2007. According to the plan, detailed functional and technical specifications will be prepared in 2004, and 2005 will be reserved for developing the platform. In 2006 it will be tested and implemented. For the central banks choosing to join the common platform, it will also be necessary to make a number of adjustments to the national payment infrastructures. Danmarks Nationalbank is currently analysing the consequences to the Danish payment infrastructure of transferring to the common platform. This is done in an ongoing dialogue with the financial sector.



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# The 2004 Enlargement of the EU

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*Governor Jens Thomsen*

## INTRODUCTION

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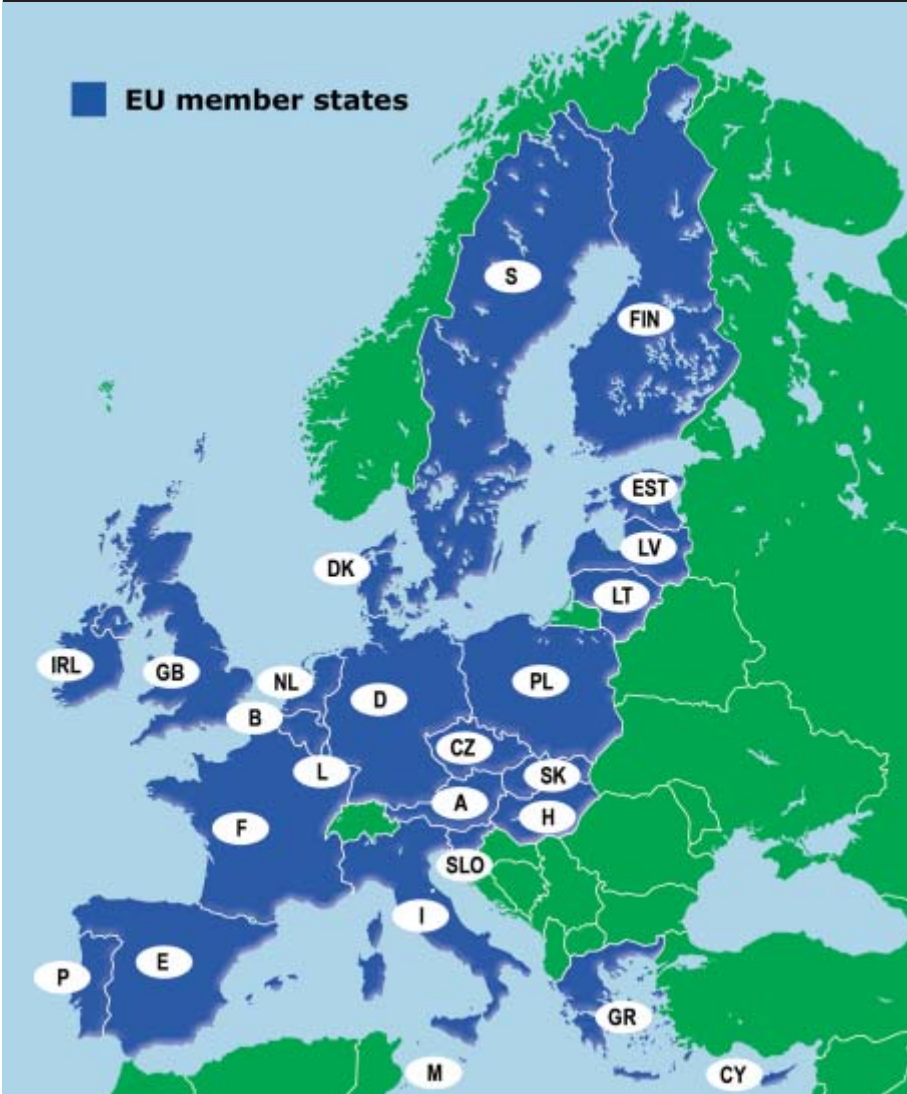
Denmark's entry into the EC on 1 January 1973 was an element of the first enlargement of the European Community after its establishment with six member states in 1958. The enlargement from 6 to 9 member states in 1973 was followed by enlargements with 1 member state (Greece) in 1981, 2 member states (Portugal and Spain) in 1986 and 3 (Finland, Sweden and Austria) in 1995.

The enlargement with a further 10 member states on 1 May 2004 is historical and unique in several respects. Firstly, the considerable increase in the number of member states will change the nature of the whole Community. This is sought addressed in the draft Treaty establishing a Constitution for Europe, but it will take a number of years before the full consequences of having 25 EU member states (and soon even more) are seen. Chart 1 shows a map of the new EU with 25 member states. Secondly, the recent enlargement signifies a healing of Europe after the collapse of the Soviet Union and the fall of the Iron Curtain. With this enlargement, the EU embraces a number of former planned economies in Central and Eastern Europe.

This article focuses on the macroeconomic aspects of the enlargement. What are the characteristics of the 10 new economies, and what is their economic outlook after joining the EU?

In economic terms the current enlargement mostly resembles the enlargements in the 1980s with Greece, Portugal and Spain, even though these countries had been market economies for many years, as opposed to 8 out of the 10 new member states. When these three member states joined the EC, their level of wealth was also considerably lower than the average for the other member states. Their experience, and that of Ireland, is therefore used as the basis for an assessment of the outlook for the new member states. Will they be able to quickly "catch up" with the other EU member states, or will it take them several decades?

The article finally discusses the outlook for further enlargements of the EU in the coming years.



### CHARACTERISTICS OF THE 10 NEW MEMBER STATES

The level of wealth in the 10 new member states is far below the EU average. The population of the 10 new member states totals 74 million people, and their GDP is a little lower than that of the Netherlands (with a population of 16 million). In terms of GDP per capita, adjusted for differences in purchasing power, the level of wealth in the 10 new member states constitutes approximately 49 per cent of the EU average, cf. Table 1. This covers considerable variations among the new member states.

## KEY INDICATORS FOR THE NEW EU MEMBER STATES (ACCEDING COUNTRIES, AC-10)

Table 1

	Area 1,000 km <sup>2</sup>	Population million 1 Jan. 2004	GDP per capita (PPP) EU15=100 2003	GDP Real growth per cent 2003	Unemploy- ment per cent 2003	Inflation per cent 2003	Balance of payments (current account) per cent of GDP 2003
Cyprus .....	9.3	0.7	77.5	2.0	4.4	4.0	-4.4
Estonia .....	45.2	1.4	41.2	4.8	10.0	1.4	-13.7
Latvia .....	64.6	2.3	37.1	7.5	10.5	2.9	-9.1
Lithuania .....	65.3	3.4	42.7	8.9	12.7	-1.1	-6.1
Malta .....	0.3	0.4	64.2	0.4	8.2	1.3	-3.4
Poland .....	312.7	38.2	42.7	3.7	19.8	0.7	-2.0
Slovakia .....	49.0	5.4	48.3	4.2	17.1	8.5	-0.9
Slovenia .....	20.3	2.0	71.3	2.3	6.5	5.7	0.2
Czech Republic...	78.9	10.2	63.8	2.9	7.8	-0.1	-6.5
Hungary .....	93.0	10.1	55.1	2.9	5.8	4.7	-5.7
AC-10 .....	738.6	74.1	48.7	3.6	14.3	2.1	-3.7
Greece .....	131.9	11.0	73.2	4.2	9.3	3.4	-7.0
Portugal .....	92.4	10.5	68.8	-1.3	6.4	3.3	-5.0
Spain .....	504.8	41.0	87.4	2.4	11.3	3.1	-3.2
Denmark .....	43.1	5.4	112.1	0.0	5.6	2.0	2.9
EU-15 .....	3.242.7	380.8	100	0.8	8.0	2.0	0.2

Source: Eurostat, European Commission Spring Economic Forecast 2004-05 and World Bank, World Development Indicators.

Latvia accounts for the lowest level, i.e. 37 per cent of the EU average, while the highest levels are seen in Cyprus and Slovenia (78 and 71 per cent, respectively, i.e. higher levels than Portugal).

For a number of years, after the transition to market economy, many of the new EU member states have seen considerably higher growth rates than the EU average. In 2003 growth in the acceding countries was also significantly higher than in the EU member states, averaging 3.6 per cent compared to merely 0.8 per cent in EU-15. Inflation has fallen markedly in recent years, while several of the new member states still have very high unemployment rates<sup>1</sup>. Finally, some of the new member states struggle with quite substantial current-account deficits. These deficits are, however, a natural phenomenon in a "catching-up" process, and have so far been financed primarily by foreign direct investments.

In structural terms the economies of the new member states are characterised by a relatively large agricultural sector, cf. Table 2. Agriculture accounts for 3.5 per cent of GDP on average, which is almost twice the average for EU-15. Measured as a ratio of total employment, agricul-

<sup>1</sup> The economic situation of the new member states and their possible compliance with the EMU convergence criteria are described in further detail in Hahnemann and Larsen (2003).

ECONOMIC WEIGHT AND EMPLOYMENT DISTRIBUTION BY SECTOR 2002

Table 2

	Economic weight (per cent of GDP)			Employment distribution (per cent of total)		
	Agriculture	Manufacturing industry and construction	Services	Agriculture	Manufacturing industry and construction	Services
Cyprus .....	4.1	20.3	75.6	5.1	23.4	71.4
Estonia .....	5.4	29.3	65.3	6.9	31.2	62.0
Latvia .....	4.7	24.7	70.6	15.1	24.4	60.5
Lithuania .....	7.1	30.5	62.4	17.4	27.4	55.2
Malta .....	2.8	28.1	69.1	2.0	31.7	66.3
Poland .....	3.1	30.3	66.5	26.3	26.2	47.5
Slovakia .....	4.4	31.1	64.5	6.2	38.5	55.3
Slovenia .....	3.3	36.0	60.7	11.0	37.0	52.0
Czech Republic .....	3.2	37.3	59.5	4.8	40.0	55.3
Hungary.....	3.7	30.7	65.6	6.2	34.1	59.7
AC-10 .....	3.5	31.6	64.9	15.8	31.2	53.0
Greece .....	7.0	22.3	70.8	15.3	24.2	60.4
Portugal .....	3.5	28.0	68.5	12.0	34.0	54.0
Spain .....	3.2	28.5	68.2	5.9	29.4	64.7
EU-15 .....	2.0	27.0	71.0	3.9	28.2	67.8

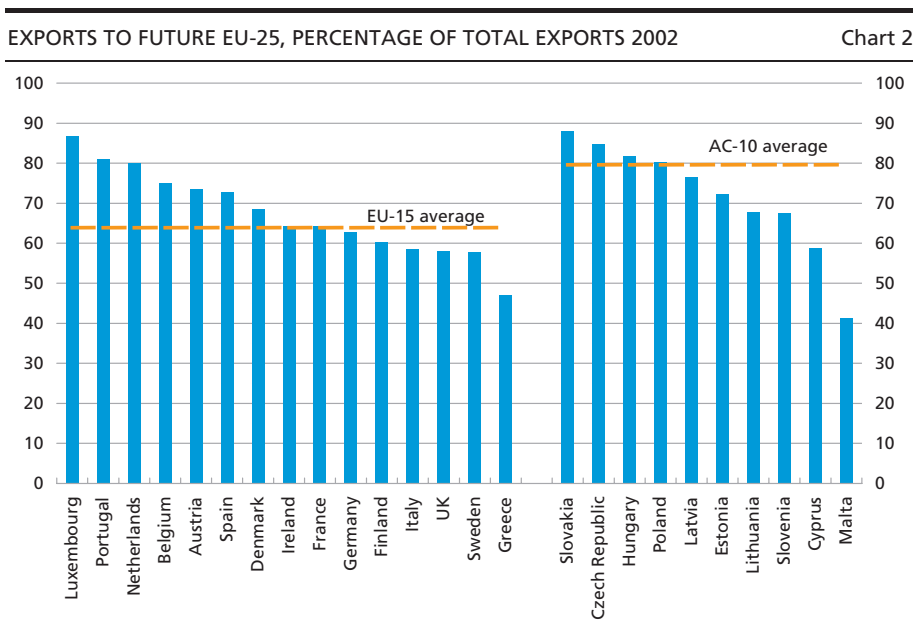
Source: European Commission and Eurostat.

ture's share in the new member states is four times that of EU-15. Especially Poland stands out, as agriculture's share of total employment is 26 per cent, even though the sector accounts for only 3 per cent of GDP. This indicates particularly low productivity in agriculture, but may also indicate statistical problems.

All of the 10 new member states except Poland can be regarded as small and very open economies, and all of them except Malta primarily trade with EU-25, cf. Chart 2.

On average, 80 per cent of the exports of the new member states go to EU-25. This percentage is considerably higher than that of EU-15. The new member states' strong trade integration with the EU should be viewed in the light of their reorientation of trade away from their former trading partners to the east towards the EU member states after the changes in Eastern Europe (as opposed to the existing EU member states which did not in this way skip their trade with neighbouring countries outside the EU).

An important economic-policy challenge for the new member states after joining the EU will be participation – soon or in the longer term – in the EU's exchange rate mechanism, ERM II, and then qualification for euro area membership. Some of the new member states have declared



Source: IMF Direction of Trade Statistics yearbook 2003.

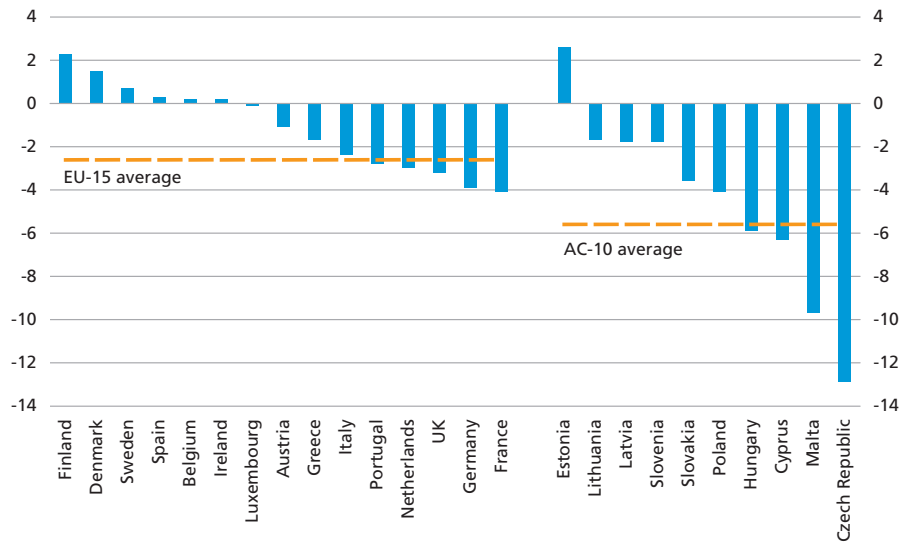
their intention of joining ERM II immediately after joining the EU, while others have announced that they will wait for a while.

Some of the new member states already pursue a fixed-exchange-rate policy, while others apply a floating-exchange-rate regime<sup>1</sup>. Even though there are no formal access requirements for participation in ERM II, except that a central rate must be agreed on, the need for stability-oriented economic policy will be reinforced when the new member states join ERM II, especially for the member states that do not already pursue a fixed-exchange-rate policy. When the new member states join ERM II monetary policy will be reserved for stabilising the exchange rate, while fiscal policy will be the most important economic-policy instrument for tackling imbalances in the economy. A government budget under control is thus an important precondition for successful ERM II participation – and subsequent qualification for euro area membership. In its policy position on exchange rate issues relating to the new EU member states, the European Central Bank says: "Entry into ERM II is not subject to a set of pre-established criteria, and there are no preconditions to be fulfilled to join the mechanism. To ensure a smooth participation in ERM II, however, it would be necessary that major policy adjustments – for example with regard to price liberalisation and fiscal policy – are undertaken prior to participation in the mechanism and that

<sup>1</sup> See Danmarks Nationalbank (2003), p. 75, for an overview of the accession countries' exchange-rate regimes.

GOVERNMENT BUDGET BALANCE, PER CENT OF GDP 2003

Chart 3



Source: European Commission Spring Economic Forecast 2004-05.

a credible fiscal consolidation path is being followed." (ECB 2003, p. 3). Chart 3 shows the status of the government budgets in 2003.

In 2003 six of the 10 new EU member states reported budget deficits exceeding the limit of 3 per cent of GDP stipulated in the Treaty. These deficits are thus "excessive" in terms of the Treaty. This will no doubt be pointed out by the Council of Ministers, but no sanctions can be imposed on the new member states as long as they are outside the euro area.

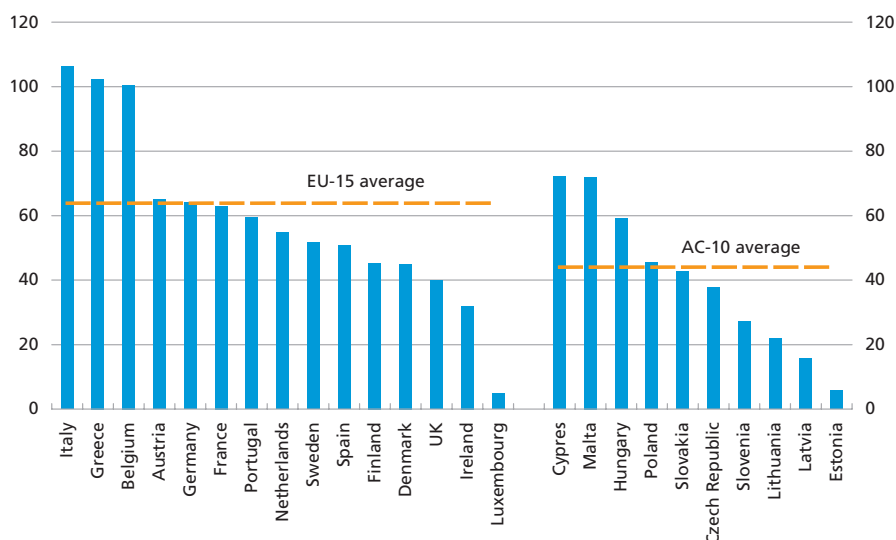
On the other hand, the government debt is generally modest in the 10 member states, cf. Chart 4. The limit of 60 per cent of GDP stipulated in the Treaty is exceeded by only two countries, Cyprus and Malta, and only by a small margin.

Entry into the EU will initially lead to increased pressure on the government budgets in the new member states. The reason is partly that a number of EU-funded infrastructure projects will require national co-financing, and partly that EU membership in general will make increased demands of the administrative capacity of the public sector, cf. Banque de France (2003).

The European Bank for Reconstruction and Development, EBRD, furthermore finds that inefficient public administration at local level will impede smooth implementation of the very extensive EU legislation that the new member states have adopted or that they will be covered by on entry into the EU (EBRD 2002, p. 7).

GOVERNMENT DEBT, PER CENT OF GDP 2003

Chart 4



Source: European Commission Spring Economic Forecast 2004-05.

## THE NEW MEMBER STATES' "CATCHING UP" WITH THE EU-15 LEVEL

Several factors will contribute to enhancing growth in the new member states due to their entry into the EU. These factors include stimuli from increased trade, more investments from abroad and funding via the EU budget. The extent of these effects remains to be seen, as does the extent to which they have already outplayed their role in the accession process. Academic studies of the effect of full integration into the single market on the new EU member states indicate an acceleration of growth by 1-2 percentage points annually, cf. EEAG (2004). Subsequent adoption of the euro is estimated to have a further positive impact on growth, cf. e.g. Köhler (2004) and IMF (2004)<sup>1</sup>.

Four of the EU-15 member states entered the EU with a considerably lower GDP level than the rest of the EU. In 1973 Ireland joined with a GDP per capita of approximately 61 per cent of the average for EU-15<sup>2</sup>. In 1981 Greece joined with a corresponding ratio of 68. In 1986 Portugal and Spain joined with a GDP per capita of 54 and 71 per cent, respectively, of the ratio for EU-15.

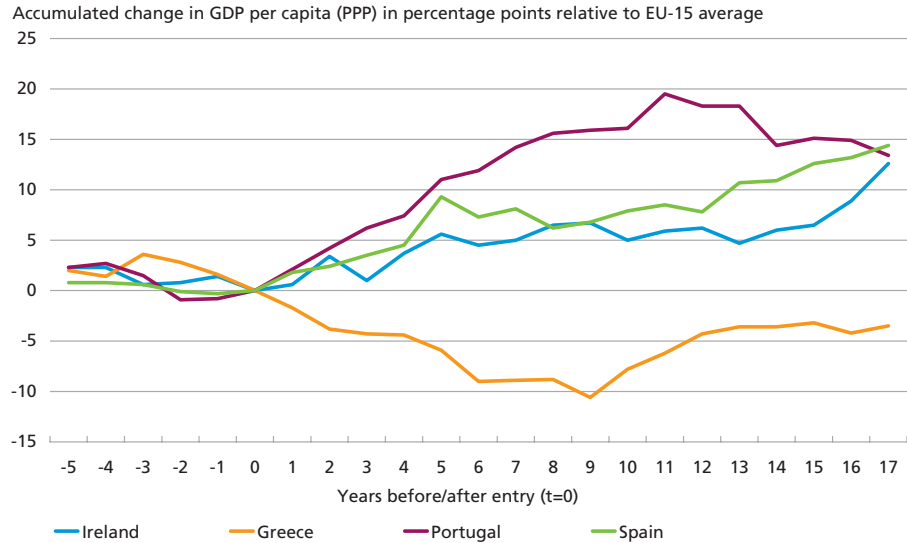
These four member states have had very different experience concerning the effect on growth and "catching up" with the rest of the EU, cf.

<sup>1</sup> See also Pedersen (2004) in this Monetary Review.

<sup>2</sup> Adjusted for differences in purchasing power. It should be noted that such adjustment is subject to considerable uncertainty.

## CATCHING-UP FOR IRELAND, GREECE, PORTUGAL AND SPAIN

Chart 5



Note: The Chart shows the catching-up for each country relative to the EU average of GDP per capita (PPP), x years after joining the EU.

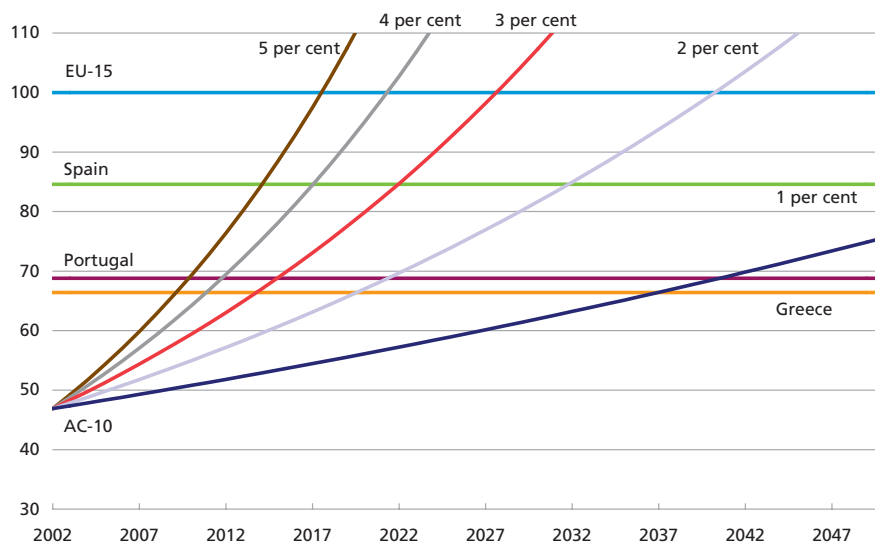
Source: European Commission.

Chart 5. However, after 15-16 years' membership all of them except Greece had narrowed the GDP gap to the EU average by 13-15 percentage points in total. Roughly, these member states on average thus gained just under 1 per cent annually. The experience of Greece was far more negative since the gap to the EU average actually widened by around 1 per cent annually during the first 10 years of EU membership. In the period 1981-95 Greece experienced considerable macroeconomic imbalances with high inflation and large government budget deficits. Furthermore, in 1981 the country joined the EC with a strongly regulated economy that was poorly equipped for EC membership. For example, it was unable to attract foreign direct investments to any notable degree, cf. e.g. Bosworth and Kollintzas (2001).

Ireland is so far the most successful example of "catching-up" within the EU. In the period covered by Chart 5, i.e. 1973-90 for Ireland, GDP per capita increased "merely" from 61 to 73 per cent of EU-15. However, growth accelerated strongly in the following 10 years. As from 2001 Ireland has had the second-highest output per capita in the EU at approximately 120 per cent of the EU-15 average, exceeded only by Luxembourg. The example of Ireland shows that it is actually possible to gain on average 4 percentage points of the differential to the EU-15 average each year for a number of years.

GDP/CAPITA UNDER VARIOUS ASSUMPTIONS REGARDING ANNUAL GROWTH DIFFERENTIAL TO EU-15

Chart 6



Note: AC-10 is the average for the 10 new EU member states. The x values of the intersecting points show when the AC-10 countries will have caught up with GDP/capita 2003 for EU-15, Spain, Portugal and Greece, respectively.  
Source: European Commission.

The example of Ireland could give rise to optimism in the new EU member states, but perhaps also to unrealistic expectations of welfare improvements after their entry into the EU.

All in all, the experience of countries that joined the EU with a relatively low level of national income gives a rather mixed picture. Greece's negative experience until 1995 demonstrated the importance of macroeconomic stability and the ability to attract foreign investments. Ireland's positive experience in the 1990s was an example of success in this respect, to some extent because the disbursements from the EU's structural funds – which will to a large extent be channelled to the new member states in future – were employed very efficiently. In more general terms the path of growth in the new member states will depend strongly on the level of investment and the course of productivity, which are in turn also closely associated with factors such as technological progress and education.

The outlook for the new member states catching up with EU-15 is illustrated in Chart 6.

In an extremely positive growth scenario with a growth differential of 4 percentage points annually – as in Ireland in the 1990s – the new member states will on average catch up with Portugal's 2003 level of

GDP per capita around 2011. In a more moderate, but still optimistic growth scenario with a growth differential of 2 percentage points annually – as in Portugal in the first 10 years after entry into the EU – the new member states will not reach Portugal's current relative level until around 2020.

The economic development will naturally vary considerably among the new EU member states. Some will follow a strong catching-up path in the coming years, while others will see more modest growth rates. The entry into the EU will undoubtedly have a positive impact on living standards in the new member states, but many of them will nevertheless find it difficult to meet the citizens' expectations of quick and substantial welfare improvements.

## **OUTLOOK FOR FURTHER ENLARGEMENTS OF THE EU**

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It is already on the cards that further enlargements of the EU will follow in the coming years.

At the EU summit in December 2003 the European Council confirmed its objective of welcoming Bulgaria and Romania as EU member states in January 2007, provided that they meet the conditions. At the same summit the EU heads of state or government confirmed that in December 2004 the European Council must decide whether accession negotiations with Turkey should be initiated. For all three countries EU accession will ultimately depend on their compliance with the "Copenhagen criteria" concerning democracy, respect for human rights, a well-functioning market economy, etc.

As regards the five countries in the Western Balkans, cf. Table 3, the European Council most recently in December 2003 confirmed its objective for these countries to be gradually integrated and ultimately included in the EU. The so-called stabilisation and association process for this region has been established as an element of these efforts. The process aims to e.g. conclude stabilisation and association agreements with each of the five countries. In February 2004 Macedonia was the first of the five to conclude such an agreement, and Croatia only needs to ratify its agreement. Both Croatia and Macedonia have submitted formal applications for EU membership. In April 2004 the Commission stated an opinion on Croatia's application, recommending that accession negotiations be initiated with Croatia. For the other three countries the work to prepare stabilisation and association agreements is in the preparation or the negotiation phase.

For the other countries in the Table there are no immediate prospects of negotiations on EU accession.

KEY INDICATORS FOR EUROPEAN COUNTRIES OUTSIDE THE EU

Table 3

	Area 1,000 km <sup>2</sup>	Population million 2002	GDP per capita (PPP) Euro area member states=100 2002	Real growth 2002	Inflation per cent 2002
<b>EU candidate countries</b>					
Bulgaria .....	110.9	7.9	27	4.8	5.8
Romania .....	237.5	22.4	25	4.3	22.5
Turkey .....	774.8	69.6	25	7.8	45.0
<b>Western Balkans</b>					
Croatia .....	56.5	4.4	39	5.2	2.0
Macedonia .....	25.3	2.0	25	0.7	0.1
Serbia and Montenegro .....	102.4	10.7	n.a.	4.0	n.a.
Bosnia and Herzegovina .....	50.7	4.1	22	3.9	n.a.
Albania .....	28.8	3.2	19	4.7	7.8
<b>EEA countries<sup>1</sup></b>					
Norway .....	324.2	4.5	141	1.0	1.3
Iceland .....	103.0	0.3	115	-0.5	5.2
<b>Others</b>					
Switzerland .....	41.3	7.3	116	0.1	0.6
Russia .....	17,075.4	144.1	32	4.3	15.8
Ukraine .....	603.7	48.7	19	4.8	0.8
Belarus .....	207.6	9.9	21	4.7	42.5
Moldova .....	33.9	4.3	6	7.2	5.1

Source: World Bank, *World Development Indicators* and CIA, *World Factbook*.

<sup>1</sup> The European Economic Area, also including Liechtenstein.

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# Currency Unions and Foreign Trade

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*Anders Mølgaard Pedersen, Economics*

## INTRODUCTION

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Recent years have seen growing interest in how currency unions affect the participating countries' foreign trade. According to new studies, a currency union may considerably boost trade among the participating countries without reducing their trade with the rest of the world. Other studies indicate that increased foreign trade is associated with higher economic growth and may affect the correlation of countries' business cycles.

The Economic and Monetary Union (EMU) in Europe that took effect on 1 January 1999 is an example of a currency union. Initial experience suggests that the single currency has increased intra-euro area trade, in accordance with the results of the general studies. Furthermore, there are no indications that the euro area member states are trading less with countries in the rest of the world.

The EU member states not participating in EMU may also expect growing trade with the euro area member states in connection with introduction of the single currency. Last year, when HM Treasury assessed the British government's five economic tests for UK membership of EMU, this was emphasised as one of the most important long-term benefits of EMU entry (HM Treasury (2003))<sup>1</sup>. Recently, in an analysis of the 10 new EU member states the International Monetary Fund, IMF, also pointed out the importance of the trade effects of subsequent EMU participation (Köhler (2004)).

## THE EFFECT OF CURRENCY UNIONS ON TRADE AND ECONOMIC ACTIVITY

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If two or more countries establish a currency union, trade among the countries may increase because

- exchange-rate uncertainty is eliminated,

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<sup>1</sup> HM Treasury's assessment of the five tests is described in Box 3 in Recent Economic and Monetary Trends, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2003.

- trading costs are reduced,
- prices across borders are easier to compare.

*Exchange-rate uncertainty* normally has a dampening effect on foreign trade as most business enterprises are adverse to the risk of fluctuations in the value of future payments in foreign currency. In certain instances, the business enterprises may eliminate this risk by buying or selling currency forward. However, this is usually only possible within a limited time horizon, e.g. up to one year, and in countries with more advanced foreign-exchange markets.

*Trading costs are reduced* in a currency union because business enterprises no longer need to exchange currency when trading with enterprises from other participating countries. Thus, they save the difference between the currency's market rate and the bank's fixing rate plus a charged commission. In addition, the enterprises may reduce their costs of managing foreign-exchange risks. The reduced trading costs contribute to increasing trade between the participating countries.

*Prices in different countries are easier to compare* in a currency union as they are expressed in the same currency. Consumers and business enterprises comparing prices in different participating countries do not have to convert from one currency into another. This strengthens competition in markets for traded goods and services and increases foreign trade.

### **The effect of increased trade on total output**

Trade among countries may have a positive impact on their total output for several reasons<sup>1</sup>. For instance, foreign trade facilitates exploitation of economies of scale in production due to the increased sales opportunities. Foreign trade also strengthens competition between business enterprises, leading to ongoing improvement of production methods, which enhances output growth. Furthermore, foreign trade may entail dissemination of new production technology, which could also boost output growth.

Several empirical studies confirm that a positive link exists between a country's foreign trade and output growth. Thus, Frankel and Rose (2002) conclude that an increase by 1 percentage point in a country's trade-to-GDP ratio is associated with an increase in GDP per capita of 1/3 per cent in the long term. Other previous studies show evidence of a stronger link between foreign trade and economic growth.

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<sup>1</sup> A review of the theoretical arguments for a positive connection between foreign trade and economic growth is given in HM Treasury (2003), Annex B.

### The effect of increased trade on the correlation of business cycles

Trade between two countries may also affect the correlation of their business cycles. Normally, a rise in trade will lead to stronger co-variation in economic activity. This is due to the fact that a change in demand for goods and services in one country has stronger effects on demand in the other country, the greater the bilateral trade between them.

However, increased trade among countries may also result in more specialised industrial production. In that case increased trade will be reflected in more *inter*-industry trade (trade in goods from different industries) as opposed to *intra*-industry trade (trade in goods from one industry). If the countries become more dependent on different industries, their business cycles may eventually be less correlated<sup>1</sup>.

The relation between trade and the correlation of business cycles is especially important in a currency union with a common monetary policy. Frankel and Rose (1998) argue that a currency union does not lead to more cross-country specialisation in production. Instead, it increases countries' intra-industry trade which is most sensitive to differences in prices. In an empirical study they also show that countries with closer trade links tend to have more tightly correlated business cycles.<sup>2</sup>

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## RECENT STUDIES

Until a few years ago, participation in a currency union was considered to have a relatively modest effect on a country's foreign trade. According to empirical studies, exchange-rate uncertainty only had limited trade effects<sup>3</sup>. This type of study, however, has been associated with a number of problems, e.g. regarding how to measure exchange-rate uncertainty.

