



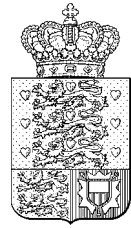
Danmarks
Nationalbank

Monetary Review
4th Quarter

2001

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Managing Editor: Jens Thomsen

Editor: Anders Møller Christensen

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Danmarks Nationalbank, Information Desk, Havnegade 5, DK-1093 Copenhagen K.

Telephone +45 33 63 70 00 (direct) or +45 33 63 63 63.

E-mail: info@nationalbanken.dk

www.nationalbanken.dk

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Recent Monetary Trends

This review covers the period from September to the middle of November 2001.

INTERNATIONAL MARKET DEVELOPMENT

At the beginning of the autumn most major OECD economies were affected by a slowdown.

On 11 September 2001 the USA was hit by a large-scale terrorist attack. New York's financial centre was one of the areas targeted. The US bond market closed and did not open again until 13 September, while the New York Stock Exchange remained closed for almost a week. The bond market reopened with a temporary extension of the settlement period to five days, compared to the usual two days. However, major parts of the financial infrastructure, such as settlement systems, continued to operate throughout this period.

The terrorist attack prompted a decisive monetary-policy response. Immediately after the attack the Federal Reserve contributed considerable amounts of liquidity to the market in order to prevent a run on liquidity and to ensure that realised transactions could be settled. The greater uncertainty in itself increased demand for liquidity. Technically, the documentation of the realised transactions could be feared lost, and moreover many of the parties to the trades or their settlement were reported missing. The settlement process is ruined if just one of the major players is unable to effect its payments. The financial sector's duplication of information at other physical locations than the head office generally seems to have functioned, but just after the attack this could not be relied on with certainty. Extraordinary liquidity therefore had to be provided.

Many European countries took similar measures. The European Central Bank, ECB, and the Bank of England entered into temporary swap agreements with the Federal Reserve with a view to accommodating the demand for dollars. Under the agreements the ECB was entitled to draw \$50 billion and the Bank of England \$30 billion on the Federal Reserve against respectively euro and pound sterling. The agreements expired after 30 days. Danmarks Nationalbank entered into a swap agreement for \$400 million at the current market interest rate, whereby dollars were made

available against kroner. This agreement expired after one day. The fact that the eligible counterparties in monetary-policy operations suffered only temporary liquidity problems eased the central banks' response to the crisis.

When the US stock market re-opened on 17 September, the Federal Reserve cut the benchmark interest rate, the fed funds target rate, by 0.5 per cent to 3.0 pct. The decision was made outside the regular meetings and was motivated by the negative impact of the terrorist attack on an already weakened economy. On 2 October and 6 November the fed funds target rate was lowered further by 0.5 per cent in each case, bringing the fed funds target rate down to 2.0 per cent. In 2001 up to mid-November the fed funds target rate has been lowered on ten occasions by a total of 4.5 per cent. Both monetary and fiscal policy in the USA are now strongly expansionary.

The Federal Reserve's lowering of the interest rate on 17 September was followed on the same day by a large number of central banks, among them the ECB, whose minimum bid rate for the main refinancing operations was cut by 0.5 per cent. The decision was taken outside the regular meetings. The ECB stated as the reason for the reduction that the less favourable short-term prospects for the economy would further dampen the inflationary pressure. On 8 November the minimum bid rate was reduced by a further 0.5 per cent to 3.25 per cent. These interest-rate reductions were preceded by cuts of 0.25 per cent on 10 May and 30 August 2001, respectively. The ECB's Governing Council meets on a fortnightly basis, but from now on decisions on interest-rate adjustments will only be made at the first meeting of the month.

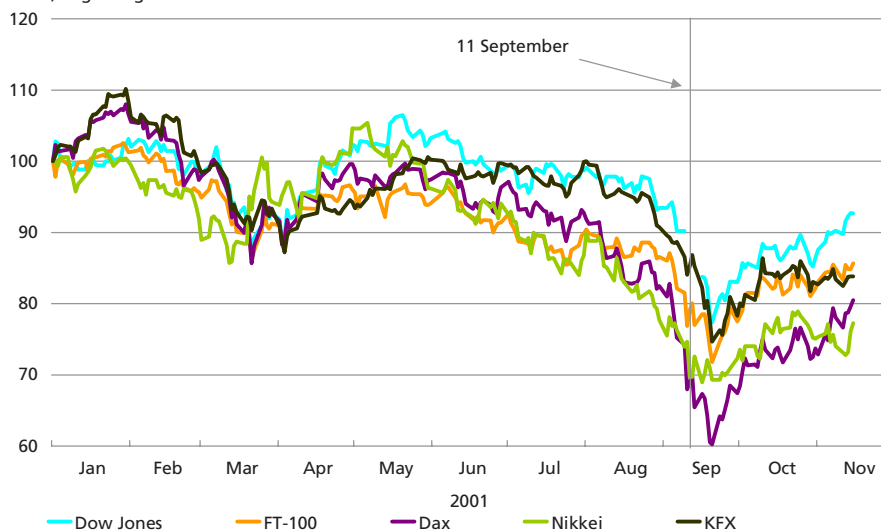
The interest-rate cuts in the wake of the terrorist attack could not stop stock markets all over the world from plummeting. When the New York Stock Exchange re-opened on 17 September, the Dow Jones and Nasdaq indices dropped by around 7 per cent on one single day. This development conceals large sectoral differences. Airline and insurance stocks fell most strongly, whereas stocks in defence-sector companies rose. However, stock prices stabilised relatively quickly and by the end of October the indices in many countries had returned to the level prior to the terrorist attack, cf. Chart 1.

Against the background of the uncertainty and falling stock prices investor demand rose for safer investments such as bonds. The US 10-year government bond yield had begun to fall in July, and this trend gained momentum after 11 September. At the end of October, the US Treasury decided to stop issues of 30-year bonds. This lent greater momentum to the drop in long-term yields. In mid-November the yield was 4.8 per cent, which is approximately 0.5 per cent below the level during the summer. In

STOCK-PRICE TRENDS

Chart 1

Index, beginning of 2001 = 100



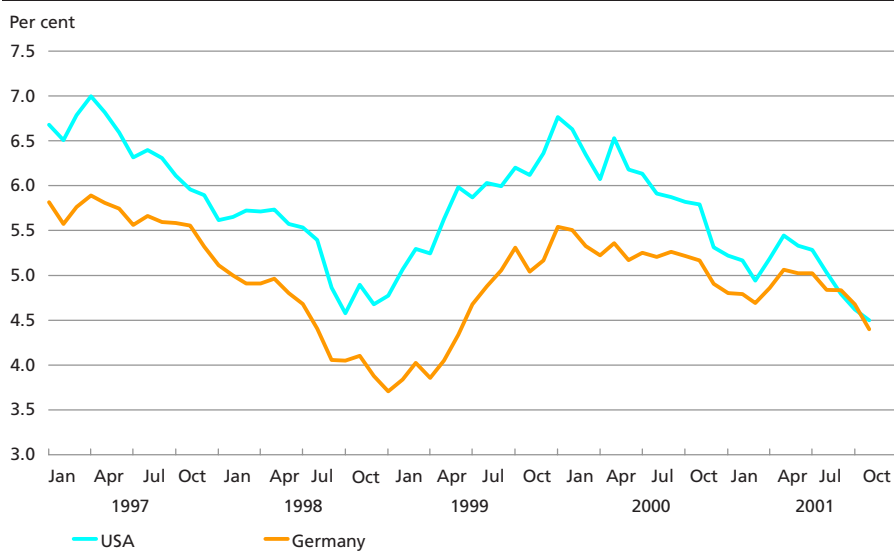
Note: The US stock market was closed between 11 and 14 September 2001.

Germany, long-term yields fell by only half as much, so that the yield differential had been all but eliminated in mid-November, cf. Chart 2.

The US dollar's weakening during the summer and into the autumn is attributable to such factors as the predominantly weak key economic

LONG-TERM YIELDS

Chart 2



Note: 10-year government-bond yields, monthly averages.

indicators for the US economy. The euro strengthened from 0.85 dollars per euro at the beginning of July to around 0.90 dollars per euro in mid-November. The Japanese yen has also strengthened against the dollar, and the Bank of Japan intervened for considerable amounts to keep the yen rate down. The effect of the terrorist attack on the exchange rates of the major currencies was a short-lived weakening of the dollar. The Swiss franc, perceived by the market as a safe-haven currency, strengthened by more than 5 per cent immediately after the terrorist attack. The Swiss National Bank has subsequently cut the fluctuation band for the 3-month money-market interest rate on two occasions by a total of 1.0 per cent, and up to mid-November the Swiss franc weakened again to a degree.

Immediately after the terrorist attack the price of crude oil (Brent) rose from 28 dollars to 31 dollars per barrel. Subsequently fears of a more sustained global economic downturn have pushed down the oil price to below 20 dollars. The oil price has thus fallen beyond OPEC's preferred price band of 22-28 dollars per barrel for a basket of seven oil products. Prices for raw materials have generally declined in the course of the year as a consequence of the slowdown in the economy.

In uncertain times, demand for gold traditionally rises, as in this case, albeit to a moderate degree. The gold price rose by almost 7 per cent immediately after the attack, but has since subsided again somewhat.

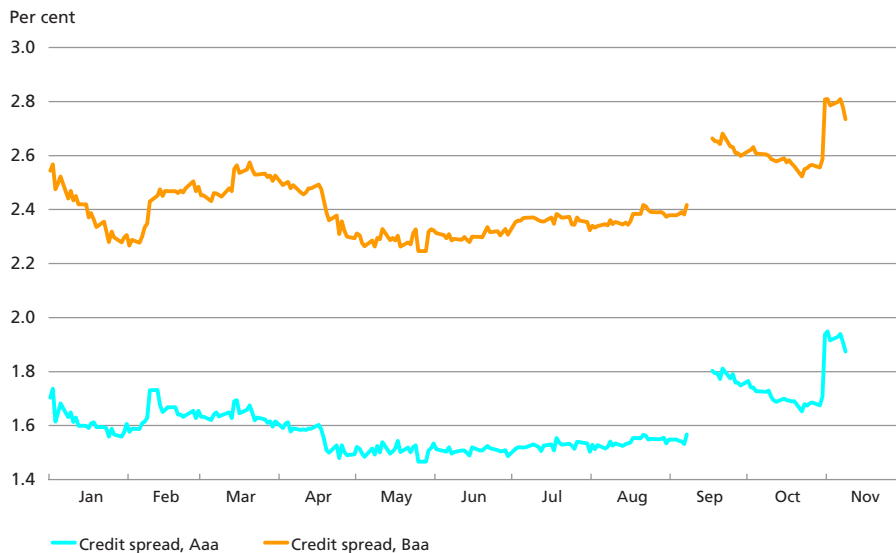
The uncertainty concerning the future prospects for the financial markets can be quantified by using credit spreads as an indicator of the expected credit risk, i.e. the risk of debtor default on payment obligations. Implicit volatility can be taken as an indicator of the expected market risk, i.e. the risk of future fluctuations in prices.

The credit spread indicates the different yields on bonds of varying credit quality, but with the same maturity. The credit spread expresses the credit risk associated with the bond. The wider the spread, the greater the risk of issuer default perceived by the market. Chart 3 shows the development in credit spreads between 30-year US government bonds and corporate bonds with varying credit ratings. The Chart shows that the credit spreads widened immediately after 11 September.

It is possible to calculate an implicit volatility indicator on the basis of option prices. This indicator expresses the uncertainty regarding the price of the underlying asset. The higher the implicit volatility, the greater the market participants' uncertainty concerning the future price development. Chart 4 shows the implicit volatility of the US stock market, indicating that the implicit volatility, and thereby uncertainty, increased significantly after the terrorist attack.

CREDIT SPREADS BETWEEN 30-YEAR GOVERNMENT BONDS AND CORPORATE BONDS IN THE USA

Chart 3

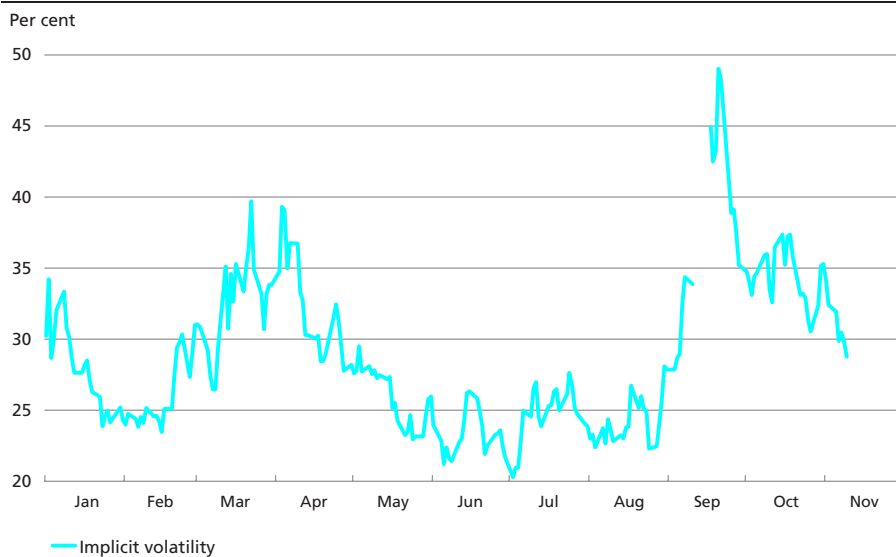


Note: The credit spread between 30-year corporate bonds rated Aaa and Baa, respectively, and a 30-year US government bond. The break in the series occurred on the two days that the bond market was closed.

Source: Ecwin.

IMPLICIT VOLATILITY IN THE US STOCK MARKET

Chart 4



Note: Implicit volatility calculated on the basis of a basket of options on the Standard & Poor's 100 index. The break in the series occurred in the period 11-14 September 2001 when the US stock market was closed.

Source: Ecwin.

INTERNATIONAL CYCLICAL TRENDS

The US economy was already on the verge of recession before the terrorist attack. The downward risks have been reinforced after 11 September. The direct effects of the terrorist attack were moderate in relation to the overall economy, but certain sectors have been severely affected. They include the airline industry, tourism and insurance companies. The indirect effects via consumer and business behaviour are potentially more important. Consumer reaction in particular will be decisive, since the US economy is to a great extent buoyed up by private consumption. Investments have fallen during 2001, preceded by a prolonged investment boom. It is noteworthy that in the period before 11 September, consumer confidence had already fallen, while unemployment had risen. It is difficult to separate the effects of the terrorist attack from the pattern that was already emerging before the attack.

The preliminary 3rd-quarter national accounts for the USA were better than the market had expected, with an only moderate decrease in GDP compared to the preceding quarter. As in the first part of the year business investments made a negative contribution to growth, while private consumption and housing investments continued to show positive development. The figures indicate that the loss of output on 11 September and the following days was lower than expected. On the other hand, the data releases during October and the first part of November paint a gloomy picture in overall terms. For example, unemployment rose from 4.9 per cent in September to 5.4 per cent in October.

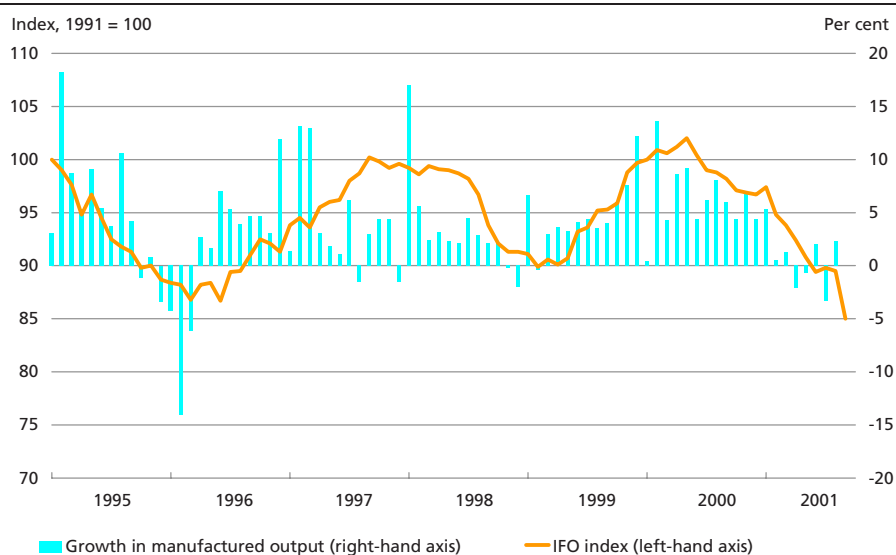
The consensus forecasts predict negative growth again in the 4th quarter, after which a revival is expected. When the turnaround in the economy will come is still highly uncertain, however. To alleviate the negative effects of the terrorist attack on the US economy, the US government has tabled proposals for a considerable easing of fiscal policy. Appropriations for reconstruction, combating terrorism and subsidies to the airline industry were granted soon after the attack. In addition, further tax concessions were adopted to supplement those from before the terrorist attack. All in all, fiscal-policy initiatives for almost \$130 billion, corresponding to 1.3 per cent of GDP, have been tabled after 11 September. In view of the diminished revenue due to the weaker cyclical position and previously adopted tax cuts, a reduction of the government-budget surplus must be anticipated. In 2000, the surplus stood at approximately 2 per cent of GDP.