A study by Rose, published in 2000, changed the perception of currency unions' effect on countries' foreign trade. Rose based his study on the so-called gravity model, which tries to explain the size of foreign trade between two countries, cf. Box 1. His remarkable conclusion was that countries with a common currency trade more than three times as much with each other than countries with separate currencies. The result was robust to inclusion in the model of a number of other variables which may effect trade between two countries.

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<sup>1</sup> This argument is presented by e.g. Eichengreen (1992) and Krugman (1993).

<sup>2</sup> Frankel and Rose describe the criteria of a so-called optimum currency area as endogenous. These criteria include *inter alia* considerable trade among countries and correlated business cycles, cf. Mundell (1961). If a currency union strengthens these trade links and leads to more correlated business cycles the participating countries will to a higher degree meet the optimum currency area criteria over time.

<sup>3</sup> For instance, earlier studies of the EU member states have shown that elimination of the exchange-rate uncertainty would increase trade among the countries by only 5-15 per cent, cf. e.g. Dell'Arricia (1999).

## ROSE'S GRAVITY MODEL

Box 1

The gravity model was originally developed by the English physicist and mathematician Isaac Newton (1642-1727) as an explanation of gravitation. In economic science the model has been used in studies of countries' foreign trade. In its basic form, trade between two countries depends positively on their total income and negatively on the distance between them. The model may then be extended to include other variables, depending on the purpose of the study.

Rose (2000) estimated an extended gravity model along the following lines

$$\ln H_{ij} = \beta_0 + \beta_1 \ln (Y_i Y_j) + \beta_2 \ln D_{ij} + \beta_3 MU_{ij} + \beta_4 X_{ij}^4 + \dots + \beta_n X_{ij}^n + \varepsilon_{ij}$$

where  $H_{ij}$  is the total trade between country  $i$  and country  $j$ ,  $Y_i$  the income in country  $i$  and  $D_{ij}$  the distance between country  $i$  and country  $j$ .  $MU_{ij}$  is a dummy variable that takes on the value of 1, if country  $i$  and country  $j$  participate in the same currency union, or else the value 0. The variables  $X_{ij}^4$  to  $X_{ij}^n$  are other variables that may affect the trade between country  $i$  and country  $j$ , e.g. measures of exchange-rate volatility and dummy variables expressing if country  $i$  and country  $j$  participate in the same free trade area, have a common language or belonged to the same colonial power.

Data in Rose's study were country-pair observations for a total of 186 countries for 5-year intervals during the period 1970-90. The observations were included in the estimation as cross-section data, i.e. without consideration of the time dependency between observations of the same country pair. In total approximately 1 per cent of the country pairs had a common currency while the rest had separate currencies.

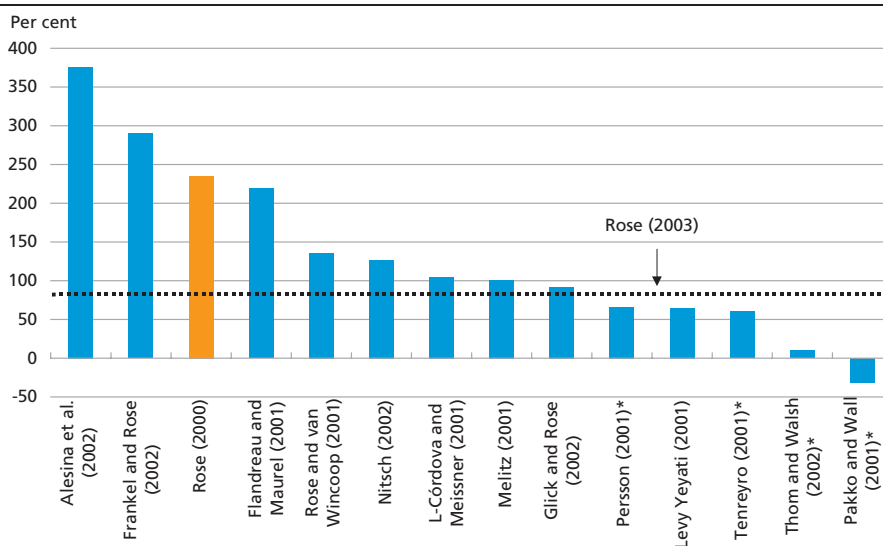
Rose's main purpose was to examine the effect of a common currency on countries' mutual trade links (expressed as  $\beta_3$ ). The estimated model showed that two countries with a common currency trade more than three times as much with each other as countries with different currencies. Furthermore, it appeared that countries in the same free trade area also trade considerably more with each other than other countries. On the other hand, according to the estimated model exchange-rate volatility only has a limited effect on trade between two countries, which is in line with previous empirical studies.

Since Rose's article, several other studies of the effect of currency unions on trade have been published. The Appendix summarises some of these studies, and the results are shown in Chart 1. Most of the studies arrive at a lower estimated trade effect of a common currency than Rose's original estimate, but still a considerable effect. According to Rose (2003), the mean value of the different studies' estimates of the trade effect of a currency union corresponds to roughly a doubling of trade among the participating countries<sup>1</sup>.

An important question is how participation in a currency union affects countries' trade with non-participating countries. A distinction is often

<sup>1</sup> Rose's calculation is based on a total of 712 estimates from 24 studies. The mean value of these estimates corresponds to a trade effect of 86 per cent. Excluding the estimates from Rose's own studies, the mean value of the estimates of a currency union's trade effect can be calculated at 65 per cent.

STUDIES OF THE EFFECT OF CURRENCY UNIONS ON TRADE AMONG COUNTRIES Chart 1



Note: An \* states that the estimated effect is not statistically significant. The dotted line is Rose's (2003) calculated mean value of the estimates of the trade effect of a currency union according to 24 studies. The Appendix comprises a short review of the studies reported.

made between a currency union's trade-creating and trade-diverting effects. A currency union has trade-diverting effects if it reduces participating countries' trade with the rest of the world. This will dampen the total increase in the participating countries' foreign trade and reduce other countries' foreign trade. In general, neither Rose (2000) nor other studies find that currency unions reduce participating countries' trade with the rest of the world.

## THE EFFECT OF EMU ON EURO AREA TRADE

As EMU has existed for more than five years, it is now relevant to examine its effects on euro area member states' foreign trade<sup>1</sup>. A possible indication of EMU's trade effects is given in Chart 2 showing the development in intra-euro area trade as a percentage of euro area member states' total trade with selected industrialised countries<sup>2</sup>. Until 2000 this measure of intra-euro area trade followed a declining trend, but since then it has been increasing. Viewed in isolation, this development is in

<sup>1</sup> Rose has called for caution in transferring his results to the euro area member states since the currency unions in his studies are primarily made up of small developing countries that differ from the euro area member states in several respects (Rose (2000), p. 15).

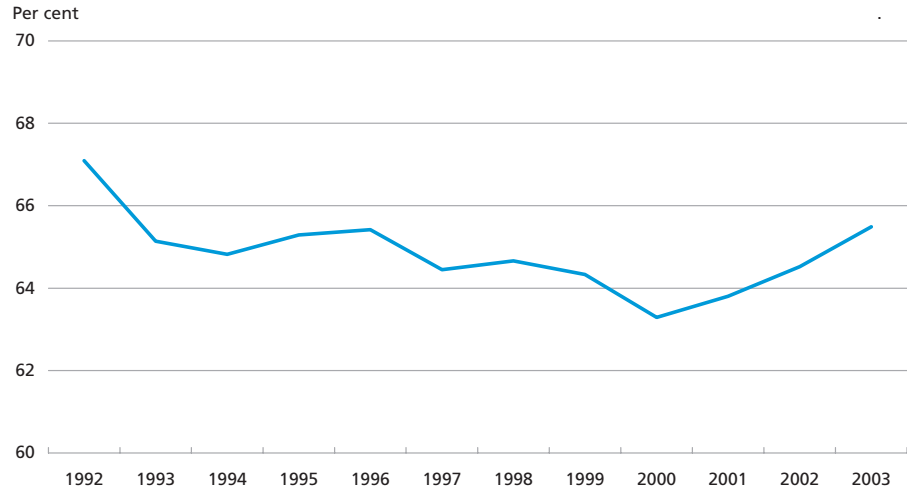
<sup>2</sup> Only trade with selected industrialised countries is included in the denominator to get a more accurate picture of the effect of EMU on intra-euro area trade. Thus, the effect is not overshadowed by a trend towards increased trade with countries in e.g. Eastern and Central Europe and certain Asian countries.

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**INTRA-EURO AREA TRADE AS A PERCENTAGE OF THE MEMBER STATES' TOTAL TRADE**


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Chart 2



Note: The euro area member states are exclusive of Greece. The member states' total trade is the sum of intra-euro area trade and the euro area member states' trade with the other EU member states (including Greece but excluding the 10 new EU member states), Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland and the USA.

Source: OECD, Monthly Statistics of Foreign Trade.

accordance with the hypothesis that EMU has contributed to increasing intra-euro area trade.

The rising trend in intra-euro area trade cannot be related to one or a few large euro area member states. Chart 3 shows the development in selected euro area member states' trade with other member states as a percentage of their total trade. Since 2000 all the euro area member states have gradually increased their share of trade with other member states. For most of the member states this follows a declining trend for several years, but for Spain and Portugal, which joined the EU in 1986, this increasing trend has been apparent for a number of years.

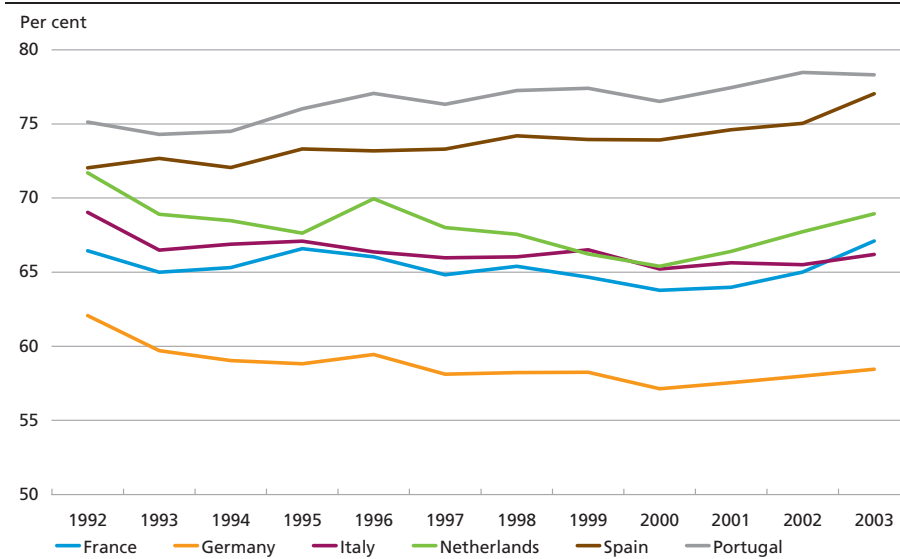
The measure of intra-euro area trade applied in Charts 2 and 3 has also been influenced by other factors than the introduction of the single currency. For instance, an important factor could be differences in economic growth between the euro area and the rest of the world. In a period of relatively high growth in the rest of the world, intra-euro area trade as a ratio of total trade will tend to decline. The high growth in the 1990s in some of the euro area's major trading partner countries, e.g. the UK and the USA, as well as more moderate growth in recent years may thus also explain part of the development in the two Charts.<sup>1</sup>

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<sup>1</sup> Another reason for the development in the applied measure of intra-euro area trade may be changes in the member states' competitiveness as a result of e.g. exchange-rate fluctuations. Since changes in competitiveness usually influence exports and imports with different signs it may be difficult to estimate the net effect on total trade.

SELECTED EURO AREA MEMBER STATES' TRADE WITH OTHER EURO AREA MEMBER STATES AS A PERCENTAGE OF THEIR TOTAL TRADE

Chart 3



Note: See note in Chart 2.

Source: OECD, Monthly Statistics of Foreign Trade.

Several empirical studies have formally examined the effect of EMU on the euro area member states' trade, cf. Table 1. The results of these studies are not directly comparable since the data period varies. All studies conclude, however, that the single currency has had a positive effect on intra-euro area trade. The measured effects so far are relatively modest compared with the estimates in Rose (2000) and other studies, but they have been increasing since the introduction of the euro. In addition, the different studies do not indicate that the single

EMPIRICAL STUDIES OF THE EFFECT OF EMU ON INTRA-EURO AREA TRADE

Table 1

Study	Effect (per cent)	Data
De Nardis and Vicarelli (2003).....	9-10	Data for 32 countries for 1980-2000
Bun and Klaasen (2002).....	10	Data for all EU member states, the USA, Japan and Canada for 1965-2001
European Commission (2003) .....	7-18	Data for all EU member states for 1991-2002
Micco et al. (2003) .....	4-16	Data for 22 industrialised countries for 1992-2002
Baar et al. (2003).....	29	Data for all EU and EFTA member states for 1978-2002 (1st quarter)

A country's intra-industry trade with other countries is often measured by using the so-called Grubel-Lloyd index (see e.g. OECD (2002)). For country A the Grubel-Lloyd index vis-à-vis country B for industry  $i$  may be calculated as

$$GL(A)_i^B = (X(A)_i^B + M(A)_i^B) - |X(A)_i^B - M(A)_i^B| / (X(A)_i^B + M(A)_i^B)$$

where  $X(A)_i^B$  and  $M(A)_i^B$  is country A's exports to and imports from country B, respectively, of goods from industry  $i$ . The value of the index may vary from 0 to 1. If all trade between country A and country B in goods from industry  $i$  consists of exports from country A to country B ( $X(A)_i^B > 0$ ,  $M(A)_i^B = 0$ ), the index will be equal to 0. The same applies if all trade in goods from industry  $i$  consists of imports to country A from country B. If exports from country A to country B of goods from industry  $i$  equal imports the other way ( $X(A)_i^B = M(A)_i^B$ ), the index is 1.

Similar indices can be calculated for country A's trade with other countries and for other industries. A total Grubel-Lloyd index for country A may then be calculated by summing up these indices weighted by country A's trade distributed on the different countries and industries. The total index gives a measure of country A's intra-industry trade, as an index closer to 1 is equivalent to a higher degree of intra-industry trade with other countries.

The value of the total Grubel-Lloyd index depends on the detail level of the specified industries. The more detailed the specification, the lower the calculated index. When calculating the indices in Chart 4, a detail level corresponding to the 2-digit level of SITC (Standard International Trade Classification), revision 3, has been used. This comprises nearly 70 different product groups.

currency has contributed to reducing the euro area member states' trade with the rest of the world (see e.g. Micco et al. (2003)).<sup>1</sup>

### The effect on intra-industry trade in the euro area

A country's intra-industry trade with other countries can be measured by the Grubel-Lloyd index, cf. Box 2. The index may vary from 0 to 1. The closer the index is to 1, the greater is a country's intra-industry trade with other countries.

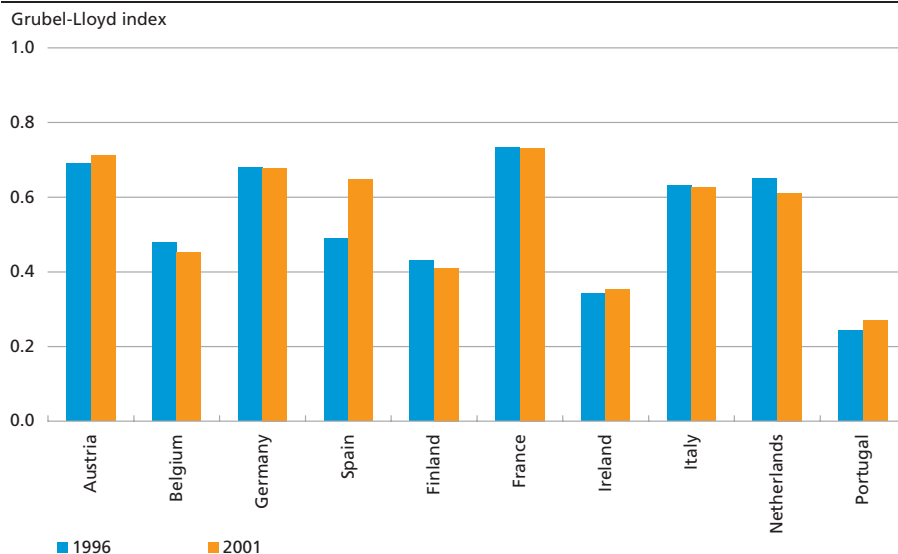
Chart 4 shows for every euro area member state (except Greece and Luxembourg) a Grubel-Lloyd index for the trade with other euro area member states calculated for 1996 and 2001. The value of the index varies significantly between the individual member states, with France and Portugal as the two extremes. However, for almost all of the member states the index is virtually unchanged or higher in 2001 compared to 1996. Viewed in isolation this does not indicate that EMU participation

<sup>1</sup> Buiter and Grafe (2003) question these estimates, which they think will only be realised over a longer period. They e.g. point out the difficulties of distinguishing between the effects of the single currency and the EU internal market that took effect as from 1992.

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**GRUBEL-LLOYD INDEX FOR EURO AREA MEMBER STATES' TRADE WITH OTHER EURO AREA MEMBER STATES**

Chart 4



Note: The closer the index is to 1, the higher the degree of the member state's intra-industry trade with other euro area member states. The calculation of the index is described in Box 2.

Source: OECD, International Trade by Commodity Statistics.

has resulted in increased specialisation of the member states' production at the risk of less correlated business cycles.

In practice, the intra-industry trade among euro area member states is only an indicator of the degree of specialisation in different industries. Thus, increased specialisation of the euro area member states' production may have taken place without being reflected in less intra-industry trade<sup>1</sup>. Furthermore, the correlation of business cycles also depends on other factors than the composition by industry of the member states' production. In general, it is too early to draw conclusions as to the effect of EMU on the correlation of the euro area member states' business cycles.

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## CONCLUSION

Until a few years ago the effect of participating in a currency union on a country's foreign trade was considered to be relatively modest. However, recent studies indicate that countries with a common currency trade considerably more among themselves than other countries.

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<sup>1</sup> Various measures of the EU member states' output by industry indicate increased specialisation from the beginning of the 1980s until 1997, while in the same period there was an increase in the member states' intra-industry trade (European Commission (2002)).

According to several studies, a currency union may lead to a doubling of trade among the participating countries, without affecting their trade with the rest of the world. In addition, other studies show that increased foreign trade is linked to higher economic growth and may lead to more uniform business cycles in the individual countries.

The experience of the euro area so far is basically in accordance with these studies. Several empirical studies confirm that the euro area member states have increased trade among themselves since EMU took effect, without this resulting in less trade with countries in the rest of the world. The measured effects on intra-euro area trade are still relatively modest but have been increasing since the introduction of the euro. Furthermore, there are no indications that the single currency has resulted in more inter-industry trade and specialisation of member states' production at the risk of less uniform business cycles.

These results are of relevance to EU member states not participating in EMU. They may expect that joining EMU at a later stage will increase their trade with the euro area member states and have positive effects on economic growth. For instance, HM Treasury estimates that over a longer time horizon EMU participation will increase the UK's trade with the euro area member states by up to 50 per cent (HM Treasury (2003)). Similarly, IMF (2004) finds that several of the new EU member states may increase their foreign trade by up to 60-70 per cent by introducing the euro. These estimates are associated with significant uncertainty but should be part of an overall assessment of the consequences of participating in EMU.

## APPENDIX: RECENT STUDIES OF THE EFFECT OF CURRENCY UNIONS ON COUNTRIES' FOREIGN TRADE

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Already before Rose (2000) a few studies had indicated that a single currency might have strong trade effects. For instance, McCallum (1995) estimated a gravity model for the trade among a number of Canadian provinces and US states. He showed that a typical Canadian province trades approximately 20 times more with another Canadian province than with a US state of the same size and at the same location (distance). An important reason may be that the separate currencies of Canada and the USA act as a barrier for trade between the two countries.

Since Rose (2000) several similar studies of the trade effects of currency unions have been published, including by Rose himself (see e.g. Frankel and Rose (2002) as well as Rose and van Wincoop (2001)). These studies typically focus on the significance of various aspects of Rose's data and method. Table A1 comprises a list of selected studies and the estimated trade effects of participation in a currency union.

Several studies have examined the significance of possible systematic differences between countries in currency unions and other countries. Rose includes various explanatory variables in his model, but cannot allow for all these differences. If any of the omitted variables are important to countries' trade, the trade effect of a common currency could be overestimated.

Melitz (2001) emphasises that countries in a currency union often participate in the same political union or free trade area, which may also have a positive impact on their trade. In Rose's model, this may lead to overestimation of the trade effect of a currency union<sup>1</sup>. Melitz examines this possibility by disregarding currency unions that are also political unions or free trade areas. This reduces the estimate of the trade effect of a currency union from just over a three-fold increase to a two-fold increase.

Persson (2001) attempts to isolate the differences between countries in currency unions and other countries by means of a match method that is normally used in medical studies. The method means comparing the results of a "control group" and a "treatment group", distinguished only by participation in a currency union. Using this method, Persson arrives at a considerably lower estimate of the trade effect of a currency union than Rose.

Levy Yeyati (2001) and Nitsch (2002) also find that Rose's high estimate of the trade effect of currency unions is attributable to variables that are not part of the model. Levy Yeyati divides the currency unions in Rose's

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<sup>1</sup> Rose includes a dummy variable for whether two countries participate in the same free trade area, cf. Box 1. If the relationship is not linear – as claimed in Rose's model – this variable, however, does not capture the entire effect of two countries participating in the same free trade area.

## STUDIES OF THE EFFECT OF CURRENCY UNIONS ON TRADE AMONG MEMBER COUNTRIES

Table A1

Study	Data	Effect (per cent) <sup>1</sup>
Rose (2000) .....	Cross-section data, 1970-1990	235
Rose and van Wincoop (2001) .....	Cross-section data, 1970-1995	136
Frankel and Rose (2002) .....	Cross-section data, 1970-1995	290
Melitz (2001) .....	Cross-section data, 1970-1995	101
Persson (2001) .....	Cross-section data, 1970-1990	66*
Levy Yeyati (2001) .....	Cross-section data, 1970-1990	65
Nitsch (2002) .....	Cross-section data, 1970-1990	127
Tenreyro (2001).....	Panel data, 1978-1997	60*
Alesina et al. (2002) .....	Panel data, 1960-1997	376
Glick and Rose (2002) .....	Panel data, 1948-1997	92
Pakko and Wall (2001) .....	Panel data, 1970-1990	-31*
Thom and Walsh (2002) .....	Panel data, 1950-1992	10*
Flandreau and Maurel (2001) .....	Cross-section data, 1880-1913	219 <sup>2</sup>
López-Córdova and Meissner (2001) .....	Panel data, 1870-1910	105

<sup>1</sup> An \* states that the estimated effect is not statistically significant.

<sup>2</sup> This estimate refers to Flandreau and Maurel's estimate of the trade effect of the currency union between Hungary and Austria.

study into unilateral and multilateral unions<sup>1</sup>. He shows that Rose's estimates are suitable for unilateral currency unions only, while countries in multilateral unions only trade approximately 65 per cent more among themselves than other countries. Using a similar approach, Nitsch finds that Rose's estimates do not hold true as regards currency unions with the US dollar as the common currency.

Other studies have focused on the causality behind Rose's results. For two countries the gains in terms of saved exchange costs from entering into a currency union will be greater, the more they traded with each other prior to entry. In principle, some of the countries in Rose's study may have decided to form a currency union because they already had strong trade links. If this is the case, the results cannot be used to draw conclusions as to the trade effects of establishing a currency union.

Two examples of such studies are Tenreyro (2001) and Alesina et al. (2002). Tenreyro estimates in one system of equations the probability that two countries establish a currency union as well as the effect of the currency union on their bilateral trade. She finds that this method reduces the estimate of the trade effect of a currency union to approximately 60 per cent.<sup>2</sup> Conversely, Alesina et al., using another method, get a higher estimate of the trade effect of a currency union than Rose.

<sup>1</sup> A multilateral currency union comprises two or more countries that have jointly decided to introduce a single currency. A unilateral currency union emerges when a country independently adopts another country's currency as legal tender, which is also often referred to as "dollarisation".

<sup>2</sup> In part, this reduction is attributable to Tenreyro – unlike Rose and other studies – including observations of a bilateral trade of 0. This reduces the estimate of the trade effect of a currency union to approximately 100 per cent.

Rose (2000) and most of the above studies are based on cross-section data. This implies that observations of the same country pair in different periods are in principle treated as independent observations. This type of study may be less suitable for measuring the consequences of two or more countries establishing a currency union. Studies based on so-called panel data, where each country pair is followed over time, is often a more useful approach for this purpose.

Glick and Rose (2002) study the trade effect of currency unions by using panel data for 217 countries from 1948 to 1997. The data set comprises a total of 16 currency union formations between country pairs and 130 dissolutions. They conclude that formation (dissolution) of a currency union between two countries almost doubles (halves) their bilateral trade. Another example of a similar study is Pakko and Wall (2001) who do not find evidence that the formation of a currency union results in increased trade. However, this study is based on a more limited data set than in Glick and Rose.

Another frequently stated reservation regarding Rose's study concerns the type of countries in the identified currency unions. Almost all country pairs in these currency unions consist of at least one small developing country. Special factors may apply to these countries so that generalisation of the results to major industrialised countries, e.g. the euro area member states, is controversial.

Thom and Walsh (2002) examine the consequences for the trade between Ireland and the UK, when Ireland in 1979 gave up its fixed one-to-one exchange rate vis-à-vis the pound sterling in order to join the European Monetary System, EMS. They conclude that this did not have any particular impact on the trade between the two countries. One interpretation of this study could be that currency unions appear to have no significant impact on industrialised countries' foreign trade. However, this is contrary to the results of the initial studies of the effect of EMU on intra-euro area trade, cf. Box 1 in the article.

Finally, some studies are based on more historical data. This applies to e.g. Flandreau and Maurel (2001) and López-Córdova and Meissner (2001) who include currency unions from before World War I. This enables studying the trade effects of defunct currency unions like the Scandinavian and Latin currency unions<sup>1</sup>. Both studies conclude that these currency unions were of great importance to the trade among the participating countries.

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<sup>1</sup> The Scandinavian Currency Union comprising Denmark, Sweden and Norway was established in 1875. The Latin Currency Union was originally established by France, Belgium, Switzerland and Italy in 1865 and later enlarged to include other countries. Both currency unions were de facto discontinued at the outbreak of World War I, cf. Abildgren (2004).

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# Monetary-Policy Targets and Instruments

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*Peter Ejler Storgaard, Economics*

## INTRODUCTION AND SUMMARY

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The monetary-policy framework in the European countries has changed over the last 20 years. In fact, Denmark is an exception in that it has maintained a basically unchanged fixed-exchange-rate policy since 1982. The other EU member states that previously participated in the Exchange Rate Mechanism have now gone one step further and have introduced a single currency, the euro. Norway, Sweden and the UK also had fixed-exchange-rate regimes at some point during this period, but they now base their monetary policies on inflation targets. The monetary-policy regimes of the new EU member states span from currency boards in Estonia and Lithuania to inflation targeting in Poland and the Czech Republic.

The EU Treaty obliges the acceding countries to introduce the euro sometime, and consequently they must join the European Exchange Rate Mechanism, ERM II, for a transitional period. The monetary and foreign-exchange policies of these countries must therefore be altered in the coming years. Some acceding countries already pursue a fixed-exchange-rate policy that can be continued within the framework of ERM II. For them, the policy change will take place in connection with the transition to EMU. Other new EU member states have floating exchange rates and base their monetary policies on inflation targets; for them a more comprehensive policy change will be required. The necessary changes to monetary and foreign-exchange policy in these countries will also have an impact on fiscal policy and other stabilisation policies, and it would be expedient to introduce some of the adjustments in connection with their ERM II membership.

This article discusses some of the theoretical aspects of monetary and foreign-exchange policy in small open economies. The basic theoretical result is that since there is only one monetary-policy instrument – the short-term interest rate – monetary policy can only meet one target, e.g. an exchange-rate target or an inflation target. If various supplementary factors are included, the theoretical model becomes more complex and the results somewhat more ambiguous. Specifically, extensions of the model indicate that a central bank's options to pursue more than one

target depend on the targets in question. For a number of reasons it is particularly difficult for central banks to control exchange rates while also meeting other targets.

The article is structured as follows: first a brief overview of the new EU member states' current monetary-policy and foreign-exchange-policy strategies is given. This is followed by the presentation of a model of the relationship between monetary-policy targets and instruments on the basis of Tinbergen's (1952) and Johansen's (1977) general analyses of targets and instruments in economic policy. After a review of a number of possible extensions of the model selected monetary-policy strategies are discussed in more detail – including fixed-exchange-rate policy and flexible inflation targeting. Finally, the article considers some of the special circumstances affecting the monetary-policy strategies of the acceding countries prior to their membership of the euro.

## THE MONETARY AND FOREIGN-EXCHANGE POLICIES OF THE ACCEDING COUNTRIES

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The monetary-policy and foreign-exchange-policy strategies of the new EU member states varied substantially at the time of accession. Foreign-exchange policies span from very tight management of exchange rates in some new member states to freely floating exchange rates in others. Likewise, the degree of monetary-policy autonomy, i.e. the possibility of adjusting monetary policy to the domestic economic situation, spans from no autonomy at all in countries with fixed-exchange-rate regimes to full autonomy, in principle, in countries with freely floating exchange rates.

In general, the small new member states (Cyprus, Estonia, Latvia, Lithuania, Malta and Slovenia) tend to manage their exchange rates more tightly than the large new member states (Poland, Slovakia, the Czech Republic and Hungary) do. The large new member states have, however, all attempted to manage exchange rates more tightly at some point.

In the small new member states, monetary policy is mainly aimed at meeting the selected exchange-rate target. Estonia and Lithuania have completely abandoned their monetary-policy autonomy in favour of currency boards<sup>1</sup> vis-à-vis the euro. Malta's fixed-exchange-rate policy against a basket of currencies (euro, dollar and sterling), the narrow band between the Latvian lat and SDR<sup>2</sup>, and the narrow band in practice

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<sup>1</sup> Under a currency board, the central bank must, on request, exchange the national currency for the selected anchor currency at a statutory exchange rate. The central bank does not issue national currency exceeding the value of its foreign-exchange reserve, cf. e.g. Bie and Hahnemann (2000).

<sup>2</sup> SDRs are Special Drawing Rights issued by the International Monetary Fund. SDRs are defined as a weighted currency unit equivalent to the sum of 0.426 euro, 21 Japanese yen, 0.0984 pounds sterling and 0.577 US dollars.

between the Cypriot pound and the euro give the respective central banks very little room for manoeuvre. In Slovenia the central bank has ensured a stable exchange-rate development in recent years in the form of a steady weakening of the tolar vis-à-vis the euro.

In the four largest acceding countries, monetary policy is generally aimed at meeting an inflation target. The Polish and Czech currencies float freely, and monetary policy is solely aimed at meeting the stipulated inflation targets. The central bank of Slovakia operates with an inflation target, while also seeking to address large exchange-rate fluctuations. Finally, the inflation target in Hungary is combined with an exchange-rate target, viz. an announced central rate vis-à-vis the euro and a fluctuation band of +/- 15 per cent.

The shifts from tight exchange-rate management to a freely floating currency in the Czech Republic and more indirect and looser management in Slovakia were brought about by currency crises in 1997 and 1998, respectively. Poland gradually went from a managed exchange rate to a freely floating currency over a prolonged period. Until 2001, Hungary managed its exchange rate within the framework of a *crawling peg*, involving a steady weakening of the forint.

## AN ECONOMIC MODEL

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Consensus has gradually been reached among economists that the short-term interest rate is the only monetary-policy instrument (see e.g. Goodhart, 1989, and Woodford, 2003). There is also agreement that price stability should be the overall target of monetary policy. However, when it comes to selecting more specific (intermediate) targets, greater variation is seen, even within Europe. In Denmark, the exchange rate vis-à-vis the euro is the direct monetary-policy target, while other countries operate with several targets, e.g. stabilising inflation and output in countries applying flexible inflation targeting.

The basic analysis of the link between economic-policy targets and instruments is found in Tinbergen (1952). The analysis shows that the relationship between the number of instruments and the number of targets is essential. If the number of targets is equal to the number of instruments, it is in principle possible to calculate how the instruments are to be adjusted in order to meet the targets. If the number of instruments exceeds the number of targets, there are several ways of meeting the targets. Finally, if there are more targets than instruments, it is normally not possible to meet the targets by means of the instruments. It is therefore necessary to weigh the various targets unless new, effective instruments can be found.

Tinbergen's analysis is a useful starting point for a discussion of the relationship between monetary-policy targets and instruments. The exposition in the following is based on Tinbergen's theory.<sup>1</sup> First it is assumed that the central bank is only interested in the target variable  $x$  (e.g. the exchange rate), and that the exact value aimed at is  $x^*$ . The central bank is assumed to have at its disposal a monetary-policy instrument  $i$  (the short-term interest rate) that can affect the selected target. Finally, the relation between the instrument and the target is given by the function  $f$ , which is assumed to link a unique value of the exchange rate  $x$  to each value of the interest rate

$$f(i) = x, \quad i \in I,$$

where the interest rate can only assume values in the set  $I$  (e.g. non-negative values). Initially we will disregard the uncertainty relating to the function  $f$ , assuming that the relationship is deterministic.