The spill-over from the USA is likely to postpone the expected upswing in the euro area. When it comes, the upswing will be weaker than so far

expected. The effects of the terrorist attack add to the deterioration of prospects. This is confirmed by the national accounts for the 2nd quarter, with GDP growth at only 0.1 per cent compared to the previous quarter, but 1.7 per cent against the same quarter of 2000. The growth is attributable entirely to private consumption, since both investments and exports made a negative contribution to growth. This pattern is identical to that in the USA. In view of lower growth on foreign markets there are no immediate prospects of an improvement in exports. Weak exports and declining investments have particularly affected the manufacturing industry, where output declined in 2001 up to July, but rose slightly in August.

Private consumption is the most effective means to kick start the economy. However, the European Commission's consumer confidence indicator showed a decrease in 2001 up to October. The most optimistic scenario for the coming quarters is thus weak and hesitant growth. According to the recent consensus forecast from November growth in the euro area for 2001 as a whole will be 1.5 per cent. The cyclical position of Germany especially is weak. The IFO business climate index for Germany in September showed a surprisingly strong decrease, cf. Chart 5, and is now at its lowest level for 8 years. The consensus forecast points to a growth rate of only 0.7 per cent in Germany in 2001, which is a downward adjustment by 2.0 per cent from the estimate early in the year. Growth is expected to pick up a little in 2002, but the downward risks are strong.

BUSINESS CONFIDENCE AND GROWTH IN MANUFACTURED OUTPUT IN GERMANY Chart 5



Source: Ecowin.

Weak growth and tax cuts in several member states have reduced the euro area's government budget balance from a small surplus in 2000 to a deficit expected to be in the range of just over 0.6 per cent of GDP in 2001. Some member states are considering expansionary measures to stimulate the economy, but have limited scope for manoeuvre due to inadequate consolidation of government finances by a number of member states in recent years.

The HICP index for the euro area showed a price-increase rate of 2.4 per cent in October. The rate of increase in HICP has declined since the spring, which can be attributed to lower oil prices, the strengthening of the euro, the general economic slowdown and wage moderation. The ECB has defined price stability as a year-on-year rate of increase in HICP of below 2 per cent in the medium term. HICP growth has exceeded this definition since mid-2000, but in view of the current economic prospects euro-area inflation can realistically be expected to approach this limit in the near future. The introduction of euro banknotes and coins as of 1 January 2002 is not expected to have any significant impact on the price level.

The monetary aggregate, M3, rose by 7.6 per cent in September, exceeding the target of 4.5 per cent. Growth in M3 rose during the summer and was particularly high in September. The ECB attributes this to investor preference for liquid assets at a time when markets are turbulent and the yield curve is relatively flat.

Front-loading to the banks of the new euro banknotes and coins commenced on 1 September 2001, although the banknotes and coins will not be part of M3 until January 2002. To facilitate liquidity management these amounts are debited together with the first, fourth and fifth allotments of liquidity by the ECB in January 2002. The effect of shifts in cash holdings on M3 are limited, first of all because banknotes and coins account for only approximately 6 per cent of M3, and secondly because a proportion of the reduction of cash holdings is offset by higher bank deposits that are also included in M3. Thirdly, M3 is calculated on the basis of end-of-period data. The changeover can be expected to be almost completed by the end of January 2002.

In Japan, economic activity is declining. Growth was negative in the first half of 2001, with a decrease in domestic demand, including investments. Foreign trade also made a negative contribution to growth. The consensus forecast points to continued negative growth in the immediate future. Unemployment has been rising for some time, and now stands at more than 5 per cent, which is the highest level for decades. At the same time the level of prices has been falling for the last few years,

i.e. deflation. The economic downturn follows a whole decade of low growth. Over the last 10 years the average growth rate has been only 1 per cent per annum, against 4 per cent per annum for the preceding 10-year period.

The Japanese government has repeatedly introduced expansionary fiscal-policy measures in order to stimulate the economy, but they have resulted in an ever-increasing government debt, which now amounts to 130 per cent of GDP. Since Japan has a current-account surplus the whole of the government deficit is financed domestically. At the same time, private consumption is weak.

Japan's substantial government debt is a source of concern in view of the country's demographical development. In the decades to come, Japan will see a strong increase in the proportion of older people in its population. Japan's government-financed welfare system is, however, less extensive than those of European states, so that government finances will be affected less than in many other countries.

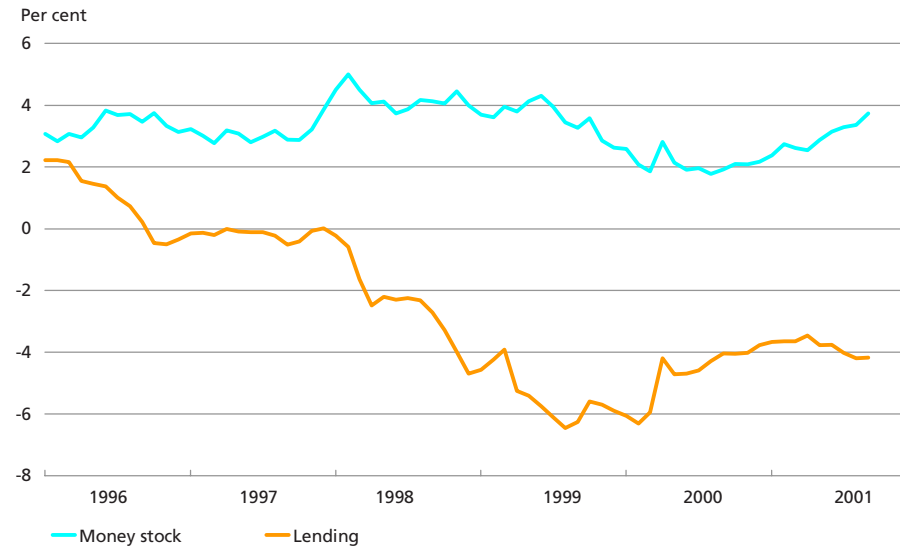
The expansionary monetary policy for some time pursued by the Bank of Japan has brought the short-term interest rate down to a level close to zero. The long-term interest rate is approximately 1.3 per cent, but with core deflation (i.e. prices excluding prices for fresh food) at almost 1 per cent per annum, the normal measure of the real interest rate is still rather high, in view of the cyclical position. The Bank of Japan sold yen to counter the currency's strengthening after 11 September. Appreciation of the yen would further weaken an already weak economy. The interventions considerably expanded liquidity in the banking sector.

The situation in the financial sector is ascribed a significant role in the persistent economic downturn. Many of the loans granted during the boom in the late 1980s amidst surging stock and property prices are today in default. According to a recent IMF assessment up to 20 per cent of Japanese banks' total lending, corresponding to 20 per cent of GDP, may be more or less unsound. At the same time, the banks' own funds are undermined by the continued decline in stock prices. Today, the banks book stocks at market prices. In mid-October the Nikkei index fell below the psychological limit of 10,000, to the lowest level for 17 years. It has since risen a little. A large part of the banking sector faces solvency problems. This has affected the banks' ability and willingness to extend loans ("credit crunch"). During the last four years total lending has thus declined, cf. Chart 6.

So far, the Japanese government has not succeeded in its attempts to solve the problem of bad loans. There is a pronounced aversion to using government funds for this purpose. The low level of interest rates

ANNUAL GROWTH IN BANK LENDING AND MONEY STOCK IN JAPAN

Chart 6



reduces the banks' incentive to clean out bad loans, since unprofitable exposures can be financed at almost no cost whatsoever.

The households are increasingly opting for savings rather than consumption. This reduces credit demand. The public welfare system is weak, so higher unemployment tends to increase uncertainty, especially in Japan, and people save up for their old age.

Japan faces other structural problems besides bad loans. Many domestically-oriented sectors, such as agriculture, the retail sector and construction, have traditionally been shielded from competition. This has undermined the efficiency of the economy. Deregulation of protected sectors will exert immediate downward pressure on prices.

In the UK the manufacturing sector is affected by the slowdown in the world market and the strong pound sterling, while the domestically-oriented service sector has performed well so far. The export sector's problems are reflected in the business-confidence indicator, PMI (Purchasing Managers' Index), which in October reached its lowest level for several years. On the other hand, domestic demand is strong, and unemployment continues to fall. However, consumer confidence has contracted slightly after the terrorist attack in the USA.

Inflation measured by the RPIX index (the consumer-price index excluding interest payments on housing loans) was 2.3 per cent in October. This is below the Bank of England's reference value of 2.5 per cent. The

increase in the RPIX index has not exceeded the reference value since March 1999, apart from the rate of increase of 2.6 per cent in August. The forward-looking price indicators point to receding inflationary pressure in the immediate future. Against this background, and in view of the increased downward risks for the economy, the Bank of England reduced the base rate by 0.25 per cent on 18 September, by a further 0.25 per cent on 4 October, and by 0.5 per cent on 8 November. Up to mid-November the base rate has thus been lowered on seven occasions in 2001, by a total of 2.0 per cent to 4.0 per cent. The long-term interest rate has closely followed the path of the long-term interest rate in Germany. The two interest rates are at the same level, but the UK rate is usually a little higher than the German rate.

The Swedish krona has been strongly volatile in recent months. From the middle of August to the end of September the krona weakened by 8 per cent against the euro and the Danish krone, but then strengthened by 5 per cent up to the middle of October, after which time the exchange rate has been around 0.80 Danish krone per Swedish krona. The krona had also weakened during the first part of the year, although the weakening was less pronounced.

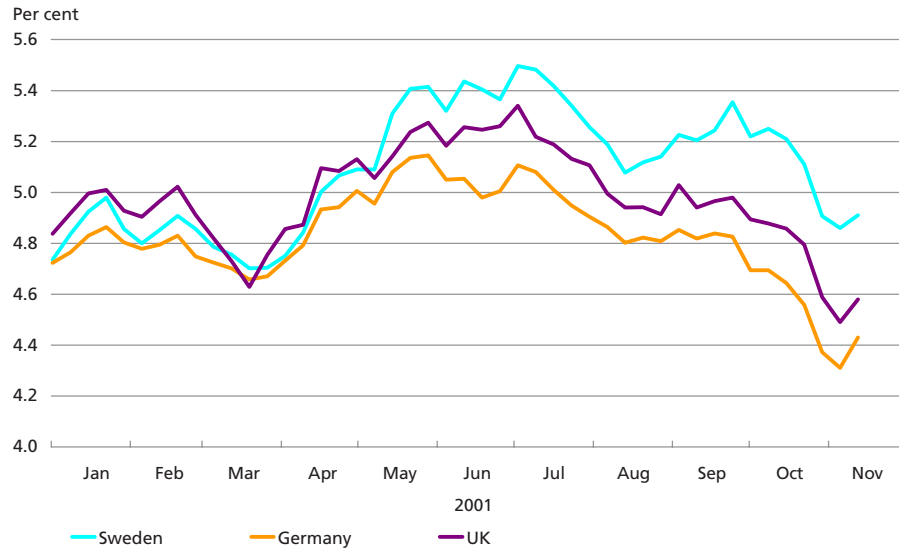
Sveriges Riksbank has an inflation target for its monetary policy. The target is inflation of 2 per cent \pm 1 per cent in the medium term. The UNDI index, which is the consumer-price index excluding interest payments on housing loans, rose by 3.4 per cent in September and by 3.1 per cent in October. Inflation is expected to decline further in the spring of 2002 as the strong price increases for foodstuffs, electricity and telecommunication services subside. The latest inflation report shows that the weakening of the Swedish krona has not contributed to higher inflation in the wake of lower oil prices and lower inflation abroad whereby the increase in import prices in local currency diminishes. In its inflation report, Sveriges Riksbank expects a rate of growth of 1.3 per cent in the Swedish economy in 2001. This represents a downward adjustment of almost 1 per cent from the May forecast. Growth is expected to be 2.2 per cent in 2002 and 2.8 per cent in 2003.

With effect from 19 September Sveriges Riksbank lowered its repo rate by 0.5 per cent to 3.75 per cent. In contrast to the international development, the Swedish long-term interest rate rose until mid-October, but thereafter fell by approximately 0.4 per cent until mid-November, cf. Chart 7. The yield differential to Germany widened to approximately 50 basis points in mid-November.

During the past year, the outflow of capital from Sweden has exceeded the current-account surplus. This is attributable to such factors as large-scale purchases of foreign stocks by Swedish AP (national pen-

10-YEAR GOVERNMENT-BOND YIELDS

Chart 7



sion) funds, which contributed to downward pressure on the Swedish krona.

The Swedish government has decided to reduce the foreign-exchange-denominated part of the government debt over time in order to minimise the exchange-rate risk. Amortisations during the year have contributed to the downward pressure on the Swedish krona. These amortisations were cancelled during the autumn in view of the weak Swedish krona. However, these are by no means the only factors contributing to the present weakness of the Swedish krona.

The Norwegian krone has also shown some volatility against the euro in recent months, but with no actual trend. Annual consumer-price inflation was 2.2 per cent in October. This is within the target band of 1.5 to 3.5 per cent on which monetary policy is based. At its meeting on 31 October Norges Bank decided to maintain the current-account interest rate at an unchanged 7.0 per cent.

DOMESTIC ACTIVITY AND THE BALANCE OF PAYMENTS

The Danish economy shows a sound current-account surplus, a government-finance surplus, and low unemployment and inflation, making Denmark well-prepared for a temporary set-back in the global economy. In view of the tight labour market and high capacity utilisation Denmark's situation is rather different, and in some ways more favourable,

than that of most euro-area member states. It remains to be seen how strongly Denmark will be affected by the international slowdown.

Growth has diminished in 2001, following a growth rate of more than 3 per cent in 2000. Year-on-year growth was 1.6 per cent in the 1st half of 2001. Private consumption fell slightly in the 2nd quarter, even though car sales stabilised after a prolonged period of decline. Private consumption has been flat since the beginning of 2000.

The development in the next few quarters is uncertain in many respects and dependent on factors such as consumer reaction to the greater uncertainty after the events in the USA. At the time of going to press, no national accounts data was available for the 3rd quarter. Retail sales, car sales, consumer expectations and a decrease in imports of consumer goods in August and September all indicate very moderate development in consumption in the 3rd quarter too. It is likely that the more uncertain international situation will induce many consumers and investors to postpone major projects and new acquisitions until the global situation is more settled. It must also be borne in mind, however, that the preceding years' increase in the private sector's savings means that there is no structural need for substantial increases in private savings. A good rate of growth in real disposable income is expected in 2002, among other things due to the tax cuts inherent in the Whitsun package of economic measures, and relatively high wage increases together with relatively moderate inflation. At the same time, the conversion of loans to loans at lower interest rates tends to increase households' disposable income. However, some households prefer to shorten the time to maturity of the loans rather than pay lower instalments here and now. It remains to be seen whether the increased uncertainty will offset the positive stimulation of private consumption.

Total employment calculated on the basis of payments to ATP (the Danish Labour Market Supplementary Pension Fund) has risen since 1994, and the increase continued in 2000, despite the slowdown in growth. Employment levels in both the private and public sectors have been increasing. Unemployment continued to decline, reaching 5.0 per cent in September. The unemployment rate calculated according to international definitions was 4.3 per cent. The labour market is thus tight, with labour shortages in certain sectors, and capacity utilisation is high. There are also signs of weakness, however, such as the increase in the number of compulsory liquidations during the past year, albeit from a low level. The IT sector accounts for a particularly high number of liquidations, rising to 145 in the period from January to October, against 42 in the same period of 2000. This explains just under half of the increase in the total number of liquidations during the period, according to the statistics of Købmands-

standen (the business information bureau). The number of enforced sales is still low, which contrasts with the trend for liquidations.