If the monetary-policy target is to be met through adjustment of the instrument, there must be a value of  $i$  for which the following equation is true

$$f(i) = x^*.$$

Chart 1(a) shows a case where a solution exists. If the short-term interest rate is equal to  $i^*$ , the monetary-policy target is met – the exchange rate assumes the value  $x^*$ .

The central bank might also be interested in several target variables, e.g. inflation and output. Here we will consider a case with two target variables,  $x$  and  $y$ , with the desired values  $x^*$  and  $y^*$ . The relation between the short-term interest rate and the targets is assumed to be given by the (vector) function  $f$ , which links unique values of the target variables to each value of the instrument

$$f(i) = (x, y), \quad i \in I.$$

Meeting the monetary-policy targets now requires a solution to the following equation

$$f(i) = (x^*, y^*).$$

Chart 1(b) illustrates that generally it is not possible to meet two targets using only one instrument. The possibility curve  $f(i) = (x, y)$  indicates the combinations of the target variables achievable by adjusting the instrument. The curve does not pass through the point  $(x^*, y^*)$ , which means that there is no value of the instrument that ensures fulfilment of both targets at the same time. However, in the example there are values of

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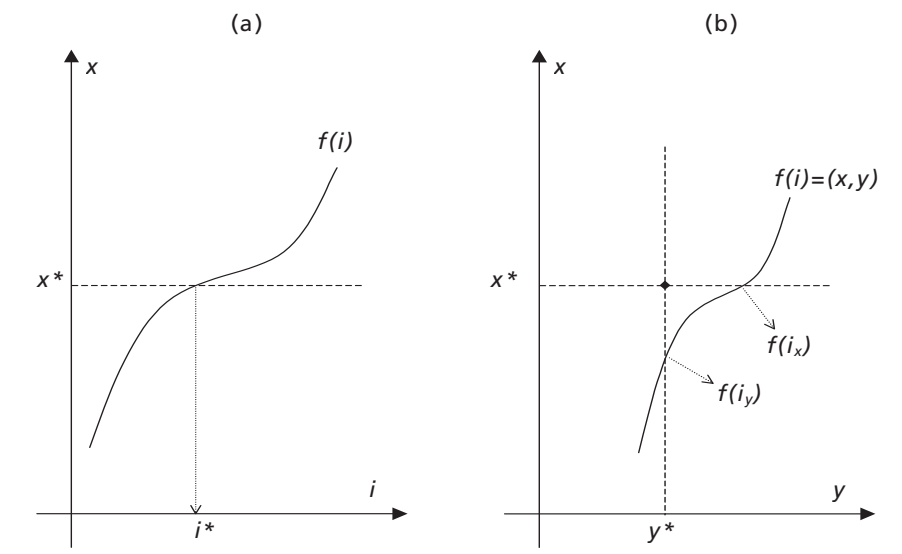
<sup>1</sup> The formal presentation here has much in common with the discussion in Johansen (1977), which considers economic policy in general.

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 EXAMPLES OF RELATIONSHIPS BETWEEN INSTRUMENT AND TARGETS IN MONETARY POLICY: (A) ONE TARGET AND (B) TWO TARGETS
 

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Chart 1



the instrument that lead to separate fulfilment of the targets: if the interest rate is set at  $i_y$ , the target for  $y$  will be met, while an interest rate of  $i_x$  ensures that the target for  $x$  is met.

The conclusion of the analysis is that a central bank can usually ensure precise fulfilment of one target by adjusting its instrument. A central bank attempting to meet several targets by adjusting its short-term interest rate may encounter the problem that the interest rate ensuring fulfilment of one target may not ensure fulfilment of the other target. In that situation the central bank must prioritise non-fulfilment of the various targets when setting its instrument.

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**EXTENDING THE MODEL**


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The basic model introduced in the preceding section allowed a clear presentation of the key result. However, the model is naturally only a very rudimentary description of monetary policy. This section discusses possible extensions of the model, focusing on their significance to the need for harmonising the number of monetary-policy targets and instruments.

**Selecting targets**

In the model, the monetary-policy targets were implicitly assumed to have been chosen independently of the relationship between instrument and target variables. In that case there is no direct mechanism

ensuring consistency between targets and instruments. If the monetary-policy targets are not set with the target-variable values achievable via the instrument in mind, the possibility curve will only pass through the target point by coincidence.

In practice monetary-policy targets are selected on the basis of the central bank's perception of the possibility curve. It is useful to make a distinction between two fundamentally different approaches: 1) The central bank continuously chooses its preferred point from the possible points on the current possibility curve. 2) The central bank selects its targets based on the possible points on a "structural" possibility curve.

In principle, the current possibility curve may give the central bank an overview of the outcomes (e.g. combinations of inflation and output) currently achievable by adjusting the instrument. This allows the bank to choose its preferred outcome on an ongoing basis and set the short-term interest rate accordingly. This type of strategy, under which the central bank continuously adjusts its instrument based on the currently optimal solution, is known as "discretionary" monetary policy in the literature. Another option is rule-based policy, where the instrument is set according to a rule, e.g. with a view to meeting a pre-announced target. Kydland and Prescott (1977) and Barro and Gordon (1983) were among the first to describe the basic difference between the two types of policies. Their main result is that the discretionary monetary policy leads to an inflation bias since inflation becomes higher than under a rule-based policy. The result is based on the assumption that the central bank's output target is higher than the potential level. More recent literature has pointed to other disadvantages of discretionary monetary policy, which do not depend on the central bank aiming at output in excess of the potential level, see e.g. Woodford (2003).

Alternatively, the monetary-policy targets may be fixed on the basis of a structural possibility curve. This means that the central bank selects the targets using its model of the economy's structural relationships that can be assumed to dominate in the longer term. In this way the central bank can ensure that there is no underlying conflict between its targets. An example could be a central bank that wishes to minimise fluctuations in inflation and output, believing that a positive short-term relationship exists between inflation and output gap<sup>1</sup>. By selecting the potential output as the output target – i.e. a target of zero for the output gap – the central bank ensures that the output target is consistent with an unchanged rate of inflation. Thus a situation where the output gap is zero

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<sup>1</sup> The output gap is the difference between actual and potential output (i.e. the output in a long-term equilibrium with full employment and flexible prices).

and the inflation target is met is an equilibrium where no underlying mechanisms in the economy act to undermine the target fulfilment.

Flexible inflation targeting is precisely based on underlying targets of stabilising inflation and output. However, it is worth noting that under fairly general assumptions of the model for the economy it is possible to demonstrate that the optimal monetary policy, given targets for stabilising inflation and output, can be expressed as a fixed target, i.e. a value for (the expected value of) inflation in the medium term (see e.g. Svensson (1997)). It is therefore arguable whether flexible inflation targeting within the framework of the model discussed in this article is best interpreted as having one or two targets.

With the selected targets, it would also be an advantage if deviations from the targets require the same (qualitative) change in the monetary-policy instrument. In the example with flexible inflation targeting, this will be met if a positive output gap is most frequently associated with inflation above the target (e.g. as a result of a positive demand shock) since the optimal monetary-policy reaction to both these deviations would be to raise the short-term interest rate. Given this relationship between the monetary-policy targets, the central bank will normally not be faced with a dilemma as to setting the short-term interest rate except for the very short term, cf. e.g. Svendsen, Røisland and Olsen (2004).

### Target zones

One of the assumptions in the model is that the central bank's target is an exact value for one or several target variables. While this is consistent with the targets of certain central banks, e.g. the Baltic currency boards, there are also many central banks which operate with wider target zones. In Denmark's case a narrow fluctuation band of +/- 2.25 per cent around the central rate vis-à-vis the euro has been fixed for the krone under ERM II,<sup>1</sup> and in most countries with inflation targets the central bank aims to keep inflation within a given interval, typically +/- 1 per cent around the target.

One reason why central banks do not attempt to keep the target variable constant at an exact value is that this strategy would require very frequent adjustments of the instrument. A high degree of variability in the instrument complicates the central bank's external communication and reduces its scope for sending a clear monetary-policy signal. Moreover, in regimes with much uncertainty as to the impact of changes in the instrument on the target variable it will only be practically possible to keep the target variable within an interval.

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<sup>1</sup> In recent years the krone has been kept stable close to the central rate.

The model can be extended to comprise target zones. Instead of  $x^*$ , the central bank's target is described as an interval e.g.  $[\underline{x}^*; \bar{x}^*]$ . Since the target is broader, several values for the instrument will result in the target being met, and this leaves more scope for conducting monetary policy. For a central bank with two targets, a transition to target zones will, all other things being equal, increase the probability that both targets can be met at the same time.

### **Several possible equilibria**

The model implies that the relationship between the monetary-policy instrument and the monetary-policy targets can be described using a function, which means that for each value of the instrument there is only one target value. It could be objected that there are economic models with several possible equilibria implied by e.g. the expectation formation. More specifically, the equilibrium of the economy – and thus the values of the target variables – can change solely as a result of changes in consumers' and business enterprises' expectations of future monetary policy. All other things being equal, the possibility of multiple equilibria will make it more difficult for the central bank to achieve precisely the equilibrium where the targets are met.

### **The transmission mechanism**

The relationship between the central bank's instrument and the target variables is often referred to as the monetary-policy transmission mechanism. In fact, this also involves a number of other economic variables and relations. The model's function,  $f$ , is a "reduced form" of this, summarising all the underlying elements. In a fully specified model of the economy, the short-term interest rate determined by the central bank and the target variables (e.g. the exchange rate or inflation and the output gap) will be included along with other macroeconomic variables such as consumption, investment, government budget balance, balance of payments, long-term interest rate and relevant foreign variables. The relationship between the central bank's instrument and targets in the aggregate model can be determined by solving the model for different values of the monetary-policy instrument and finding the associated values for the central bank's target variables. When the function binding the instrument and targets together has been derived in this way, assumptions regarding the values of the other variables and regarding the economic relationships included in the aggregate model have been made in the process. The estimated function is therefore only valid if these auxiliary assumptions are true.

A fiscal-policy expansion is an example of an event that can lead to a shift in the function  $f$ . If the central bank's target is a stable exchange rate, an unexpected fiscal-policy expansion could exert downwards pressure on the currency. Thus the previous relationship between the short-term interest rate and the exchange rate no longer holds true, and monetary policy must be tightened if the exchange-rate target is to be met. A central bank with targets for inflation and the output gap may also find that where a given value for the short-term interest rate ensured that the targets were met before the fiscal-policy expansion, this is not the case after the expansion. Usually, fiscal-policy expansion will lead to increased inflation and a positive output gap, and the central bank will therefore have to raise its interest rate to reduce demand so that its targets can be met once again.

Influences from abroad may also lead to shifts in the transmission mechanism. For instance, it is obvious that the exchange rate between two currencies is determined by economic developments and policies in both countries. Consequently, a central bank with an exchange-rate target will see frequent shifts in the possibility curve as a result of e.g. changes in the anchor country's monetary policy. In Chart 1(a) this is equivalent to a shift in the function  $f$  and a change of the interest rate at which the exchange-rate target is met. For a central bank with an inflation target foreign impacts may also lead to shifts requiring a change in monetary policy in order to keep the development in prices on track.

Generally there are many types of changes in the economic system that can lead to changes in the monetary-policy transmission mechanism. Changes in fiscal policy and foreign influences are important examples, but structural shifts in the economy – e.g. owing to innovations in the financial markets – may have similar effects. This makes it more difficult for the central bank to conduct monetary policy than the basic model indicates. The relationship between the monetary-policy instrument and the targets is not invariant, and the central bank must therefore be ready to adjust its monetary policy if the relationship changes.

Since fiscal policy plays an important role in the central bank's ability to reach its targets, adjustment of fiscal policy may be necessary if monetary policy alone cannot ensure that the monetary-policy targets are met. For instance, lack of confidence in the economic policy of a country pursuing a fixed-exchange-rate policy may exert pressure on the currency, which cannot necessarily be addressed via tighter monetary policy, but which must rather be addressed via a fiscal-policy correction.

### **Dynamic transmission**

The model described in this article does not distinguish between dynamic and static relationships. If changes to the monetary-policy instrument have a delayed effect on the monetary-policy targets, the central bank's task becomes considerably more difficult. When monetary policy is based on flexible inflation targeting, the relationship is dynamic since the target is to control inflation in the medium term. The central bank changes its short-term interest rate in order to influence inflation e.g. two years ahead.<sup>1</sup> This means that the central bank cannot immediately assess whether an adjustment of the monetary-policy instrument has the desired impact on its target variable.

For a central bank with an exchange-rate target the relationship between instrument and target is, however, static in the sense that adjustments of the short-term interest rate have an immediate impact on the exchange rate. Consequently, the central bank can very quickly see whether the change to the interest rate has the desired effect on the exchange rate.

Generally the model's results do not, however, depend on the target horizon. Within the framework of the model other cases can be analysed, e.g. several targets with different horizons. A monetary-policy strategy based on a medium-term inflation target and an exchange-rate target to be observed continuously is thus merely a variant of the two-target situation. However, it is clear that the horizon for the monetary-policy target is of major importance to the "technique" of the central bank's implementation of monetary policy and to its external communication, cf. e.g. Storgaard (2002).

### **Stochastic transmission**

In the model, the transmission mechanism has been described as a deterministic relation. In practice, however, the transmission from the monetary-policy instrument to the targets is subject to uncertainty. When the central bank changes its short-term interest rate, the effect on the exchange rate or the future inflation is not known precisely. The importance of this depends on whether the relationship between the instrument and the targets is dynamic. The longer and more complex the transmission mechanism, the greater the risk that e.g. unexpected shocks to the economy prevent the central bank from meeting its targets. Extending the model to the case of a stochastic relationship between the instrument and the targets renders it more probable that

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<sup>1</sup> The reason why the central bank does not try to manage current inflation when applying flexible inflation targeting is that changes in the monetary-policy instrument are only assumed to pass through to prices with a certain lag.

the central bank will not meet its targets precisely and does not reduce the need for the number of monetary-policy instruments to match the number of targets.<sup>1</sup>

## MONETARY-POLICY STRATEGIES IN SMALL OPEN ECONOMIES

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In an open economy with free movement of capital one generally has to choose between exchange-rate stabilisation or monetary-policy autonomy. The reason is that a monetary policy based on domestic targets, a fixed exchange rate and free movement of capital constitute a trilemma since only two of them can be mutually consistent in the long term, cf. e.g. Obstfeld, Shambaugh and Taylor (2004).<sup>2</sup>

The two examples of monetary-policy strategies in the above discussion of the model – an exchange-rate target and an inflation target – meet this basic condition. Both strategies are aimed at meeting the overall monetary-policy target of price stability, but in different ways. The exchange-rate target is an external target under which the central bank attempts to stabilise the price development by maintaining a fixed exchange rate as the nominal anchor of the economy, whereas the inflation target is an internal target where the medium-term inflation target serves as the nominal anchor.

In addition to the basic theoretical argument that a fixed exchange rate is inconsistent with monetary-policy autonomy in a scenario with free movement of capital, a number of other aspects of a fixed-exchange-rate policy make it difficult to combine this strategy with e.g. an inflation target.

Firstly, there is a significant difference between the two strategies in that the transmission from the short-term interest rate to the exchange rate is usually instant, while the full effect of interest-rate changes on inflation and the output gap typically lags by up to two years.

The theoretical reason why changes in the short-term interest rate often have an immediate impact on the exchange rate is that exchange rates are "forward-looking" asset prices. In addition to monetary-policy measures at home and abroad other "news" about economic trends in the two countries influencing the expected future yield on the two currencies may rapidly lead to substantial capital flows and changes in the

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<sup>1</sup> An early survey of the significance of uncertainty as to the effect of adjustments in the instrument on the target variable can be found in Brainard (1967). An example of a more recent analysis of the same issue is Giannoni (2002).

<sup>2</sup> In a credible fixed-exchange-rate regime, the interest rate is close to the interest rate in the anchor country since the yield on placements in the two currencies must be the same when capital moves freely and the exchange rate is not expected to change. This makes it impossible for the central bank to conduct autonomous monetary policy at the same time since this requires the ability to set a rate of interest which differs from that of the anchor country.

exchange rate. Consequently, a central bank with an exchange-rate target must always be ready to change its short-term interest rate to counteract undesirable exchange-rate fluctuations. Since speculators can make large gains if pressure on the currency results in its devaluation or revaluation, the central bank must be ready to change the rate of interest substantially in order to defend the currency in a currency crisis.

Matters are further complicated by the fact that there is no economic theory providing satisfactory forecasts of the short-term development in the exchange rate, cf. e.g. Meese and Rogoff (1983) and Faust, Rogers and Wright (2003). As a result, a central bank wishing to manage the exchange rate cannot rely on model-based calculations. This is another reason why the central bank's strategy must be based on continuously reacting to the current development. In a credible fixed-exchange-rate regime, exchange-rate expectations will be close to the exchange-rate target, and changes to the short-term interest rate to stabilise the current exchange rate will therefore not affect longer-term interest rates.

When monetary policy is based on flexible inflation targeting, the underlying purpose is to bring inflation and the output gap as close as possible to the targets set. The task of the central bank is complicated by the considerable sluggishness in the development in prices and output.<sup>1</sup> In addition, the pass-through from a change in the short-term interest rate to aggregate demand – including consumption and investments – involves uncertainty in respect of both strength and speed.

The above model and the subsequent discussion point to the risk that the targets for inflation and the output gap cannot be precisely met at all times by the central bank applying the interest-rate instrument. In addition, the central bank's prioritisation of the two targets can in practice appear unclear and variable over time. Owing to the sluggishness in inflation and output, shifts in focus, like interest-rates changes, will take a relatively long time to pass through and are not likely to cause abrupt effects.

In countries with inflation targets the exchange rate is an important monetary-policy transmission channel in that changes in the short-term interest rate to influence the future price development will quickly impact on the exchange rate and thus import prices. In addition to the fluctuations attributable to monetary-policy adjustments of interest rates, it is well known that floating exchange rates entail substantial short-term volatility and that prolonged deviations from equilibrium

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<sup>1</sup> In an economy with low or moderate inflation, many prices only seldom change because the costs of considering and introducing price changes often exceed the advantages. Likewise, adaptations of the output of goods and services to changing demand are slow because fluctuations in sales are initially addressed via stockbuilding or stock depletion.

values may occur. Such deviations may complicate the fulfilment of the targets for inflation and the output gap. There are thus no indications that these countries, in return for higher exchange-rate volatility, have lower volatility in inflation and output than countries pursuing a fixed-exchange-rate policy, cf. Christensen and Hansen (2003) for a survey of the development in the Nordic countries in recent years.<sup>1</sup>

Altogether there are thus several factors rendering it particularly difficult for a central bank with an exchange-rate target also to pursue other targets. The exchange rate is a forward-looking asset price that is instantly affected by monetary-policy changes at home and abroad and shifts in monetary-policy expectations. Consequently, monetary-policy measures aimed at meeting other targets – e.g. an inflation target or an output-gap target – will in most cases also lead to fluctuations in the exchange rate, which will therefore deviate from the target.

If the central bank does not have a firm exchange-rate target, but rather wishes to keep the exchange rate within a band, a certain room for manoeuvre in setting interest rates is achieved. A broad target zone may thus give the central bank more monetary-policy scope to also pursue e.g. an inflation target, but this will be at the expense of the central bank's influence on the exchange rate. If the market rate does reach the fluctuation limits, the central bank will be forced to either move/abandon the band or defend the exchange rate by changing the interest rate. If the central bank opts for the latter solution, there is a risk that the bank will experience problems meeting its inflation target.

## **STRATEGIES TOWARDS EURO AREA MEMBERSHIP**

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For the new EU member states, euro area membership is the guiding light for monetary and foreign-exchange policy in the coming years. Adoption of the euro requires that a number of convergence criteria are met, including low inflation and participation in ERM II without severe tensions for at least two years, and without devaluing against the euro. Price stability in a broad sense is a prerequisite for simultaneously meeting the conditions of stable domestic price development and a stable exchange rate.

Owing to the convergence criteria, stabilisation of the exchange rate within the framework of ERM II will sooner or later be a condition of monetary and foreign-exchange policy in each of the acceding countries. Consequently, reorientation of monetary policy will be necessary if the

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<sup>1</sup> The authors point out that part of the explanation may be that a medium-term orientation of fiscal policy and a consistent fixed-exchange-rate policy shield an economy from the domestic shocks attributable to short-sighted fiscal policy and exchange-rate fluctuations.

central bank does not currently operate with an exchange-rate target and the exchange-rate volatility is substantial.

In this connection the above discussion shows that it can generally be a problem to have other monetary-policy targets when aiming to stabilise the exchange rate. In the specific case where the requirement of a stable exchange rate and low inflation only applies for a short period, exchange-rate stability and an inflation target will not necessarily conflict. For instance, Finland and Spain had no major problems maintaining inflation targets as part of their monetary policies up to their adoption of the euro.<sup>1</sup> Monetary policy did not stand alone, however, since the convergence strategy in many of the present euro area member states was a package, also comprising fiscal and structural policies, cf. e.g. Papaspyrou (2004). Nevertheless, the development in Hungary in recent years shows that the risk that the central bank may find it difficult to meet two targets is not only theoretical.<sup>2</sup>

In the period up to euro area membership, monetary policy will also be affected by a number of more technical issues. If the announced membership date is credible, the yield curve in the member state in question will be bound to the yield curve in the euro area from that time. This means that monetary policy can only affect interest rates if their maturities do not go beyond the time of the expected introduction of the euro. As this time draws near, monetary policy will therefore become still less effective. Owing to the sluggishness in the transmission from the monetary-policy interest rate to output and inflation, the impact of monetary policy on these variables will weaken sooner than its impact on e.g. the exchange rate.

Another important relationship is interest-rate parity, which links the rate of interest in the acceding country to the rate of interest in the euro area and the current and future exchange rates between the currency of the acceding country and the euro. Given the rate of interest in the euro area and the market's expectations of the exchange rate on entry, a change in the short-term interest rate in the acceding country will lead to a change in the (spot) exchange rate. Unless the market's expectations of the exchange rate on entry changes at the same time, a change in the monetary-policy interest rate in the acceding country will thus lead to an immediate change in the exchange rate. It will therefore

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<sup>1</sup> Reviews of the Finnish and Spanish experiences can be found in Korhonen (2001) and Gutiérrez (1998), respectively.

<sup>2</sup> At the beginning of 2003 the central bank had to ease monetary policy considerably in order to keep the currency within the fluctuation band vis-à-vis the euro. After a devaluation in June, the central bank tightened its monetary policy on several occasions during the rest of the year in order to prevent the currency from weakening too much. The central bank succeeded in keeping the currency within the fluctuation band, but the announced inflation target for end-2003 was exceeded, *inter alia* as a result of the weakening of the currency over the year.

be difficult for the central bank to change interest rates in order to e.g. meet an inflation target without creating exchange-rate volatility.

When monetary policy is aimed at keeping the exchange rate stable, the market will continuously assess whether this strategy is credible, and any doubt as to the sustainability of the target may lead to speculation against the currency. In the time up to a country's entry into a currency union focus on the sustainability of the strategy chosen is not likely to be less intense. This makes further demands on the central bank, which must be ready to apply monetary policy to address speculative attacks. To the extent that the doubt about the strategy for euro area membership is a result of economic policy in general, it may, of course, also be necessary e.g. to adjust fiscal policy.

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# The Stability and Growth Pact – Status in 2004

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## INTRODUCTION

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During the economic slowdown in recent years, an increasing number of EU member states have had difficulties complying with the limit of 3 per cent of GDP for government budget deficits set out in the Treaty. This is a consequence of their non-compliance with the Stability and Growth Pact in previous years.

In 2003 Germany and France exceeded the 3-per-cent limit for the second year running. The UK, the Netherlands and Greece also exceeded the limit in 2003. In the autumn of 2003 the Stability and Growth Pact's excessive deficit procedure was suspended for Germany and France in view of their non-compliance. The non-compliance has also intensified the debate on whether the rules of the Pact should be amended. This article, which is an element of Denmark's Nationalbank's annual status of the Stability and Growth Pact presented in the Monetary Review, summarises the events in connection with the excessive deficit procedure and the most recent assessment of the member states' stability and convergence programmes. A number of proposals for amendment of the Pact are also described.

## THE PURPOSE AND RULES OF THE STABILITY AND GROWTH PACT

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In the Economic and Monetary Union, EMU, monetary policy is determined by the European Central Bank, ECB, while fiscal policy is the responsibility of the individual member states. In order to ensure sound public finances and avoid inappropriate interaction between the single monetary policy and national fiscal policies, the EU Treaty and the Stability and Growth Pact<sup>1</sup> contain a number of fiscal rules. The central limi-

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<sup>1</sup> The Stability and Growth Pact, which has been in force since the euro was introduced as the single currency in a number of EU member states on 1 January 1999, formally consists of a resolution of the European Council and two Council regulations adopted in June and July 1997, cf. Official Journal C 236, 2 August 1997 and Official Journal L 209, 2 August 1997.

tation in the EU Treaty is the prohibition against "excessive government deficits", defined as deficits exceeding 3 per cent of GDP. All EU member states are subject to the prohibition<sup>1</sup>, but recommendations to take action to reduce excessive deficits can only be made to and sanctions only imposed on the euro area member states.

The Stability and Growth Pact is based on the 3-per-cent rule set out in the Treaty. A central obligation in the Pact is that all EU member states must seek to ensure a medium-term budgetary position "close to balance or in surplus". The "close to balance or in surplus" requirement will enable the automatic stabilisers<sup>2</sup> to work freely, dampening a "normal" cyclical downturn without the risk that the budgetary deterioration will lead to an excessive deficit. The interpretation of this "close to balance" obligation has changed since the Pact entered into force in 1999. In recent years the European Commission has in practice interpreted the obligation set out in the Pact as a cyclically adjusted budget balance<sup>3</sup> of at least zero, subject to a margin of uncertainty of 0.5 per cent of GDP.<sup>4</sup>

Since many euro area member states were far from "close to balance", approaching the 3-per-cent limit, the Eurogroup (the Ministers of Economic Affairs and Finance of the euro area member states) in October 2002 established the principle that the member states that had not yet achieved a budgetary position "close to balance or in surplus" should reduce their cyclically adjusted deficits by at least 0.5 per cent of GDP annually until a budgetary position close to balance or in surplus had been reached. In March 2003 the Ecofin Council (the Ministers of Economic Affairs and Finance of the EU member states) further specified that attention should be paid to country-specific factors, e.g. the long-term sustainability of public finances, in the assessment of a member state's compliance with the Pact. Implicitly, this provides for a slightly more flexible interpretation of "close to balance" for member states with a relatively low government debt.

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<sup>1</sup> Except the UK, which is subject to a special derogation as long as the UK does not participate in the euro area.

<sup>2</sup> Economic activity has a direct effect on the government budget via the automatic stabilisers. During a cyclical upswing the budget balance is automatically improved via lower expenditure on e.g. unemployment benefits and higher tax revenue. This also dampens the growth fluctuations. A cyclical downturn equivalently encompasses a budgetary deterioration, which in turn reduces the slowdown.

<sup>3</sup> The government budget balance is influenced by a number of factors, including in particular the cyclical situation via the automatic stabilisers, which are not directly related to fiscal policy. A cyclically adjusted balance, i.e. adjusted for cyclical factors, therefore provides a more accurate picture of the actual fiscal development. However, the cyclically adjusted balance always contains estimated elements and is thus subject to uncertainty. The problems concerning the compilation of cyclically adjusted government budget balances are described in Allan Bødskov Andersen, *Cyclically Adjusted Government Budget Balances*, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2002.

<sup>4</sup> As regards member states with a cyclically sensitive government budget, the European Commission states that an even better cyclically adjusted budget balance can be required. See The European Commission, *Public Finances in EMU – 2001*, European Economy, Reports and Studies, No. 3, 2001.

Besides verbal criticism, no sanctions are imposed in case of non-compliance with the Pact, as long as the deficit remains below 3 per cent of GDP.

### **PROBLEMS WITH THE 3-PER-CENT LIMIT**

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The excessive deficit procedure was initiated for Germany in November 2002 and France in April 2003 as a consequence of the two member states' non-compliance with the 3-per-cent limit for government deficits in 2002. When the Ecofin Council has decided that an excessive deficit exists, it issues recommendations to the member state in question, which then has to take effective action within 4 months. The recommendations to Germany and France were issued in January 2003 and June 2003, respectively. According to the Stability and Growth Pact, excessive deficits must be corrected in the year after the existence of the deficit has been decided, unless exceptional circumstances apply. For Germany and France this would have meant correction in 2004. However, as a result of insufficient fiscal consolidation in previous years and the continued slowdown in growth, the deficits rose to approximately 4 per cent in 2003, with prospects of continued non-compliance with the 3-per-cent limit in 2004. Against this background, in the autumn of 2003 the European Commission recommended that the Ecofin Council order Germany and France to tighten fiscal policy to correct the deficits. However, the European Commission's recommendation entailed spreading the tightening measures over 2004 and 2005 in consideration of the weak economic growth, whereby the budget deficits would not have to be below the 3-per-cent limit until the year 2005. If the imposition had been adopted by the Ecofin Council and the two member states had failed to comply, the next step for the Ecofin Council would have been to decide whether to impose sanctions on the two member states.

Although the European Commission's recommendation went a long way in the interpretation of the rules in the Pact<sup>1</sup>, the recommendation failed to muster the required majority at the meeting of the Ecofin Council on 25 November 2003. Instead, the Ecofin Council adopted a set of non-binding Council conclusions that softened the consolidation requirements for Germany and France in 2004 a little compared to the Commission's recommendation, but nevertheless maintained the requirement to bring the situation of excessive deficits to an end by 2005 at the latest. Only the euro area member states participated in the

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<sup>1</sup> It has subsequently been questioned whether the European Commission's extension of the time limit for correcting the budget deficits to 2005 was in accordance with the "spirit" of the Pact, cf. Deutsche Bundesbank (2004), p. 67.

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**FROM RECOMMENDATION TO SANCTIONS IN THE EXCESSIVE DEFICIT PROCEDURE**

Box 1

The excessive deficit procedure is described in the Treaty (Article 104) and detailed and clarified in the Stability and Growth Pact.

The procedure is as follows:

- When non-compliance with the 3-per-cent limit for government budgets is ascertained, the procedure is initiated by the Commission preparing a report on the situation. No later than 3 months after the existence of the deficit has been decided, the Ecofin Council must make a recommendation to the member state, which is given 4 months to implement effective measures. Furthermore, a deadline for reducing the deficit to below the 3-per-cent limit must be decided. This is normally one year after the existence of the deficit has been decided.
- If, after the expiry of the time limit of 4 months, the Ecofin Council decides that effective measures to reduce the deficit have not been implemented, the Council must impose on the member state to implement, within a given time limit, a number of measures deemed necessary by the Council to solve the budgetary problem. If the member state fails to implement such measures, the Council must, within 2 months, decide whether to impose sanctions on the member state.

According to the Stability and Growth Pact the sanctions shall always start with a non-interest-bearing deposit to the EU of 0.2 per cent of the member state's GDP plus a premium depending on the extent to which the deficit deviates from the 3-per-cent limit. In the following years it may be decided to impose a further deposit depending on the extent to which the deficit deviates from the 3-per-cent limit. The deposit may not exceed 0.5 per cent of GDP annually. If the member state fails to correct its deficit, the deposit is normally converted into a fine after 2 years.

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voting, and the Council conclusions were adopted by a small majority. Furthermore, the Ecofin Council's conclusions suspended the excessive deficit procedure for the two member states, whereby no sanctions would be imposed on them in the first instance. However, it was emphasised that the Ecofin Council is willing to continue the procedure on the basis of recommendations from the European Commission if the two member states fail to meet the obligations in the Council conclusions adopted.

The conclusions of the Ecofin Council thus disregarded the envisaged excessive deficit procedure, cf. Box 1. Against this background, in January 2004 the European Commission decided to bring the procedure concerning the decision of the Ecofin Council of 25 November 2003 before the European Court of Justice to seek legal clarity and predictability of the rules in the Stability and Growth Pact, also with a view to future enforcement of the rules. The European Commission finds that the Ecofin Council could have opted for amendment of the content of the

Commission's recommendation, but not amendment of the "legal form" of the recommendations to be issued to the two member states. The Ecofin Council should have issued an imposition on the two member states rather than legally non-binding Council conclusions. The Commission's legal action is not intended to force Germany and France to implement further consolidation measures. The European Court of Justice is expected to rule in the matter in the middle of 2004.

The excessive deficit procedure for Portugal was abrogated by the Ecofin Council in May 2004. The procedure was initiated in September 2003 after it had been ascertained that Portugal's budget deficit amounted to 4.4 per cent of GDP in 2001. Action including non-recurring measures brought Portugal's deficit below the 3-per-cent limit at 2.7 per cent of GDP in 2002 and 2.8 per cent in 2003. The European Commission's 2004 spring forecast expects Portugal to exceed the limit of 3 per cent of GDP again in 2004 and 2005, unless fiscal policy is tightened further.

In 2003 the Netherlands, the UK and Greece joined the group of member states with a budget deficit close to or exceeding the 3-per-cent limit stipulated in the EU Treaty, cf. Table 1. Consequently, in April 2004 the European Commission initiated the excessive deficit procedure for the Netherlands and the UK. A decision concerning Greece has awaited validation by Eurostat of the budget figures for 2003. After preliminary revision Greece's 2003 budget deficit was compiled at 3.2 per cent of GDP at the beginning of May 2004. Since the UK is subject to a special derogation as long as it does not participate in the euro area, it is not covered by the Treaty's prohibition against excessive deficits, but is nevertheless obliged to seek to avoid such deficits.<sup>1</sup> The European Commission's assessment of the UK was lenient since the deficit is expected to fall below the 3-per-cent limit again in 2004, and the UK's government debt is one of the lowest among the EU member states. The Netherlands' excessive deficit is primarily attributable to a severe recession in 2003. The Netherlands implemented considerable public budget cuts in 2003, and again in April 2004 the Dutch government took steps towards further consolidation to bring the deficit below the 3-per-cent limit. The European Commission finds that without these further consolidation measures the deficit would remain above 3 per cent of GDP in 2004 and 2005.

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<sup>1</sup> According to Protocol no. 25 to the Treaty, the UK is subject to a special derogation from the obligation of Article 104 (1) of the Treaty to avoid excessive government deficits. However, the UK is bound by Article 116 (4) to seek to avoid excessive deficits. Article 104 (9) and (11) regarding the imposition of measures to reduce the deficit and any sanctions do not apply to the UK, nor to the other non-euro area EU member states.

**GOVERNMENT BUDGET FORECASTS IN THE STABILITY AND CONVERGENCE PROGRAMMES OF THE EU MEMBER STATES, 2004-2007**

Table 1

Per cent of GDP	2000	2001	2002	2003	2004	2005	2006	2007
<i>Euro area member states</i>								
Belgium .....	0.2	0.5	0.1	0.2	0.0	0.0	0.0	0.3
Finland .....	7.1	5.2	4.3	2.3	1.7	2.1	2.1	2.2
France .....	-1.4	-1.5	-3.2	-4.1	-3.6	-2.9	-2.2	-1.5
Greece .....	-2.0	-1.4	-1.4	-3.2	-1.2	-0.5	0.0	-
Netherlands .....	2.2	-0.0	-1.9	-3.2	-2.3	-1.6	-0.9	-0.6
Ireland .....	4.4	1.1	-0.2	0.2	-1.1	-1.4	-1.1	-
Italy .....	-0.6	-2.6	-2.3	-2.4	-2.2	-1.5	-0.7	0.0
Luxembourg .....	6.3	6.3	2.7	-0.1	-1.8	-2.3	-1.5	-
Portugal .....	-2.8	-4.4	-2.7	-2.8	-2.8	-2.2	-1.6	-1.1
Spain .....	-0.9	-0.4	0.0	0.3	0.0	0.1	0.2	0.3
Germany .....	1.3	-2.8	-3.5	-3.9	-	-2.5	-2.0	-1.5
Austria .....	-1.5	0.2	-0.2	-1.1	-0.7	-1.5	-1.1	-0.4
Euro 12 .....	0.2	-1.6	-2.3	-2.	-2.3	-1.8	-1.2	-0.7
<i>Non-euro area member states</i>								
Denmark <sup>2</sup> .....	2.6	3.1	1.7	1.5	1.5	2.0	2.0	2.3 <sup>3</sup>
UK .....	3.8	0.7	-1.6	-3.2	-2.6	-2.4	-2.1	-2.0
Sweden .....	5.1	2.8	-0.0	0.7	0.4	1.2	1.6	-
EU-15 .....	1.0	-1.0	-2.0	-2.6	-2.2	-1.7	-1.2	-0.9

Note: The "shaded" member states had a deficit of at least 3 per cent in 2003.

Source: The figures for 2004-07 are from the 5th updated version of the stability and convergence programmes, while the figures for 2000-03 are final data from the European Commission.

<sup>1</sup> Including the revision after the reform package of 17 December 2003, cf. Aktualisierung des deutschen Stabilitätsprogram, January 2004, Bundesministerium der Finanzen.

<sup>2</sup> Figures compiled in accordance with the definition applied in the EU under the excessive deficit procedure.

<sup>3</sup> Target for 2010.

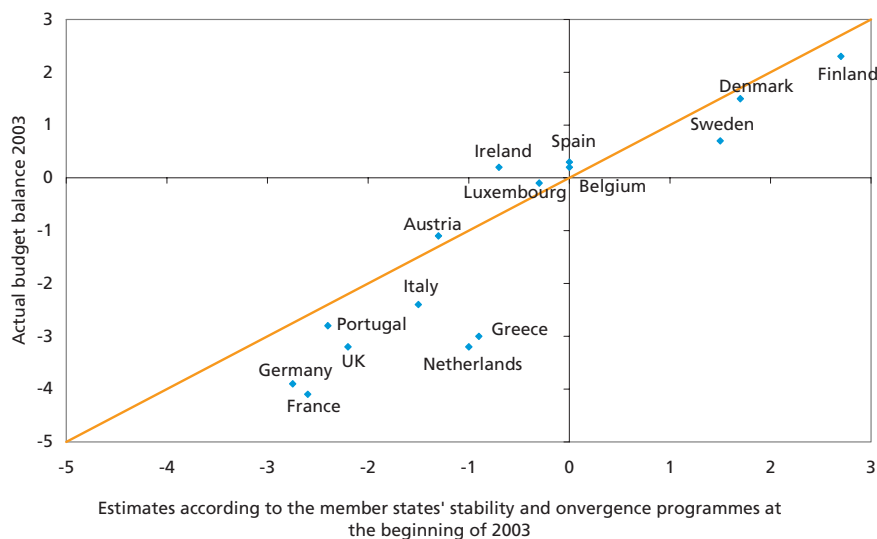
<sup>4</sup> Based on the figures for the fiscal years from 2000-01 to 2007-08.

**THE 5TH UPDATED VERSION OF THE STABILITY AND CONVERGENCE PROGRAMMES**

According to the Stability and Growth Pact the EU member states must each year prepare stability programmes (the euro area member states) or convergence programmes (the non-euro area member states). In the programmes the EU member states must present their government budget plans for the next 3 years as a minimum. GDP growth has continued to decline in the EU member states since the last round of stability and convergence programmes at the beginning of 2003. Thus, GDP growth fell from 1.1 per cent in 2002 to 0.8 per cent in 2003. For most member states the absence of the upswing and the postponement of planned fiscal consolidation measures led to a deterioration of the budget from the expectation at the beginning of the year, cf. Chart 1. The government budget deficit for the EU member states taken as one rose for the third year running from 2.0 per cent in 2002 to 2.6 per cent

ACTUAL AND ESTIMATED BUDGET BALANCE 2003

Chart 1



Source: European Commission and the 4th updated version of the member states' stability and convergence programmes.

in 2003. Only Belgium, Ireland, Luxembourg, Spain and Austria reported better-than-expected budget balances. Among the member states with a deficit the UK, France, Italy, Portugal, Germany and especially Greece and the Netherlands reported too optimistic expectations of their budgetary paths. Box 2 summarises a recent survey of the quality of the stability and convergence programmes.

As a consequence of the increased deficits in most member states in 2003, the planned fiscal consolidation in the coming years will take longer than expected in the 2003 programmes. In its spring forecast from April 2004 the European Commission expects France, Germany, Greece, Portugal, the Netherlands and Italy to have deficits exceeding the 3-per-cent limit in 2004, cf. above, unless further consolidation measures are implemented. Furthermore, the Commission expects France, Italy, the Netherlands and Portugal to also exceed the 3-per-cent limit in 2005. The Commission's growth and budget forecast for Italy in 2004 deviates considerably from the forecast in Italy's stability programme. In April 2004 the Commission proposed that the Ecofin Council issue an "early warning" to Italy with a view to avoiding excessive deficits.<sup>1</sup>

<sup>1</sup> The early warning system of the Stability and Growth Pact is described in Tina Winther Frandsen and Jens Anton Kjærgaard Larsen, *The Stability and Growth Pact – Status in 2002*, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2002.

The annually updated stability and convergence programmes of the EU member states play an important role in the European Commission's and the Ecofin Council's surveillance of the fiscal development in the individual member states. The surveillance is made easier, the more accurate the programmes' forecasts.

Strauch, Hallerberg and von Hagen (2004) provide a systematic analysis of the accuracy of the historical programme forecasts compared with the actual development in the period 1991-2002.<sup>1</sup> The forecast errors, calculated as the difference between the actual and expected development, are analysed in relation to the projection period and for the individual member states.

As regards the programmes' budget forecasts in the period 1991-2002, the *average* deviation from the actual budget development is rather limited, but the accuracy tends to decline as the projection period gets longer. The low average deviations are primarily attributable to the symmetrical distribution of the forecast errors around the actual result. The budget forecasts for the subperiod 1999-2002, when the programmes were prepared according to the Stability and Growth Pact, show a similar pattern. The accuracy of the growth forecasts forming the basis for the budget calculations is generally at the same level as the accuracy of the growth forecasts of international organisations like the IMF and the European Commission.

As regards the individual member states, there are indications of systematic deviations in the forecasts. Portugal, Greece, Italy, France and to some extent Germany have presented too optimistic forecasts of their budget deficits. On the other hand, the budget forecasts of Austria, Denmark, Sweden, the UK, Luxembourg and Finland have systematically been too cautious in relation to the actual budget development. A certain degree of correlation is seen between forecast errors in the budget and growth forecasts. Especially Germany, Portugal and Italy have overestimated growth, while Ireland, Sweden and the UK tend to underestimate growth.

<sup>1</sup> The programmes were not standardised until the Stability and Growth Pact was introduced in 1999.

### The development in the cyclically adjusted budget deficits

Despite mounting budgetary problems in several member states, the stability and convergence programmes were assessed at the beginning of 2004 without major tensions. Indeed, the opinions of the Ecofin Council attracted only limited media attention, which should be seen in the light of the events concerning Germany and France in November 2003 and of the vacuum until the legal action by the European Commission is resolved.

As appears from Table 2, seven member states are not expected to achieve a budgetary position "close to balance or in surplus" in 2004 in accordance with the Commission's interpretation, i.e. a *cyclically adjusted* budget balance<sup>1</sup> of at least -0.5 per cent of GDP. Furthermore,

<sup>1</sup> The calculation of the cyclically adjusted budget balance and the European Commission's benchmarks are described in Tina Winther Frandsen, *The Stability and Growth Pact – Status in 2001*, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2001.

CYCLICALLY ADJUSTED BUDGET BALANCE						Table 2
Per cent of GDP	2002	2003	2004	2005	2006	2007
<i>Euro area member states</i>						
Belgium .....	0.1	0.7	0.6	0.1	-0.1	0.2
Finland .....	3.7	2.3	2.4	2.4	2.3	2.2
France .....	-3.8	-3.8	-2.0	-1.4	-0.8	-0.2
Greece .....	-1.6	-3.3	-1.8	-1.1	-0.5	-
Netherlands.....	-2.4	-1.7	-0.7	-0.5	-0.3	-0.5
Ireland .....	-1.9	0.1	-0.5	-0.4	-0.1	-
Italy .....	-2.2	-1.9	-1.6	-1.1	-0.5	0.1
Luxembourg .....	1.8	0.0	1.0	0.6	1.2	-
Portugal .....	-2.6	-1.7	-1.1	-0.6	-0.1	0.4
Spain .....	-0.2	0.4	0.1	0.1	0.2	0.3 <sup>1</sup>
Germany.....	-3.5	-3.2	-2.5	-2.0	-1.5	-1.0
Austria .....	-0.3	-0.9	-0.4	-1.3	-1.1	-0.5
<i>Non-euro area member states</i>						
Denmark .....	0.9	2.0	1.7	2.1	2.0	2.3 <sup>2</sup>
UK .....	-1.4	-2.8	-2.0	-2.2	-2.1	-2.0
Sweden .....	-0.6	0.7	1.3	1.8	2.0	-

Note: The "shaded" member states are those that do not comply with the "close to balance or in surplus" requirement in 2004 or periodically breach the requirement to reduce their cyclically adjusted deficits by 0.5 per cent of GDP annually.

Source: The figures for 2004-07 are from the 5th updated version of the stability and convergence programmes, while the figures for 2000-03 are final data from the European Commission.

<sup>1</sup> 2004-07 based on calculations from the European Commission on the basis of Spain's stability programme.

<sup>2</sup> Target for 2010.

Italy, the Netherlands, Austria and the UK will periodically deviate from the principle of reducing the deficit by 0.5 per cent of GDP annually.

### The debt path

The debt ratio for the EU member states taken as one rose from 2002 to 2003. As Table 3 shows, in 2003 half the member states exceeded the limit for the government debt<sup>1</sup> of 60 per cent of GDP. In 2003 the debt of Belgium, Greece and Italy continued to exceed 100 per cent of GDP. The debt ratios of Germany and France rose strongly from 2002 to 2003, and both member states exceeded the 60-per-cent limit. As a result of the budgetary situation, Germany and France do not expect to reduce their debt to below 60 per cent of GDP within the programme period until 2007. Portugal's government debt is expected to peak at 60 per cent of GDP in 2004 and then decline until 2007. In its opinions on the Stability and Growth Pact in recent years the Ecofin Council has attached increasing importance to the member states' government debt.

<sup>1</sup> The criterion of the gross government debt not exceeding 60 per cent of GDP is also an element of the excessive deficit procedure. However, government debt exceeding this limit is acceptable if it is found that the ratio of government debt to GDP is sufficiently diminishing and approaching the reference value at a satisfactory pace. In practice the size of the government debt has not played the same role as the government deficit in the assessment of fiscal discipline in a member state. If the budget is close to balance, the debt ratio will decline under normal circumstances. The size of the debt is therefore not included as a target variable in the Stability and Growth Pact.

## GOVERNMENT DEBT OF THE EU MEMBER STATES

Table 3

Per cent of GDP	2000	2001	2002	2003	2004	2005	2006	2007
<i>Euro area member states, according to the European Commission and their stability programmes</i>								
Belgium .....	109.1	108.1	105.8	100.5	97.6	93.6	90.1	87.0
Finland .....	44.6	43.9	42.6	45.3	44.7	44.9	45.0	44.6
France .....	57.2	56.8	58.6	63.0	62.8	63.2	62.8	61.8
Greece .....	106.2	106.9	104.7	103.0	98.5	94.6	90.5	-
Netherlands .....	55.9	52.9	52.6	54.8	54.5	53.7	53.0	52.2
Ireland .....	38.4	36.1	32.3	32.0	33.3	33.5	33.3	-
Italy .....	111.2	110.6	108.0	106.2	105.0	103.0	100.9	98.6
Luxembourg .....	5.5	5.5	5.7	4.9	5.2	5.0	-	-
Portugal .....	53.3	55.6	58.1	59.4	60.0	59.7	58.6	57.0
Spain .....	61.2	57.5	54.6	50.8	49.6	47.7	45.7	43.8
Germany .....	60.2	59.4	60.8	64.2	65.0	65.5	65.5	65.0
Austria .....	67.0	67.1	66.6	65.0	65.8	64.1	62.3	59.9
Euro 12 .....	70.4	69.4	69.2	70.4	70.0	69.4	68.4	67.6
<i>Non-euro area member states, according to the European Commission and their convergence programmes</i>								
Denmark .....	50.1	47.8	47.2	45.0	41.2	38.7	36.4	27.5 <sup>2</sup>
UK <sup>1</sup> .....	42.1	38.9	38.5	39.9	40.2	40.8	41.1	41.4
Sweden .....	52.8	54.4	52.6	51.9	51.5	50.0	48.3	-
EU-15 .....	64.0	63.2	62.5	64.0	63.8	63.3	62.5	61.9

Note: The "shaded" member states are those with a gross government debt exceeding 60 per cent of GDP in 2004.

Source: The figures for 2004-07 are from the 5th updated version of the stability and convergence programmes, while the figures for 2000-03 are final data from the European Commission.

<sup>1</sup> Based on figures for the fiscal years from 2000-01 to 2007-08.

<sup>2</sup> Target for 2010.

### The new member states and the Stability and Growth Pact

Upon joining the EU on 1 May 2004 the 10 new member states became "member states with a derogation" as regards EMU. This means that they must comply with the provisions of the Stability and Growth Pact, but – like Sweden, the UK and Denmark – they cannot be subject to an imposition to take action to reduce excessive deficits; nor can formal sanctions be imposed on them. Although the government debt is relatively small in most of the new member states, their budget deficits exceeded 3 per cent of GDP in 2003.<sup>1</sup> Consequently, the excessive deficit procedure will be initiated for these member states as well.

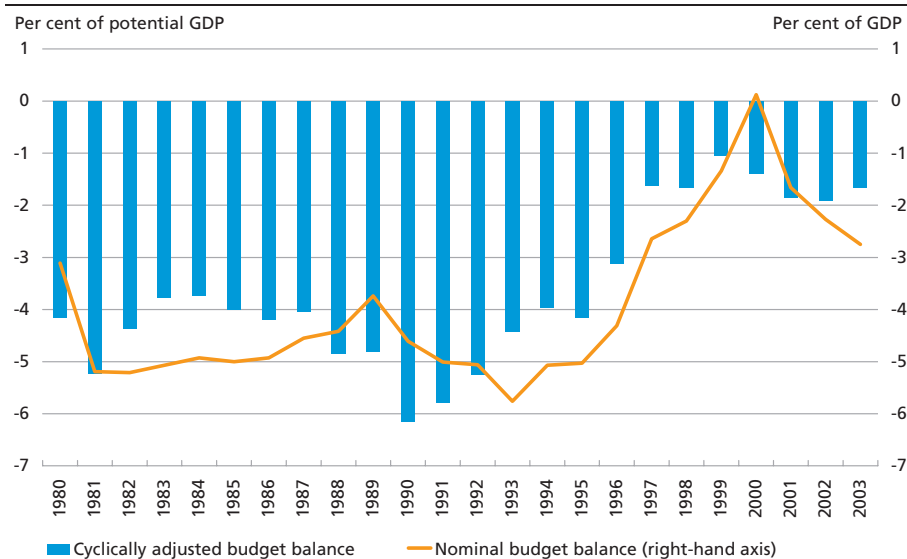
### PROPOSALS TO REFORM THE PACT

The fiscal-policy experience in EMU has been both positive and negative. On the positive side is the marked fiscal consolidation in the years up to

<sup>1</sup> The new member states' government budgets in 2003 are described in the article The 2004 enlargement of the EU, pp. 23ff.

BUDGET BALANCE IN THE EURO AREA MEMBER STATES

Chart 2



Source: OECD Economic Outlook 74.

the commencement of the third stage of EMU in 1999, cf. Chart 2. Another positive factor is that the current budget deficits for the euro area as a whole – adjusted for the current weak economic development – are not severe. On the negative side, the euro area has failed to maintain the fiscal consolidation from the period up to 1999, which was actually an important objective in the Pact.

The requirement to comply with the "close to balance or in surplus" target within the horizon envisaged by the Stability and Growth Pact is thus perceived as a "moving target", which is pushed forward one year in every updated programme. Originally, compliance with the "close to balance or in surplus" target should have been ensured by 2002 at the latest, but, as mentioned, less than half of the EU member states complied in 2003, and Germany and the UK do not even expect to comply by the end of the programme period in 2007. Furthermore, the Ecofin Council's recent majority decision to suspend the excessive deficit procedure for Germany and France casts doubt on the future compliance with the rules stipulated in the Treaty and the Stability and Growth Pact.

There is broad-based agreement on the need to have a common fiscal-policy framework with a view to achieving sound public finances that are compatible with the ECB's objective of price stability. However, the in-compliance with the Treaty and the budgetary rules in the Stability and Growth Pact has fuelled the debate on how to improve the Stability and Growth Pact. The debate intensified even more in connection with the

enlargement of the EU. The new member states differ from the existing EU member states in terms of e.g. high growth and relatively low government debt. Some of the central arguments in this debate are described in the following.

### **The European Commission's proposal to strengthen the Pact**

Already in November 2002, the European Commission proposed a number of principles to strengthen the implementation of the Pact<sup>1</sup> to pave the way for a more flexible interpretation of the rules. The increased flexibility envisaged by the Commission primarily concerned those member states that already complied with the "close to balance or in surplus" requirement and whose government debt was relatively low. The Commission found that these member states should be granted the scope of manoeuvre to operate with slightly higher budget deficits, e.g. in connection with structural reforms.

The Commission's proposals led to adoption by the Ecofin Council of a Report on "Strengthening the co-ordination of budgetary policies" on 7 March 2003. The Ecofin Council stated, among other things, that when assessing a member state's compliance with the Stability and Growth Pact attention should be paid to country-specific circumstances, including the long-term sustainability of public finances. As mentioned, this implies a certain scope for taking into account the member states' government debt. Overall, this represented a small adjustment of the principles of the Stability and Growth Pact compared to the Commission's original proposal.

In the wake of the course of events concerning Germany and France in 2003, the European Commission stated that it would prepare a new proposal based on the proposal of November 2002 to improve the framework for economic coordination in the EU. The proposal is expected to be submitted when the new European Commission is in office and when the European Court of Justice has ruled in the action brought before it by the Commission against the Ecofin Council.

### **UK considerations of a different interpretation of the Pact**

In March 2004 HM Treasury published a Discussion Paper on the Stability and Growth Pact. According to this Paper, the Pact has tended to focus on short-term targets for public finances, with rather less consideration being given to government debt and longer-term political challenges such as the rising pension commitments in the future. Furthermore, the effectiveness of the Stability and Growth Pact has been adversely af-

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<sup>1</sup> Communication from the Commission to The Council and The European Parliament, Strengthening the co-ordination of budgetary policies. COM(2002) 668 of 27 November 2002.

ected by the lack of attention paid to cyclical factors, especially when the economies were in the upswing phase of the cycle. HM Treasury therefore finds that the Pact can be improved in several respects.

The Discussion Paper does not put forward specific proposals on how to reform the Pact, but a "prudent" interpretation of the Pact is envisaged, which builds on the Code of Conduct adopted by the member states in 2001 and on the Report on "Strengthening the co-ordination of budgetary policies" adopted by the Ecofin Council in 2003. The interpretation attaches importance to improved consideration of the economic cycle, the long-term sustainability of public finances and public investment.

The interpretation focuses on the economic cycle because the automatic stabilisers must be able to operate fully and symmetrically to ensure economic stability. This is only compatible with sustainable public finances if the member states consolidate their public finances in periods of high growth. The UK therefore emphasises the need to focus on cyclically adjusted budgets.

A low level of government debt entails lower interest expenditure, thus enhancing the fiscal-policy scope. This provides a sufficient margin for the automatic stabilisers to work in full without endangering the sustainability of public finances. Furthermore, at a low level of debt more resources are available for public investment. The Discussion Paper refers to selected academic proposals to the effect that member states with a low level of debt should be subject to less restrictive conditions regarding the size of their deficits.

According to HM Treasury, public investment generates a future return, so expenditure, as well as revenue, should be distributed over the investment horizon, which is not the case today. In order to strengthen the public-investment incentive, the Discussion Paper proposes to exclude investment costs from the government budget balance. This proposal relates to the "golden rule", i.e. the government budget deficit must not exceed the expenditure for public investment.

### **Academic proposals to reform the Pact**

The academic world has put forward several proposals to amend the Treaty and the provisions of the Stability and Growth Pact. There is general agreement on the need for a Stability and Growth Pact, but there is also a wish to enhance the flexibility and credibility of the Pact. A number of problems with the Treaty and the Pact in its present form have been pointed out:

- The 3-per-cent rule is too rigorous, inflexible and generally lacks credibility since it has come about without any real economic foundation.

- The Treaty and the Pact apply the same rule to all budget deficits, irrespective of substantial differences between the member states' debt ratios.
- The "close to balance or in surplus" rule implies long-term debt ratios of zero. This is in conflict with the "golden rule" argument, whereby public investment may be financed via public indebtedness.
- The Treaty is asymmetrical, i.e. the requirements of consolidation in high-growth periods are inadequate.
- The sanction mechanism lacks credibility.

A large part of the criticism is based on the fact that there is no real economic foundation for the 3-per-cent limit, so there is no reason to believe that this is the optimum rule for all participating member states in terms of welfare. Several economists regard this rule as more or less random (Eichengreen, 2004). This has spurred a number of reform proposals to either improve the current rule or to shift the focus of the Pact from budget deficits to government debt. The relationship between budget deficit, growth and a constant government debt in the longer term is described in Box 3.

The proposals focusing on the ongoing budget deficit in the implementation of the Treaty and the Pact include modifications of the current system – especially regarding public investment, which introduces the idea of a "golden rule" for growth-enhancing public investment. Blanchard and Giavazzi (2004), like the UK Discussion Paper mentioned above, propose, among other things, that public investment should be excluded from the budget deficit considered in connection with the Stability and Growth Pact since public investment often generates revenue in the future. Only current interest costs and write-offs on the investment should be included. This aspect is particularly relevant to the new member states that are facing major public investment in infrastructure, etc.

Several academics propose to attach more importance to the individual member states' debt as a ratio of GDP than to the current budget deficit. Pisani-Ferry (2002) proposes to extend the 3-per-cent rule for a member state's budget deficit to include the member state's current debt ratio. This should make it possible for member states with a low debt ratio to operate with a higher budget deficit than member states with a high debt ratio. According to Pisani-Ferry, this can contribute to ensuring fiscal consolidation in periods of high growth since it enables member states with a low debt ratio to pursue more expansionary fiscal policy in a future downturn without breaching the rules. Proposals focusing on the debt ratio rather than on ongoing budget expenditure will benefit the new member states, which generally have relatively low debt ratios.

One of the purposes of the Treaty's deficit and debt criteria was to prevent irresponsibly high government budget deficits. The limits of maximum 3 per cent of GDP for budget deficits and 60 per cent of GDP for government debt were stipulated against the background of an average debt level in the EU of 62 per cent of GDP in 1992, and of an assumption of annual real GDP growth of 3 per cent as well as annual inflation in line with the ECB's definition of price stability of 2 per cent, corresponding to a nominal growth rate of 5 per cent. In the period 1992-2003 average real growth in EU-15 and the euro area amounted to 2.0 per cent and 1.9 per cent, respectively.

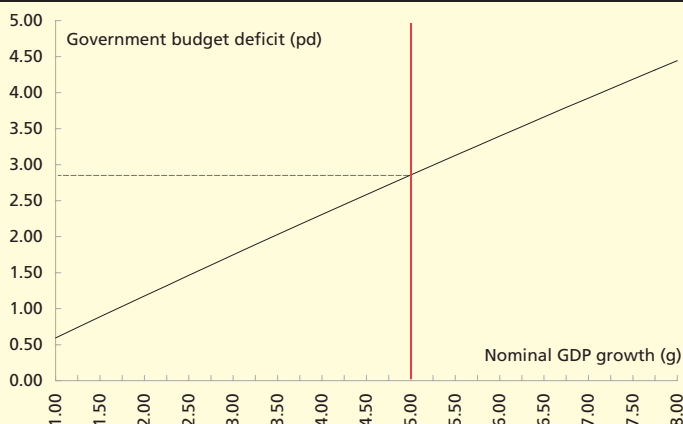
The correlation between these figures can be illustrated by the following expression of the debt-to-GDP ratio:

$$d_t = d_{t-1} \cdot \frac{1}{1+g} + pd_t$$

where  $d$  is the government debt ratio,  $g$  is nominal growth in GDP and  $pd$  is the government budget deficit, including interest costs, as a ratio of GDP. Fixing the long-term debt ratio at 60 per cent makes it possible to calculate the government budget deficit that ensures a sustainable debt ratio at various nominal growth rates. This is illustrated in the Chart below. It appears that at a nominal growth rate of 5 per cent (3 per cent real growth and 2 per cent inflation) the limit for a budget deficit that will ensure a stable debt ratio of 60 per cent is just under 3 per cent. Conversely, a budget limit of 3 per cent does not ensure a stable debt ratio of 60 per cent if the growth rate is lower, which is currently the case in most EU member states. For instance, if nominal GDP growth is 2.5 per cent annually (1 per cent real growth and 1.5 per cent inflation) the budget deficit must not exceed 1.5 per cent annually. Correspondingly, lower real growth implies a higher long-term debt ratio for a given budget deficit of 3 per cent of GDP. If real growth is only 2 per cent annually instead of 3 per cent, the debt ratio will tend to converge towards 78 per cent.

The above equation clearly illustrates that if the debt at a given time exceeds 60 per cent of GDP, the budget deficit, at a given nominal growth rate, must be lower than 3 per cent of GDP in a transition period in order to achieve a debt ratio of 60 per cent.

#### GROWTH AND BUDGET DEFICIT AT A DEBT RATIO OF 60 PER CENT OF GDP



Another frequently discussed point of criticism is the asymmetrical structure of the Treaty. The current budgetary problems in several EU member states can to a large extent be attributed to insufficient consolidation in periods of high growth. Buiters and Grafe (2002), among others, regard the Treaty as asymmetrical in so far as the rules only limit deficits without giving the member states sufficient incentives to consolidate public finances in periods of high growth. Barysch (2003) argues that the rules concerning "early warnings", cf. p. 75, and sanctions must also apply to the member states that fail to meet their fiscal-policy objectives in good times.

Eichengreen (2003, 2004) stands for some of the more far-reaching proposals to reform the Stability and Growth Pact. The essence is that the EU focuses too much on numerical budget and debt rules that do not rest on a sound economic foundation, according to Eichengreen. Instead, the focus should be on fiscal-policy procedures and institutions. Eichengreen finds that chronic government budget deficits can often be attributed to inefficient fiscal-policy procedures and institutions, whereby decision-making competence is spread between central and local government. It should therefore be possible to exempt individual member states from compliance with the rules in the Treaty and the Pact, if the member states implement the "right" institutional framework for fiscal policy. In practice, Eichengreen proposes that the member states be assessed on the basis of an index of the quality of their fiscal-policy procedures and institutions. Eichengreen (2003, 2004) presents specific examples of the construction of this index where the member states are given points for their compliance with selected criteria related to the implementation of fiscal policy and structural reforms. Under the criteria, a member state is given points according to the degree of centralisation of spending decisions and the degree of implemented structural reforms, e.g. privatisation, pension reforms and labour-market reforms. According to Eichengreen, member states with a high index score will be able to exit from the excessive deficit procedure since there is no reason to assume that these member states will have permanently high budget deficits.

In the period up to the introduction of the euro in 1999, the consequence of non-compliance with the convergence criteria was exclusion from participation. The consequences of breaching the criteria were thus concrete and credible. The Stability and Growth Pact contains no similar incentives, which is often pointed out as a problem – especially if there is no political will to apply the sanction mechanism. According to the EEAG (European Economic Advisory Group), the Ecofin Council's lack of willingness to observe the Pact calls for the establishment of an independ-

ent institution to administer the excessive deficit procedure. The EEAG has put forward a specific proposal to transfer decisions concerning sanctions in connection with the excessive deficit procedure from the Ecofin Council to the European Court of Justice. Even though the member states with excessive deficits do not have the right to vote when recommendations and any sanctions regarding their deficits are considered, the EEAG states that there is a risk of member states with deficits helping each other out in political deals.

## **ASSESSMENT AND CONCLUSION**

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The excessive deficits of Germany and France in 2003 and the decision to suspend the excessive deficit procedure under the Pact for the two member states led many people to regard the Pact as inexpedient or even defunct. In this connection it can be said that if all the EU member states had complied with the requirement in the Stability and Growth Pact concerning a budgetary position "close to balance or in surplus" in the period up to the low growth in recent years, the current budgetary problems could have been avoided. The provisions in the Treaty and the Stability and Growth Pact are clear and controllable. Implementation of several of the proposals described in this article would introduce more elements of assessment, creating the scope for circumventing the rules. For instance, the proposal to exclude certain public investments from the government budget deficit could make it difficult to distinguish between public investment and public spending. It should also be noted that in practice, the current set of rules makes it possible to a certain extent to accommodate country-specific circumstances, such as the size of the member state's government debt and the volume of public investment. Against this background, there is no obvious need for major amendment of the rules. Indeed, a number of member states find that there is a less pressing need for amendment of the rules.

However, the decision of the Ecofin Council in November 2003 led to uncertainty concerning the legal status of the rules of the Pact, and the threat of sanctions in the event of persistent excessive deficits has lost some of its credibility. The fiscal discipline under the rules is not only brought about by preventing problems, but also by enforcing the rules when required.

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# The Activity in the Danish Money Market

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*Kim Abildgren, Economics and Henrik Arnt, Payment Systems*

## INTRODUCTION AND SUMMARY

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The Danish money market is the market among banks and mortgage-credit institutes for loan agreements and interest-rate derivatives denominated in kroner with a maturity of up to one year. A well-functioning money market with a broad range of participants, active trading and efficient price formation is important for ensuring a clear transmission from Danmarks Nationalbank's monetary-policy interest rates to the short-term market rates.

The total turnover of uncollateralised day-to-day loans in the Danish money market amounts to kr. 18.6 billion per banking day. One half is traded between Danish and foreign market participants, while the other half is traded among Danish banks and mortgage-credit institutes, i.e. Danmarks Nationalbank's monetary-policy counterparties.

This article gives a structural analysis of the monetary-policy counterparties' trading among themselves in uncollateralised day-to-day money-market loans in the 4th quarter of 2003 and the 1st quarter of 2004. The analysis is prepared on the basis of payments made via Danmarks Nationalbank's payment system, Kronos.<sup>1</sup> It throws light on different parts of the market structure, e.g. the correlation between the size of the banks and mortgage-credit institutes and the scope of their market activity, the trade relations between institutions of varying size, the most frequent transaction sizes, etc.