Seasonally-adjusted house prices were unchanged from the 2nd to the 3rd quarter of 2001. Without seasonal adjustments, house prices fell by 0.5 per cent, cf. the statistics of the Association of Danish Mortgage Banks. This is the first decrease in house prices since 1993, apart from a minor adjustment in the 3rd quarter of 1996. In view of the high level of prices for owner-occupied homes, this dampening is not surprising. However, the low level of interest rates and low unemployment will undoubtedly protect housing prices from a more pronounced decline. The strong geographical variations are also part of this pattern. The significant price increases in the greater Copenhagen area have driven growth in the general index in the preceding quarters, while for some time prices have stagnated or even declined in many other areas of Denmark.

The strong increase in property prices since 1993 has led to substantial appreciation of the property taxation base and thereby in revenue to the public sector, since generally there has been no compensatory reduction of the relevant tax rates.

The Ministry of Economic Affairs expects government finances to deteriorate by kr. 12 billion in 2002 to an expected surplus of kr. 23 billion, or 1.6 per cent of GDP. The deterioration is attributable mainly to the decrease in stock prices, which reduces the proceeds from pension taxes. The public sector's revenue is thus sensitive to fluctuations in stock prices.

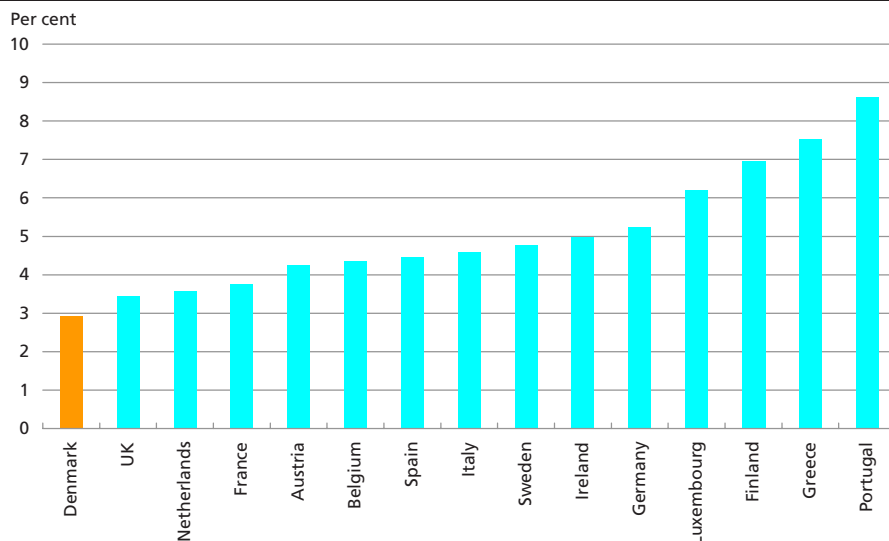
In the 12-month period up to and including September the current-account surplus was more than kr. 40 billion, against just under kr. 20 billion in the preceding 12-month period. Denmark is thus rapidly reducing its external debt, even though in the short term the picture may be blurred by movements in stock and bond prices. In contrast to the beginning of the 1990s the current-account surplus was achieved in a situation where domestic capacity utilisation is high.

A period of high prices has benefited both agricultural and energy exports, as well as marine freight. This development is not likely to be sustained in the immediate future due to the effects of lower oil prices, pressure on freight rates, declining pork prices and the international economic slowdown. Manufactured exports were stable in the first 9 months of 2001. The trend of recent years confirms that lower domestic consumption and demand are offset to a degree by higher exports, which in turn also depend on the growth on export markets and Denmark's competitive position.

It remains to be seen how strongly exports will be affected by the international slowdown. One analysis indicates less volatility in Danish exports than in those of the other EU member states, cf. Chart 8. Lower

VOLATILITY OF EXPORTS TO EU MEMBER STATES

Chart 8



Note: Calculated for the period 1971-2000. Volatility is calculated as the standard deviation of the annual percentage change in exports of goods and services in constant prices.

Source: OECD and own calculations.

export volatility may be attributable to less volatile export markets, although this does not seem to apply in this case. Denmark's exports have a higher proportion of services, including marine freight, and agricultural products, than those of most other European countries, while manufacturing industry accounts for a smaller share. The proportion of pharmaceuticals in Danish exports is also relatively high, and demand for pharmaceuticals is not the most cyclical component. A number of factors thus point to the composition of Denmark's exports as the explanation for the lower volatility. Another explanatory factor may be the relatively large number in Denmark of flexible small and medium-sized enterprises which can easily adapt to a new situation.

Growth in total lending to residents by banks and mortgage-credit institutes has declined over the past year, but did rise in September. Growth in business lending in particular has subsided, while growth in non-business lending has been stable at around 7 per cent year-on-year. Growth in lending by mortgage-credit institutes includes a significant increase in loans at variable interest rates.

DEVELOPMENT IN INTEREST AND EXCHANGE RATES IN DENMARK

Since May the Danish krone has strengthened from a position just below the ERM II central rate of kr. 7.46038 per euro to a position just above.

The exchange rate was kr. 7.4450 per euro in mid-November. From May to August, Danmarks Nationalbank's foreign-exchange purchases totalled kr. 5.1 billion. The krone's strengthening gained momentum in mid-September and Danmarks Nationalbank purchased foreign exchange. Intervention in September and the first part of October totalled kr. 23 billion, and was concentrated on very few days. The foreign-exchange reserve hereby increased to kr. 146.1 billion by the end of October, which is the highest level since the beginning of 2000.

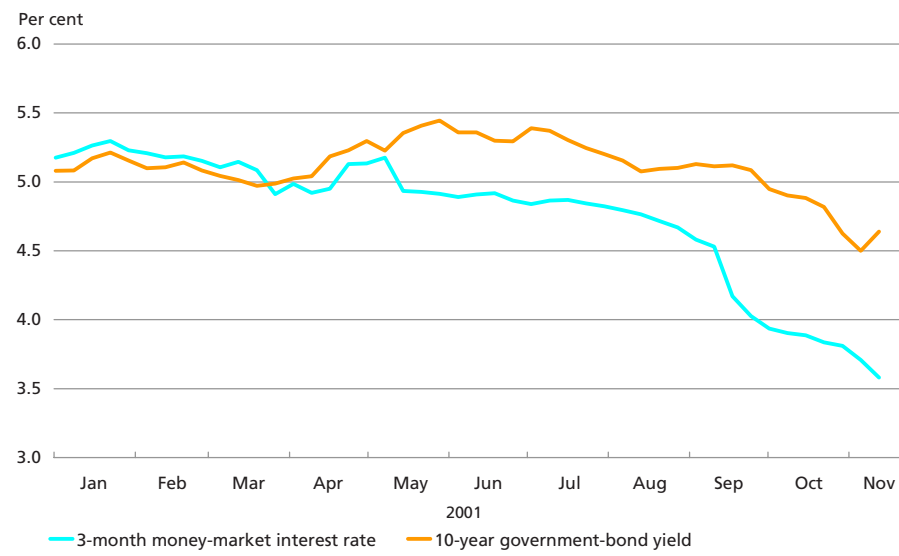
After the ECB's reduction of interest rates in the wake of the terrorist attack on the USA in September Danmarks Nationalbank followed suit and lowered the lending rate and the rate of interest for certificates of deposit by 0.5 per cent with effect from 18 September. The discount rate and the current-account rate were likewise lowered by 0.5 per cent. This lowering ensured that the interest-rate differential to the euro area remained unchanged. On 5 October the Nationalbank lowered the lending rate by 0.05 per cent to 4.10 per cent, whereby the differential to the benchmark euro-area interest rate narrowed to 35 basis points. An inflow of capital and a strong krone were the background to the interest-rate reduction. On 8 November, the Nationalbank followed the ECB and lowered the lending rate and the rate of interest for certificates of deposit by 0.5 per cent to 3.60 per cent, while the discount rate and the current-account rate were also cut by 0.5 per cent to 3.25 per cent.

The 3-month money-market interest rate matched the reduction of the official interest rates, and was around 3.6 per cent in mid-November, which is 1.5 per cent below the level at the turn of the year. During the period the interest-rate differential to the euro area narrowed to approximately 30 basis points. The 10-year Danish interest rate has matched the corresponding German rate, although the differential narrowed slightly to approximately 20 basis points in mid-November. The money-market interest rate showed a significantly greater decline than for the long-term yield, so that the yield curve steepened, cf. Chart 9. On 23 November the minimum coupon rate was lowered extraordinarily from 4 to 3 per cent.

The narrowing of the long-term yield differential was driven by domestic investors. Pension funds in particular have switched to more long-term assets against the background of the general drop in interest rates, which made it more difficult for the pension funds to fulfil their interest guarantees, cf. below. The drop in interest rates also reduces the option-adjusted duration of callable mortgage-credit bonds. Investors therefore generally need to switch to bonds with long duration in order to avoid a decrease in the total maturity of their portfolios. The effect on yields was particularly pronounced for the central government's

DANISH LONG-TERM AND SHORT-TERM INTEREST RATES

Chart 9



7 per cent bullet loan maturing in 2024, which for a period showed a negative yield differential to the equivalent German bond. No new issues in this series have been made in recent years.

The difficulties faced by a number of Danish pension funds were reinforced by the drop in stock prices immediately after the terrorist attack in the USA. Some pension funds' reserves were insufficient to cover the share risk, making it difficult for them to meet the statutory requirement as stock prices plummeted.

Against this background the Danish government initiated certain amendments to tax regulations, the solvency order and the accounts regulations. These amendments included the implementation of measures already adopted to enter into force at the beginning of 2002. According to the government, this will have no impact on government finances.

Subsequently, stock prices have rallied, but long-term yields have declined. The fundamental problems in this sector have thus not been overcome, since a number of companies are still vulnerable to falling stock prices or long-term yields.

The sensitivity to further interest-rate decreases can be attributed to the fact that pension funds and life assurance companies have typically guaranteed their customers a minimum nominal interest rate for many years into the future. At the time that the interest guarantee was given, the interest rate offered was perceived to be low, in view of the high

level of interest rates at that time. However, the low interest-rate level in recent years has made this situation problematic. This demonstrates the problems related to the principle of issuing longstanding nominal interest-rate guarantees which cannot be hedged by purchasing nominal bonds with the same maturity and an equivalent return after taxation of pension yields. However, some pension funds and life assurance companies have used the option market to hedge against interest rates falling below an agreed threshold for an agreed period. The low level of interest rates is a consequence of low inflation. This renders the structure of the pension system unsuitable, since low inflation is the pension savers' best protection against real erosion of the purchasing power of pensions.

The drop in long-term yields has boosted conversion activity. Loans for almost kr. 80 billion have been called for extraordinary redemption on the January settlement date. This is the highest amount since April 1999. The decline in short-term interest rates against long-term yields has increased mortgage-credit borrowers' preference for variable-rate loans rather than the customary long-term fixed-interest loans. In the 3rd quarter of 2001 variable-rate loans accounted for half of gross lending. Home owners and owners of holiday cottages accounted for the strongest increase, but in relative terms farmers still make greatest use of this type of loan. At the end of October, variable-rate loans accounted for approximately 18 per cent of outstanding mortgage-credit loans. Approximately 20 per cent of these loans were denominated in euro, and the proportion is rising. So far, predominantly farmers with euro-related income have raised euro-denominated fixed-rate loans, but ordinary home owners have recently also begun to raise these loans.

In the current interest-rate conditions, the yield differential between krone-denominated and euro-denominated loans is 30-40 basis points. However, the saving is reduced by the exchange-rate deduction when the loan is raised, and by the exchange-rate premium on repayment or redemption of the loan. The net saving is insignificant, and is in the short term sensitive to the exchange-rate loss arising should the krone approach the central rate.

PRICES AND WAGES

The rate of increase in consumer prices, measured by the Harmonised Index of Consumer Prices (HICP), peaked in May 2001 at 2.8 per cent against the previous year. Since then consumer prices have fallen, mainly as a consequence of more moderate development in energy, import and

DEVELOPMENT IN CONSUMER PRICES AND NET RETAIL PRICES

Table 1

	Consumer-price index		Index of net retail prices	Energy	Imports	Domestic prices				
						Total	Food-stuffs	Rent	Public services	Other factors
	HICP	CPI	Weights							
			1.000	0.088	0.149	0.763	0.140	0.235	0.037	0.351
Year-on-year growth, per cent										
1995	2.0	2.1	1.9	-2.5	2.5	2.2	3.1	1.8	2.5	2.0
1996	2.1	2.1	2.0	6.6	0.1	1.9	1.7	1.6	1.1	2.4
1997	1.9	2.2	2.2	2.7	0.9	2.4	3.6	2.8	2.2	1.8
1998	1.3	1.8	1.5	-2.8	0.6	1.9	1.8	2.1	-0.9	2.3
1999	2.1	2.5	2.1	2.1	-0.3	2.5	0.6	2.7	3.5	3.0
2000	2.7	2.9	3.2	19.5	4.3	1.7	2.5	3.1	3.8	0.2
1999 1st qtr. ...	1.4	2.0	1.5	-7.0	-0.7	2.4	0.3	2.8	2.1	3.1
1999 2nd qtr. .	1.8	2.3	1.8	-1.4	-0.8	2.4	-0.2	2.5	4.5	3.1
1999 3rd qtr. ..	2.3	2.6	2.3	5.7	-0.2	2.5	0.7	2.8	3.8	2.8
1999 4th qtr. ..	2.8	3.0	2.8	11.5	0.4	2.6	1.7	2.7	3.6	2.7
2000 1st qtr. ...	2.8	3.1	3.4	24.1	2.1	2.1	2.6	3.1	3.6	1.0
2000 2nd qtr. .	2.9	3.2	3.5	21.6	4.1	2.0	3.4	3.5	3.6	0.3
2000 3rd qtr. ...	2.6	2.7	3.0	18.3	5.1	1.4	2.3	3.0	4.3	-0.4
2000 4th qtr. ..	2.6	2.6	2.8	14.9	5.9	1.4	1.8	2.8	3.7	-0.2
2001 1st qtr. ...	2.3	2.4	2.5	2.2	4.6	2.2	3.0	2.9	3.3	1.1
2001 2nd qtr. .	2.5	2.6	2.7	2.4	2.8	2.8	4.0	3.0	2.4	2.1
2001 3rd qtr. ..	2.3	2.4	2.4	-1.3	1.9	2.9	3.7	3.0	3.5	2.2
2001 October ..	2.0	2.2	2.2	-6.2	...	...	3.5	3.0	4.0	...

Note: Weighting basis as of December 2000.

The index of net retail prices is the consumer-price index adjusted for indirect taxes, duties and subsidies for general price reductions.

"Other factors" is a measure of domestic market-determined inflation. "Other factors" normally increases faster than the index of net retail prices due to an overweight of services, for which the price development is typically stronger than for other commodities. At the same time the rise in demand for services is typically stronger in the longer term than demand for other products.

HICP is the Harmonised Index of Consumer Prices.

food prices. In October, HICP rose by 2.0 per cent, while the general index of consumer prices (CPI) increased by 2.2 per cent. The difference is explained mainly by the different weights given to the housing item in the two price indices. In recent years Danish price increases have been slightly below price increases in the euro area. In the 3rd quarter underlying market-determined domestic inflation, which reflects changes in domestic wages and profits, was 2.2 per cent, i.e. in line with the rate of increase in the general index, cf. "Other factors" in Table 1. The rate of price increase in Denmark thus does not yet reflect the lagged effect of the relatively high wage-increase rate. This effect is by no means certain, as the income distribution may shift from residual to wage income. During the past year e.g. high productivity increases have increased residual income, to the detriment of the wage element.

The tight labour market is reflected in the wage-increase rate of 4.4 per cent in the 3rd quarter, compared to 4.9 per cent in the preceding quarter, according to the statistics of the Danish Employers' Confederation. The high rate of increase in the 2nd quarter can be attributed to such factors as the transition from four family days to four general days of holiday entitlement. Holiday entitlement days are more cost-intensive than family days, since more people are entitled to the former. A fifth day of holiday entitlement will not affect the wage-increase rate until 2003. In a typical collective wage agreement the employers' pension contribution in the 3rd quarter will increase by only 0.2 per cent as compensation to employers for the days of holiday entitlement, in contrast to 0.8 per cent in the 3rd quarter of 2000. This factor contributes to the decrease in the wage-increase rate in the 3rd quarter, but the level is still high compared to Denmark's competitors.

DANMARKS NATIONALBANK'S NEW PAYMENT SYSTEM

KRONOS is Danmarks Nationalbank's new RTGS¹ payment system for kroner and euro and was launched on 19 November 2001. KRONOS replaces the obsolete DN Inquiry and Transfer System² from 1981 and DEBES from 1999 as the payment system for holders of current accounts at Danmarks Nationalbank. In KRONOS current-account holders can make transactions via their accounts at Danmarks Nationalbank and also e.g. send payments to other current-account holders. KRONOS is also Denmark's portal for euro payments to Danish and foreign participants in TARGET, which is the European payment system.