The largest institutions dominate the uncollateralised day-to-day market, but the trading volume among the medium-sized institutions is not insignificant. The group of medium-sized institutions accounts for 7-13 per cent of the turnover. This contributes to ensuring the competition in the money market.

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<sup>1</sup> The same data was used for an analysis of systemic risks in the Danish banking and mortgage-credit sector in Danmarks Nationalbank (2004).

## THE DANISH MONEY MARKET AND MONETARY POLICY IN DENMARK<sup>1</sup>

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The Danish money market is the market among banks and mortgage-credit institutes for loan agreements and interest-rate derivatives denominated in kroner with a maturity of up to one year. The money market, also known as the interbank market, is mainly used to exchange krone liquidity<sup>2</sup> and to manage short-term interest-rate positions.

In practice the definition of the money market is often less clear-cut than stated above as foreign banks and Danish institutional investors also trade in the market.

Day-to-day loans account for around 70 per cent of the liquidity exchanges in the money market.<sup>3</sup> The turnover of day-to-day loans comprises uncollateralised krone-denominated loans (deposits), krone-denominated loans against bonds as collateral (repos) and krone-denominated loans against foreign exchange as collateral (foreign-exchange swaps), cf. Chart 1. The individual loan types are described in detail in Box 1.

On average, the total turnover of uncollateralised day-to-day loans in the Danish money market was kr. 18.6 billion per banking day in the period from the 4th quarter of 2003 to the 1st quarter of 2004. One half was traded between Danish and foreign market participants, while the other half was traded among Danish banks and mortgage-credit institutes, i.e. Danmarks Nationalbank's monetary-policy counterparties. The latter part of the turnover is described in the following sections.

A well-functioning money market is important for e.g. ensuring a clear transmission from Danmarks Nationalbank's monetary-policy interest rates to the short-term market rates. The interest rates in the money market are the basis for the interest rates which the banks offer their customers for deposits or lending. Thus, Danmarks Nationalbank has an interest in supporting an active money market by designing the monetary-policy instruments in such a way that the counterparties exchange liquidity on market terms among themselves rather than trade exclusively with Danmarks Nationalbank.

Danmarks Nationalbank's monetary-policy counterparties comprise banks and mortgage-credit institutes. The large monetary-policy counterparties are expected to participate actively in the money market and

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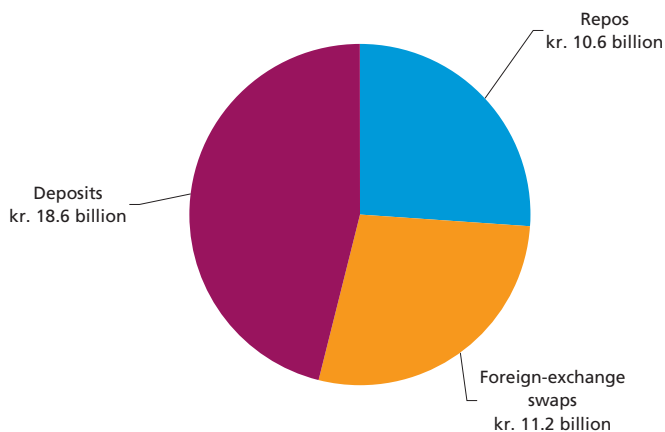
<sup>1</sup> Monetary policy in Denmark is described in detail in Danmarks Nationalbank (2003). The development in the Danish money market during recent years is described in detail in Pedersen and Sand (2002).

<sup>2</sup> In this article "krone liquidity" means current-account deposits with Danmarks Nationalbank. In this connection, krone liquidity may also be called "current-account liquidity" or just "liquidity".

<sup>3</sup> However, it should be noted that, all other things being equal, the trading volume in products at the short end of the money market is higher than the trading volume in products with longer maturities, since loans with short maturities are refinanced more frequently than loans with longer maturities.

AVERAGE DAILY TURNOVER OF DAY-TO-DAY LOANS ON THE MONEY MARKET IN THE 4TH QUARTER OF 2003 AND THE 1ST QUARTER OF 2004

Chart 1



Note: Average turnover in krone-denominated day-to-day loans per banking day. Foreign-exchange swaps and repos are based on daily reporting from 13 banks in Denmark. Besides the figures reported by the 13 banks, deposits are also based on payments via Danmarks Nationalbank's payment system Kronos. The turnover comprises the overnight (o/n) and tomorrow-next (t/n) segment for deposits, the turnover in the t/n and the spot-next (s/n) segment for repos and the turnover in the t/n segment for foreign-exchange swaps. Source: Danmarks Nationalbank.

thereby be responsible for ensuring a well-functioning marketplace with efficient price formation.

In principle, Danmarks Nationalbank only provides liquidity to the monetary-policy counterparties once a week. During the week the coun-

LOAN TYPES IN THE DANISH MONEY MARKET

Box 1

*Deposits* are uncollateralised krone-denominated loans with standardised maturities from 1 day up to 12 months.

*Repurchase agreements* (repos) are collateralised krone-denominated loans with standardised maturities from 1 day up to 6 months. The pledged collateral comprises securities, typically bonds. Repos are also known as sell and buy-back transactions since on the conclusion of the agreement the seller of the bonds (the liquidity recipient) enters into an obligation to buy back the securities at a later date at a price fixed when the agreement is entered into. The repo rate is reflected in the difference between the agreed purchase and sales prices (spot and forward prices).

*Foreign-exchange swaps* (FX swaps) are collateralised krone-denominated loans with standardised maturities from 1 day up to 12 months. In this case the collateral is foreign exchange, typically dollars. A foreign-exchange swap can be seen as a simultaneous spot and forward foreign-exchange contract: when the spot transaction is settled, kroner are exchanged for foreign exchange, and vice versa when the forward contract is settled. The rate of interest on the krone-denominated loan is reflected in the spot and forward exchange rates applied.

terparties must normally trade among themselves on market terms via the money market, thus supporting the activity in the market.

Danmarks Nationalbank has a current-account limit, which is an overall ceiling on the monetary-policy counterparties' current-account deposits at the close of the day, i.e. at the close of the monetary-policy day at 3.30 p.m. Current-account deposits with Danmarks Nationalbank are demand deposits which the monetary-policy counterparties may use as a means of payment without notice and at their own initiative. The current-account limit thus constitutes a ceiling on the volume of day-to-day krone liquidity which the counterparties taken as one can obtain at their own initiative. The purpose of the current-account-limit system is to discourage the build-up of large current-account deposits which could be used to speculate in changes in interest and exchange rates. The total limit is approximately kr. 20 billion, broken down as individual current-account limits for the counterparties. The activity in the money market is an important factor in the allocation of individual current-account limits. It is, therefore, natural to group the monetary-policy counterparties according to their individual current-account limits in analyses of the trading volume in the money market, cf. below.

## **STATISTICS FOR THE MONEY-MARKET TRADING VOLUME**

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Danmarks Nationalbank regularly collects data from 13 banks on their money-market trading in deposits, repos and foreign-exchange swaps, cf. Damm and Pedersen (1997). The statistics are relatively aggregated, comprise only the lending side and do not provide for detailing the trading structure.

As regards the monetary-policy counterparties' trading among themselves in uncollateralised day-to-day loans, it is, however, possible to map the market structure in detail. The reason is that Danmarks Nationalbank is banker to the banks and mortgage-credit institutes and that the liquidity exchange between the institutions takes place via accounts with Danmarks Nationalbank via Danmarks Nationalbank's payment system, Kronos. For instance, if bank A on Monday agrees an overnight loan of kr. 100 million to bank B, the transaction in itself implies a payment of kr. 100 million from bank A's current account to bank B's current account on the same day. When the loan is repaid including interest the next day (Tuesday), an opposite payment from bank B's current account to bank A's current account of kr. 100 million plus interest is executed. On the basis of payments via Kronos it is thus possible to detail the trading volume in the uncollateralised part of the day-to-day money market. The method is described in more detail in the Appendix.

TRADING VOLUME IN UNCOLLATERALISED DAY-TO-DAY LOANS AMONG  
 MONETARY-POLICY COUNTERPARTIES IN THE 4TH QUARTER OF 2003 AND THE  
 1ST QUARTER OF 2004

Table 1

Current-account limit (Kr. million)	Number of institutions	Loans per banking day		Deposits per banking day	
		Kr. million	Per cent	Kr. million	Per cent
700 and above .....	6	6,085	65	6,240	67
300 – 699 .....	7	1,569	17	2,080	22
101 – 299 .....	20	1,222	13	619	7
50 – 100 .....	60	429	5	308	3
1 – 49 .....	24	0	0	59	1
Total .....	117	9,305	100	9,305	100

Source: Danmarks Nationalbank.

As appears from the Appendix, a compilation of the trading in uncollateralised day-to-day loans based on payments in Kronos is associated with certain factors of uncertainty. However, the overall assessment is that the compilation provides a fair picture.

#### THE MONETARY-POLICY COUNTERPARTIES' TRADING IN UNCOLLATERALISED DAY-TO-DAY LOANS IN THE 4TH QUARTER OF 2003 AND THE 1ST QUARTER OF 2004

Danmarks Nationalbank's monetary-policy counterparties are 117 banks and mortgage-credit institutes. Table 1 shows the institutions' trading in uncollateralised day-to-day loans in the 4th quarter of 2003 and the 1st quarter of 2004, grouped according to the institutions' current-account limits.

The average daily turnover is kr. 9.3 billion per banking day. The turnover is fairly equally distributed on the days of the week. The lowest average daily turnover occurs on Fridays (kr. 8.0 billion) when Danmarks Nationalbank is normally open for sale of certificates of deposit and collateralised monetary-policy lending. The highest average daily turnover occurs on Thursdays (kr. 11.0 billion).

The six largest institutions (i.e. the six institutions with the six highest individual current-account limits) account for around 65 per cent of the turnover, while the 13 largest institutions account for 80-90 per cent. The tendency for a large part of the turnover to be concentrated on relatively few participants is known from money markets in other countries.<sup>1</sup> This is predominantly a "wholesale market" where the main par-

<sup>1</sup> In the USA, where the banking sector comprises around 10,000 institutions money-market participation is also relatively concentrated. Only around 1,000 institutions executed day-to-day loans via the money market during the 1st quarter of 1998, and of these the 100 largest accounted for more than 85 per cent of the loans, cf. Furfine (1999).

ACTIVITY IN THE MARKET FOR UNCOLLATERALISED DAY-TO-DAY LOANS  
AMONG MONETARY-POLICY COUNTERPARTIES IN THE 4TH QUARTER OF 2003  
AND THE 1ST QUARTER OF 2004

Table 2

Current-account limit (kr. million)	Number of institu- tions	Lending		Deposits		Number of institutions that at least once in the period executed	
		Average number of transactions per institu- tion per banking day	Average transac- tion amount (kr. mil- lion)	Average number of transactions per institu- tion per banking day	Average transac- tion amount (kr. mil- lion)	Lending transac- tions	Deposit transactions
700 and above .....	6	2.52	402	2.05	507	6	6
300 - 699 .....	7	0.75	298	1.08	274	6	6
101 - 299 .....	20	0.47	131	0.45	69	16	15
50 - 100 .....	60	0.16	44	0.16	33	30	28
1 - 49 .....	24	0.00	40	0.05	51	1	1
Total .....	117	0.34	236	0.34	236	59	56

Source: Danmarks Nationalbank.

ticipants are the largest institutions. The banks and mortgage-credit institutes not actively participating in the money market instead exchange liquidity via correspondent banks and transactions directly with Danmarks Nationalbank.

As mentioned, active participation in the money market is an important factor in the allocation of individual current-account limits. This is illustrated in Table 1 where by far the largest part of the turnover is placed with the institutions with the highest current-account limits. The same trend is also seen in Table 2. On average, the six largest institutions have around 2.5 loans and 2 deposits per banking day. The smallest institutions, on the other hand, are generally not active in this part of the money market.

The average size of a transaction between monetary-policy counterparties in the uncollateralised day-to-day market amounts to approximately kr. 400-500 million for the largest institutions and approximately kr. 30-50 million for the small institutions.

The average size of the loan transactions is described in more detail in Table 3. On average, the largest institutions with a current-account limit of minimum kr. 700 million executed 318 loans during the 4th quarter of 2003 and the 1st quarter of 2004. On average, 57 of these transactions (equivalent to 18 per cent) amounted to more than kr. 500 million while 182 of the transactions (equivalent to 57 per cent) amounted to kr. 100 million or less. The large loans of more than kr. 500 million were primarily to other large institutions while most of the small loans were to small and medium-sized institutions. In connection with the latter, it should

NUMBER OF LENDING TRANSACTIONS IN THE 4TH QUARTER OF 2003 AND THE 1ST QUARTER OF 2004, AVERAGE PER INSTITUTION BY LOAN AMOUNT AND THE LENDER'S CURRENT-ACCOUNT LIMIT

Table 3

Lending by institutions with a current-account limit (kr. million) of:	Number of lending transactions:			
	Maximum kr. 100 million	More than kr. 100 million and maximum kr. 500 million	Above kr. 500 million	Total
700 and above .....	182	79	57	318
300 - 699 .....	42	36	17	95
101 - 299 .....	43	13	3	59
50 - 100 .....	19	1	0	20
1 - 49 .....	0	0	0	0

Note: Uncollateralised day-to-day money-market loans among monetary-policy counterparties in the 4th quarter of 2003 and the 1st quarter of 2004.

Source: Danmarks Nationalbank.

be noted that large institutions frequently operate as the main banker to small institutions. Institutions with a current-account limit of kr. 100 million or less primarily conclude transactions of less than kr. 100 million.

Kr. 50 million is the most frequent transaction size, which accounts for approximately 8 per cent of the total number of transactions. This is followed by transaction sizes of kr. 100 million and kr. 25 million that each accounts for around 6 per cent of the total number of transactions while transaction sizes of kr. 10 million and kr. 20 million each makes up 4 per cent of the total number of transactions. However, a large number of transactions are of "odd" amounts. This shows that to a large extent the uncollateralised day-to-day money market is used to settle daily liquidity surpluses or deficits in the individual institutions.

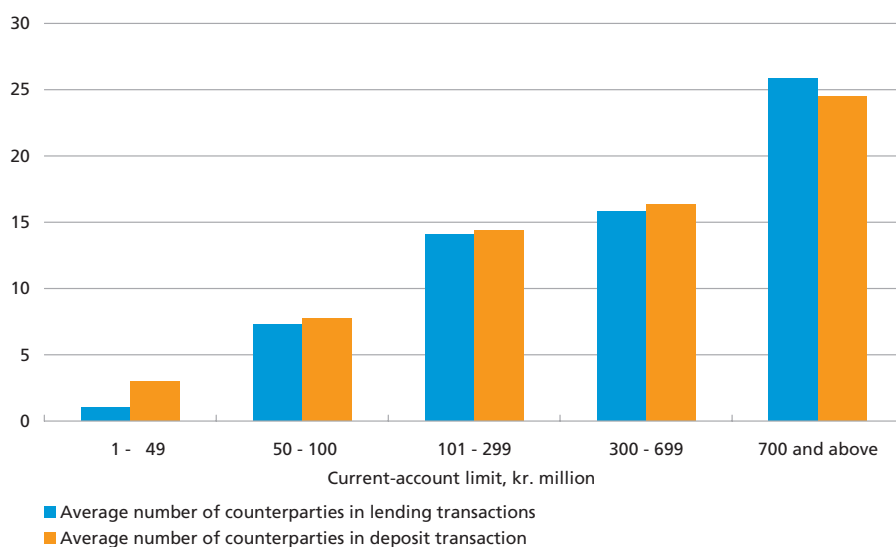
Chart 2 shows the average total number of different trading counterparties for active institutions during the 4th quarter of 2003 and the 1st quarter of 2004. The largest institutions trade with around 25 different counterparties, while the group of medium-sized institutions on average has around 15 different counterparties.

Table 4 shows the distribution by value of uncollateralised day-to-day money-market loans among the institutions per banking day in the 4th quarter of 2003 and the 1st quarter of 2004. Total lending by institutions with a current-account limit of kr. 700 million and above amounted to kr. 6.1 billion per banking day, of which kr. 4.3 billion (equivalent to 71 per cent) went to other large institutions. Correspondingly, the largest institutions received 70 per cent of their deposits from other large institutions.

Table 4 also illustrates that to a considerable degree the medium-sized banks trade liquidity among themselves. For instance, 8 per cent of the loans from institutions with a current-account limit of kr. 100-299 million

**NUMBER OF DIFFERENT TRADING COUNTERPARTIES PER INSTITUTION  
DURING THE 4TH QUARTER OF 2003 AND THE 1ST QUARTER OF 2004**

Chart 2



Note: For each category of current-account limit the average number of counterparties is calculated based on institutions that have concluded at least one transaction in the uncollateralised day-to-day market among monetary-policy counterparties in the 4th quarter of 2003 or the 1st quarter of 2004.

Source: Danmarks Nationalbank.

were to other institutions of a similar size. On the deposit side the figure was 17 per cent. The trading pattern is thus relatively diversified, which contributes to ensuring potential competition and thus efficient price formation.

**DISTRIBUTION BY VALUE OF TRADING VOLUME IN UNCOLLATERALISED DAY-TO-DAY LOANS AMONG MONETARY-POLICY COUNTERPARTIES IN THE 4TH QUARTER OF 2003 AND THE 1ST QUARTER OF 2004, AVERAGE PER BANKING DAY (KR. MILLION)**

Table 4

From institutions with a current-account limit (kr. million) of:	To institutions with a current-account limit (kr. million) of:					
	700 and above	300-699	101-299	50-100	1-49	Total
700 and above .....	4,340	1,125	360	201	59	6,085
300 - 699 .....	1,243	228	71	28	-	1,569
101 - 299 .....	421	661	103	38	-	1,222
50 - 100 .....	236	66	86	41	-	429
1 - 49 .....	0	-	-	-	-	0
<b>Total .....</b>	<b>6,240</b>	<b>2,080</b>	<b>619</b>	<b>308</b>	<b>59</b>	<b>9,305</b>

Source: Danmarks Nationalbank.

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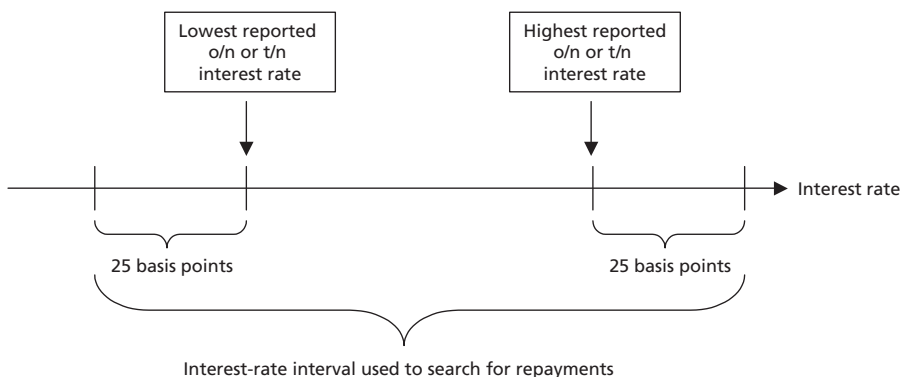
## APPENDIX: METHOD OF IDENTIFICATION OF UNCOLLATERALISED DAY-TO-DAY MONEY-MARKET LOANS

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Payments in kroner among the monetary-policy counterparties take place via Danmarks Nationalbank's payment system, Kronos, and are settled via accounts with Danmarks Nationalbank. Thus, trading in uncollateralised day-to-day loans among the monetary-policy counterparties may be identified by using an algorithm searching through the individual payments in Kronos. An equivalent analysis method has been used previously by others. Furfine (1999) analysed the structures in the US day-to-day money market (the federal funds market) based on data from a search algorithm with assumptions similar to those in Danmarks Nationalbank's algorithm, while Millard and Polenghi (2004) carried out a similar study of the money market in the UK. Furfine (2003) used the same method and data to estimate systemic risks in the US interbank market. Danmarks Nationalbank (2004) contains a similar analysis.

The idea of the search algorithm is simple. For instance, if bank A grants bank B an overnight loan of kr. 100 million at an annual interest rate of 2 per cent, a payment of kr. 100 million will be made from bank A's current account with Danmarks Nationalbank on the day of the agreement, while on the same day a payment of kr. 100 million will be made to bank B's current account. The loan of kr. 100 million is repaid from bank B to bank A on the following day with accrued interest of kr. 5,555.56 ( $= 0.02 \cdot 100,000,000 / 360$ ). The algorithm runs through all payments via current accounts of banks and mortgage-credit institutes and searches for repayments on the following banking day "matching" the accrued interest.

The agreed interest rate for the individual loans is not known in advance and may depend on the counterparty's credit rating, the time of transaction and liquidity in the money market in general. Thus, the algorithm searches for counterbalancing payments where the accrued interest may vary within a certain interval. This interval is determined on the basis of day-to-day interest rates that are reported daily to Danmarks Nationalbank from 13 banks. The lower limit of the interval is determined by the lowest reported interest rate for uncollateralised overnight or tomorrow-next transactions less 0.25 per cent per annum. Similarly, the upper limit of the interval is determined by the highest reported interest rate plus 0.25 per cent per annum. The interval is not constant as the difference between the lowest and the highest reported interest rate varies from day to day. The interest-rate interval is shown in Chart 3.



The reason for adding and deducting 0.25 per cent is that the reported interest rates are based on a weighted average of all trades in the relevant segment. The interest rates for the individual trades may therefore deviate from the reported average. Since the algorithm does not differentiate between overnight and tomorrow-next transactions<sup>1</sup>, the lowest and highest, respectively, of the two reported interest rates is used as the point of departure. To avoid that other types of day-to-day transactions, cf. Box 1, than uncollateralised day-to-day loans are identified by the algorithm only payments of at least kr. 1 million and which are in whole hundred thousands (i.e. ending in five zeros) are included. A payment of kr. 2.1 million is thus included as a potential loan, while a payment of kr. 2.15 million is not. The reason for this criterion is that "round figures" are the market standard for deposit transactions. Furthermore, it ensures that foreign-exchange swaps are not included, as these are typically agreed in round amounts in dollars which predominantly result in odd amounts in kroner. Collateralised trades in the form of repos are settled by VP Securities Services and thus not via individual transactions between current accounts. Loans between institutions that are both part of the same group and that both have current accounts with Danmarks Nationalbank are disregarded.

In the 4th quarter of 2003 and the 1st quarter of 2004 approximately 323,000 payments were made in Kronos between current accounts equivalent to 2,561 payments per banking day, cf. Table 5. The algorithm identified approximately 21 per cent of these payments as candidates for uncollateralised day-to-day money-market loans, and matching repayments of around 7 per cent hereof were found.

<sup>1</sup> Only settlement date and time are known. The actual time of agreement is unknown.

## IDENTIFICATION OF UNCOLLATERALISED DAY-TO-DAY LOANS

Table 5

	Number	Value (kr. million)
Payments per day in Kronos .....	2,561	209,331
Of which potential day-to-day loans .....	544	100,255
Of which identified day-to-day loans .....	39	9,305

Note: Payments are here defined as a payment from one current account to another.  
Source: Danmarks Nationalbank.

The loans identified by the algorithm are solely uncollateralised day-to-day loans between monetary-policy counterparties, i.e. banks or mortgage-credit institutes with interest-bearing current accounts with Danmarks Nationalbank. Consequently, only parts of the market for uncollateralised day-to-day money-market loans in kroner are included. The analysis does not comprise trading with foreign institutions and with small institutions that are not monetary-policy counterparties.

A compilation of the money-market trading volume based on payments in Kronos is associated with some factors of uncertainty. For example, the algorithm will fail to identify instances where several loans to the same counterparty on the same day are bundled into one repayment on the following banking day. Similarly, in principle the algorithm fails to identify loans between monetary-policy counterparties executed via a common correspondent bank. There may also be day-to-day money-market loans agreed at higher or lower interest rates than the interest rates defined by the algorithm. Finally, the capture of "random" items that are not attached to day-to-day money-market deposits cannot be ruled out.

Thus, the figures are associated with some uncertainty. The overall impression, however, is that the compilation provides a fair picture of the monetary-policy counterparties' trading among themselves in uncollateralised day-to-day loans in the 4th quarter of 2003 and the 1st quarter of 2004. To check the calculated trading volume on one single day, it has been compared with reports from a questionnaire survey for selected banks. This random sampling confirms that it is possible to identify uncollateralised day-to-day money-market loans via the method described.

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# Liquidity and Transparency in the Danish Government Bond Market

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*Jens Verner Andersen, Financial Markets, and Per Plougmand Bærtelsen, Market Operations*

## **SUMMARY**

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During the autumn of 2003 a number of new initiatives were introduced in the Danish government bond market, such as electronic trading and market making. In cooperation with the market participants Government Debt Management at Danmarks Nationalbank established the wholesale market, MTS Denmark. Concurrently with the transition to electronic trading, a primary dealer system was established which, *inter alia*, comprises a market-making obligation in the wholesale market. In the market for government bonds on the Copenhagen Stock Exchange a price-quote scheme was launched where Government Debt Management has concluded an agreement with a number of banks which have committed themselves to quoting current bid and ask prices in Danish government securities.

At the same time, the initiatives have enabled the introduction of Danish government securities on international electronic trading platforms, such as BondVision and TradeWeb, where securities dealers electronically distribute government bonds to major investors connected to the electronic trading platforms.

The market implications of the initiatives are described in the following based on the initial experience. The new initiatives have modernised the Danish government securities market. Prior to executing a deal, it is now possible to view tradeable prices and connected amounts. This has made the market more transparent. In addition, the market has become more liquid and a larger part of the trading is now conducted electronically.

So far, experience shows that in the wholesale market, MTS Denmark, there are current tradeable prices for around 95 per cent of the time from 8.30 am to 5.00 pm. In the benchmark securities, the market participants can normally currently trade more than kr. 100 million at the best bid/ask price.

Furthermore, as a result of the launch of the price-quote scheme in the market for government bonds on the Copenhagen Stock Exchange there are now tradeable prices for around 95 per cent of the opening hours of the trading day, contrary to previously when pre-trade information was only rarely available. Since the launch of the price-quote scheme, interested investors have been able to currently trade kr. 4-6 million at the best bid/ask price. New trading facilities have made it easier for small investors on the Copenhagen Stock Exchange to execute deals directly in the bond market.

## **NEW INITIATIVES IN THE MARKET FOR DANISH GOVERNMENT SECURITIES**

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The market for Danish government bonds has changed in recent months. Previously, trading took place predominantly via telephone, while an essential part of the trade volume is now traded on electronic trading platforms<sup>1</sup>. Some of the most important initiatives that have changed the infrastructure of the market for government securities are described in the following. The description is not an exhaustive review of the market structure and all available market platforms in the market for Danish government securities.

### **Introduction of MTS in the wholesale market**

On 4 November 2003 the wholesale market for Danish government bonds opened on the trading platform MTS<sup>2</sup>. A primary dealer system was established in connection with the introduction of electronic trading. The key obligation is to quote current prices for at least five hours a day in all government securities of the type bullet loans with a remaining maturity of more than 13 months. In order to meet the conditions of the primary dealer agreement, the participants must quote simultaneous bid and ask prices within certain maximum spreads. At the same time, the participants on the quoted prices must be prepared to trade for a minimum amount reflecting the wholesale nature of the market. At present, 13 banks, including several foreign banks, are primary dealers in Danish government securities. The introduction of electronic trading and market making in the wholesale market has enabled the market participants to buy and sell government securities on a current basis for considerable amounts without significantly influencing price formation.

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<sup>1</sup> For more information on electronic trading and market making, see *Danish Government Borrowing and Debt 2002*, Chapter 9: Electronic Trading and Market-Making in Danish Government Bonds.

<sup>2</sup> For more information on the introduction of Danish government securities on MTS, see *Danish Government Borrowing and Debt 2003*, Chapter 9: MTS Denmark and the Primary Dealer System for Danish Government Securities.

### **Introduction of electronic trading platforms for institutional investors**

During the autumn of 2003 Danish government bonds were introduced on international dealer-to-customer trading platforms such as TradeWeb and BondVision. The dealer-to-customer markets enable e.g. institutional investors to trade securities with banks and securities dealers. The suppliers of the electronic trading platforms have typically concluded agreements with securities dealers and banks as well as institutional investors on connection to the trading systems. Thus, banks and securities dealers can distribute government bonds from the wholesale market, and institutional investors have electronic access to trade Danish government securities.

The market structure differs from MTS Denmark and the market for government bonds on the Copenhagen Stock Exchange in that it comprises quote-on-request systems. On specific request from an institutional customer contemplating buying or selling, the counterparties invited by the institutional customer to participate will quote a price<sup>1</sup>.

A number of securities dealers participate on both platforms, and competition among dealers typically results in price quotes with narrow bid and ask spreads.

### **Price-quote scheme in the market for government bonds on the Copenhagen Stock Exchange**

On 1 December 2003 a special segment for Danish government bonds was established on the Copenhagen Stock Exchange. At the same time a price-quote scheme was launched whereby six banks have concluded an agreement with Government Debt Management on quoting current prices for at least 95 per cent of the time from 9.00 am to 4.30 pm in the government securities that are included in the primary dealer system. In order to meet the requirement of the price-quote scheme, the participants must quote concurrent bid and ask prices within certain maximum spreads. At the same time, the participants on the quoted prices must be prepared to trade for a minimum amount. By placing orders for minimum kr. 1,000 the six banks, other members of the market for government bonds on the Copenhagen Stock Exchange and investors<sup>2</sup> may all influence the best bid and ask price.

In addition, new trading facilities have been introduced, e.g. auto-match where matching buy and sell orders are automatically matched without one party having to confirm the deal first. This has, for instance,

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<sup>1</sup> On TradeWeb, a maximum of five counterparties can be asked during a bid session, while on BondVision a maximum of four counterparties can be asked.

<sup>2</sup> Retail investors must place their orders via their bank or securities dealer, for example directly via their web bank.

enabled retail investors to execute deals electronically and directly on the Copenhagen Stock Exchange without the investor's banker having to confirm the deal in advance.

## **THE CONSEQUENCE OF THE NEW INITIATIVES FOR LIQUIDITY AND TRANSPARENCY IN THE MARKET FOR GOVERNMENT SECURITIES**

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The new market structure has existed for almost half a year and the market implications may be analysed based on the initial experience. In general, trading in the market for government securities is now more concentrated on a few markets where several participants concurrently set the prices. Basically, trading in a market with more concurrent buyers and sellers will boost market efficiency.

At the same time, the expansion of electronic trading has provided investors in Danish government securities with current access to information on tradeable prices in the market. Access to more and better pre-trade information enhances the transparency in the market and reduces the barriers to trade.

A number of different aspects of liquidity and transparency are considered in the following in order to gain a more comprehensive picture of the consequences for the market for government securities.

Trade volume is often used as the only indicator of market liquidity. However, Fleming (2003), among others, attaches more importance to other indicators for assessing market liquidity.<sup>1</sup> Thus, trade volume exclusively expresses the volume of executed deals, while liquidity generally expresses the possibility of trading should the need arise at a given time. A market may therefore be liquid even with a relatively modest trade volume. Several dimensions are used to assess the liquidity and transparency in the market. The liquidity ratios applied are described in Box 1.

### **Order coverage**

In a liquid market tradeable prices are registered on an ongoing basis. The longer the system comprises tradeable prices, the better the opportunity for the investor to buy or sell government securities. The key ratio of order coverage is used as an indicator.

### *MTS Denmark*

The development in order coverage on MTS Denmark shows that the market participants are able to see tradeable prices in the relevant gov-

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<sup>1</sup> Fleming, Michael J. (2003), *Measuring Treasury Market Liquidity*, FRBNY Economic Policy Review.

## DEFINITION OF KEY LIQUIDITY RATIOS

Box 1

In this article, the assessment of the transparency and liquidity in the government bond market is based on four key ratios: order coverage, spread, depth and trade volume. Individually the four key ratios are of limited information value, but taken as one they contribute to creating an overall picture of liquidity and transparency development in the trade in government bonds.

*Order coverage* states the percentage of the trading day with concurrent bid and ask prices in the trading system. The investor is thus informed about the percentage of the trading day in which the investor can trade (buy or sell) an instrument.

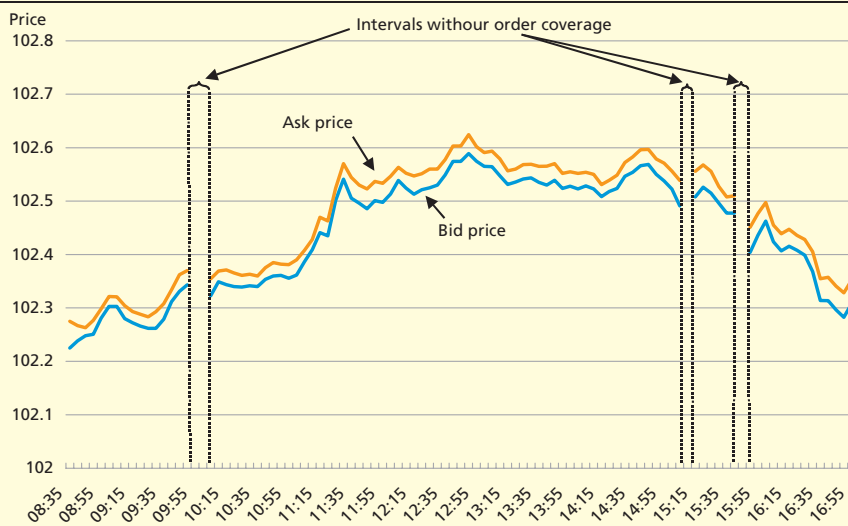
*Spread* is calculated as the time-weighted average of the difference between the bid and ask price during the interval of the trading day with order coverage, i.e. concurrent bid and ask prices. The spread captures the cost of buying an instrument and selling it immediately after. The unit is calculated in 0.01 price points (ticks).

*Depth* expresses the amounts tradeable at the best bid and ask prices. Like the spread, depth has information value only when concurrent bid and ask prices are present in the system. Depth indicates to the investor the size of the amounts immediately tradeable at the best prices.

The correlation between order coverage and spread is illustrated in the Chart below. The x-axis shows the time during a trading day while the y-axis shows the prices tradeable during the trading day.

While these three key ratios indicate the possibilities of trading in government bonds, trade volume shows the amount actually traded for in the government bonds.

#### ORDER COVERAGE ON MTS DENMARK IN 4 PER CENT 2008 ON 16 JANUARY 2004

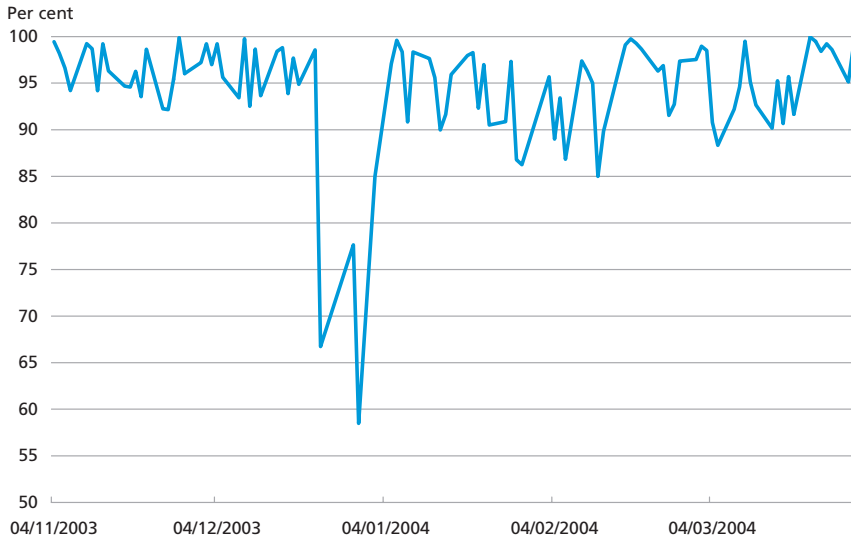


Note: In this Chart the reported prices are determined as forward-looking averages for intervals of 5 minutes. If no order coverage occurs during an observation period of 5 minutes the Chart will show no order coverage during the entire observation period. The Chart thus illustrates that in "intervals without order coverage" there have been times without concurrent bid and ask prices for shorter or longer intervals.

Source: MTS Denmark.

ORDER COVERAGE IN DANISH GOVERNMENT SECURITIES ON MTS  
DENMARK IN THE PERIOD AS FROM 4/11-2003 UNTIL 31/3-2004

Chart 1



Note: Danish government securities on MTS Denmark comprise all bullet loans with a remaining maturity of more than 13 months. The total order coverage is calculated as a simple average of the included securities in the time from 8.30 am to 5.00 pm.

Source: MTS Denmark.

ernment securities for around 95 per cent of the time from 8.30 am to 5.00 pm, cf. Chart 1. The drop in order coverage between Christmas and New Year is attributable to the suspension of the primary dealers' market-making obligation during that period.

The order-coverage level reflects the characteristics of the primary dealer system. The primary dealers have an obligation to quote prices for five hours a day in the time from 9.00 am to 4.30 pm, which may explain that the order coverage on MTS Denmark is not 100 per cent. In the time from 9.00 am to 4.30 pm the order coverage is, however, almost 100 per cent, indicating that the primary dealers typically quote prices for longer than required in the agreement, cf. Box 2.<sup>1</sup>

The participants on MTS Denmark are able to see tradeable prices from the wholesale market via their direct links. Furthermore, there is public access, against a fee, to the real-time information via international market information suppliers. On MTS Denmark's website the information is available with a lag of 15 minutes<sup>2</sup>.

<sup>1</sup> The characteristics of the primary dealer agreement for Danish government securities are in line with the requirements in other countries' government securities markets.

<sup>2</sup> [www.mtsdenmark.com](http://www.mtsdenmark.com).

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**USE OF PRICE GENERATORS FOR QUOTING CURRENT BID AND ASK PRICES**

Box 2

Electronic trading is primarily introduced in markets where standardised products are traded. Government bonds are precisely such a standardised product traded across national borders and priced in relation to other countries' government issues. German government bonds typically form the basis of price formation in Europe.

The introduction of electronic trading has enabled the introduction of automatic price generators that quote bid and ask prices in Danish government securities during the day. Price quoting is typically executed on the basis of similar euro-denominated government bonds and government bond futures plus a spread.

Price generators are primary used to save resources. One dealer can take care of several markets since the price generator will currently quote prices across markets and execute updates. Only for short time spans, e.g. around the release of key ratios, publications, etc., price quoting is frequently suspended due to the uncertain price formation.

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### *The Copenhagen Stock Exchange*

The development in order coverage in the market for government bonds on the Copenhagen Stock Exchange is shown in Chart 2. In connection with the launch of the price-quote scheme a considerable shift is seen where order coverage grows from less than 10 per cent to more than 90 per cent of the trading day.

The shift reflects the changed market structure. Previously, the system contained prices e.g. during the short intervals when Government Debt Management executed tap issuances and buy-backs. Following the launch of the price-quote scheme six banks now have an obligation to quote current tradeable prices.

Similarly to MTS Denmark, the order-coverage level reflects the contents of the price-quoting agreement. As stated above, each participant in the scheme must quote prices on the Copenhagen Stock Exchange for 95 per cent of the time between 9.00 am and 4.30 pm. It appears from Chart 2 that from 8.30 am to 5.00 pm there are tradeable prices for approximately 95 per cent of the time.

Via their links, members of the Copenhagen Stock Exchange's market for government bonds have current access to view tradeable prices. In addition, some banks offer their customers access to view tradeable prices in real time via the web bank, in some cases for a fee. Furthermore, the prices are available with a time lag of 15 minutes on the Copenhagen Stock Exchange's website.<sup>1</sup>

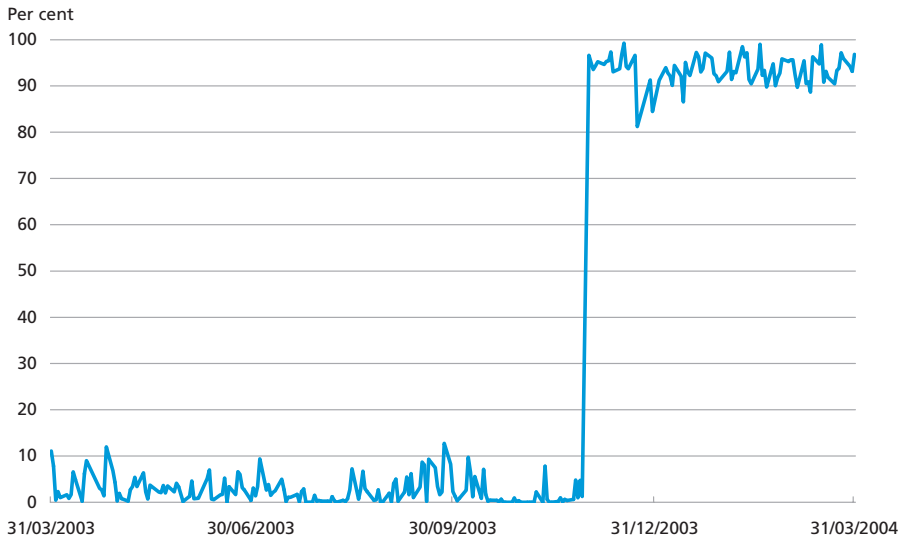
The higher order coverage in the market for government securities means that the investors have better access to pre-trade information, which enhances market transparency.

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<sup>1</sup> [www.cse.dk](http://www.cse.dk).

ORDER COVERAGE IN DANISH GOVERNMENT SECURITIES ON THE  
COPENHAGEN STOCK EXCHANGE IN THE PERIOD AS FROM 31/3-2003  
UNTIL 31/3-2004

Chart 2



Note: Danish government securities include bullet loans with a remaining maturity of more than 13 months. The total order coverage is calculated as a simple average of the included securities in the time from 8.30 am to 5.00 pm.  
Source: The Copenhagen Stock Exchange.

### Spread between best bid and ask price

The difference between best bid and ask price is the cost of buying an instrument and selling it immediately after. The difference can be interpreted as an expression of the efficiency of the price formation; the narrower the spread, the more efficient the price formation. The spread is e.g. determined by trading costs, the number of market participants and differences in maturity.

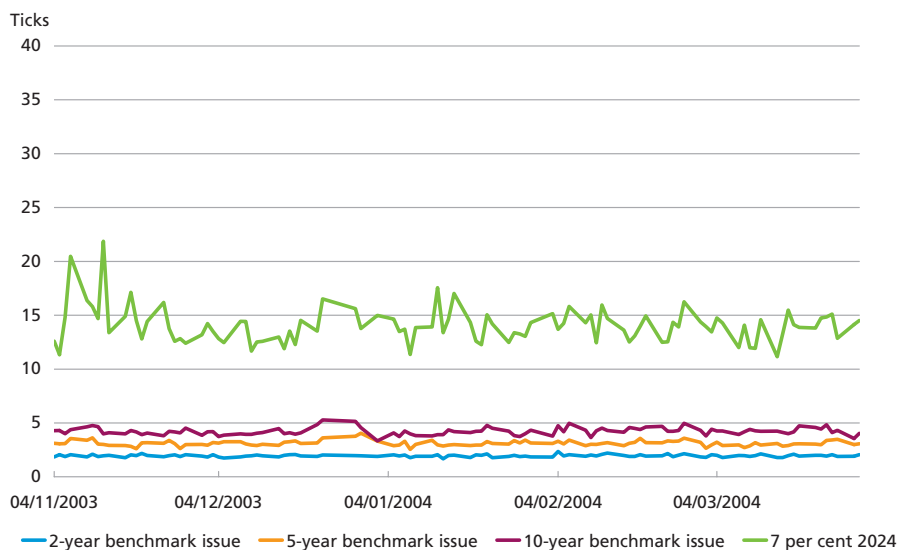
#### *MTS Denmark*

The development in spreads in the different maturity segments in the wholesale market MTS Denmark has been relatively stable since the introduction, cf. Chart 3. For securities in the maturity segments up to and including 10 years the spread is less than five ticks, equivalent to 0.05 points.

The bid-ask spread is the same as in other wholesale markets for government bonds. The evolution of a more efficient Danish wholesale market for government securities is primarily attributable to the introduction of electronic trading and related market making. This has provided for more efficient trade execution by the market participants. At the same time, the launch of the MTS trading platform has contrib-

BID-ASK SPREADS ON MTS DENMARK IN BENCHMARK SECURITIES AND 7 PER CENT 2024 IN THE PERIOD AS FROM 4/11-2003 UNTIL 31/3-2004

Chart 3



Note: The spread is calculated as a time-weighted average between best bid and ask price.

Source: MTS Denmark.

uted to attracting more international interest in Danish government securities.

In addition, Chart 3 shows that the spread widens as the maturity increases, reflecting the greater market risk associated with securities with longer maturities. It appears that 7 per cent 2024 differs from the other benchmark securities due to its special nature *inter alia* as regards maturity. The bond therefore requires price quoting for smaller amounts, resulting in a wider spread.

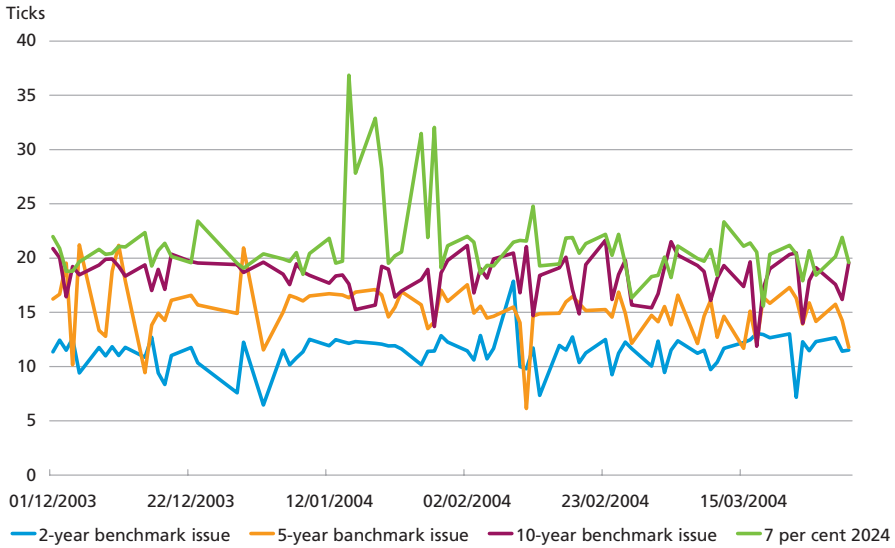
### *The Copenhagen Stock Exchange*

Chart 4 shows the development in bid-ask spreads in the market for government bonds on the Copenhagen Stock Exchange. In general, the bid-ask spread is between 10 and 20 ticks for the various maturity segments.

The spreads observed are an indication of the competition among all participants in the market, including the six banks that have an obligation to quote current prices. Other members of the market for government bonds on the Copenhagen Stock Exchange can enter bid and ask prices, which contributes to narrowing the spread. In addition, the introduction of new trading facilities has enabled investors to place their own orders directly in the system. Orders from investors thus affect the spread if the bid price entered is maximum kr. 1,000 and if the bid and ask prices narrow the spread between the best bid and ask price.

SPREAD IN BENCHMARK SECURITIES AND 7 PER CENT 2024 ON THE  
COPENHAGEN STOCK EXCHANGE IN THE PERIOD AS FROM 1/12-2003  
UNTIL 31/3-2004

Chart 4



Note: The spread is calculated as a time-weighted average between best bid and ask price.  
Source: The Copenhagen Stock Exchange.

## Market depth

Depth is a third indicator of liquidity. Depth is here calculated as the time-weighted average of the amount of bonds entered at the best bid and ask price.

### *MTS Denmark*

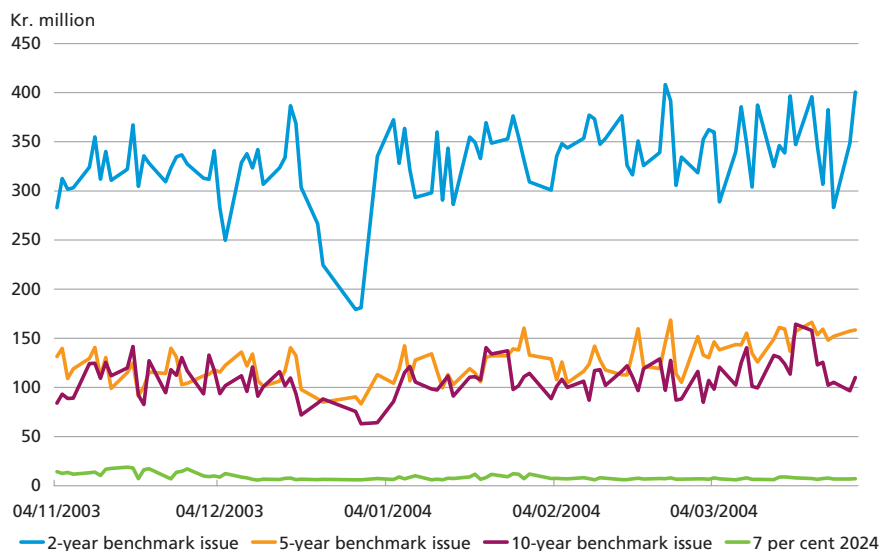
The depth in the wholesale market on MTS Denmark is shown in Chart 5. It appears that on average during the entire trading day it is possible to buy or sell on a current basis for around kr. 100-150 million in the 5- and 10-year benchmark securities at the best bid and ask prices. The depth of the 2-year benchmark issue is somewhat greater, around kr. 300-350 million, which reflects less risk in the shorter maturity segments.

### *The Copenhagen Stock Exchange*

Chart 6 shows the development of depth in the market for government bonds on the Copenhagen Stock Exchange. It appears that government securities may be bought or sold in the benchmark segments and 7 per cent 2024 for around kr. 4-6 million at the best bid and ask prices. Equivalent depth applies to the other government securities included in the price-quote scheme.

DEPTH OF BEST PRICES OF BENCHMARK SECURITIES AND 7 PER CENT 2024  
ON MTS DENMARK IN THE PERIOD AS FROM 4/11-2003 UNTIL 31/3-2004

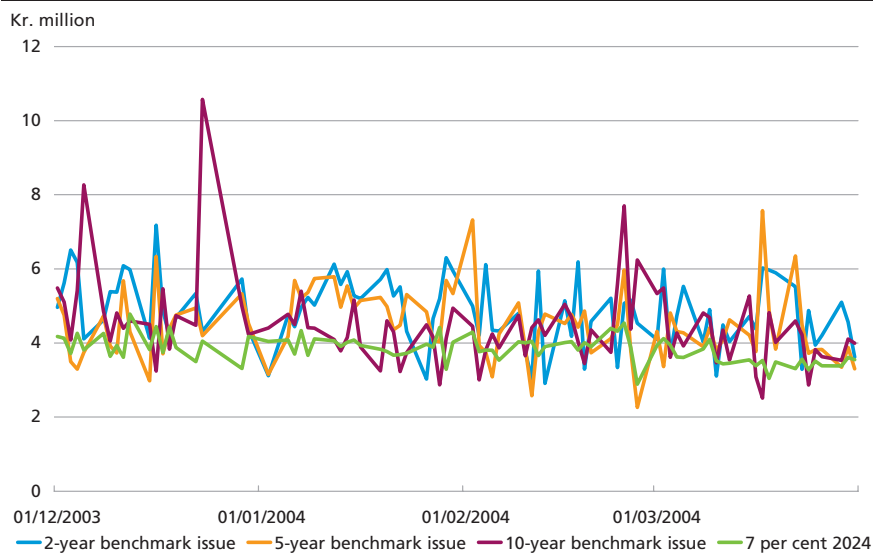
Chart 5



Note: The depth is calculated as a time-weighted average of tradeable volumes at best bid/ask price.  
Source: MTS Denmark.

DEPTH OF BEST PRICES OF BENCHMARK SECURITIES AND 7 PER CENT 2024  
ON THE COPENHAGEN STOCK EXCHANGE IN THE PERIOD AS FROM 1/12-  
2003 UNTIL 31/3-2004

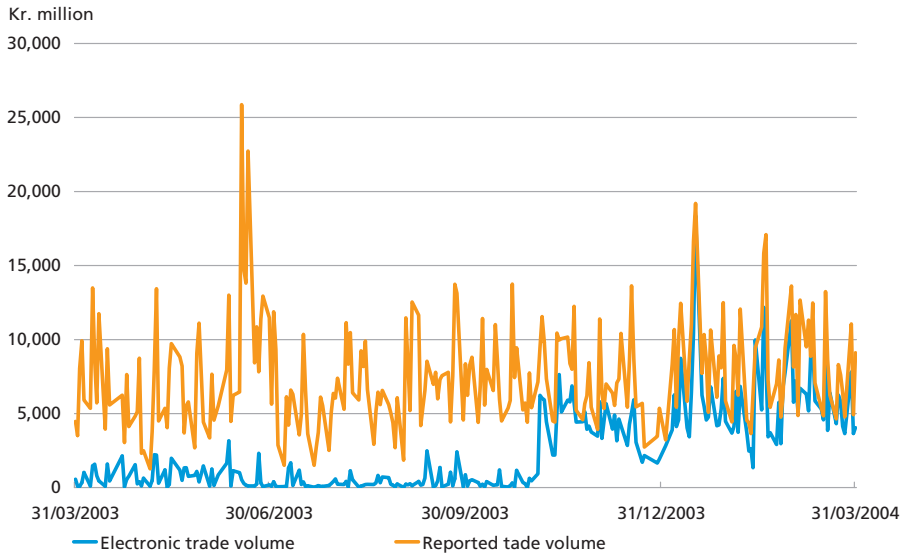
Chart 6



Note: The depth is calculated as a time-weighted average of tradeable volumes at best bid/ask price.  
Source: The Copenhagen Stock Exchange.

TOTAL ELECTRONIC TRADE VOLUME IN DANISH GOVERNMENT SECURITIES ON MTS DENMARK, THE COPENHAGEN STOCK EXCHANGE, TRADEWEB AND BONDVISION AND TRADE VOLUME REPORTED TO THE COPENHAGEN STOCK EXCHANGE IN THE PERIOD AS FROM 31/3-2003 UNTIL 31/3-2004

Chart 7



Note: Danish government securities include all bullet loans with a remaining maturity of more than 13 months. All members of the Copenhagen Stock Exchange's market for government bonds are obliged to report all trades to the Copenhagen Stock Exchange. This trade volume appears from the reported trade volume. Not all participants on MTS Denmark are members of the Copenhagen Stock Exchange's market for government bonds. For TradeWeb and BondVision the figures are the average daily turnover calculated on the basis of monthly observations.

Source: MTS Denmark, Copenhagen Stock Exchange, TradeWeb and BondVision.

### Total trade volume on the electronic trading platforms

Since the launch of the new measures the trade volume on the electronic platforms (MTS Denmark, the market for government bonds on the Copenhagen Stock Exchange, TradeWeb and BondVision) has increased, cf. Chart 7. The increased trade on electronic platforms is attributable to the introduction of new electronic trading platforms and to the inclusion of new participants, which has led to increased trade volume.

In addition, Chart 7 shows that the trade volume compiled on the basis of reports to the Copenhagen Stock Exchange is rather consistent. The new initiatives have left the group of dealers subject to a reporting requirement to the Copenhagen Stock Exchange unchanged, but the new trading platforms have attracted several international banks that are active in the market for Danish government securities. For instance, the new market participants in connection with the introduction of MTS Denmark have contributed more than one third of the total trade volume on MTS Denmark.

On this basis the Chart indicates two general trends. Firstly, a large proportion of the trade via telephone among former and present market participants now takes place via electronic trading platforms. Secondly, the new measures have boosted the total trade volume as new market participants – that are not subject to a reporting requirement to the Copenhagen Stock Exchange when trading among themselves – account for a large proportion of the trade volume in the wholesale market.



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# Mortgage Credit in the USA and Denmark

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*Kristian Kjeldsen, Financial Markets*

The US mortgage-credit system resembles the Danish system in a number of ways, but the two systems also differ considerably in terms of structure and function. This becomes evident in periods with high conversion activity as seen in recent years due to the low interest rates. The wave of conversions in 2002 had a strong impact on volatility in the US bond market – both in terms of mortgage-credit and government bonds – whereas no corresponding effects were seen in Denmark. The problems experienced by the US mortgage-credit system in 2002 led to increasing interest in the pros and cons of the various types of market-based mortgage-credit systems. This articles describes the US system in relation to the Danish system.

## THE US AND DANISH MORTGAGE-CREDIT SYSTEMS

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The US and Danish mortgage-credit systems offer borrowers relatively cheap and more flexible financing of real property than those of most other countries. In absolute terms, the US mortgage-credit market is far bigger than the Danish market, but as Table 1 illustrates, both markets are very large, relatively speaking.

THE US AND DANISH MORTGAGE-CREDIT MARKETS		Table 1
End-2003	USA	Denmark
Mortgage-credit bonds issued .....	kr. 30,774 billion <sup>1</sup>	kr. 1,392 billion
Daily turnover in mortgage-credit bonds .....	kr. 1,314 billion <sup>1</sup>	kr. 12 billion
Total mortgage credit as a ratio of GDP .....	81 per cent	101 per cent
The households' debt as a ratio of disposable income .....	112 per cent	192 per cent
Number of institutions offering mortgage credit for owner-occupied housing .....	7,771	4
Ratio of owner-occupied housing .....	68 per cent	59 per cent

Note: Assuming an exchange rate of kr. 6 to the dollar.

Source: Frankel et al. (2004).

<sup>1</sup> Q3 2003.

## OBTAINING A MORTGAGE IN THE USA

Box 1

In addition to the usual loan costs, the borrower must bear the costs for:

- Assessment: An independent agency must assess the value of the property.
- Credit assessment: The borrower must present a personal credit-assessment certificate.
- Building survey: The borrower must arrange a survey of the property.
- Private mortgage insurance: If the down payment is less than 20 per cent of the property price, the bank may require that a private mortgage insurance policy is taken out on the payments due. The insurance is typically terminated when the aggregate redemptions are so large that the mortgageable value exceeds 20-25 per cent.
- Title search fees: Since there is no central registration system, it is necessary to determine the legitimate owner of the property, and whether the property has been pledged as collateral for other loans.
- Title insurance: The borrower must take out an insurance policy against errors in the title search.

Source: How Mortgages Work, <http://money.howstuffworks.com>.

### Obtaining a mortgage

Mortgage credit is provided by many thousands of banks and savings banks ("thrifts") in the USA, known as "originators". As Box 1 shows, a borrower in the USA must contact a number of institutions before a mortgage can be obtained. In Denmark, it can be obtained directly from the mortgage-credit institute after payment of registration fees, a fee for arrangement of the loan and regular fees throughout the term of the loan. In addition, the Danish land registration system comprises a central register of the mortgages on the individual residential properties. This is not the case in the USA, and consequently the buyer must ensure that there are no other mortgages on the property. Personal credit assessment is necessary in order to obtain a mortgage under the US system since personal bankruptcy in the USA is a state matter, not a federal matter. Most lenders require a debt-to-income ratio of "28/36". A maximum of 28 per cent of the monthly income before tax may be used for servicing mortgage debt, and a maximum of 36 per cent may be used for servicing the borrower's total debt (mortgage credit and other debt). If these limits are exceeded, the lender will require a larger down payment, e.g. payment of "discount points", cf. Box 2.

Under the Danish mortgage-credit system, the rate of interest does not depend on the borrower's status. A borrower is assessed to be creditworthy or not creditworthy, and the degree of creditworthiness does not affect the interest rate for the loan. As Box 2 shows, this is not the case under the US system. Here it is possible for the borrower to reduce the interest rate for the loan via a larger down payment. In addi-

## DISCOUNT POINTS

Box 2

In addition to an ordinary down payment, the US system operates with so-called discount points. One point is 1 per cent of the principal of the loan. By paying points it is possible for the borrower to reduce the interest rate for the loan. The correlation between the number of discount points and the interest rate for the loan is adjusted according to supply and demand. The table below shows an example of the correlation between the number of points and the interest on a 30-year loan. "Conforming loans" are loans within the maximum limit set by the US Government Sponsored Enterprises, while "jumbo loans" are loans exceeding this maximum, cf. the section on issuance of bonds.<sup>1</sup>

## CORRELATION BETWEEN DISCOUNT POINTS AND INTEREST PAYABLE

Discount points in per cent	Per cent	Interest payable, per cent
"Conforming loans"	"Jumbo loans"	
1.470	-	6.750
1.360	-	6.875
0.870	-	7.000
0.380	-	7.125
-0.110	1.920	7.250
-0.600	0.013	7.375
-1.090	0.795	7.500
-1.500	0.325	7.625
-1.920	-0.145	7.750
-2.330	-0.520	7.875
-	-0.830	8.000
-	-1.150	8.125
-	-1.365	8.250

<sup>1</sup> Stanton and Wallace (1997).

tion, the credit assessment has a significant impact on the effective yield. There may be a significant difference between the interest payable on a 30-year loan by a highly creditworthy person and a less creditworthy person.

Overall, borrowing is presumably more expensive under the US system than under the Danish system, but pricing of the individual elements of a mortgage is more transparent. In addition, the individual institutions offering the services described in Box 1 compete in terms of fees. Under the Danish system, each loan conversion has hitherto required re-registration and payment of a new registration fee. Under the US system, registration only takes place once, i.e. when the house is bought. Consequently conversions, etc. do not entail registration fees. The borrower must, however, be able to prove that no other mortgage has been taken out on the house, e.g. in connection with non-payment of taxes. In Denmark the balance principle, to which the mortgage-credit institutes are subject, entails a close relationship between the mortgages

provided and the bonds issued. The US institutions are not subject to a balance principle, and consequently they can provide more flexible loans. However, the linking of the loan to the underlying bonds under the balance principle means that Danish borrowers can purchase the underlying bonds and use them to redeem the loan and thus manage their debt more actively. Change of ownership is also facilitated.

Fixed-rate loans are callable, but since there is no direct link between the loans and the bonds issued, cf. below, the loans cannot be prematurely redeemed via purchases in the market as in Denmark. This means that whenever a borrower wishes to terminate a loan, it must be redeemed at par. Under the Danish system, borrowers can manage their debt more actively since Danish homeowners with fixed-rate loans can always buy up the underlying bonds at market price. When interest rates increase, Danish homeowners therefore benefit from a decrease in the value of the debt corresponding to the fall in bond prices. If interest rates rise, borrowers under the Danish system may reduce their outstanding debt on the loan by redeeming the loan and at the same time refinancing it by issuing higher-yield bonds, i.e. upward conversion. A possible future decline in interest rates can then be used to reduce payments on the loan while the outstanding debt is reduced via the upward conversion. As stated in Frankel et al. (2004), Danish borrowers make use of this option when interest rates go up. The option to redeem the debt at the market price of the underlying bonds also means that if a rise in interest rates entails lower house prices, the mortgageable value of owner-occupied housing is protected because the market value of the debt falls correspondingly.<sup>1</sup>

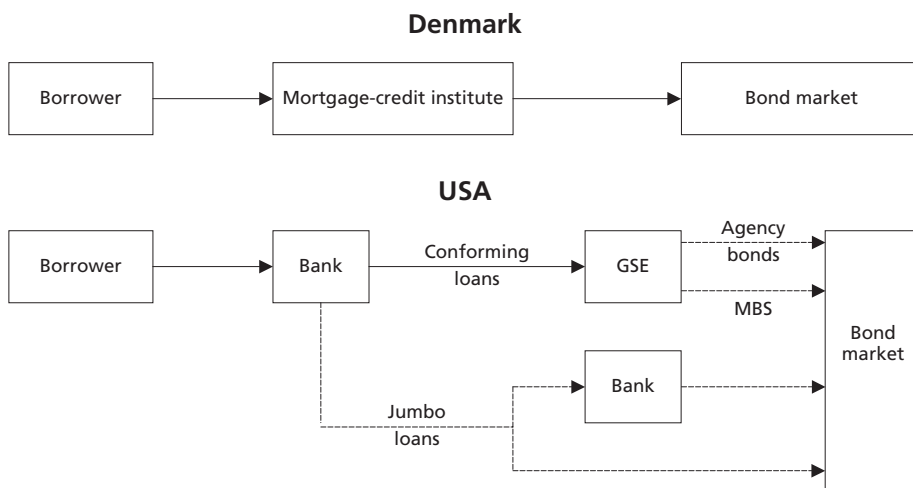
Since US borrowers can only redeem their loans at par, they cannot reduce their debt via upward conversion. Moreover, the loans must be redeemed at par when the house is sold. The homeowners' mortgageable value is therefore not protected if interest rates go up and property prices fall at the same time.

### **Issuance of bonds**

Under the Danish system, the mortgage-credit institutes issue bonds on the basis of the loans granted. Under the US system, the banks may choose to handle mortgage-credit loans as other loans or to resell them. The bank granting the mortgage-credit loan may also choose to bundle several loans and issue a security, known as a Mortgage-Backed Security, MBS, where the yield comprises the payment flows received from the borrowers. These securities are sold in the bond market. The US system

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<sup>1</sup> This only applies to fixed-rate loans, see Christensen and Kjeldsen (2002).



Note: The broken-line arrows indicate a choice on the part of the institution. For instance, the bank providing a mortgage-credit loan may choose to keep a jumbo loan on the balance sheet, resell it to another bank, or issue an MBS itself.

makes a clear distinction between "conforming loans" and "jumbo loans". Loans up to a certain limit, in 2004 333,700 dollars, are called conforming since they can be resold to the so-called Government Sponsored Enterprises, GSE, see below. GSEs enjoy a number of advantages, and consequently the vast majority of loans below the limit are sold to GSEs. Loans exceeding the limit, i.e. jumbo loans, are either kept on the balance sheet, resold or bundled in a bond. Issuance of bonds is illustrated in Chart 1. The credit risk on the underlying loans is typically split into tranches, the bank bearing the risk on the extreme part of the loan. In addition, there are a number of independent institutions selling credit-loss insurance for mortgage-credit loans. Since jumbo loans cannot be resold to a GSE, the interest payable by the borrower on these loans is higher than for conforming loans.

### **Government Sponsored Enterprises, Fannie Mae and Freddie Mac**

During the depression in the 1930s it was very difficult for middle- and low-income families to obtain mortgage-credit loans from banks in the USA. The US government therefore decided to set up an institution to purchase mortgage-credit loans up to a certain limit from banks so that they would be willing to grant loans. Fannie Mae<sup>1</sup> was set up in 1938.