For current-account holders KRONOS represents a state-of-the-art payment system with a modern user interface and a number of new facilities. KRONOS e.g. offers several functions to facilitate the account holders' liquidity management. KRONOS is designed to fulfil the needs of large and small account holders alike. Account holders can thus choose to submit payments manually via the KRONOS terminal, which small account holders typically prefer, or to transmit payments via SWIFT, the international payment system, which is typically preferred by large account holders. KRONOS will then automatically "translate" between the two types of payments. KRONOS also represents an improved opportunity for Danmarks Nationalbank to solve any problems in the

¹ In an RTGS payment system payment transactions are settled individually and immediately. Central banks prefer RTGS systems for large-value payments due to RTGS systems' high speed and high level of security.

² In addition to the payment elements replaced by KRONOS the DN Inquiry and Transfer System offers a number of other functions such as collateralised loans.

system, and introduces a mechanism to facilitate settlement of payments in situations where liquidity is tight (gridlock resolution).¹

The launch of the new payment system implies a minor adjustment of the Nationalbank's practice so far for calculating the collateral value of securities pledged as collateral for euro-denominated loans to Danmarks Nationalbank. The article "Financial Institutions' Accounts at and Pledging of Collateral to Danmarks Nationalbank" on p. 23 presents an overview of the accounts held by financial institutions at Danmarks Nationalbank and how the institutions pledge collateral for loans at Danmarks Nationalbank.

¹ See Morten Linnemann Bech and Kimmo Soramäki, Gridlock Resolution in Payment Systems, p. 67 in this *Monetary Review*.

Financial Institutions' Accounts at and Pledging of Collateral to Danmarks Nationalbank

INTRODUCTION

Danmarks Nationalbank plays a pivotal role in Denmark's financial system since fundamentally, claims on Danmarks Nationalbank are free of risk and liquid. The general acceptance of this is prerequisite to Danmarks Nationalbank's ability to conduct monetary policy and thereby determine the level of the short-term interest rate. Furthermore, it entails that claims on Danmarks Nationalbank are used to settle transactions between the financial agents. In practice, transactions are settled via accounts at Danmarks Nationalbank.

The financial institutions that are entitled to hold accounts at Danmarks Nationalbank are Danish credit institutions and investment companies, foreign credit institutions and investment companies that conduct cross-border operations in Denmark, and branches in Denmark of foreign credit institutions and investment companies. In addition, Danmarks Nationalbank is banker to the central government. Finally, a number of other institutions, including foreign central banks, may hold accounts at Danmarks Nationalbank. In this article, the term "account holders" refers to financial institutions as defined above.

Danmarks Nationalbank uses a number of accounts in its role as settlement bank for payment systems. The current account is the account holders' principal account at Danmarks Nationalbank. It is used for settlement of payments among the account holders and between the account holders and Danmarks Nationalbank. Payments to and from the central government are also transacted via the current accounts. The account holders may also hold a number of settlement accounts at Danmarks Nationalbank.

Danmarks Nationalbank furthermore has a range of transactions with a specific group of account holders. These transactions are related to Danmarks Nationalbank's role as the monetary-policy authority and supplier of banknotes and coins. The account holders with access to the

monetary-policy instruments are Danish banks and mortgage-credit institutes, and branches in Denmark of foreign banks and mortgage-credit institutes. Only the banks play a role in the supply of banknotes and coins. Danmarks Nationalbank's monetary-policy operations and transactions related to the supply of cash are settled via the current account and registered to special accounts.

Danmarks Nationalbank requires securities as collateral for all types of credit. This applies to intraday credit in the settlement of payments, to monetary-policy loans, and to loans to cash depots. There are also a number of accounts related to the pledging of collateral at Danmarks Nationalbank.

Since the introduction of the euro on 1 January 1999, Denmark has participated in the European payment system, TARGET. This has required an infrastructure for payments denominated in euro. This infrastructure, including the structure of accounts at Danmarks Nationalbank, is generally similar to the infrastructure for krone-denominated payments. A number of adjustments were required, however, to take account of the special terms for credit granting in euro applying to EU member states that have not introduced the euro.

It is also possible to hold settlement accounts denominated in Swedish kronor at Danmarks Nationalbank for settlement of payments concerning Swedish securities issued on the Copenhagen Stock Exchange and registered at the Danish Securities Centre (VP).

The terms and conditions for accounts held at Danmarks Nationalbank govern the use of the counterparties' accounts in Danish kroner, euro and Swedish kronor. This article describes the structure of accounts at Danmarks Nationalbank and the practical design of the systems to handle collateral that have been developed as part of the credit facilities extended by Danmarks Nationalbank.

ACCOUNT HOLDERS' TRANSACTIONS IN DANISH KRONER AT DANMARKS NATIONALBANK

In practice, the general acceptance that deposits/overdrafts on current accounts at Danmarks Nationalbank can be used to settle the financial systems' transactions in Danish kroner implies that Danmarks Nationalbank is the sole provider of liquidity to the overall system. The account holders can trade liquidity among themselves and thereby reallocate liquidity, but they cannot themselves generate liquidity. Therefore it is an important task for Danmarks Nationalbank to ensure sufficient liquidity in the system at all times. The task has two closely related elements:

- Payment system: to ensure that sufficient liquidity is available to the system in the course of the day.
- Monetary policy: to ensure that there is sufficient liquidity in the overall system at 3.30 p.m., when the monetary-policy day closes and the account holders' balances are settled.

Payment systems

Payments settled via accounts at Danmarks Nationalbank are the result of transactions between the account holders' customers, or of the account holders' own transactions. Some payments are settled directly via the account holders' current accounts, while other types of payments are first collected and cleared in a separate system outside the Nationalbank and then settled via accounts at the Nationalbank.

Danmarks Nationalbank participates in the settlement of payments via three different Danish systems: KRONOS (has replaced the payment part of the DN Inquiry and Transfer System (DN-F) and DEBES), retail clearing and VP clearing. Moreover, trading of options and futures (derivatives) is settled via accounts at Danmarks Nationalbank. Derivative trades are cleared in the Swedish derivative clearing system.

KRONOS is Danmarks Nationalbank's payment system. It offers account holders access to transfer amounts between their own accounts and the accounts of other account holders in Danish kroner and euro. KRONOS is an RTGS (*Real-time Gross Settlement*) system whereby payments are settled individually immediately after the payment request. RTGS systems are used for a relatively small number of large-value payments.

The retail clearing and VP clearing are clearing systems whereby payments of the same type to and from the participants are collected and cleared. The retail clearing and VP clearing are both netting systems¹. In these systems, all payments to and from a participant are netted into one payment which is subsequently settled via the participants' accounts at Danmarks Nationalbank. The settlement terms are described in further detail in settlement agreements between Danmarks Nationalbank and the clearing systems.

The retail clearing system inter alia settles Dankort (direct debit) transactions, cheque payments and payments via Betalingsservice (payment service system). The retail clearing system is owned by Finansrådet (the Danish Bankers Association) and is operated by Pengeinstitutternes BetalingsSystem (PBS). The VP clearing system comprises settlement of se-

¹ During daytime hours the Danish Securities Centre (VP) also offers "real-time settlement", i.e. gross settlement of securities trades.

curities trades whereby securities are exchanged for money, and "periodic settlements" where interest and repayments are settled. Net securities positions are cleared between the participants' VP safekeeping accounts, while net cash positions are settled via accounts at Danmarks Nationalbank. The Danish Securities Centre (VP) both owns and operates the VP clearing system.

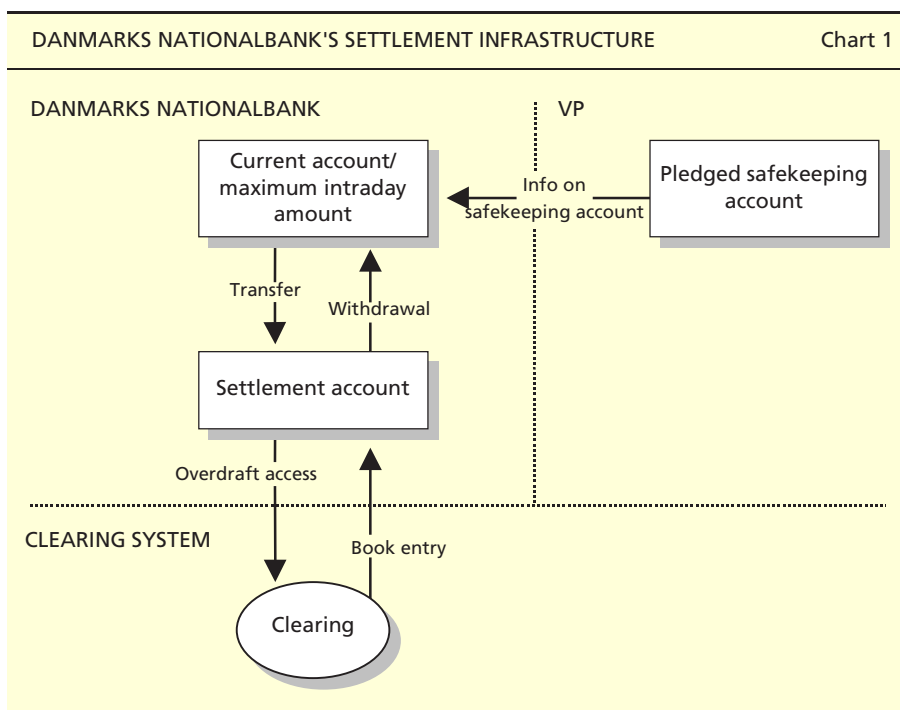
In the retail clearing and VP clearing systems payments are settled in two separate settlement runs. Each settlement run in turn consists of a number of settlements or settlement blocks, according to a fixed timetable. Most of the retail clearing and VP clearing operations take place overnight.

As part of Danmarks Nationalbank's role as settlement bank in payment systems intraday current-account overdrafts against securities pledged as collateral are permitted. However, no current account may show an overdraft when the account is settled at 3.30 p.m. If an overdraft has not been covered, Danmarks Nationalbank will charge an amount calculated as a fixed percentage of the overdraft. Between 3.30 p.m. and 4.00 p.m. the account holders may not make transactions via their krone-denominated accounts at Danmarks Nationalbank. A new monetary-policy day begins after 4.00 p.m., so that in practice the account holders have intraday access to draw on their current accounts from 4.00 p.m. until 3.30 p.m. on the following day. The rules for pledging of collateral to Danmarks Nationalbank are described in further detail below.

The intraday overdraft access facilitates the transaction of payments by making it easier for the account holders to settle payments falling due at various times of the day. No interest is charged on intraday overdrafts. The practical aspects of the pledging of collateral are handled via the DN Inquiry and Transfer System (DN-F). The account holder must have KRONOS and DN-F in order to have access to a current account at Danmarks Nationalbank¹.

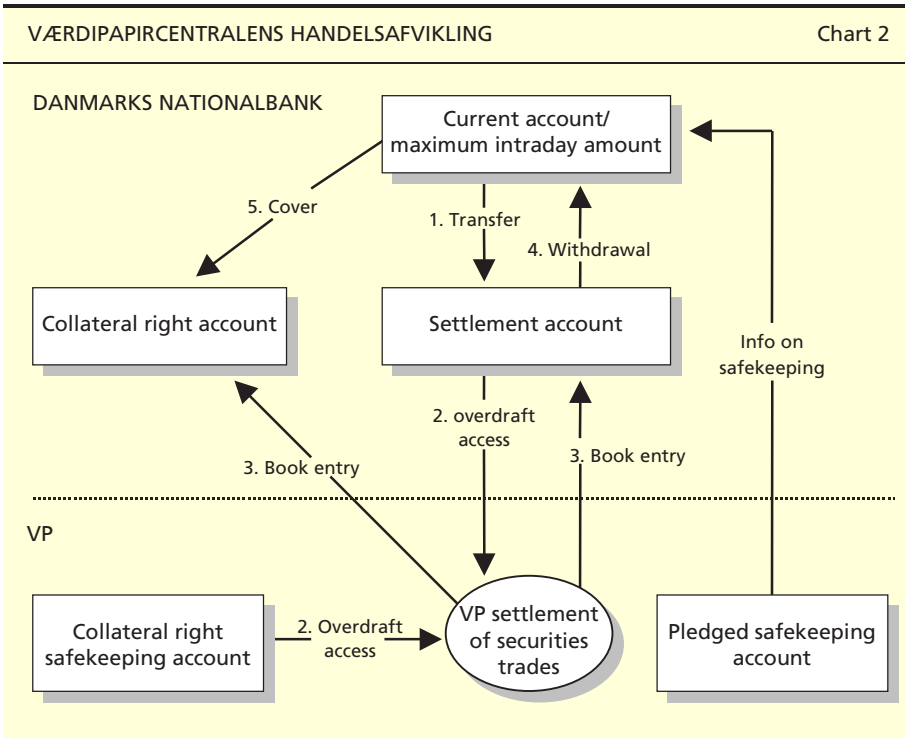
The clearing systems for settlement via accounts at Danmarks Nationalbank by and large apply the same overall concept, cf. Chart 1. Within an agreed time frame the participants in the retail clearing and VP clearing systems must transfer liquidity from their current accounts to special accounts, called settlement accounts, that are dedicated to retail clearing and VP clearing respectively. Since the account holders have free access to their current accounts, settlement accounts are necessary to ensure that vis-à-vis the clearing systems Danmarks Nationalbank can guarantee the account holders' clearing transfers.

¹ Dispensation may be granted from the requirement concerning DN-F.



On the basis of the settlement account balance Danmarks Nationalbank specifies each participant's maximum access to draw on the clearing systems. The clearing transactions are then carried out, provided that there is sufficient liquidity. Danmarks Nationalbank is subsequently informed of each participant's net position, which is booked to the settlement accounts. After completion of the overnight settlements, the balances of the participants' settlement accounts are transferred to their current accounts, whereby the amounts are again freely available to the account holders.

A special procedure for pledging of collateral in connection with securities trades, called the automatic collateralisation agreement, has been established in connection with VP settlement in Danish kroner. An automatic collateralisation agreement between an account holder and Danmarks Nationalbank entitles the account holder to credit facilities at Danmarks Nationalbank on the basis of a securities portfolio held in a VP safekeeping account. For the account holder the special aspect of the automatic collateralisation agreement compared to the traditional pledging of collateral is primarily that this makes it possible to use purchased securities as collateral as from the settlement in which the securities are purchased. Normally, securities can only be used as collateral as from subsequent settlement blocks. Pledging collateral via the automatic collateralisation agreement thus binds fewer securities than the



traditional pledging of collateral. At present, the automatic collateralisation agreement is used only in connection with VP settlements. An amendment of the Securities Trading Act in 2001 has provided the legal basis for broader application of the automatic collateralisation agreement.

In connection with VP clearing the participants' total maximum overdraft access is the sum of the settlement account's balance and the overdraft access under the automatic collateralisation agreement. Settlement takes place on condition that a participant's total net overdraft can be kept within the limits of the overall overdraft access. Each participant holds a automatic collateralisation agreement account at Danmarks Nationalbank to which overdrafts under the automatic collateralisation agreement are booked. Liquidity requirements arising from the VP clearing are first covered by drawing on the automatic collateralisation agreement account, and then by drawing on the settlement account at Danmarks Nationalbank, while the net proceeds from a settlement are first used to cover any overdrafts under the automatic collateralisation agreement, after which any positive balance is transferred to the settlement account. Overdrafts under the automatic collateralisation agreement must be covered before 1.30 p.m. by transfer from the current account. Chart 2 outlines the structure for settlement of VP trades.

Monetary policy

Danmarks Nationalbank's monetary-policy instruments are the facilities normally used by Danmarks Nationalbank to manage and remunerate accounts with the eligible counterparties. Monetary policy is implemented via Danmarks Nationalbank's fixing of the rate of interest for the monetary-policy accounts, which comprise

- overnight current-account deposits
- 14-day transactions whereby the counterparties either borrow from Danmarks Nationalbank against securities as collateral (monetary-policy loans), or make placements by purchasing certificates of deposit.

The net position of the eligible counterparties vis-à-vis Danmarks Nationalbank is defined as the sum of the counterparties' total current-account balances and holdings of certificates of deposit, less their total monetary-policy loans. The net position of the counterparties taken as one is given externally, and is determined primarily by Danmarks Nationalbank's interventions in the foreign-exchange market. In the short term, net payments by the central government can also affect the net position, although this effect is neutralised by the central government's domestic borrowing within the year. The net position is also influenced by other factors, including fluctuations in banknotes and coins in circulation, but in terms of amounts this impact is negligible.