<sup>1</sup> The Federal National Mortgage Association.

The other major GSE, Freddie Mac<sup>1</sup>, was hived off from Fannie Mae in 1970. In this connection both enterprises, also known as agencies, went public. There are also a number of smaller GSEs in the USA, including Ginnie Mac, which primarily buy up loans from small enterprises. The main purpose of the GSEs is to ensure a well-functioning market for mortgage-credit bonds and thus to give US homeowners access to the cheapest possible financing. The institutions cannot directly offer mortgage-credit loans, but may only purchase mortgage-credit loans from private banks and issue bonds.<sup>2</sup> The institutions are subject to a number of provisions, ensuring, *inter alia*, that borrowers in less developed areas of the USA also have access to mortgage credit.

Fannie Mae and Freddie Mac buy up mortgage-credit loans up to the limit for conforming loans. These loans are either kept on the balance sheet or resold as MBSs in the bond market. Fannie Mae and Freddie Mac bear the credit risk on all the loans. The MBSs receive the cash flow from the underlying mortgage-credit loans, and the investors therefore bear the market risk, primarily the conversion risk. The MBSs are not standardised like the Danish mortgage-credit bonds, but vary greatly in size and composition. Loans that are not resold as MBSs are financed via issues of so-called agency bonds. These are ordinary corporate bonds and have completely different characteristics from the mortgage-credit bonds. For instance, they are often non-callable. The purpose is to provide opportunistic bond issues tailored to the requirements of the investors at the time of issue in order to minimise financing costs. In addition to the credit risk the institutions therefore bear considerable market risk on the assets, namely conversion risk on the mortgage-credit loans not resold as MBSs.

All GSEs enjoy a number of benefits in relation to the private banks. The capital requirement is only 2.5 per cent for Fannie Mae and Freddie Mac, while the capital requirement for private banks is 4 per cent for mortgage-credit loans. GSEs are exempt from certain taxes and a number of fees for e.g. supervisory authorities. Public authorities are empowered to lend them up to 2.25 billion dollars in case of problems. In addition, they have a number of other advantages over the private banks. Even though they are private corporations, investors perceive them to have an implicit government guarantee, *inter alia* because they have access to public loans, and they are deemed to be "too big to fail". In other words, the investors believe that the institutions are so large

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<sup>1</sup> The Federal Home Loan Mortgage Corporation.

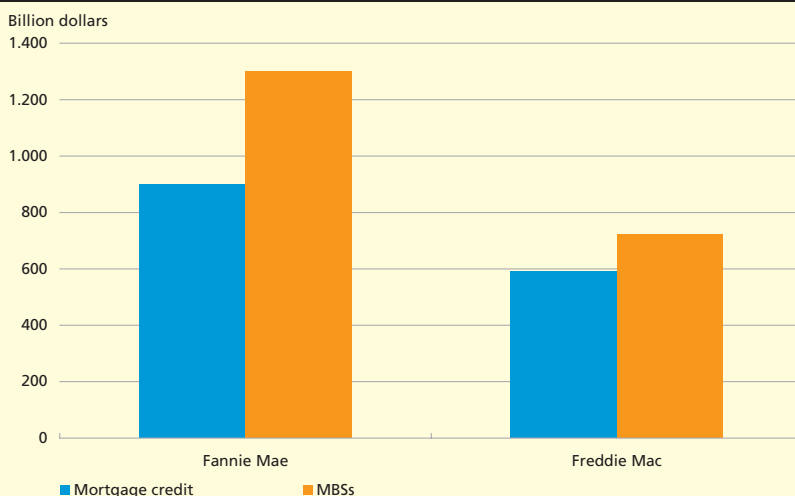
<sup>2</sup> "The Congress declares that the purposes of this title are to establish secondary market facilities for residential mortgages ..." (excerpt of the charter adopted by the US Congress when Fannie Mae was established in 1938, [www.fanniemae.com](http://www.fanniemae.com)).

## FINANCING AND HEDGING OF MORTGAGE CREDIT IN THE USA

Box 3

As the Chart shows, Fannie Mae has financed mortgage credit totalling approximately 2,200 billion dollars and Freddie Mac approximately 1,300 billion dollars. More than 40 per cent is kept on the balance sheet, and the conversion risk is thus borne by the enterprises. The enterprises bear the credit risk for the loans kept on the balance sheet, as well as the loans underlying the MBSs, i.e. the credit risk on loans totalling more than 3,500 billion dollars. Both enterprises have a core capital ratio of just over 3 per cent.

## MORTGAGE CREDIT AND ISSUED MORTGAGE-BACKED SECURITIES 2003



Note: Since Freddie Mac's accounts are still being revised, the end-2002 figures are shown for Freddie Mac.  
Source: [www.fanniemae.com](http://www.fanniemae.com), [www.freddie.mac.com](http://www.freddie.mac.com).

The institutions bear the interest-rate risk, i.e. the conversion risk, on the loans kept on the balance sheet. This means that periods with falling interest rates and thus large conversion activity as seen from the autumn of 2001 to the summer of 2003, as well as periods with significantly increasing interest rates, lead to considerable unrest in the US bond markets. Fannie Mae and Freddie Mac hedge the conversion risk on mortgage credit via derivatives and by purchasing and selling US government bonds. The non-callable government bonds are purchased when interest rates are falling, since the rising prices for these bonds limit the institutions' losses on conversion of mortgage-credit loans. Government bonds are sold when interest rates are rising. The general interest-rate falls and increases are reinforced by Fannie Mae and Freddie Mac's operations due to their size.<sup>1</sup>

<sup>1</sup> See e.g. Louise Mogensen, Market Dynamics at Low Interest Rates, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2002, Recent Economic and Monetary Trends, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2002, International Monetary Fund, *Global Financial Stability Report*, September 2003.

and important to the financing of owner-occupied housing in the USA that the government will bail them out in case of problems. The investors see the more relaxed capital requirements as an expression of this implicit government guarantee, cf. White (2001).

The more relaxed requirements and the implicit government guarantee are deemed to enable the GSEs to issue bonds with a yield that is around 40 basis points lower than for bonds issued by private banks, cf. Passmore, Sparks and Ingpen (2001). Whether these lower financing costs benefit the borrowers or the shareholders of Fannie Mae and Freddie Mac is difficult to say. The results in Passmore (2003) show that the borrowers do not derive the full benefit of the lower financing costs since some of the advantages fall to the shareholders.

These circumstances and the problems seen in the summer of 2002, cf. Box 3, combined with a revision of the accounts from recent years by Freddie Mac<sup>1</sup>, have led to considerable public interest in the activities of the GSEs in the USA. In a speech before Congress<sup>2</sup>, the Chairman of the Federal Reserve Board, Alan Greenspan, expressed concern over the impact of Fannie Mae and Freddie Mac's high degree of leverage on financial stability. In addition, he expressed concern about the low level of capital held by the institutions to cover both credit and conversion risks.<sup>3</sup>

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## MORTGAGE-CREDIT SYSTEMS AND FINANCIAL STABILITY

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As the only mortgage-credit systems in the world, the US and Danish systems offer long-term, fixed-rate callable mortgage-credit loans for financing of real property. These two systems thereby offer borrowers a broad range of options to reduce the risk on housing loans. The lack of access to long-term, fixed-rate financing is seen as a major factor explaining the uncertainty prevailing in the private mortgage market in the UK, cf. Miles (2004).

The problems in the US mortgage-credit system have raised the question of which system is the more expedient one in terms of financial stability. Under the US system, conversion risk is concentrated on a few, systemically important institutions, whereas under the Danish system the balance principle means that the conversion risk is distributed on a broad range of investors. As a result of the fixed-exchange-rate policy Danish investors also to a large extent use the far larger euro market to hedge the market risk on Danish mortgage-credit bonds.<sup>4</sup> Consequently, the investors' hedging of the conversion risk on Danish mortgage-credit bonds has no substantial effect on the Danish bond market. Since US

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<sup>1</sup> Freddie Mac had applied income smoothing to its accounts in order to achieve steady earnings growth. Subsequently Freddie Mac has had to restate its accounts, see [www.freddiemac.com](http://www.freddiemac.com).

<sup>2</sup> The Federal Reserve Board, Testimony of Chairman Alan Greenspan, 24 February 2004.

<sup>3</sup> Fannie Mae has announced that the difference in duration for assets and debt will now be kept below 6 months, [www.fanniemae.com](http://www.fanniemae.com). With equity capital of only 3.2 per cent this will, however, still entail considerable interest-rate risk on the equity capital.

<sup>4</sup> See Frankel et al. (2004).

borrowers must redeem their loans at par when selling their houses, demographic factors have a far greater impact on the calculation of the degree of conversion, etc. for US mortgage-credit bonds. Models for predicting payments on US mortgage-credit bonds therefore require considerably more information than corresponding models for Danish mortgage-credit bonds. The credit risk of both US and Danish mortgage-credit institutes is limited to the loan-to-value ratio of maximum 80 per cent of the value of the owner-occupied home.

Even though investors perceive the GSEs to have an implicit government guarantee, the spread between mortgage-credit and government bonds is the same as in Denmark. The reason is that it is more complicated to predict payments on US bonds and that Danish mortgage-credit bonds are far more standardised in terms of size, etc. than the US bonds, cf. Frankel et al. (2004).

There have been recent initiatives to establish a pan-European mortgage-credit system in order to integrate and extend mortgage credit in the EU. The European Mortgage Finance Agency has proposed the establishment of a system like the US system with a private agency acting as a sort of pan-European "Fannie Mae", purchasing mortgage-credit loans and issuing bonds.<sup>1</sup> The Danish model has been deselected since the banks behind the initiative find that incurring an interest-rate risk should be a major source of income for such an institution. Mexico is setting up a mortgage-credit system modelled on the Danish system with a view to preventing the mortgage-credit institutions from incurring market risks.

## Conclusion

The US and the Danish mortgage-credit systems both give homeowners access to long-term, flexible and relatively cheap housing financing. The differences between the two systems reflect the fact that they were established in very different circumstances. The Danish system is based on the tradition of forming associations and was established by private initiative. The US system was established during the depression in the 1930s when the government had to step in to ensure access to housing financing for middle- and low-income families. The Danish balance principle means that Danish mortgage-credit institutes do not bear the risk in relation to the borrowers' conversion options. The Danish mortgage-credit borrowers obtain relatively cheap and flexible financing of their homes in that Danish mortgage-credit loans are standardised. This means that bonds issued by the mortgage-credit institutes to finance the

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<sup>1</sup> See e.g. *The Banker*, January 2004.

loans become sufficiently liquid for investors to find Danish mortgage-credit bonds attractive. In comparison with the US system, the Danish system is more robust when faced with conversion waves in connection with falling interest rates. This is attributable to the balance principle and the circumstance that investors purchasing Danish mortgage-credit bonds can hedge the interest-rate risk in the far larger euro market. Denmark's fixed-exchange-rate policy vis-à-vis the euro means that such hedging is relatively cheap.

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# Index-Linked Bonds in Portfolio Decisions

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*Bo William Hansen, Financial Markets*

## INTRODUCTION

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Index-linked bonds are bonds where the principal, outstanding debt, instalments and/or repayments are regulated using indices. This article considers index-linked bonds from an investment point of view, i.e. how the return/risk is perceived and how index-linked bonds are managed. The starting point is an investor presenting nominal accounts. An interesting aspect in this connection is that index-linked bonds in some respects resemble bonds denominated in a foreign currency. In that case the foreign currency is the index factor.

The motive for introducing index-linked bonds was the wish to compensate investors for inflationary erosion of the future nominal payments. Payments are therefore written up by a factor corresponding to the price development so that payments are in real amounts. In principle, payments on index-linked bonds can be linked to any index – e.g. gold, dollars or stocks. In practice, they are linked to an index of consumer prices.

Index-linked bonds should be seen as an independent class of assets on a par with nominal bonds and shares. The yield on index-linked bonds is a real yield (i.e. a yield with no built-in compensation for expected inflation).<sup>1</sup> In addition, the investor is compensated for the erosion of purchasing power. The *real repayments* are thus known in advance, while the *nominal repayments* are not known until later. The opposite applies to nominal bonds.

In connection with investments in index-linked bonds, new measures must be calculated for assessing and managing the portfolio. As far as calculation goes, these measures are not complicated. They are break-even inflation, inflation sensitivity and real interest-rate sensitivity.<sup>2</sup> Break-even inflation is used to assess the relative pricing of index-linked and nominal bonds, while the other two measures indicate the exposure to the development in inflation and the real yield, respectively.

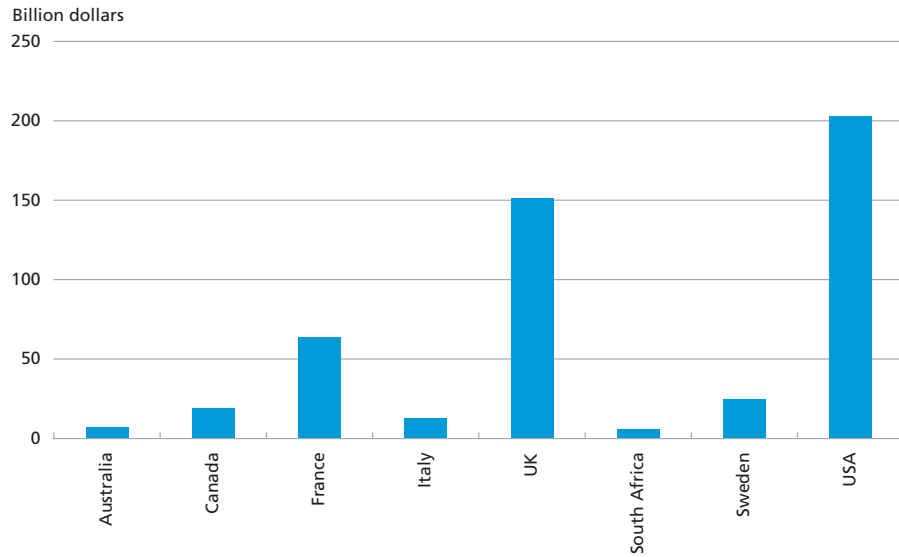
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<sup>1</sup> It should be noted that these are real yields in relation to the index applied, and thus only "pure" real yields to the extent that the index in question reflects the actual price development in society.

<sup>2</sup> Inflation sensitivity is relevant from an accounting point of view where the investor takes the nominal return into account.

MARKET VALUE OF INDEX-LINKED BONDS ISSUED, 31 DECEMBER 2003

Chart 1



Source: Barclays Capital.

Index-linked bonds have long been a topic in academic literature, and over time a number of leading economists (including Keynes, Musgrave, Friedman and Barro) have argued in their favour – from the borrower's as well as the investor's point of view.<sup>1</sup> In Denmark the issue was intensely analysed and discussed in the 1970s.<sup>2</sup> Previously index-linked bonds were mainly introduced in countries with high inflation. Today index-linked bonds are issued for other reasons, primarily diversification, and several countries now include index-linked bonds in their government-debt programmes. The most liquid markets for index-linked bonds are Australia, Canada, France, Italy, the UK, South Africa, Sweden and the USA.<sup>3</sup> Chart 1 shows the market value in the individual markets.

A Danish market for index-linked bonds was introduced in 1982, but is now languishing, *inter alia* due to the Danish rules governing the issue and taxation of index-linked bonds.<sup>4</sup> The market for Danish index-linked bonds has also been characterised by various borrower considerations. This has resulted in the issue of many bonds with different structures and contributed to reducing liquidity.

Recent years have seen renewed interest in index-linked bonds. One reason is that investors and borrowers are often interested in repay-

<sup>1</sup> For a review of the literature and the various rationales behind index-linked bonds, see Price (1997).

<sup>2</sup> Cf. e.g. Report No. 732 (1975) and Ølgaard (1975).

<sup>3</sup> Index-linked bonds are also issued in Greece, Iceland, Israel, Mexico and New Zealand, among other countries. The Japanese government-debt office opened a new 10-year index-linked bond series in March 2004. For a detailed description of the individual markets, see Barclays Capital (2004).

<sup>4</sup> For a detailed description, see Andersen and Gyntelberg (1999).

ments linked to inflation, so they can achieve a diversification gain by holding index-linked bonds in their portfolios. Another – perhaps more important – reason is that they are beginning to comprehend the special features of index-linked bonds. The increasing interest in index-linked bonds has led to the creation of a rapidly growing market for inflation-linked financial derivatives – e.g. inflation swaps.

## NOMINAL AND REAL YIELDS – FISHER'S EQUATION

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Chart 2 shows the (nominal) yield to maturity on a French nominal government bond and the (real) yield to maturity on a French index-linked government bond. Both bonds mature in 2009.<sup>1</sup>

To illustrate the difference between index-linked and nominal bonds the classical Fisher identity is a good starting point. Fisher sees the nominal yield ( $i$ ) as the sum of the real yield ( $r$ ) and expected inflation ( $\pi^e$ ):

$$i = r + \pi^e . \quad (1)$$

Fisher's equation is often extended with an "inflation risk premium" ( $n$ ):

$$i = r + \pi^e + n \quad (2)$$

where  $n$  is, *inter alia*, a function of the variability in inflation and the maturity of the bond, cf. below.<sup>2</sup>

The inflation risk premium reflects a wish on the part of investors for further compensation for the inflation risk associated with buying nominal bonds, e.g. for incurring a risk that actual inflation exceeds expected inflation.<sup>3</sup> The existence of the inflation risk premium is an empirical question. Estimation of the individual elements is complicated by the fact that neither  $\pi^e$  nor  $n$  can be observed in practice. At the same time, the value of the risk premium can be expected to vary over time and between markets.<sup>4</sup> Most studies are based on data from the USA and the UK and estimate a significantly positive inflation risk premium, i.e. a higher expected return on nominal bonds.

In order to gain a better understanding of the underlying risks associated with investing in index-linked bonds, it is useful to compare with

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<sup>1</sup> Here we will consider the choice between two placements of equal horizon. In practice the decision involves a horizon choice between short-term and long-term placements.

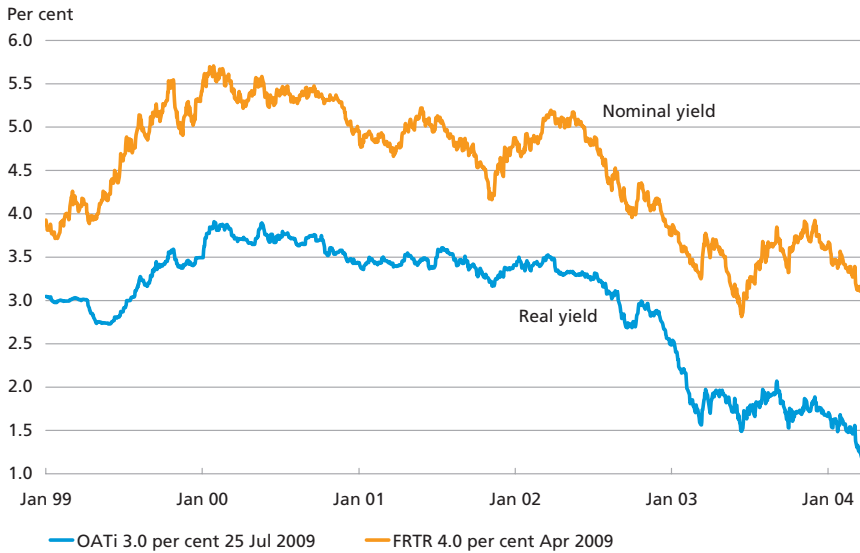
<sup>2</sup> In principle liquidity premiums and any other premiums can be added to Fisher's equation.

<sup>3</sup> A high inflation risk premium has been used as an argument for issuing index-linked bonds and thus reducing issuing costs.

<sup>4</sup> The inflation risk premium must therefore be expected to have been larger in the 1970s and 1980s when inflation was far higher and more volatile than now.

YIELD TO MATURITY ON FRENCH NOMINAL AND INDEX-LINKED BONDS

Chart 2



Source: Barclays Capital.

an investment in e.g. US nominal dollar-denominated bonds. The US investor who solely cares about the return in dollars naturally incurs no exchange-rate risk when investing in dollar-denominated bonds, but solely exposure to the development in US interest rates. A foreign investor in dollar-denominated bonds, on the other hand, is typically interested in the return measured in his own currency and therefore incurs an exchange-rate risk.

For the foreign investor, the dollar rate may in principle be interpreted as the bond's "index", and the development in the "index" constitutes a risk in terms of the return. On the basis of equation (2), the foreign investor's total expected return comprises an expected return in dollars, as well as a return in the form of the expected development in the dollar rate, and finally an exchange-rate-risk premium.

In the same way, an investor in index-linked bonds who is only interested in the real return naturally runs no inflation risk. However, he still incurs a risk in terms of the development in real interest rates. This corresponds to the dollar-based investor only incurring a risk in terms of the dollar interest rate.

An investor in index-linked bonds who is interested in the nominal return, however, does incur an inflation risk, i.e. a risk connected with the development in the price index applied, in the same way that the foreign investor runs an exchange-rate risk. It should be borne in mind that although an investor has nominal accounts he may well have real liabil-

ities, which naturally means that investments in index-linked bonds will reduce his sensitivity to inflationary changes.

## BREAK-EVEN INFLATION

When assessing index-linked bonds in relation to nominal bonds, break-even inflation is the basic key indicator. This is the rate of inflation at which the return on an index-linked bond is equal to the return on an equivalent nominal bond.

Break-even inflation is comparable to e.g. forward rates in the foreign-exchange market balancing the return on bonds denominated in different currencies.

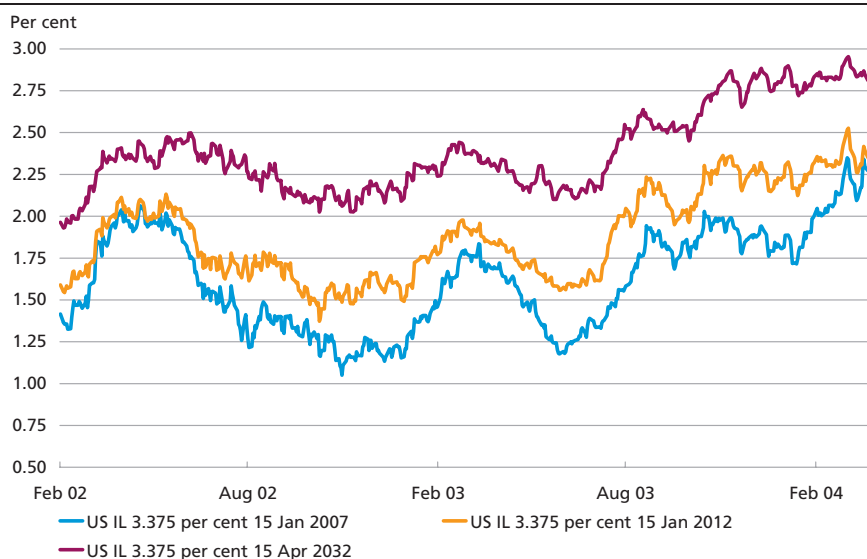
In practice, break-even inflation is often approximated by subtracting the yield to maturity on an index-linked bond from the yield to maturity for a (comparative) nominal bond. Thus break-even inflation (*bei*) is equal to

$$bei = i - r. \quad (3)$$

A more advanced method consists in deriving break-even inflation using the market price of the index-linked bond. Break-even inflation can be applied as a measure of the relative pricing of index-linked bonds and nominal bonds. If break-even inflation is higher than the investor's own inflation expectations, the expected return on index-linked bonds is lower than for nominal bonds.

BREAK-EVEN INFLATION FOR SELECTED US INDEX-LINKED BONDS

Chart 3



Source: Barclays Capital.

Break-even inflation is typically volatile since the ratio of nominal to real yields is not constant. In periods with relatively strong demand for index-linked bonds, break-even inflation rises. At the same time, break-even inflation typically rises with the maturity of the bond. The reason is that the inflation risk premium increases with the maturity, cf. Chart 3.

## PRICING

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For index-linked bonds a distinction should be made between the real price, i.e. the price before indexation, and the indexed value, the market value. The following relationship applies

$$V = I_0 P, \quad (4)$$

where  $V$  is the indexed value,  $P$  is the real price<sup>1</sup> and  $I_0$  is the current indexing factor. The indexing factor is a function of inflation ( $\pi$ ). The indexed value is the amount which an investor must pay to purchase the bonds.

In the previous example, where the index is the dollar rate,  $P$  corresponds to the dollar price,  $I$  to the exchange rate and  $V$  to the price in the domestic currency.

In the markets the *real price* is typically quoted. Provided that the real price is known, the real yield to maturity can be calculated in a standard manner using the following equation

$$P = \sum_t^T \frac{C_t}{(1+r)^t}, \quad (5)$$

where  $C_t$  is the bond's known real payment at the time  $t$ ,  $r$  is the real yield to maturity and  $T$  is the expiry date. All other things being equal, a higher real price lead to a lower real yield to maturity. Equation (5) can also be used to calculate the real theoretical price on the basis of the real yield to maturity or real-yield curve and a known series of real payments.

## SENSITIVITY MEASURES

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For an investor investing in index-linked bonds the development in  $V$  – the market value of the bond – is interesting from a nominal point of view. The development in the market value depends on the parameters affecting  $I$  and  $P$ , cf. equation (4).  $V$  is thus a function of inflation and

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<sup>1</sup> The real clean price plus real accrued interest.

real interest rates, which are the primary first-order derivative. The return in kroner over a period can be written as

$$\begin{aligned}\Delta V = \text{return} &= \text{capital gain/loss} + \text{direct return} \\ &= \Delta r \frac{\partial V}{\partial r} + \Delta \pi \frac{\partial V}{\partial \pi} + \Delta t \frac{\partial V}{\partial t},\end{aligned}\quad (6)$$

where

- $\partial V / \partial r$  is the sensitivity to the real interest rate (real krone duration).
- $\partial V / \partial \pi$  is the sensitivity to inflation (which is close to 1).
- $\partial V / \partial t$  is the direct return (carry) in the form of coupon and reduction of maturity.

For investments in foreign index-linked bonds, the return is furthermore exposed to the development in exchange rates.

In practice many investors are interested in the exposure to the nominal interest-rate, e.g. if their liabilities are calculated on the basis of a nominal yield. An investor with a portfolio comprising both index-linked and nominal bonds thus wants to know the portfolio's aggregate nominal interest-rate sensitivity.

For index-linked bonds it only makes sense to calculate the nominal sensitivity if the co-variation between the nominal and real yield is 1. This is seldom the case since inflation expectations and premiums change, cf. equation (2). The nominal and real yields are thus not fully correlated. Typically, the nominal interest-rate sensitivity is lower for index-linked bonds than for otherwise comparable nominal bonds. For an investor with a nominal portfolio the introduction of index-linked bonds may therefore give a lower expected risk due to diversification, a so-called diversification gain.

## WHY INVEST IN INDEX-LINKED BONDS?

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Index-linked bonds are an obvious investment object for investors with commitments that are sensitive to inflation. This could be pension funds with real commitments. However, if assets and liabilities are to be matched, the index-linked bonds must have the same maturity as the liabilities. If the maturities differ, a real-interest-rate risk will persist. Pension funds with nominal commitments may also find it expedient to hedge the real value of the pensions to a certain degree.

As a result of the replacement need in connection with the regular interest payments and instalments, a strategy comprising index-linked bonds may not always ensure a given real return, just as a strategy comprising nominal bonds may not always ensure a given nominal return.

Even though an institution does not have index-linked liabilities, it may make sense to invest in index-linked bonds due to diversification gains. Empirically there have been small or negative yield correlations between index-linked bonds and other assets, cf. e.g. Barclays Capital (2004).

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## Speech by Bodil Nyboe Andersen at the Annual Meeting of the Association of Danish Mortgage Banks on 29 April 2004

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The Danish economy has shown very positive trends in the last decades even though economic growth has been modest recently. Various governments have implemented a number of structural reforms since the beginning of the 1980s. As a result, the Danish economy is today extremely robust with strong economic fundamentals.

The fixed-exchange-rate policy, which was introduced in 1982, has been a cornerstone of this development. However, a sustainable and credible fixed-exchange-rate policy requires that the rest of the economic policy and the structural conditions are in order.

In Denmark this called for a number of economic reforms that began in the 1980s. The cost-of-living adjustment was abolished and the central-government finances improved. The deductibility of interest payments was restricted and interest taxation reduced. All of these factors contributed to breaking expectations of a devaluation-inflation spiral.

However, breaking these expectations took its toll and, as many people in the financial sector may still recall, the years around 1990 were lean years for Denmark.

On the other hand, these measures resolved some of the structural problems that had burdened the Danish economy for many years.

Since the beginning of the 1990s Denmark has seen stable growth with declining inflation, lower interest rates and the accumulation of solid surpluses on both public finances and the balance of payments, as well as gradual expansion of pension savings.

In recent years Denmark has seen strong growth in real wages, and at the same time Danish companies have successfully carried out rationalisation measures. Even though unemployment has been increasing for a period of time, unemployment has been low on a European scale in the last 5-10 years. This indicates that the structural reforms already implemented in the labour market have contributed to enhancing the flexibility of the Danish economy.

In international assessments and comparisons it is noted that Denmark has successfully applied a long-term and medium-term orientation to its economic policy without resorting to short-term fiscal-policy measures.

Most recently, the IMF delegation that visited Denmark in March this year described this as follows in their conclusions:

"At the same time, Denmark has been well-served by focusing on medium term fiscal targets, and relying on large automatic stabilizers to support demand during downturns. Discretionary counter-cyclical policy should be kept as an exceptional response to avoid creating an expectation of fine tuning and short-term fixes that could weaken the effectiveness of the medium-term fiscal framework."

Why focus on medium-term economic policy? Why is it recommended to refrain from fine-tuning via fiscal policy?

Because experience shows that detailed management of economic development is hard to achieve by adapting fiscal policy on an ongoing basis.

Not only is it difficult to make short-term predictions of economic development, it is also difficult to obtain an accurate picture of the current situation. We get a myriad of statistics, for example national accounts data, that are published rather quickly, with a dedicated effort. However, the short publication deadline means that the data will often have to undergo very extensive revision a few months later. This is especially problematic around a cyclical reversal when even minor revisions may give rise to a very different interpretation.

Unemployment represents a key indicator, which is timely as well as accurate. Consequently, unemployment plays a central role in the cyclical analysis and in the debate on the structure of economic policy.

However, the unemployment rate should not be readily interpreted as a reflection of the cyclical situation.

Firstly, experience shows that changes in employment lag behind cyclical trends. A cyclical reversal is reflected in the unemployment rate some months after the reversal actually takes place. Normally about six months on average, but the number of months varies considerably.

Secondly, the unemployment measure comprises both the unemployed who will be able to quickly find employment when economic growth picks up, and those who will not be able to find employment so quickly. The latter group, called structural unemployment, is not easily affected by an upswing created by a fiscal stimulus. It must be influenced via structural-policy measures targeted at mobility, education, unemployment benefit, activation, tax, etc.

In practice, however, it is impossible to draw a distinction between structural and cyclical unemployment. And such a distinction is by no means permanent over time. Most people believe that structural unemployment in Denmark has declined over the last decade.

Since cyclical unemployment is not easily defined, it is obviously difficult to aim to abolish it.

Finally, another uncertainty in connection with fiscal fine-tuning is how quickly a fiscal adjustment is reflected in the demand for labour. Studies indicate that it may take a number of years before the economic effect of a fiscal-policy measure peaks. By then the cyclical situation may be quite different from when the measure was adopted.

Therefore, it is very difficult to apply even an approximately correct dosage of fiscal activism.

Still, it is hard for governments to refrain from fiscal activism, as they will often be under pressure to make adjustments, from political players as well as from professional organisations and the media.

In good times there will be pressure to relax fiscal policy by lowering taxes rather than to let the automatic stabilisers work to improve the government surplus. At a weak point in the economic cycle there will also be pressure to relax fiscal policy in order to stimulate economic growth.

Denmark has avoided this kind of fiscal activism for a number of years, and only minor adjustments have been made in connection with the annual Finance Acts.

Danmarks Nationalbank's comments on the government's so-called "spring package" should be viewed in this light. I take this opportunity to repeat our comments issued in connection with the publication of Danmarks Nationalbank's Annual Report.

"Danmarks Nationalbank finds that there is no pressing need to implement measures to adjust economic development. Fiscal policy is already slightly expansionary, interest rates are historically low, and most observers share the view that an upswing is in the making.

Although the unemployment rate is still low, both by international comparison and in a historical Danish perspective, it is on the increase.

The widespread political view is therefore that extensive relaxation of fiscal policy is needed.

Denmark's economic situation is very robust with a government surplus, a considerable current-account surplus, a highly stable krone rate and low inflation. Against this background we have to acknowledge that today the economic scope for implementing reasonable measures exists.

The government's plan may turn out to be too expansionary, which is too early to assess. However, especially in this light it is important that the plan applies a combination of temporary measures and moves forward already adopted relaxations. This limits the potential adverse consequences in connection with maintenance of the medium-term objec-

tive of expanding the supply of labour, limiting the increase in public expenditure and reducing the government debt."

These comments on the government's plan were made in a current context about six weeks ago. Nevertheless, they are a good reflection of Danmarks Nationalbank's overall position that the overriding priority is to maintain the medium-term economic policy. This also requires more reforms to be implemented to reduce structural unemployment and thus ensure that Denmark will continue to be among the countries with a low unemployment rate.

The general course of the economy is of great significance to mortgage credit, as was seen around 1990. In addition, mortgage-credit legislation was previously often used as an element of economic policy. A case in point is the introduction of so-called mixed loans in the mid-1980s.

The beginning of the 1990s saw new adjustments to the acts, but this time the purpose was to stimulate economic development. This implied liberalisation of the rules.

Furthermore, the last decade or so has been characterised by extensive waves of conversion which have helped to reduce the homeowners' interest costs in step with the general global decline in interest rates in that period.

The introduction and widespread use of adjustable-rate loans have also contributed to this, and at the same time short-term interest rates have been lower than long-term interest rates.

Finally, the introduction of the so-called deferred-amortisation loans has meant that the homeowners' debt service can be limited to interest payments for a number of years. In other words, deferred-amortisation loans represent an easier way of achieving the same results as with supplementary mortgage credit.

The gradual liberalisation has made it easier for existing homeowners to weather situations of financial tightness. When social events altering the ability to meet payments occurred, many homeowners came through by remortgaging or raising supplementary mortgage credit, and society was spared many problems.

In recent years new homeowners have made extensive use of the new mortgaging opportunities in such a way that they can be expected to be more vulnerable in the future. This applies both when the homeowners' net income is reduced and when the level of interest rates in the economy rises significantly.

What will happen in the coming years? The scope for relaxing the borrowing conditions seems to be exhausted – unless interest payments are

frozen. Indeed, in view of the current level of interest rates further significant relaxations in this respect can hardly be envisaged. On the contrary, everybody is talking about the risk that interest rates will increase.

The coming years will then show who have successfully advised their customers about the consequences of interest-rate changes or changes in the customers' ability to meet payments – and who have merely been sales men.

The basic principles of mortgage credit in Denmark have been retained in the many adjustments to mortgage-credit legislation over the years.

The mortgage-credit institutes are intermediaries providing loans on the basis of bonds. The credit risk is "pooled" so that the bondholders are not dependent on one single borrower's ability to meet payments. However, the interest-rate risk still rests on the borrowers and bondholders, respectively, not on the mortgage-credit institute.

This is different from the home-financing system in the USA, which is otherwise similar to the Danish system in that the borrower may remortgage by redeeming the loan when interest rates decline. In the USA the conversion risk is to a large extent assumed by two privileged institutes with a large proportion of the housing loans on their balance sheets. These institutes have encountered significant risk-management problems as a consequence of interest-rate fluctuations. They have thus had to conduct very extensive hedging in the bond market, among other things, and this again has led to pronounced volatility in the bond market.

Denmark did not experience a similar increase in volatility.

At international meetings we are sometimes asked why this increase did not happen in Denmark. One explanation is our balance principle, which ensures that the conversion risk is spread out on a large number of investors rather than being concentrated on a few mortgage-credit institutes.

The next question is then: why did Denmark introduce the balance principle?

This is not quite as easy to answer. When the mortgage-credit system was founded there were no clearly expressed considerations about the balance principle. What happened was that the borrowers joined forces – just like the cooperative movement in other areas of the economy – to be able to provide joint collateral and issue standardised bonds.

The balance principle has been a cornerstone of the mortgage-credit system in Denmark for more than 100 years. Since then the authorities – including Danmarks Nationalbank – have come to appreciate it to such a degree that they have again and again resisted the request from the mortgage-credit institutes to relax the balance principle.



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## Press Release

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### **30 MARCH 2004: THEMATIC COIN WITH THE GOOSE TOWER**

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Danmarks Nationalbank will be issuing the fourth coin in its series of thematic coins with towers as the common theme. The Goose Tower in Vordingborg is the motif on the reverse of the coin. The face of the coin shows a profile of the Queen, identical to the one used on the most recent 20-krone coins. The Goose Tower coin will be issued as a 20-krone coin in an edition of 1.2 million coins. It is of the same size and alloy as the ordinary 20-krone coin in circulation and can be purchased at face value from banks and Danmarks Nationalbank from 31 March 2004.

The relief of the Goose Tower was designed by the sculptor Tina Maria Nielsen, who comments on the relief as follows: "The stairway by the Tower has been emphasised, and the goose and the brickwork have been made relatively larger than in real life to make the motif more dynamic. The Tower has been placed slightly to the left of the centre of the coin so that the motif does not become too static."

The Goose Tower is the best-preserved Medieval fortification tower in Denmark. It was built in the reign of King Valdemar IV (Atterdag) in the 1360s and is named for the golden goose that adorns the Tower. As the story goes, King Valdemar placed a golden goose on the Tower to mock his arch-enemies, the Hanseatic League, which he referred to as a flock of cackling, but otherwise harmless geese.

"Towers have been chosen as the theme since they represent both national and historical symbols. Unlike e.g. whole buildings they also give the artist a good opportunity to create an interesting coin with depth and a wealth of detail", says Governor Torben Nielsen, Danmarks Nationalbank. The tower motifs on the thematic coins have been chosen from among the many suggestions received by Danmarks Nationalbank. The next coin in the series will be issued later this year.



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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: 21 June 2004.

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 1-12, 14-16 and 21-22, 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 13 and 17-20. The calculations in Tables 18 and 22 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				10-year central-government bond	30-year mortgage-credit bond	
1999 .....	3.00	3.30	3.00	1999 .....	3.57	5.64	7.45	255.69
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
2002 6 Dec ....	2.75	2.95	2.75	Nov 03 ....	2.19	4.62	5.61	242.72
2003 7 Mar.....	2.50	2.70	2.50	Dec 03 ....	2.16	4.46	5.45	244.35
23 May.....	2.50	2.65	2.50	Jan 04 ....	2.16	4.41	5.39	261.83
6 Jun ....	2.00	2.15	2.00	Feb 04 ....	2.11	4.22	5.23	275.94
				Mar 04 ....	2.04	4.10	5.20	258.75
2004 21 Jun ....	2.00	2.15	2.00	Apr 04 ....	2.14	4.38	5.35	254.99
				May 04 ....	2.15	4.47	5.47	253.14

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							
1999 .....	165.3	46.4	39.7	99.9	6.5	33.1	73.3
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
Dec 03 .....	224.0	49.7	40.9	157.3	12.9	48.0	122.1
Jan 04 .....	214.6	47.2	56.9	131.1	4.7	39.4	96.5
Feb 04 .....	206.4	46.7	54.5	139.0	3.3	51.7	90.7
Mar 04 .....	215.5	47.6	96.6	141.3	18.2	99.1	60.3
Apr 04 .....	223.1	48.5	102.0	159.4	5.5	104.4	60.5
May 04 .....	225.9	49.3	96.4	134.5	4.4	71.1	67.8

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
1999 .....	67.9	68.8	-0.9	62.7	1.9	-7.9	55.7	73.3
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
Dec 03 .....	11.7	4.5	7.3	0.3	0.3	-1.2	6.7	122.1
Jan 04 .....	0.6	16.6	-16.0	-9.6	-2.0	1.9	-25.7	96.5
Feb 04 .....	2.5	1.0	1.5	-7.3	0.0	0.0	-5.8	90.7
Mar 04 .....	-11.7	15.5	-27.2	-5.8	0.2	2.5	-30.4	60.3
Apr 04 .....	11.0	16.4	-5.3	7.6	-0.5	-1.6	0.2	60.5
May 04 .....	-3.6	-9.0	5.3	3.1	0.0	-1.1	7.3	67.8

SELECTED ITEMS FROM THE CONSOLIDATED  
BALANCE SHEET OF THE MFI SECTOR

Table 4

End of period	Total balance	Assets				Liabilities		Foreign assets, net <sup>1</sup>
		Domestic lending		Domestic securities		Domestic deposits	Bonds, etc. issued	
		Public sector	Private sector	Bonds, etc.	Shares, etc.			
		Kr. billion						
1999 .....	2,612.8	59.5	1,516.6	125.8	45.7	648.4	1,018.0	163.7
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
Nov 03 .....	3,312.2	87.6	2,042.1	122.1	42.3	786.2	1,110.6	-81.5
Dec 03 .....	3,359.0	89.6	2,062.0	123.3	43.3	754.7	1,157.9	-70.7
Jan 04 .....	3,347.3	89.4	2,070.5	126.5	43.8	812.2	1,149.2	-72.9
Feb 04 .....	3,369.5	87.3	2,078.4	124.1	44.8	803.1	1,159.0	-89.5
Mar 04 .....	3,452.3	91.0	2,124.9	134.8	44.4	846.4	1,180.9	-68.3
Apr 04 .....	3,465.6	91.4	2,145.9	139.5	44.4	890.6	1,151.9	-84.8
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	...
Nov 03 .....	...	12.2	5.5	-12.5	11.6	3.9	0.7	...
Dec 03 .....	...	12.1	6.0	-13.7	18.6	4.3	2.8	...
Jan 04 .....	...	12.9	6.0	-15.6	20.0	4.3	4.4	...
Feb 04 .....	...	7.2	5.9	-19.4	23.6	2.5	2.5	...
Mar 04 .....	...	11.0	6.8	-21.3	19.0	7.7	1.5	...
Apr 04 .....	...	10.1	7.5	-20.5	15.4	7.7	2.9	...

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.

<sup>1</sup> 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								
1999 .....	36.1	341.8	378.0	111.0	12.9	501.9	4.3	17.0	523.2
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
Nov 03 .....	40.2	441.5	481.7	126.8	19.6	628.0	3.3	88.2	719.5
Dec 03 .....	41.0	428.2	469.2	112.2	19.2	600.5	2.7	77.3	680.6
Jan 04 .....	40.1	440.4	480.5	141.1	19.1	640.6	4.4	114.1	759.1
Feb 04 .....	40.0	437.8	477.7	137.7	19.0	634.5	4.1	119.8	758.3
Mar 04 .....	39.9	437.0	476.9	141.1	19.2	637.2	3.5	120.7	761.4
Apr 04 .....	41.6	463.7	505.3	145.2	20.2	670.7	8.7	123.2	802.6
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
Nov 03 .....	...	...	8.1	...	...	9.9	...	...	19.0
Dec 03 .....	...	...	8.8	...	...	8.8	...	...	12.5
Jan 04 .....	...	...	7.1	...	...	7.3	...	...	15.6
Feb 04 .....	...	...	6.2	...	...	6.6	...	...	13.9
Mar 04 .....	...	...	8.3	...	...	10.8	...	...	18.6
Apr 04 .....	...	...	8.8	...	...	8.8	...	...	15.3

## 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								
1999 .....	1,458.6	388.4	399.8	203.4	117.2	427.8	465.8	678.0
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
Nov 03 .....	2,125.3	417.2	647.3	256.8	277.1	772.7	738.5	805.5
Dec 03 .....	2,204.4	468.7	663.0	271.6	285.7	764.4	823.8	795.2
Jan 04 .....	2,153.2	452.4	661.6	265.4	279.9	755.7	745.2	837.0
Feb 04 .....	2,171.5	448.1	657.8	266.3	280.1	774.4	749.9	837.0
Mar 04 .....	2,275.1	493.5	691.8	278.4	297.2	791.0	835.2	846.2
Apr 04 .....	2,265.3	451.2	705.2	278.1	308.6	827.7	825.9	869.4
Change compared with previous year, per cent								
2000 .....	...	10.1	31.6	17.5	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	23.1	18.8	4.0
Nov 03 .....	...	-0.7	1.6	5.5	0.2	17.8	6.9	1.3
Dec 03 .....	...	10.7	2.5	7.1	3.1	23.1	18.8	4.0
Jan 04 .....	...	5.7	2.5	8.0	-0.4	11.0	5.3	4.1
Feb 04 .....	...	-7.3	2.7	9.0	0.2	10.2	-4.5	4.2
Mar 04 .....	...	-1.5	5.5	10.0	3.0	4.3	-5.0	8.4
Apr 04 .....	...	-3.2	7.5	12.0	6.9	10.8	7.9	1.9

Note: Excluding Danish banks' units abroad. As from 2003 the lending is affected by an addition to the group of banks, for which account has been taken on calculation of the rate of increase.

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								
1999 .....	1,222.9	48.6	1,050.9	785.8	222.9	117.9	22.1	1,116.2
2000 .....	1,341.1	53.7	1,095.4	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	1,284.6	988.0	259.2	338.5	58.9	1,584.2
2003 .....	1,863.8	100.9	1,393.5	1,072.1	284.4	342.6	32.6	1,729.0
Nov 03 .....	1,606.4	55.8	1,388.2	1,069.5	283.0	126.4	13.4	1,491.2
Dec 03 .....	1,863.8	100.9	1,393.5	1,072.1	284.4	342.6	32.6	1,729.0
Jan 04 .....	1,571.2	49.1	1,402.1	1,081.8	285.1	95.5	16.3	1,488.3
Feb 04 .....	1,599.5	50.5	1,412.3	1,084.0	291.7	106.0	18.6	1,520.2
Mar 04 .....	1,663.5	82.0	1,424.1	1,093.8	293.7	130.0	27.0	1,567.2
Apr 04 .....	1,628.3	52.8	1,431.9	1,098.9	296.4	114.8	22.6	1,537.3
Change compared with previous year, per cent								
2000 .....	...	10.5	4.2	5.7	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
Nov 03 .....	...	5.4	8.0	8.4	8.7	3.2	-10.8	6.5
Dec 03 .....	...	30.6	8.5	8.5	9.7	1.2	-44.8	9.1
Jan 04 .....	...	-26.0	8.2	8.6	8.8	-20.5	-25.8	4.4
Feb 04 .....	...	-39.5	7.7	7.4	9.4	-26.1	-45.6	2.6
Mar 04 .....	...	-32.1	7.8	7.3	9.8	-17.8	13.8	2.3
Apr 04 .....	...	-5.3	7.7	7.3	9.8	9.7	56.7	6.8

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								
1999 .....	1,573.9	990.1	526.5	523.0	204.3	291.4	1,050.9	785.8	235.1
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
Nov 03 .....	2,066.7	1,326.3	682.7	677.5	256.8	393.1	1,389.2	1,069.5	289.6
Dec 03 .....	2,087.7	1,343.7	683.1	693.2	271.6	392.3	1,394.6	1,072.1	290.9
Jan 04 .....	2,097.1	1,347.2	689.8	693.3	265.4	398.5	1,403.8	1,081.8	291.3
Feb 04 .....	2,103.0	1,350.3	694.8	689.5	266.3	396.8	1,413.5	1,084.0	297.9
Mar 04 .....	2,150.1	1,372.2	718.5	723.4	278.4	418.5	1,426.6	1,093.8	300.0
Apr 04 .....	2,170.1	1,377.1	734.2	736.9	278.1	431.8	1,433.2	1,098.9	302.4
Change compared with previous year, per cent									
1999 .....	7.6	6.7	10.0	10.0	3.9	16.3	6.4	7.5	3.1
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
Nov 03 .....	5.6	7.9	2.2	1.0	5.5	-1.8	8.1	8.4	8.3
Dec 03 .....	6.1	8.2	2.7	1.5	7.1	-1.7	8.5	8.5	9.3
Jan 04 .....	6.3	8.5	2.6	2.5	8.0	-1.4	8.4	8.6	8.6
Feb 04 .....	6.0	7.7	3.2	2.7	9.0	-0.9	7.7	7.4	9.1
Mar 04 .....	7.0	7.9	5.4	5.4	10.0	2.6	7.9	7.3	9.6
Apr 04 .....	7.6	8.2	6.7	7.2	12.0	4.8	7.8	7.3	9.6

Note: Including lending in Danish banks' units abroad. As from 2003 the lending is affected by an addition to the group of banks, for which allowance has been made on calculation of the rate of increase.

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		Total	Lending in foreign currency	Instalment-free lending <sup>1</sup>
1999 .....	113.7	877.5	59.7	43.5	1,050.9	9.6	...	
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	
Nov 03 .....	102.0	810.1	476.1	228.3	1,388.2	88.9	...	
Dec 03 .....	99.5	795.0	499.0	250.0	1,393.5	85.7	44.4	
Jan 04 .....	99.8	785.4	516.9	272.6	1,402.1	85.4	...	
Feb 04 .....	100.1	780.2	532.0	285.4	1,412.3	85.3	...	
Mar 04 .....	100.4	770.1	553.7	300.8	1,424.1	85.8	85.8	
Apr 04 .....	100.6	762.6	568.7	331.5	1,431.9	85.9	...	

<sup>1</sup> The mortgage-credit institutes' instalment-free lending to owner-occupied dwellings.

THE BANKS' EFFECTIVE INTEREST RATES

Tabel 10

	Lending				Deposits			
	All sectors	Households, etc.	Non-financial companies	Financial companies	All sectors	Households, etc.	Non-financial companies	Financial companies
Q1 02 .....	6.4	9.2	6.1	3.6	2.6	1.9	2.9	3.4
Q2 02 .....	6.3	9.1	6.1	3.6	2.5	1.9	3.0	3.1
Q3 02 .....	6.5	9.2	6.1	3.8	2.6	2.0	3.0	3.2
Q4 02 .....	6.3	9.0	6.1	3.7	2.5	1.9	2.8	3.1
Q1 03 .....	5.9	8.3	5.9	3.4	2.3	1.8	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
Nov 03 .....	5.5	7.5	5.1	2.9	1.5	1.1	1.7	2.1
Dec 03 .....	5.3	7.4	4.9	2.9	1.5	1.1	1.7	2.0
Jan 04 .....	5.3	7.4	5.0	2.8	1.6	1.1	1.7	2.1
Feb 04 .....	5.3	7.4	5.0	3.0	1.6	1.1	1.7	2.1
Mar 04 .....	5.2	7.2	4.9	2.9	1.6	1.1	1.7	2.1
Apr 04 .....	5.3	7.3	4.8	2.9	1.6	1.1	1.7	2.1

SELECTED ITEMS FROM THE BALANCE SHEET OF  
THE INVESTMENT ASSOCIATIONS

Table 11

End of period	Total balance	Assets			Liabilities			
		Holdings of securities		Certificates issued by investment associations by owner				
		Bonds, etc.	Shares, etc.	Households, etc.	Insurance companies 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	62.0	67.1	9.6	
2002 .....	288.9	180.8	89.5	153.6	68.6	53.0	8.9	
2003 .....	367.1	237.2	108.7	188.2	101.9	61.4	12.5	
Q1 03 .....	294.7	194.0	79.9	158.7	70.9	51.4	9.5	
Q2 03 .....	328.3	216.1	89.4	173.0	82.9	57.3	11.0	
Q3 03 .....	341.9	221.8	98.4	179.8	88.0	59.6	10.8	
Q4 03 .....	367.1	237.2	108.7	188.2	101.9	61.4	12.5	
Q1 04 .....	481.3	282.9	135.3	199.5	120.7	145.0	12.9	
		Quarterly transactions, kr. billion						
Q1 03 .....	...	14.3	-2.0	8.4	3.7	0.0	0.8	
Q2 03 .....	...	19.8	-1.8	10.3	7.4	2.5	0.9	
Q3 03 .....	...	7.2	3.6	5.1	3.8	-0.7	-0.3	
Q4 03 .....	...	18.9	4.1	5.4	9.7	0.2	1.2	
Q1 04 .....	...	40.0	17.1	7.5	12.6	80.0	0.6	

SECURITIES ISSUED BY RESIDENTS BY OWNER'S HOME COUNTRY

Table 12

End of period	Total		Bonds, etc.				Shares	
			of which:					
			Central-government securities		Mortgage-credit bonds			
	Denmark	Abroad	Denmark	Abroad	Denmark	Abroad	Denmark	Abroad
	Market value, kr. billion							
1999 .....	1,535.1	388.3	441.6	249.1	977.2	134.1	569.7	211.3
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
Dec 03 .....	2,124.2	419.6	488.2	210.0	1,523.9	207.9	488.1	208.6
Jan 04 .....	1,872.1	428.9	492.1	219.7	1,274.5	207.4	531.4	226.6
Feb 04 .....	1,926.7	411.9	493.4	221.2	1,327.5	189.0	556.4	238.7
Mar 04 .....	1,972.8	443.0	501.7	242.2	1,364.0	199.1	530.0	224.9
Apr 04 .....	1,959.9	430.0	511.3	237.7	1,341.1	190.5	519.1	225.2
May 04 .....	1,960.2	434.3	488.4	245.7	1,360.9	186.9	515.2	218.5

## CURRENT ACCOUNT OF THE BALANCE OF PAYMENTS (NET REVENUES)

Table 13

	Goods (fob)	Services	Goods and services	Wages and property income	Current transfers	Total current account
	Kr. billion					
1999 .....	46.7	11.1	57.8	-17.4	-19.3	21.2
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 .....	60.1	18.1	78.2	-27.5	-23.4	27.3
2003 .....	66.6	24.8	91.4	-26.1	-25.3	40.0
May 02 - Apr 03 .....	64.8	20.4	85.2	-29.1	-25.9	30.2
May 03 - Apr 04 .....	61.3	28.5	89.8	-23.3	-26.2	40.4
Nov 03 .....	4.9	2.2	7.1	-4.6	-1.8	0.8
Dec 03 .....	3.8	3.1	6.9	-2.9	-2.5	1.5
Jan 04 .....	3.1	1.1	4.2	-2.4	1.8	3.6
Feb 04 .....	3.7	2.4	6.1	0.3	-4.0	2.4
Mar 04 .....	6.6	2.7	9.3	-3.0	-2.2	4.1
Apr 04 .....	2.9	2.5	5.5	-3.6	-2.6	-0.8

PRINCIPAL ITEMS OF THE BALANCE OF PAYMENTS  
(NET PAYMENTS FROM ABROAD)

Table 14

	Current account	Capital import				Errors and omissions, etc.	Increase in the foreign-exchange reserve
		Direct investments		Portfolio investments	Other capital import		
		Danish abroad	Foreign in Denmark				
Kr. billion							
1999 .....	21.2	-118.6	116.9	-21.9	85.0	-18.4	64.2
2000 .....	18.6	-202.7	266.9	-145.9	64.0	-43.9	-43.0
2001 .....	40.1	-107.9	92.5	-35.0	6.3	31.5	27.5
2002 .....	27.3	-44.6	52.4	1.0	20.4	-11.1	45.4
2003 .....	40.0	-8.4	18.0	-99.8	72.1	8.9	30.8
May 02 - Apr 03 .....	30.2	-37.6	44.2	46.2	-38.9	-24.0	20.1
May 03 - Apr 04 .....	40.4	7.5	3.2	-126.4	43.6	56.3	24.6
Nov 03 .....	0.8	2.2	1.2	-6.7	7.1	-4.9	-0.3
Dec 03 .....	1.5	2.0	1.0	-30.5	21.5	0.2	-4.3
Jan 04 .....	3.6	0.1	6.2	-3.1	-34.5	18.3	-9.4
Feb 04 .....	2.4	-3.1	-0.9	-27.8	9.6	11.6	-8.2
Mar 04 .....	4.1	9.8	-13.2	29.0	-21.8	1.2	9.1
Apr 04 .....	-0.8	-1.1	3.1	-26.5	26.0	6.9	7.6

PORTFOLIO INVESTMENTS OF THE BALANCE OF PAYMENTS  
(NET PAYMENTS FROM ABROAD)

Table 15

	Danish securities			Foreign securities	
	Krone-denominated bonds, etc.	Foreign currency denominated bonds, etc.	Shares	bonds, etc.	Shares
1999 .....	15.3	30.6	0.1	-24.4	-43.5
2000 .....	-21.3	47.7	19.2	-78.7	-112.8
2001 .....	-17.7	97.7	7.0	-86.2	-35.8
2002 .....	8.5	24.0	4.7	-34.8	-1.4
2003 .....	-30.3	64.8	9.1	-121.6	-21.8
Nov 03 .....	-14.1	8.3	-0.6	3.0	-3.3
Dec 03 .....	17.0	-19.0	1.1	-21.1	-8.5
Jan 04 .....	-2.9	18.5	-0.1	-11.3	-7.3
Feb 04 .....	-17.8	7.2	-0.4	-9.8	-7.0
Mar 04 .....	15.0	21.5	-2.3	-2.1	-3.1
Apr 04 .....	-5.6	-0.5	0.2	-19.4	-1.2

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 16

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						
<b>Assets</b>							
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	2,131
2002 .....	571	30	254	359	757	197	2,167
2003 .....	580	30	301	442	755	228	2,336
Q1 03 .....	572	30	226	407	828	202	2,265
Q2 03 .....	584	30	246	421	894	240	2,416
Q3 03 .....	584	30	273	405	844	234	2,371
Q4 03 .....	580	30	301	442	755	228	2,336
Q1 04 .....	575	30	339	460	789	219	2,412
<b>Liabilities</b>							
1999 .....	19	333	160	611	718	58	1,899
2000 .....	26	564	218	646	816	3	2,274
2001 .....	33	601	201	754	766	4	2,359
2002 .....	33	551	146	763	911	4	2,408
2003 .....	33	575	189	771	983	3	2,554
Q1 03 .....	33	551	144	815	983	1	2,528
Q2 03 .....	33	567	164	822	1,078	3	2,666
Q3 03 .....	33	572	180	824	1,019	3	2,632
Q4 03 .....	33	575	189	771	983	3	2,554
Q1 04 .....	33	570	203	835	982	1	2,625
<b>Net assets</b>							
1999 .....	338	-311	227	-459	-115	167	-152
2000 .....	531	-535	236	-418	-150	117	-218
2001 .....	591	-567	203	-436	-168	148	-229
2002 .....	538	-521	107	-404	-154	193	-241
2003 .....	548	-545	112	-329	-228	224	-218
Q1 03 .....	539	-521	82	-408	-155	202	-263
Q2 03 .....	551	-537	82	-400	-184	237	-251
Q3 03 .....	551	-542	93	-419	-175	231	-261
Q4 03 .....	548	-545	112	-329	-228	224	-218
Q1 04 .....	542	-540	136	-375	-193	218	-213

Note: As a key principle, the market value has been used for the compilation.

## GDP BY TYPE OF EXPENDITURE

Table 17

	GDP	Final domestic demand					Exports of goods and services	Imports of goods and services
		Private consumption	General-government consumption	Gross fixed capital formation	Change in inventories	Total		
		Kr. billion						
1999 .....	1,207.7	599.5	312.1	240.9	-2.6	1,149.9	459.6	401.8
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 .....	1,395.9	660.9	369.2	277.2	-3.3	1,304.1	606.2	514.5
Q1 03 .....	337.0	162.3	88.8	66.0	0.4	317.5	149.8	130.3
Q2 03 .....	348.2	163.8	92.7	68.4	0.7	325.5	147.2	124.5
Q3 03 .....	345.3	161.4	92.7	67.4	-2.8	318.7	152.4	125.7
Q4 03 .....	365.3	173.4	95.1	75.5	-1.6	342.4	156.8	133.9
Q1 04 .....	345.7	168.4	92.0	65.6	1.8	327.7	150.5	132.5
Real growth compared with previous year, per cent								
1999 .....	2.6	0.7	2.0	1.5	...	0.1	12.3	5.5
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	1.1	0.5	-0.4	...	0.1	0.3	-0.4
Q1 03 .....	1.7	0.4	1.4	-0.8	...	1.3	4.5	3.7
Q2 03 .....	-1.1	0.3	0.7	-5.1	...	-2.0	-1.6	-3.8
Q3 03 .....	0.1	1.2	-0.2	1.0	...	-0.6	-1.1	-2.7
Q4 03 .....	1.0	2.5	0.0	3.1	...	1.9	-0.4	1.3
Q1 04 .....	1.3	3.2	0.2	0.2	...	2.3	0.4	2.6
Real growth compared with previous quarter (seasonally adjusted), per cent								
Q1 03 .....	0.8	-0.2	-0.3	-1.1	...	0.7	0.5	0.0
Q2 03 .....	-0.5	0.2	0.7	-1.4	...	-1.1	-0.4	-1.8
Q3 03 .....	0.1	0.4	-0.5	4.6	...	0.6	-0.6	0.7
Q4 03 .....	0.6	1.9	0.1	1.0	...	1.5	0.3	2.6
Q1 04 .....	0.7	0.4	0.0	-3.2	...	1.1	0.8	1.0

## DEVELOPMENT IN CONSUMER PRICES AND NET RETAIL PRICES

Table 18

	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										
1999 .....	2.1	2.5	2.1	2.1	-0.3	2.5	0.6	2.7	3.5	2.9
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	1.6	0.4	2.6	1.8	2.7	7.9	2.2
Q1 01 .....	2.3	2.4	2.5	2.2	4.6	2.2	2.8	2.9	3.3	1.2
Q2 01 .....	2.5	2.6	2.7	2.4	2.8	2.8	4.0	3.0	2.4	2.1
Q3 01 .....	2.3	2.4	2.4	-1.3	1.9	2.9	3.7	3.0	3.5	2.2
Q4 01 .....	2.0	2.1	2.0	-6.5	0.6	3.1	3.1	3.0	3.8	2.9
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	10.6	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	-1.0	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

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 19

	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 <sup>1</sup> 2000=100	Retail trade 2000=100				Manu- facturing industry	Building and construc- tion	Service
1999 .....	5.7	94.2	99.1	2,397	144,259	-2	-11	-8	-2
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 .....	6.1	102.7	107.8	3,039	96,502	1	-6	-18	-2
Seasonally adjusted									
Dec 03 .....	6.6	101.2	110.1	203	8,798	2	0	-13	3
Jan 04 .....	6.6	105.1	108.5	240	9,326	3	1	-13	8
Feb 04 .....	6.5	106.0	111.9	237	8,811	3	6	-11	9
Mar 04 .....	6.5	104.4	112.0	232	8,905	5	1	-9	10
Apr 04 .....	6.5	106.8	112.2	258	9,844	6	1	-7	4
May 04 .....	...	...	...	247	8,755	7	3	-3	13

<sup>1</sup> Excluding shipbuilding.

SELECTED QUARTERLY ECONOMIC INDICATORS

Table 20

	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			
1999 .....	2,721	1,901	114.6	114.3	110.1	143.7
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 .....	2,718	1,886	133.3	133.7	124.3	173.4
Seasonally adjusted						
Q1 03 .....	2,725	1,890	131.6	131.9	123.1	170.1
Q2 03 .....	2,715	1,883	132.3	132.8	123.9	173.5
Q3 03 .....	2,716	1,886	134.3	134.4	124.6	175.5
Q4 03 .....	2,716	1,884	135.1	135.8	125.5	174.5
Q1 04 .....	2,722	1,887	136.0	137.3	126.4	...
Change compared with previous year, per cent						
1999 .....	2.1	2.6	4.2	4.1	2.9	6.7
2000 .....	0.6	0.9	3.6	3.5	3.4	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 .....	-0.8	-1.1	3.7	4.2	3.0	3.2
Q1 03 .....	-0.8	-1.0	3.9	4.4	3.2	3.1
Q2 03 .....	-1.0	-1.2	3.8	4.0	3.1	3.1
Q3 03 .....	-0.9	-1.3	3.7	4.3	2.8	3.6
Q4 03 .....	-0.6	-1.0	3.5	4.0	2.7	3.1
Q1 04 .....	-0.1	-0.2	3.4	4.1	2.7	...

## EXCHANGE RATES

Table 21

	EUR	GBP	SEK	NOK	USD	JPY	CHF
	Kroner per 100 units						
	Average						
1999 .....	743.56	1,129.49	84.46	89.47	698.34	6.1755	464.63
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
Dec 03 .....	744.17	1,060.36	82.54	90.51	607.03	5.6270	478.88
Jan 04 .....	744.81	1,076.15	81.52	86.69	590.55	5.5535	475.72
Feb 04 .....	745.11	1,100.85	81.20	84.91	589.25	5.5291	473.56
Mar 04 .....	744.93	1,109.85	80.67	87.23	607.56	5.5992	475.39
Apr 04 .....	744.35	1,118.36	81.21	89.75	621.43	5.7656	478.74
May 04 .....	744.06	1,107.53	81.46	90.62	620.24	5.5293	483.03

## EFFECTIVE KRONE RATE

Table 22

	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
1999 .....	99.6	213.0	203.7	104.3	102.7	103.8
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	229.8	217.1	103.5	103.3	110.9
2003 .....	101.2	234.6	220.9	107.5	108.2	113.2
Dec 03 .....	102.2	234.8	221.8	108.2	109.3	114.2
Jan 04 .....	102.6	234.6	222.2	108.3	...	114.0
Feb 04 .....	102.6	236.4	222.7	108.9	...	114.2
Mar 04 .....	102.1	237.5	223.6	108.4	...	115.0
Apr 04 .....	101.4	237.7	224.4	107.5	...	115.5
May 04 .....	101.8	238.3	...	...	...	115.9
Change compared with previous year, per cent						
1999 .....	-1.7	2.5	1.2	-0.3	-0.4	1.1
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	2.3
2003 .....	3.6	2.1	1.7	3.9	4.7	2.1
Dec 03 .....	3.4	1.4	1.5	3.3	4.6	2.0
Jan 04 .....	3.1	1.1	1.3	2.9	...	1.9
Feb 04 .....	2.5	0.9	1.1	2.4	...	1.6
Mar 04 .....	1.4	0.7	1.2	1.0	...	1.7
Apr 04 .....	0.6	0.8	1.5	0.0	...	2.0
May 04 .....	-0.1	1.3	...	...	...	2.5

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# Danmarks Nationalbank's Statistical Publications

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## **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.