When the day ends at 3.30 p.m. the account holders' current accounts are closed and the amounts change status from non-interest-bearing intraday balances to monetary-policy balances that accrue interest at the current-account interest rate. Since 1992 the current-account interest rate has corresponded to the discount rate. Lending against pledged securities and certificates of deposit is remunerated at the same interest rate, i.e. the rate for lending and certificates of deposit.

Each counterparty is allocated a limit for current-account deposits so as to limit the eligible counterparties' opportunities to build up large current-account balances that can be used to speculate against the krone in connection with foreign-exchange crises. The limit is fixed with due consideration of the capital base of the counterparties and their significance to the money market. Any current-account deposit that exceeds the individual limit at 3.30 p.m. is converted into certificates of deposit by Danmarks Nationalbank. However, the Nationalbank will only resort to individual conversion if the counterparties' total limit is exceeded. The present total limit for current-account deposits at the Nationalbank is just under kr. 19.4 billion.

Danmarks Nationalbank conducts regular monetary-policy operations once a week. In these operations the eligible counterparties taken as one distribute the net position on current-account balances, certificates of deposit and loans against collateral so as to ensure sufficient liquidity in the system as a whole to accommodate the expected liquidity fluctuations one week ahead. Individual liquidity requirements in the course of the week must be set off in the money market, since as stated, Danmarks Nationalbank does not permit overdrafts on the counterparties' current accounts when the day ends at 3.30 p.m.

The regular monetary-policy operations are normally carried out on the last banking day of each week. Danmarks Nationalbank sells certificates of deposit between 10.00 a.m. and 3.30 p.m., while lending transactions are handled between 10.00 a.m. and 1.00 p.m. Both types of transaction have an immediate liquidity effect, and the counterparties' purchases of certificates of deposit and raising of monetary-policy loans are not subject to any quantitative restrictions. Besides the regular monetary-policy operations Danmarks Nationalbank provides or absorbs liquidity via operations in open series of certificates of deposit.

At any time there will be two outstanding series of certificates of deposit and two outstanding monetary-policy loans, which are held via separate accounts. Since the transactions are established and mature on the same day, in practice each monetary-policy counterparty has three accounts for certificates of deposit and for loans. Each series of certificates of deposit and loans is designated by the year and week of maturity (e.g. 01/48 for the certificate of deposit/monetary-policy loan maturing in week 48 of 2001).

When a loan transaction is established the loan is debited to a loan account and the proceeds are credited to the current account. When the loan transactions fall due, the interest is debited to the loan account and the loan proceeds, including interest, are transferred from the current account to the loan account. The loan falls due for repayment before KRONOS opens. When certificates of deposit are purchased, the purchase price is drawn from the current account, while the nominal value of the certificates of deposit is registered to the certificate-of-deposit account. When the certificates of deposit fall due for repayment, before the start of the banking day the relevant counterparty's current account is credited with the nominal value of the certificate of deposit, while the same amount is debited to the certificate-of-deposit account. The interest on the certificates of deposit corresponds to the difference between the purchase price and par.

Loans to cash depots

The supply of banknotes and coins in Denmark takes place via a number of cash depots situated at banks all over the country. The cash depots are owned and operated by the banks. When a cash depot is established, a ceiling (maximum limit) is set for the size of the depot, and Danmarks Nationalbank grants the depot a non-interest-bearing loan against securities as collateral, cf. below. The collateral must correspond to the value of this maximum limit. Each cash depot has an account at Danmarks Nationalbank to which this loan is booked. For practical and insurance-related reasons collateral must be provided for the depot's maximum limit on an ongoing basis, even though the actual amount of cash held in the depot is typically less than the maximum amount.

In connection with the collection of banknotes and coins from a cash depot the requesting bank transfers funds from its current account to an intermediate account related to the depot in question. The depot withdraws the amount from the intermediate account, writes down the balance of the depot's loan account, and disburses the banknotes and coins. When banknotes and coins are delivered to a cash depot, the depot transfers the amount directly to the current account of the delivering bank.

PLEDGING OF COLLATERAL FOR KRONE-DENOMINATED CREDIT

As a general rule Danmarks Nationalbank grants intraday credit, monetary-policy loans and loans for cash depots on the basis of collateralised securities that are listed on the Copenhagen Stock Exchange and registered at the Danish Securities Centre (VP). The arrangement of the pledging of collateral to Danmarks Nationalbank is that a pool of pledged securities in a VP safekeeping account can be used as collateral for all three types of loan. In practice, the securities are pledged by the counterparty transferring assets to a VP safekeeping account that is pledged to Danmarks Nationalbank. Certificates of deposit can also be used as collateral, although only for intraday credit.

The overall framework for the liquidity available to a counterparty from Danmarks Nationalbank consists of the sum of the collateral value of the securities pledged to Danmarks Nationalbank, the balance of the yield account attached to the safekeeping account, and the collateral value of the counterparty's holdings of certificates of deposit.

The intraday credit is determined residually, i.e. the collateral value is first used to cover actual monetary-policy loans and loans to cash depots. Any excess collateral, together with the collateral value of the

counterparty's holdings of certificates of deposit, will then determine the total maximum intraday amount, cf. the list below.

Calculation of the maximum intraday amount:

Collateral value after margin of collateral in the safekeeping account
 + balance of yield account (any withheld drawings)
 + other assets
 = *Total collateral value after margin of pledged assets*
 - monetary-policy loans
 - maximum amount for loans concerning cash depots
 = *Excess collateral*
 + collateral value of certificates of deposit
 = *Maximum intraday amount*
 - overdrafts on current account
 = *Disposable amount*

The value of the pledged safekeeping account fluctuates continuously due to the day-to-day fluctuations in the prices of the pledged securities. To minimise the risk of the value of the counterparty's monetary-policy loans and loans to cash depots exceeding the value of the pledged securities, the collateral value of the pledged VP assets is calculated by deducting securities-specific *haircuts*, which are dependent on the securities' residual maturity and liquidity, from the market value of the securities, cf. Table 1. Moreover, a general margin of 2 per cent is required, whereby collateral with a value of at least kr. 102 must be pledged for each loan of kr. 100.

When monetary-policy loans and loans to cash depots are granted, and when securities are withdrawn from the safekeeping account, the

MARGINS AND HAIRCUTS FOR PROVISION OF COLLATERAL
 FOR KRONE-DENOMINATED CREDIT FROM DANMARKS NATIONALBANK Table 1

	Per cent	Percentage points
Margin	2	
Haircuts for VP-registered assets:		
Residual maturity up to and including 3 years.....	0	
Residual maturity over 3 years up to and including 7 years	1	
Residual maturity over 7 years.....	3	
Haircut premium due to limited liquidity'		10

Note: If the collateral value of the pledged VP-registered assets is less than 101 per cent of the outstanding loans the margin of 2 per cent must be re-established.

¹ If the amount in circulation in a series is less than kr. 3 billion.

collateral value must always exceed the sum of the already outstanding loans and the loans granted by a margin of 2 per cent. To facilitate the day-to-day administration of the safekeeping account supplementary collateral is only requested if the collateral value of the pledged securities is less than 101 per cent of the outstanding 14-day loans and loans to cash depots. When supplementary collateral has been requested the collateral value must exceed the outstanding loans by the margin of 2 per cent.

Bonds drawn from the pledged safekeeping account are credited to a pledged yield account which is part of the collateral basis alongside the collateral value of the securities after deduction of margin. In so far as other required collateral exists, the balance of the yield account will be transferred to the current account on a daily basis.

Accrued interest on pledged securities is booked directly to the current account or to another account as indicated by the account holder.

If pledged assets are to be exchanged the counterparty must first deposit and then withdraw pledged assets from the pledged safekeeping account.

VP-registered assets that can be used as collateral

Danmarks Nationalbank accepts as collateral for krone-denominated loans the following securities denominated in Danish kroner, registered in VP and listed on the Copenhagen Stock Exchange:

- Danish central-government securities, including bonds issued by the Fisheries Bank and the Mortgage Bank.
- Bonds guaranteed by the Kingdom of Denmark.
- Bonds issued by KommuneKredit (the Danish Credit Institution for Local Authorities) and the Ship Credit Fund of Denmark.
- Mortgage-credit bonds issued by institutions subject to the Mortgage Credit Act.

In addition, Danmarks Nationalbank may determine which other assets can be pledged as collateral for krone-denominated credit facilities, subject to specific assessment. Danmarks Nationalbank has concluded a correspondent bank agreement with Sveriges Riksbank and Norges Bank whereby branches in Denmark of Swedish and Norwegian banks may obtain krone-denominated credit from Danmarks Nationalbank on the basis of Swedish and Norwegian central-government securities held in safekeeping accounts with the respective securities depositories of Sweden and Norway and pledged to Danmarks Nationalbank. On the other hand, branches of Danish banks in the two countries may obtain credit from Sveriges Riksbank and/or Norges Bank on the basis of Danish

central-government securities held in VP safekeeping accounts and pledged to the respective central banks of the two countries. In addition to each VP safekeeping account pledged to Sveriges Riksbank or Norges Bank, Danish participants in this Nordic correspondent central banking model also hold a pledged yield account at Danmarks Nationalbank.

DANMARKS NATIONALBANK'S SETTLEMENT OF PAYMENTS IN EURO AND SWEDISH KRONOR

Like the other EU member states Denmark participates in TARGET, which is the joint European payment system. TARGET is based on the national RTGS systems. The Danish payment system KRONOS thus includes a TARGET module. Via TARGET, participants can transmit euro-denominated payments to each other with immediate effect. The amounts are transferred in TARGET via the participants' accounts at the central banks.

As for the system for settlement of payments denominated in kroner Danmarks Nationalbank participates in the settlement of euro-denominated payments via three Danish systems: KRONOS, euro retail clearing and VP clearing in euro.

Payments in euro between two Danish TARGET participants are transacted via KRONOS, just as a euro amount is transferred between a Danish and a foreign participant via KRONOS and the foreign participant's national RTGS system.

The infrastructure for euro payments is generally similar to the infrastructure for krone payments. However, more restrictive terms apply to TARGET participants that are residents in EU member states outside the euro area than to euro-area participants. The latter have access to unlimited intraday credit from their respective national central banks against appropriate collateral, whereas central banks in non-euro-area member states may only grant intraday euro credit on the basis of a deposit with a euro-area central bank. Denmark's current access to drawing amounts to euro 650 million. These are the overall terms for the Danish infrastructure for euro-denominated payments, including the structure of euro accounts at Danmarks Nationalbank.

The retail clearing system for euro payments is established as a copy of the retail clearing system for krone payments. However, at the present time the system does not offer certain types of transaction, including PBS transfers, in euro. In contrast to the retail clearing system for krone payments, the retail clearing in euro is settled during the day, since Danmarks Nationalbank may only make liquidity in euro available between 8.00 a.m. and 5.00 p.m. The overall settlement concept is other-

wise identical to that for krone payments: the participants in the retail clearing system for euro payments must transfer funds to their retail clearing settlement accounts in euro. On the basis of the balance of the settlement account, Danmarks Nationalbank notifies each participant's maximum drawing right in euro to PBS. PBS calculates net positions for each participant, which are then compared to the participant's maximum drawing right. If the balance of the account is sufficient, PBS sends book entries to Danmarks Nationalbank, and the net positions are booked to the settlement accounts. The balance of the settlement accounts is then transferred to the respective euro current accounts.

A key consideration for the design of the VP clearing system in euro was to ensure the possibility of settlement with value on the same day of trades where the parties hold safekeeping accounts in respectively VP and Euroclear, the European clearing centre. Since securities settlement in Euroclear takes place overnight, when the Danish participants do not have access to euro-denominated liquidity from Danmarks Nationalbank, in practice euro-denominated trades must be converted to kroner and included in VP's general settlement of krone payments. Before noon, when the Danish participants have access to euro-denominated liquidity, the party that acquired securities via the overnight settlement pays in euro and is reimbursed with the equivalent amount in Danish kroner, and vice versa, whereby the net result is settlement in euro. The exchange of kroner against euro takes place in a special VP settlement, called a *PvP (Payment versus Payment)* settlement. For this purpose, each participant holds a *PvP* account in kroner and a *PvP* account in euro at Danmarks Nationalbank.

VP also settles securities trades in euro during the day. The counterparties to these trades hold a VP settlement account in euro at Danmarks Nationalbank.

Pledging of collateral for intraday credit in euro

The overall framework for the composition and risk management of the collateralisation basis for central banks' granting of intraday credit in euro in EU member states that have not introduced the euro is described in the rules of the European Central Bank (ECB)¹. In practice, the collateralisation basis for credit denominated in euro corresponds to the collateralisation basis for credit denominated in kroner, except that certificates of deposit are not eligible as collateral for euro credit from Danmarks Nationalbank.

¹ Cf. "The single monetary policy in stage three", ECB, November 2000.

MARGINS AND HAIRCUTS FOR PROVISION OF DANISH SECURITIES
AS COLLATERAL FOR EURO-DENOMINATED CREDIT FROM
DANMARKS NATIONALBANK

Table 2

	Per cent	Percentage points
Margin	1	
Exchange-rate haircut	3	
Haircuts for VP-registered assets:		
Residual maturity up to and including 1 year	0	
Residual maturity over 1 year up to and including 3 years.....	1½	
Residual maturity over 3 years up and including 7 years.....	2	
Residual maturity over 7 years	3	
Haircut premium due to limited liquidity		10

¹ If the amount in circulation in a series is less than kr. 3 billion.

With regard to risk management, in principle the ECB's margins and *haircuts* for gilt-edged securities, or tier 1 assets, are applied, cf. Table 2. Moreover, an illiquidity premium of 10 percentage points is applied, as in the system for krone payments. Finally, a *haircut* of 3 per cent is applied to the handling of the exchange-rate risk which is attributable to credit granting and the pledging of collateral in different currencies.

The technical framework for the pledging of collateral on the euro side corresponds to the system on the krone side: the account holder pledges a VP safekeeping account to Danmarks Nationalbank as collateral. The yields on the pledged securities are entered to a pledged yield account related to the safekeeping account.

The correspondent central banking model, CCBM

The ECB and the EU central banks have established the correspondent central banking model (CCBM) for cross-border pledging of collateral in order to facilitate the pledging of collateral in TARGET. CCBM permits a central bank to grant credit in euro against collateral placed with another central bank. Special terms apply to Denmark's participation in CCBM as a non-euro-area EU member state. In practice, Danish banks with branches in a euro-area member state may obtain intraday credit (but not monetary-policy credit) in euro from a central bank in the euro area against Danish securities as collateral. It is up to the central banks of the euro area whether they will accept securities from non-euro-area EU member states as collateral pursuant to CCBM. At present, the central banks of Germany, France, the Netherlands, Luxembourg and Finland accept Danish securities as collateral. The CCBM agreement is a mutual agreement in the sense that branches in Denmark of foreign banks may also obtain credit in euro

from Danmarks Nationalbank against collateral as securities held in safe-keeping accounts in the euro area that are approved by the ECB (CCBM assets, cf. the list below). This facility is not used in practice, however.

The Danish securities eligible for use as collateral under CCBM correspond to the collateralisation basis on the krone side, cf. above. However, for administrative reasons an outstanding amount of at least kr. 10 billion is required. The list currently comprises approximately 30 securities codes with a total outstanding amount of more than kr. 1,000 billion.

The collateral value of the Danish securities pledged as collateral is calculated by the central bank in the euro area which grants the credit facility, on the basis of the ECB's rules.

Maximum intraday amount in euro

As on the krone side, the maximum intraday amount in euro is calculated residually as follows:

Collateral value after margin of VP-registered assets

+ collateral value of CCBM assets

+ balance of yield account (any withheld drawings)

= *Total collateral value after margin of pledged assets*

- other credit facilities

= *Maximum intraday amount, but not exceeding the allocated limit, cf. below*

+/- euro current account balance

= *Disposable amount*

The maximum intraday amount of an account holder can never exceed the account holder's individual limit for euro-denominated intraday overdrafts. The individual limits are allocated according to the following guidelines: if the sum of the participants' requested intraday overdrafts in euro is within the overall limit, currently euro 650 million as stated, the limit requested by each participant is granted. Should the sum of the participants' requested limits exceed the total limit, a limit is allocated to each participant on the basis of the participants' relative shares of the TARGET connection fee.

Overdrafts on the euro current account must be covered by no later than 5.15 p.m. Otherwise, interest will be charged to the account holder. Further interest will be charged if the account holder has failed to cover the overdraft before TARGET's normal closing at 6.00 p.m.

Settlement of payments in Swedish kronor

In addition to the payment infrastructure developed to handle payments in euro in the Danish financial system, a special settlement infrastructure

has been developed for payments on bonds denominated in Swedish kronor, listed on the Copenhagen Stock Exchange and registered at VP. This settlement concept is similar to the infrastructure for krone and euro payments. With a view to the settlement of periodic payments in Swedish kronor each participant holds a VP settlement account in Swedish kronor at Danmarks Nationalbank. The participants transfer liquidity to the settlement account before each settlement. The participants transfer funds to Danmarks Nationalbank's account at Sveriges Riksbank, which in this way is the correspondent bank of Danmarks Nationalbank. On the basis of the balance of the settlement account, Danmarks Nationalbank notifies VP of the maximum drawing right, and VP undertakes clearing, provided that the net position of each participant does not exceed the overdraft limit. Danmarks Nationalbank then books the participants' net positions to their settlement accounts. Disbursements are made from the settlement accounts via Danmarks Nationalbank's account at Sveriges Riksbank.

CONCLUSION

The terms and conditions for accounts at Danmarks Nationalbank are the formal framework for the access to and use of accounts at Danmarks Nationalbank. The terms and conditions specify the overall framework for the extension of credit by Danmarks Nationalbank and the pledging of collateral to Danmarks Nationalbank, as described above. Danmarks Nationalbank intends this framework to be as smooth and appropriate as possible, in accordance with international standards and practice. With regard to the payments system, where Danmarks Nationalbank's operational role is primarily to act as settlement bank, Danmarks Nationalbank cooperates with the account holders' organisations as well as the clearing systems on the ongoing development of the Danish settlement infrastructure.

The terms and conditions are updated and adjusted on an ongoing basis, e.g. in connection with the introduction of new IT systems and new national and international legislation.

Administration of the terms and conditions is undertaken by Danmarks Nationalbank's Accounting department.

Credit Derivatives – Possible Implications for Financial Stability

Suzanne Hyldahl, Financial Markets

INTRODUCTION

Taking risks is an integral element of banking operations. The banks typically take several types of risk. The principal type is credit risk, but the banks also face market risk, operational risk and other risks. Management of market risk, comprising e.g. interest-rate and exchange-rate risk, has developed significantly in recent years, and financial instruments for the management and hedging of market risk are a key element of banking operations.

Lending – and thereby assuming credit risk – is a key task for the banks. Credit derivatives are instruments used for credit-risk management. Management and hedging of credit risk is by no means a new phenomenon. Banks have traditionally used guarantees for this purpose. Business enterprises have also been able to take out e.g. credit insurance to hedge the credit risk or losses on their customers/debtors, just as buildings, stocks, etc. can be insured. A credit insurance policy typically covers losses due to default on payment of deliveries of goods and services due to a customer's insolvency (compulsory liquidation, suspension of payments or similar). Credit insurance thereby contributes to reducing the credit risk in the business enterprise's relationship with its bank. Guarantees and credit insurance resemble, but are more individualised than, credit derivatives, and the documentation is different. Credit derivatives are thus more standardised, but in principle all the instruments serve the same purpose, which is to manage and hedge the credit risk.

In recent years, trading of credit derivatives on the international capital markets has expanded significantly, and the banks are key agents in this market.

This article briefly presents the principles behind credit derivative instruments and their typical applications. This is followed by an assessment of the implications for financial stability of extensive use of credit derivatives. All in all, the use of credit derivatives entails advantages as well as drawbacks. One of the advantages is that credit derivatives facili-

tate the banks' management and diversification of the credit risk on their loan portfolios¹. Credit derivatives can thus help to achieve a more appropriate distribution of the credit risk, since transferring risk from one bank to another can improve the position of both banks, thereby enhancing financial stability. Liquid markets for credit risk are also a source of useful price information for the banks, e.g. when determining how their credit products are priced.

On the other hand, the market for credit derivatives is relatively new, and has therefore not yet been "tested" in a cyclical downturn where the credit risk is typically on the increase. This less mature market is still subject to a number of legal and operational risks. In addition, the use of credit derivatives can complicate the monitoring of credit risk in the financial system. Credit derivatives now offer non-banks an opportunity to assume a higher credit risk. It is important that they have the capacity and knowledge to assess the consequences.

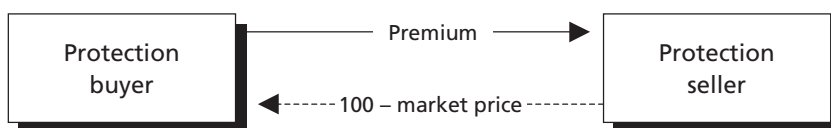
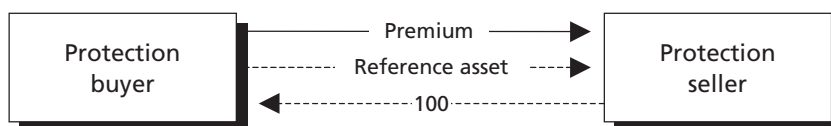
This article focuses on international issues, since the market for credit derivatives is still in its infancy in Denmark. Continued expansion of the international market for credit derivatives is expected. This will include greater participation by non-financial agents (business enterprises). Until now, the banks' use of credit derivatives has been motivated by e.g. regulatory aspects (to reduce the solvency burden). However, these considerations are expected to be reduced in view of the Basle Committee's proposed new capital-adequacy rules². On the other hand, the banks' increasing quantification of credit risk in their management of credit portfolios and the capital base is expected to give them a stronger incentive to use credit derivatives.

OUTLINE OF CREDIT DERIVATIVES

Credit derivatives are related to traditional bank guarantees or insurance, since one party receives a regular premium for compensating the other party (the protection buyer) for any loss during the contract period. Credit derivatives can contribute to interlinking the loan market, the securities market and the insurance market, making insurance companies active market participants too.

A credit derivative transfers the credit risk related to a specific loan or portfolio of loans from one party (the lender) to another party. Credit derivatives are bilateral agreements between two parties, and credit derivative agreements concern specific risk elements associated with the

¹ For example, in the 2nd half of 2000, problems in the telecommunications sector contributed to increasing demand for instruments to hedge the credit risk (Bank of England, 2001).
² The New Basel Capital Accord, January 2001.

Example of Cash Settlement**Example of Physical Settlement**

Note: The premium is typically a number of basis points per year on an agreed notional amount.

underlying loan or loan portfolio, without simultaneously affecting the other characteristics of the loan or credit portfolio¹. The general structure of credit derivatives is that compensation is made when a specific credit event occurs. This event may be compulsory liquidation or suspension of payments, but also downgrading of credit ratings, debt restructuring, etc.

Over time, a variety of different techniques have been developed whereby credit derivatives are included in various financial product structures. Credit default swaps are still considered to be the "standard" credit derivatives, however, and are thereby the central element of the market for credit derivatives. This article therefore solely concerns credit default swaps.

Credit default swaps

In a *credit default swap* a counterparty (protection seller) agrees to pay compensation to the protection buyer in the event of breach of contract concerning the reference asset that is subject to transfer of credit risk pursuant to the contract. The reference asset may be for instance a loan or security. As payment for assuming the credit risk, the protection seller receives a fixed premium from the protection buyer during the term of the contract, cf. Chart 1. Should a credit event occur, the protection buyer receives compensation, typically as the difference between the original face value of the reference asset and its market value (recovery value) following the credit event.

¹ Baldvinsson et al. (2000).

There are several settlement methods. Settlement could occur by the protection buyer delivering the defaulted reference asset to the protection seller in return for par value in cash (physical settlement), or as the difference between the par value of the reference asset and its market value following the credit event (cash settlement).

The contract expires when a credit event triggers settlement. If no credit event occurs during the contract period, the protection buyer re-assumes the credit risk on the reference asset on expiry of the contract.

A credit default swap does not entirely eliminate the credit risk for the protection buyer, since there will always be a risk that the protection seller in the default swap is unable to meet its obligations due to e.g. compulsory liquidation. A credit default swap will nevertheless in normal circumstances reduce the credit risk considerably, since it takes two events for the protection buyer to suffer a loss. The greater the correlation between the creditworthiness of the protection seller and the reference asset itself, the greater the probability of the compulsory liquidation of both the reference asset and the protection seller at the same time (breach of the default swap). The higher this correlation, the poorer the protection, which should be reflected in the premium paid by the protection buyer. For example, if the credit derivative is to purchase protection on a business enterprise and the counterparty is a bank situated in the same "high-risk" country as the business enterprise, the premium will normally be lower than if the protection seller of the same reference asset had been domiciled in a "low-risk" country.

A credit default swap offers the protection buyer the opportunity to reduce the credit risk on a wide range of exposures such as loans, bonds, trade credits, etc., and to transfer this credit risk by means of a simple, relatively standardised instrument. In the same way, market participants can buy or sell with a view to hedging, speculation or arbitrage, even though they have no direct exposures in the reference asset.

Documentation

A central problem in the credit default swap market has been the lack of standard documentation with clear, "water-tight" legal definitions. The need for standards for trading in credit derivatives became even more evident during the Russian crisis in 1998, when many documentation problems arose. Until that time, the terms and conditions for each individual credit default swap had been agreed bilaterally¹.

¹ Bank of England (2001).

In 1999, the legal documentation of credit default swaps was standardised under ISDA¹, and most credit default swaps are now traded within the framework of the ISDA Master Agreement. This documentation e.g. contains definitions of a wide range of terms used in the contract. ISDA has thus specified the typical "credit events" that can trigger a credit default swap. This contributes to reducing the legal risk associated with trading of these instruments.

The documentation is subject to continuous development. The credit default swap market cannot yet be described as "mature", and the documentation has not yet been fully tested during a cyclical downturn. For comparison, the market for interest swaps was at an equivalent stage at the end of the 1980s².

CREDIT DERIVATIVES AND THEIR USE

In simplified form, the credit derivative market comprises: a) "end-buyers" of credit protection, seeking to hedge a credit risk associated with other elements of their activities; b) "end-sellers" of credit protection, who typically wish to diversify an existing loan or insurance portfolio; and in between them c) intermediaries who provide liquidity, trade on their own account and use credit derivatives to carry out various structured transactions. Table 1 shows the results of a survey whereby the market participants are divided into protection buyers and protection sellers, and are measured in terms of their share of the total market (notional value).

Banks participate in the credit derivative market as intermediaries (contributing to market liquidity), but typically also as net protection buyers. In view of the banks' increased focus on shareholder value, they require higher and higher returns on equity³. Recent years' trends have shown that certain banks can benefit from greater focus on intermediation and structuring of credit risk.

For a number of years the banks have used statistical models to quantify market risk, i.e. the risk of the bank incurring losses due to fluctuations in market prices (interest and exchange rates, and stock prices). Such models are now also increasingly used to quantify credit risk. The purpose is to enhance the management of credit portfolios and capital base. The bank's own estimate of the capital requirement is the economic

¹ The International Swaps and Derivatives Association has prepared the Credit Derivative Definitions from 1999. See also www.isda.org.

² Bank of England (2001).

³ More and more banks allocate capital according to the RAROC (Risk Adjusted Return on Capital) models due to the increasing focus on capital utilisation.

MARKET PARTICIPANTS IN THE CREDIT DERIVATIVE MARKET,
BEGINNING OF 2000

Table 1

Per cent	Protection buyer	Protection seller
Banks	63	47
Securities houses	18	16
Insurance companies	7	23
Business enterprises	6	3
Hedge funds	3	5
Mutual funds	1	2
Pension funds	1	3
Governments/export credit agencies	1	1

Note: There is no comprehensive global data in this area, but the figures are based on a survey conducted by the British Bankers' Association.

Source: Bank of England (2001) and Lehman Brothers International (March 2001).

capital¹. It is the amount of capital required for a bank to be able to cover unexpected losses with a given probability. The greater focus on credit-risk management is expected to augment the incentive to use credit derivatives.

A bank with a large exposure on a customer or a sector may apply various methods to diversify the credit risk, such as reinsurance or syndicated loans, whereby the loan is split up into smaller units and distributed on several banks. Alternatively, the bank may reduce the credit risk by using credit derivatives. Credit derivatives can therefore be perceived as the alternative to divesting assets from the balance sheet, since they can contribute to easing the capital requirements and releasing any credit lines. The effect is the same, i.e. a reduction of the credit risk and thereby of the solvency burden on the bank's assets. Credit derivatives thus enable the bank to diversify its risk exposure, while preserving the relationship with the borrower². A bank can e.g. "grow" with its customer, without the bank exceeding the limit for single exposures (otherwise the bank would have to divest part or whole of the loan portfolio).

Another incentive to use credit derivatives is that the transfer of a particular risk element from one bank to another may improve the positions of both banks. The reason may be that a more diversified risk exposure is achieved for both banks' loan portfolios. For example, the bank may use credit derivatives to achieve a credit exposure, which it would otherwise not be able to obtain (e.g. in a specific sector or a particular geographical area). The bank may be the protection seller via a default swap on a certain sector, while also being the protection buyer on another sector where the bank's credit exposure is particularly high.

¹ The concept of economic capital is described in further detail in Andersen et al. (2001).
² See Clementi (2001).

This management of the credit portfolio enables the bank to achieve the desired relationship between risk and yield without changing its customer base or balance-sheet structure.

Table 1 shows that securities houses constitute the second-largest group in the market. As market makers, they contribute to supplying liquidity in the market. Their position is relatively neutral, since they sell and buy on approximately the same scale.

Insurance and reinsurance companies are primarily protection sellers in the credit derivative market. They sell credit protection with a view to diversification of the traditional insurance portfolio¹ (e.g. casualty and property insurance). Insurance companies may also buy credit protection, however, e.g. by hedging insurance for projects in developing countries by purchasing sovereign credit derivatives (non-perfect hedging). In addition, they perceive certain credit derivative products with a high credit rating as an attractive alternative (i.e. higher yield) to investment in more conventional securities.

Credit derivatives may also be used for hedging or risk management of corporate bonds in investors' portfolios. They can be an attractive alternative in an illiquid corporate bond market, or if the investor does not wish to buy or sell assets in the underlying portfolio².

Financial agents are thus the key players in the credit derivative market, but there is nothing to prevent e.g. business enterprises from using the market. At present, however, they account for only a small proportion of the market³. Business enterprises can use credit derivatives to reduce the credit risk associated with e.g. supplier credit. Credit derivatives can thus function as an alternative to insurance, export guarantees and similar.

THE CREDIT DERIVATIVE MARKET

The global market for credit derivatives has expanded strongly in recent years. There is no comprehensive global data, but it is estimated that the notional amount outstanding in the market totals approximately 1,000 billion dollars⁴, which is double the 1999 figure, and more than six times greater than the figure for 1997. For comparison, the derivatives markets related to interest rates, foreign exchange rates or equities in 2000 were respectively 65, 16 and 2 times larger, measured in terms of notional principals.

¹ Bank of England (2001).

² See Rygaard (2001).

³ See Risk Magazine (2001).

⁴ Bank of England (2001).

Electronic trading platforms for credit derivatives have been established in recent years¹. This has contributed to increasing the transparency and liquidity of the credit derivative market.

The market is concentrated geographically on London and New York. Credit derivatives are subject to ongoing product development, but credit default swaps still account for approximately half of the market².

CREDIT DERIVATIVES AND FINANCIAL STABILITY

Advantages of using credit derivatives

Credit derivatives can enhance the diversification of credit risk. This advantage is achieved if the protection seller can assume a risk at a lower cost than the protection buyer, due to e.g. different portfolio compositions or a different degree of risk aversion.

More widespread use of credit derivatives can contribute to increasing the stability of the financial system. The banks can use credit derivatives to enhance their management and diversification of credit risk, thereby reducing their vulnerability to e.g. sector-specific price shocks. Moreover, the opportunity to transfer credit risk via credit derivatives can help to make the supply of credit to borrowers less dependent on the banks' willingness and ability to assume specific types of credit risk. This will contribute to avoiding "credit crunch", i.e. inappropriate credit tightening.

A liquid credit derivative market can also contribute to enhancing price information concerning credit risk, and thereby improving the banks' pricing of loans and other credit exposures. This is beneficial to financial stability, since the banks' insufficient ability/opportunity for correct price fixing may constitute a risk.

Drawbacks and challenges of using credit derivatives

The use of credit derivatives is also associated with a number of drawbacks and challenges. A fundamental problem is the banks' reduced interest in monitoring the credit risk (i.e. their customers) if the banks that originally extended the loans separate the credit risk³. These banks' incentive to monitor the borrower's creditworthiness is reduced, and any restructuring of the borrowers' debt can be a source of concern if the banks no longer have "interests" in that borrower.

The authorities' oversight of the risk exposure of each bank and of the overall financial sector may also be complicated by a *lack of transparency* in the use of credit derivatives.

¹ E.g. CreditTrade, www.credittrade.com and Credit Ex, www.creditex.com.

² Bank of England (2001).

³ The same problem is associated with e.g. syndicated loans.

Credit derivatives will most likely be used mainly for diversification of the credit risk, but they may also be used to concentrate the credit risk. This emphasises the need for a high degree of transparency for the banks that use credit derivatives. Lack of transparency can make it more difficult for authorities, potential counterparties and shareholders to assess the bank's total risk exposure¹.

It should also be noted that the market for credit derivatives has not yet been "tested" in a recession where credit risk grows. The probability of credit events occurring is greater during a recession or at times of financial crisis, where the protection seller can also be financially vulnerable. Many market participants therefore seek to reduce the risk of correlation between the credit rating of the reference asset and the counterparty (wrong way risk).

Focus should still be on the *legal and operational risks* associated with this relatively new market². As stated above, the documentation for credit default swaps remains to be fully tested during a full economic cycle. New documentation initiatives such as the 1999 ISDA Credit Derivative Definitions reduce the legal risks, but there are still outstanding issues such as a standard definition of credit events. The documentation of credit derivatives is generally a complex issue, and market participants therefore need effective control systems to avoid document errors. Market growth in itself generates risks. Over a relatively short period, the intermediaries have strongly expanded their business areas related to trading and structuring. This generates a risk that internal control procedures, internal risk exposure monitoring and general administration of trading will lag behind front office activities.

As previously stated, greater diversification of the credit risk away from the banks will make the role of insurance companies and other non-banks more important. Diversification of credit risk will have a stabilising effect if financial stability is considered solely on the basis of the banks' situation. If the basis of assessment of financial stability is expanded to include insurance companies and other non-banks, it is important that the necessary knowledge and capacity to evaluate the implications of the risk associated with credit derivatives is available. Non-banks' participation in the market contributes to increasing liquidity, but also raises the question of whether the new participants are fully aware of the related risks.

¹ In The New Basel Capital Accord of January 2001, the Basle Committee proposes a significant amendment of the current rules, i.e. that the banks must provide more detailed information to the market on e.g. the banks' risks (pillar 3 on Market Discipline). See also www.bis.org.

² See Clementi (2001).

CAPITAL REQUIREMENTS OF CREDIT DERIVATIVES

The current capital adequacy rules for banks are stipulated in the Basel Accord of 1988. The 13-year-old rules thus do not take account of the most recent financial innovations, including credit derivatives and the opportunities for e.g. credit risk mitigation¹.

Since credit derivatives are not covered by the rules, individual national authorities were responsible for preparing any guidelines for capital requirements for credit derivatives. The treatment of credit derivatives has thus to some extent varied among countries. The countries that have introduced rules in this area have typically adhered to the practice in the UK and the USA. This is obviously not an appropriate development, but since the credit derivatives are part of the Basle Committee's proposal for new capital adequacy rules², this should help to ensure a level playing field in this area.

The preparation of guidelines for capital requirements for credit derivatives has commenced in Denmark. Since this work is not yet complete, the following is a brief account of the current capital requirements for credit derivatives, based on legislation in the UK³. This is followed by a description of the Basle Committee's proposed new capital adequacy rules for credit derivatives.

The current international rules concerning capital requirements for credit derivatives

The Basel Accord distinguishes between capital requirements for assets in the trading book and the banking book, respectively. The trading book typically consists of negotiable financial assets held for a short period, while the banking book comprises loans granted in connection with the banks' traditional lending activities. Such loans are held for longer periods.

Credit default swaps in the *banking book* are perceived as bank guarantees, provided that the entire credit risk has been transferred to the protection seller. If the reference asset is e.g. a loan to a business enterprise, and the protection seller is an OECD bank, the risk weighting can be reduced from 100 per cent to 20 per cent, and the capital requirement thereby from 8 per cent to 1.6 per cent. A bank acting as a protection buyer can thus apply the risk weighting of the protection seller

¹ The Basel Accord was updated in the mid-1990s, however, with the introduction of capital adequacy rules for market risk. The rules were also amended to allow calculation of the capital requirements for market risks on the basis of value-at-risk models (the internal rating-based approach).

² The New Basel Capital Accord, January 2001. The consultation paper is available on BIS' Web site

³ www.bis.org. See also Hyldahl (2001) for a review of the proposed new capital adequacy rules. Bank of England (2001).

rather than of the reference asset (i.e. substitution). It can be argued that this still imposes a high capital requirement, since, in principle, a credit default swap only exposes the protection buyer to the risk of default of the reference asset as well as of the protection seller ("joint probability of default").

With regard to *the trading book*, capital requirements for credit derivatives are divided into requirements covering specific risks associated with the reference asset itself, and general risks associated with the entire securities market. This is the "traditional" method of calculating the capital requirement for the market risk in the trading book. Derivatives also entail a capital requirement for the counterparty risk, i.e. the risk of the counterparty defaulting on its obligations¹. The international practice for capital charges to trading book positions hedged by credit default swaps is typically to recognise the transfer of the entire specific risk from the protection buyer to the protection seller if the reference asset, currency and maturity are exactly matched².

The proposed new capital adequacy rules

The objective of the Basle Committee's latest proposal for new capital adequacy rules is to e.g. achieve greater coherence between capital requirements and the actual risk profile of the banks, and thereby the banks' assessment of the required economic capital. This may entail a reduction of the regulatory incentive to use credit derivatives. The reason is that the new rules make a stronger distinction between the credit risks within various counterparty categories, so that different business enterprises are given different risk weightings. On the other hand, especially the banks' increased focus on quantification and dynamic management of credit risk, and their general use of the concept of economic capital, are expected to contribute to continued strong future growth in the market.

With regard to the *banking book*, the following proposal is made concerning treatment of credit default swaps: only credit default swaps offering credit protection comparable to that offered by guarantees are entitled to recognition, and the previously mentioned "substitution" of the risk weighting of the reference asset by the risk weighting of the pro-

¹ For example, if the credit rating of the reference asset has diminished after the credit default swap is established. In this situation the protection buyer has an exposure vis-à-vis the protection seller, since the premium for establishing a new contract will probably now be greater than before the downgrading of the reference asset. The premium will thus have risen in the event of liquidation of the protection seller, where the protection buyer has to establish a credit default with a new protection seller.

² As stated above, this is not subject to joint standard international rules, however, so that the treatment of credit derivatives tends to vary among the national authorities.

tection seller is maintained. The Basle Committee also finds that use of credit derivatives cannot cover all risks, but that a residual risk will always remain. According to the proposal, this will be covered under pillar 2 (the supervisory review process)¹, making it up to the national supervisory authorities to ensure consistency between the banks' capital adequacy and the risk profile. According to the Basle Committee's proposal, protection granted by non-banks with a high credit rating may now also reduce the risk weighting of a bank's credit exposure². This means that in the future banks, as protection buyers, can choose e.g. insurance companies of high creditworthiness (a credit rating of A or above) as counterparties. Previously, protection sellers were exclusively banks.

For the specific risk capital charge applied to *trading book positions that are hedged* by credit default swaps where there is an exact match in terms of reference asset, maturity and currency) an 80 per cent specific risk offset is allowed under the new rules. For some countries, this will entail a tightening of the current rules.

In seeking to avoid any legal or operational risks in connection with credit derivatives, the Basle Committee's proposal for new capital adequacy rules includes a number of requirements concerning the banks' use of credit derivatives. These must be fulfilled before the capital charges can be reduced in any way. The requirements include provisions concerning the banks' risk management, as well as explicit requirements concerning the credit derivative contract itself. It must be emphasised that the new capital adequacy rules are not yet complete, and another consultation round will take place in the spring of 2002.

CONCLUSION

In overall terms, credit derivatives are assessed to enhance financial stability via the benefits of improved management and diversification of credit risk, as well as the opportunity for improved pricing of credit risk. However, focus should still be on a number of issues related to the use of credit derivatives, including that the banks' interest in monitoring credit risk may diminish, that the credit risk can be diversified to non-banks, and finally, that credit derivatives can increase the concentration of credit risk. The use of credit derivatives requires improved transparency on the part of the banks with regard to transfer of credit risk, as well as continued focus on the legal and operational risks of credit derivatives.

¹ The Basle Committee: Update on work on the New Basel Capital Accord, 21 September 2001, see also www.bis.org.

² This is subject to observance of the ISDA definitions of credit events, cf. the above section concerning documentation.

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Turnover in the Foreign-Exchange and Derivatives Markets in April 2001

Tina Christoffersen and Martin Seneca, Statistics

INTRODUCTION

Danmarks Nationalbank has conducted a survey of turnover in April 2001 in the Danish market for foreign exchange and OTC derivatives¹. The survey is part of a major international survey coordinated by the Bank for International Settlements (BIS). The survey is conducted every three years as the most extensive survey of activity in the global foreign-exchange and derivatives markets.

According to the survey, turnover in the Danish foreign-exchange market in April 2001 amounted to \$23.3 billion per banking day, while turnover in the Danish market for OTC derivatives was \$6.3 billion. Turnover in the foreign-exchange market has declined from 1998, amongst other factors due to the introduction of the euro. On the other hand, the derivatives market has seen a considerable increase in turnover, attributable mainly to the greater activity in the short-term tomorrow/next interest-rate swap.

The survey confirms that the foreign-exchange and derivatives markets are well-integrated international markets that are used in the financial planning and risk management of banks and other business enterprises, and make it possible for business enterprises to achieve the desired risk profile. Furthermore, the players in the foreign-exchange market have access to acquire or place liquidity in a given currency at any time.

In line with the trends in the Danish market, the global market shows a decrease in turnover of foreign exchange and a considerable increase in turnover of derivatives. Global market activity is concentrated in the financial centres, particularly London. The UK thus accounts for approximately one third of total global turnover in both the foreign-exchange and derivatives markets.

¹ *Derivatives* are financial contracts whose value is derived from another contract, an interest rate, a currency, an index or similar. Derivatives are traded on exchanges as well as over-the-counter (OTC), i.e. directly between two parties. Foreign exchange, on the other hand, is always traded directly between two parties.

Danmarks Nationalbank's survey of the foreign-exchange and derivatives markets is part of a major international survey coordinated by the Bank for International Settlements (BIS). The survey has been conducted every three years since 1989, and in 2001 involved the largest market participants in 48 countries. The Danish part of the survey comprised 11 banks, including 4 branches of foreign banks. Together, the 11 banks are estimated to account for more than 99 per cent of turnover in the Danish foreign-exchange and derivatives markets. The survey covers transactions entered into by the banks' units in Denmark, and includes intra-Group trade on market terms. All figures are adjusted for double counting of trades between two reporting banks. The results are stated in dollars to facilitate comparison with other national surveys.

The survey includes the foreign-exchange market (spot transactions, outright forwards and FX swaps), the market for OTC foreign-exchange derivatives (currency swaps and OTC currency options) and the market for OTC interest-rate derivatives (forward rate agreements, interest-rate swaps and OTC interest-rate options). The survey does not include exchange-traded contracts.

Turnover is compiled in nominal terms and is broken down by currency and counterparty for all contracts, and furthermore by original maturity for outright forwards and FX swaps. Turnover is broken down by three counterparty categories, i.e. other reporting dealers, other financial institutions and non-financial customers. For each counterparty category, a further distinction is drawn between whether the counterparty is located in Denmark or abroad.

The survey has applied the following definitions:

- *Spot transaction*: Single outright transaction involving the exchange of two currencies for settlement within two banking days.
- *Outright forward*: Single outright transaction involving the exchange of two currencies for settlement more than two banking days later.
- *FX swap*: A combination of a spot transaction and an offsetting outright forward. An FX swap is in effect a loan or placement in one currency against another currency as collateral.
- *Currency swap*: A contract committing two counterparties to exchange streams of interest payments and principal amounts in different currencies. A currency swap is in effect an exchange of loans in different currencies.
- *Currency option*: A contract which gives one party a right, but no obligation, to buy or sell an amount in foreign currency at an agreed price on a future date.
- *Forward rate agreement (FRA)*: An agreement to fix an interest rate for a specified amount for an agreed future period.
- *Interest-rate swap*: An agreement to exchange interest payments for a period. Typically, fixed interest rates are swapped for variable interest rates.
- *Interest-rate option*: A contract which gives one party a right, but no obligation, to receive or pay a particular interest rate on an agreed principal for a future period.

Amounts outstanding in foreign-exchange contracts and derivatives in mid-2001 have been compiled as a supplement to the turnover survey. The compilation of amounts outstanding is not described in this article. A detailed presentation of the results of the Danish turnover survey and the survey of amounts outstanding will be published in Danmarks Nationalbank's Special Reports publication series before the end of 2001.

TURNOVER IN THE FOREIGN-EXCHANGE MARKET BY TYPE OF INSTRUMENT					Table 1
Billion dollars per banking day	April 1989	April 1992	April 1995	April 1998	April 2001
Spot transactions	6.4	10.5	8.6	6.3	4.3
Outright forwards	1.3	2.0	1.5	1.1	0.7
FX swaps	5.5	14.4	19.7	19.9	18.3
Total foreign-exchange contracts	13.2	26.9	29.8	27.3	23.3

This article first describes the results of the Danish turnover survey, followed by a comparison with the global survey results. Box 1 presents sources, methods and definitions.

TURNOVER IN THE DANISH FOREIGN-EXCHANGE MARKET

According to the survey, turnover in the Danish foreign-exchange market totalled \$23.3 billion per banking day in April 2001, cf. Table 1. For comparison, gross current payments between Denmark and abroad amounted to \$1.1 billion per banking day in April 2001, or less than 5 per cent of daily turnover in the Danish foreign-exchange markets.

The difference between turnover in the foreign-exchange market and the sum of revenue and expenditure on the current account of the balance of payments reflects that foreign exchange is traded for other purposes besides the exchange of currency in connection with current payments to and from abroad. Investments and foreign loans as well as the liquidity and risk management of financial institutions and other business enterprises generate foreign-exchange trading, and the foreign-exchange markets are also used for taking actual positions or for arbitrage, cf. Box 2. Furthermore, each customer transaction usually generates a chain of trades between banks. This significantly inflates turnover, cf. Box 3.

In addition, it is important to bear in mind that turnover of FX swaps accounted for more than 75 per cent of total turnover in the foreign-exchange market in April 2001. To a certain extent FX swaps are used in combination with spot transactions to hedge exchange-rate risks.¹ In the Danish market, however, FX swaps are to a far greater extent used as a money-market product² than as an actual foreign-exchange instrument.

¹ A FX swap alone, which combines a spot transaction with an opposite forward transaction, does not affect a bank's foreign-exchange exposure, and thus cannot be used to hedge exchange-rate risk. However, by simultaneously entering into a spot transaction to offset the spot transaction included in the FX swap the same result is obtained as by entering into an outright forward. The incentive to use this hedging method, rather than hedging via an outright forward, could be that the spot and FX swap markets are more liquid than the market for outright forwards.

² The money market consists of loan agreements between banks for a period of up to one year. The loan agreements are designed to settle differences in the banks' liquidity requirements.

Current payments to and from abroad, including payments related to imports and exports of goods and services, will typically entail a need for at least one of the parties to exchange an amount in that party's own currency for the transaction currency.

Besides current payments, a large proportion of the activity in the foreign-exchange and derivatives markets is generated by the financial planning and risk management of financial institutions as well as other business enterprises. A business enterprise may thus use foreign-exchange or derivatives contracts to achieve the desired balance-sheet structure in terms of foreign-exchange and interest-rate exposure.

Many business enterprises have stipulated limits for their exchange-rate or interest-rate risks, i.e. the size of any losses arising as a result of exchange-rate or interest-rate fluctuation. If financial transactions (e.g. raising foreign loans at fixed interest rates or purchase of foreign shares) cause these limits to be exceeded, the business enterprise will be obliged to resort to foreign-exchange and derivatives contracts to hedge the excessive foreign-exchange and interest-rate exposure.

Naturally, foreign-exchange and derivatives contracts are also used to take positions so as to exploit expectations of future changes in exchange or interest rates. However, positions will also usually be taken within the aforementioned limits set for financial risks.

In the assessment of turnover of foreign exchange and derivatives it must also be borne in mind that business enterprises are subject to taxation and accounting legislation which may support or hinder their activities in the market. These rules vary strongly across sectors and countries. Most financial enterprises are also subject to solvency and placement rules, which likewise affect their exposure in the foreign-exchange and derivatives markets. Some countries have stipulated very restrictive rules, even prohibitions, concerning the use of foreign-exchange and derivatives contracts by certain institutional investors (e.g. pension funds and insurance companies).

Another factor contributing to turnover is financial innovation, i.e. the development of new financial products. The introduction of new products offers business enterprises new opportunities to adjust their risk exposure. A new product can thus increase the turnover of market participants that are already active, but it may also induce new enterprises to enter the market because the new product is well-suited to their financial management.

A bank in need of krone liquidity may enter into an FX swap with another bank rather than raising a krone-denominated loan via a repurchase agreement or deposit¹. This enables the bank to buy kroner spot against e.g. dollars, with simultaneous agreement of forward repurchase of dollars against kroner, i.e. at a later date at a fixed exchange rate. A FX swap thus corresponds to raising a loan in one currency against collateral pledged in another currency. Such transactions cannot be described as foreign-exchange trading in a narrow sense.

¹ A repurchase agreement is a loan against securities, typically bonds, as collateral. A deposit is an ordinary non-collateralised loan.

When a customer concludes a foreign-exchange transaction with its bank, this normally generates a chain of interbank transactions. For example, when a customer sells foreign exchange to its bank, the bank may not want to hold that currency and assume the associated exchange-rate risk. However, normally the bank will have no difficulty in selling the purchased foreign exchange in the very liquid foreign-exchange market. The bank may thus sell the currency to another bank (or to several banks in smaller portions), that needs the currency, is more willing to assume the exchange-rate risk, or sees an opportunity to resell the currency at a profit.

A similar situation applies when a customer wishes to hedge its exchange-rate risk by e.g. entering into a forward contract with its bank. The customer thus passes on its exchange-rate risk to the bank, which will then hedge the risk by entering into a contract with another bank, which again will hedge the risk in the foreign-exchange market, etc.

A simple foreign-exchange transaction thus typically generates a whole chain of foreign-exchange transactions, whereby the risk is passed on through the financial system until a bank is willing to hold the currency, or until a customer demands the currency in question.

Declining turnover in the foreign-exchange market

Turnover in the foreign-exchange market fell by 15 per cent from 1998 to 2001, cf. Table 1. This continues the trend from 1995 to 1998. However, the estimated decline in turnover in the foreign-exchange market is only 6 per cent after adjustment for the dollar's strengthening against other currencies between April 1998 and April 2001.¹ Spot and forward transactions have shown the strongest decline since 1998. Considering the dollar's course, the turnover of FX swaps is estimated to be almost unchanged.

The main factor behind the decline in spot and forward turnover can be assumed to be the introduction of the euro as the single currency in 12 EU member states. The lapse of trading between the currencies of these countries has naturally caused spot turnover to decline. Furthermore, the existence of a single currency has reduced the need to hedge exchange-rate risks, which is often via a forward contract or an FX swap combined with a spot transaction. The negative effect on FX swap turnover is nevertheless offset by the more widespread use of the FX swap as a money-market product, cf. above.

The observed decline in turnover from 1998 is attributable mainly to trading with other banks, particularly with foreign banks. This is found

¹ Adjustment for the development in the dollar rate is by isolating the foreign-exchange transactions not denominated in dollars. These amounts are adjusted for the difference between the average exchange rate against the dollar in April 1998 and April 2001, respectively.

TURNOVER IN THE FOREIGN-EXCHANGE MARKET BY COUNTERPARTY

Table 2

April	Billion dollars per banking day			Percentage share		
	1995	1998	2001	1995	1998	2001
<i>Reporting dealers</i>						
Danish	0.7	1.4	1.1	3	5	5
Foreign	25.2	20.1	16.3	85	74	70
<i>Other financial institutions</i>						
Danish	0.2	0.6	0.4	1	2	2
Foreign	0.2	2.9	2.8	1	11	12
<i>Non-financial customers</i>						
Danish	2.4	0.9	1.6	8	3	7
Foreign	1.1	1.2	1.1	4	4	5
Total	29.8	27.3	23.3	100	100	100

Note: The distribution on Danish and foreign counterparties is by counterparty location, irrespective of national ownership. For example, Danish reporting dealers are the banks that participate in the Danish survey, while foreign reporting dealers are the institutions that participate in the corresponding surveys of other countries.

inter alia to be a consequence of the global trend for greater consolidation in the banking industry, which has reduced the number of trading units.

Finally, the increased use of electronic broking in the foreign-exchange market has probably contributed to the decline in especially spot turnover. By traditional means of trading, dealers must obtain prices from potential counterparties e.g. by telephone, whereas this price information is immediately available in electronic broking systems. The increased use of electronic broking thus enhances market transparency, and fewer transactions are required to clear the prices offered in the market. Electronic broking is used mostly for spot transactions between banks. In April 2001, electronic broking accounted for approximately 50 per cent of spot turnover in Denmark.

Structure of foreign-exchange turnover

In April 2001, trading among reporting dealers accounted for 75 per cent of the total turnover of foreign-exchange contracts in the Danish market, cf. Table 2. The remainder is fairly evenly distributed on trades with other financial institutions and non-financial customers, respectively.

This distribution reflects primarily that FX swaps, which are mainly used as money-market products, and are thus primarily traded among banks, account for the greater part of turnover. Secondly, the distribution reflects that, as mentioned, a customer transaction often generates a chain of transactions between banks.

**TURNOVER IN THE FOREIGN-EXCHANGE MARKET
IN APRIL 2001 BY CURRENCY PAIR**

Chart 1

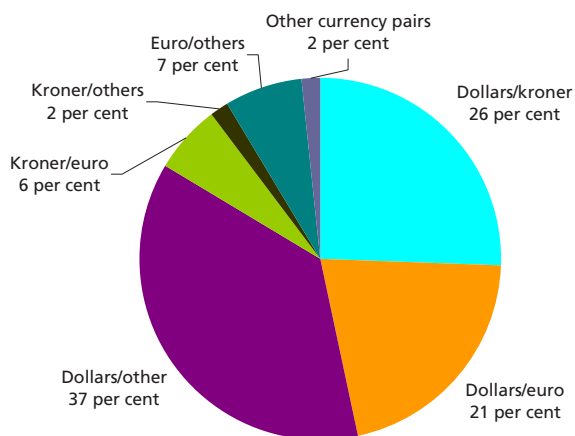


Chart 1 shows that foreign-exchange turnover is concentrated on relatively few currencies. The dollar was part of 84 per cent of all transactions in April 2001, which makes it the most actively traded currency in the Danish market. It is followed by Danish kroner and euro, each with a share of 34 per cent of all transactions. Finally, turnover in Swedish kronor and Norwegian kronor was also significant.¹

The dollar's predominance can be attributed to its use as a vehicle currency, i.e. a transaction between two currencies is often carried out by exchanging one of the currencies for dollars and then exchanging dollars for the other currency.

TURNOVER IN THE DANISH OTC DERIVATIVES MARKET

Single-currency interest-rate derivatives account for more than 90 per cent of turnover in the OTC derivatives market, and amounted to \$5.8 billion per banking day in April 2001. The market for currency derivatives is thus relatively small, with turnover amounting to \$0.5 billion per banking day in April 2001, cf. Table 3.

It must be emphasised that a very large proportion of the turnover of interest-rate derivatives takes place via exchanges, especially exchanges

¹ In the survey, all foreign-exchange transactions are registered as currency pairs. For example, kroner traded against dollars is registered as a krone/dollar transaction. On calculating each currency's *share* of total foreign-exchange turnover, the trading of kroner against dollars is registered on the krone as well as on the dollar side. The various currencies' shares of the total foreign-exchange turnover will therefore total 200 per cent.

TURNOVER IN THE OTC DERIVATIVES MARKET BY TYPE OF INSTRUMENT Table 3

Billion dollars per banking day	April 1995	April 1998	April 2001
Currency swaps	0.9	0.1	0.1
Currency options (OTC)	0.4	0.7	0.4
Total foreign-exchange derivatives	1.2	0.7	0.5
Forward rate agreements (FRAs)	2.0	3.4	4.1
Interest-rate swaps	0.2	0.7	1.5
Interest-rate options (OTC)	0.2	0.1	0.2
Total interest-rate derivatives.....	2.4	4.2	5.8
Total OTC derivatives.....	3.7	4.9	6.3

abroad.¹ Since this survey solely comprises OTC contracts, the reported turnover constitutes only part of Danish banks' total turnover of interest-rate derivatives.

Rising turnover in the market for interest-rate derivatives

Turnover of interest-rate derivatives has risen by 39 per cent from 1998. In fixed exchange rates, however, the real increase in turnover is estimated to be no less than 63 per cent.

Interest-rate swaps account for the strongest increase, with average daily turnover more than doubling since April 1998. This is a continuation of the trend from 1995 to 1998. The increase in swap turnover is attributable mainly to the tomorrow/next interest-rate swap, which is a short-term interest-rate swap introduced in the Danish market in 1997². The tomorrow/next interest-rate swap has boosted activity by offering new opportunities to hedge interest-rate risk and exploit expectations of future developments in interest rates.

FRA turnover has risen by 22 per cent against April 1998. As before, FRAs account for by far the largest share of turnover of interest-rate derivatives. However, because of the significant increase in swap turnover, FRAs' share of the total turnover of interest-rate derivatives has decreased from approximately 80 per cent in April 1998 to 70 per cent in April 2001.

Structure of trading in interest-rate derivatives

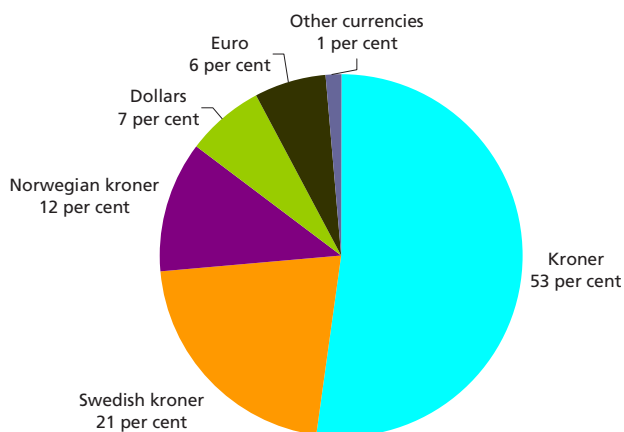
Like the foreign-exchange market, the market for interest-rate derivatives is dominated by trades among reporting dealers, cf. Table 4. Trades

¹ Derivatives traded via exchanges are standardised contracts which cannot be customised to meet individual requirements. The all-important exchange-traded derivatives are options and futures, where the latter in principle correspond to forward contracts.

² The tomorrow/next interest-rate swap is described in further detail in Birgitte Damm and Anne Reinhold Pedersen, New Money-Market Statistics, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 1997.

**TURNOVER IN THE OTC INTEREST-RATE DERIVATIVES MARKET
IN APRIL 2001 BY CURRENCY**

Chart 2



among reporting dealers have been the sole contributor to the increase in turnover since 1998, while trades with other financial institutions and non-financial customers have declined a little. Trades among reporting dealers thus accounted for approximately 80 per cent of the total turnover in April 2001, against 70 per cent in 1998.

Instruments pegged to a Danish interest rate account for more than 50 per cent of turnover in the Danish market for OTC interest-rate derivatives, cf. Chart 2. However, instruments pegged to a Swedish or Norwegian interest rate are also significant. As stated, the survey solely com-

TURNOVER IN THE OTC DERIVATIVES MARKET BY COUNTERPARTY

Table 4

April	Billion dollars per banking day			Percentage share		
	1995	1998	2001	1995	1998	2001
<i>Reporting dealers</i>						
Danish	0.3	0.8	1.0	8	17	16
Foreign	2.8	2.7	4.0	77	54	63
<i>Other financial institutions</i>						
Danish	0.1	0.1	0.2	2	3	3
Foreign	0.1	0.8	0.7	3	17	12
<i>Non-financial customers</i>						
Danish	0.3	0.1	0.1	7	2	2
Foreign	0.2	0.3	0.2	4	7	4
Total.....	3.7	4.9	6.3	100	100	100

Note: The distribution on Danish and foreign counterparties is by counterparty location, irrespective of national ownership. For example, Danish reporting dealers are the banks that participate in the Danish survey, while foreign reporting dealers are the institutions that participate in the corresponding surveys of other countries.

prises OTC contracts. Had it included exchange-traded derivatives, the turnover shares of dollar- and euro-denominated contracts would have been considerably larger.

GLOBAL TURNOVER OF FOREIGN EXCHANGE AND DERIVATIVES

According to the global survey coordinated by BIS¹, in April 2001 turnover in the global foreign-exchange market amounted to \$1,210 billion per banking day, while turnover in the global market for OTC derivatives totalled \$575 billion per banking day, cf. Table 5.

To supplement the 48 national surveys of the markets for OTC derivatives, BIS has obtained information on turnover of exchange-traded derivatives from a range of exchanges. Table 5 shows that exchange trading of foreign-exchange derivatives is modest, while exchange trading of interest-rate derivatives far exceeds OTC trading.

Declining foreign-exchange turnover and rising turnover in interest-rate derivatives

Since 1998, the global markets have taken the same course as the Danish markets, although the international development trends have been stronger. Global foreign-exchange trading has thus decreased by almost 20 per cent against 1998, while derivatives trading has increased by 53 per cent. This includes an increase of 85 per cent in isolated terms in turnover of interest-rate derivatives, but a decrease by more than 30 per cent in turnover of foreign-exchange derivatives. Taking the dollar's course into account, total foreign-exchange trading has decreased by only 14 per cent, while derivatives trading has increased by 67 per cent.

BIS finds that the drop in global foreign-exchange trading is derived from the same factors as those assumed to explain the decline in Danish trading, i.e. the introduction of the euro, consolidation in the global banking industry, and the more widespread use of electronic broking.

These factors appear to have had a stronger impact on total global turnover than on Danish turnover, viewed in isolation. Naturally, the introduction of the euro has had a stronger impact on turnover in the euro-area member states than on Danish turnover. The majority of euro-area member states have thus seen a significant decline in turnover of foreign exchange, and in overall terms foreign-exchange trading in the euro area has fallen by approximately 30 per cent against 1998.

¹ See BIS, Press Release of 9 October 2001.

**TURNOVER IN THE GLOBAL MARKETS FOR FOREIGN EXCHANGE AND
DERIVATIVES BY TYPE OF INSTRUMENT**

Table 5

Billion dollars per banking day	April 1989	April 1992	April 1995	April 1998	April 2001
Spot transactions.....	317	394	494	568	387
Outright forwards.....	27	58	97	128	131
FX swaps.....	190	324	546	734	656
Total foreign-exchange contracts.....	590	820	1.190	1.490	1.210
Currency swaps.....	...	...	4	10	7
Currency options.....	...	...	41	87	60
Other foreign-exchange derivatives.....	...	...	1	0	0
Total foreign-exchange derivatives.....	...	...	45	97	67
Forward rate agreements (FRAs).....	...	...	66	74	129
Interest-rate swaps.....	...	...	63	155	331
Interest-rate options (OTC).....	...	...	21	36	29
Other interest-rate derivatives.....	...	...	2	0	0
Total interest-rate derivatives.....	...	...	151	265	489
Total OTC derivatives.....	...	...	200	375	575
Exchange-traded foreign-exchange derivatives.....	...	...	17	12	9
Exchange-traded interest-rate derivatives.	...	...	1.205	1.360	2.200
Total exchange-traded derivatives.....	...	...	1.222	1.372	2.209

Note: Total turnover in the foreign-exchange and derivatives markets is adjusted for the fact that the reported turnover does not cover 100 per cent of global turnover.

Source: BIS, Press Release of 9 October 2001.

Moreover, it should be noted that the decline in turnover in both the Danish and the global foreign-exchange markets is attributable primarily to a decrease in spot turnover, while the turnover of FX swaps was somewhat weaker. FX swaps account for a considerably larger proportion of the turnover of the Danish foreign-exchange market than of the global market, which may contribute to explaining the smaller decrease in turnover of foreign exchange in the Danish market than in the global market.

As in the Danish market, the greater interest-rate swap activity has lent momentum to the growth in global turnover of interest-rate derivatives. Global turnover of interest-rate swaps has thus risen by 114 per cent against 1998. Dollar- and euro-denominated swaps accounted for the largest increases. According to BIS, the growth in dollar-denominated swaps can be attributed mainly to the less liquid market for long-term US government bonds than before, and to the fact that interest-rate swaps constitute an alternative, more effective instrument for hedging and taking positions. The explanation for the increase in trading of euro-

denominated swaps is that since the introduction of the euro a large liquid market for euro-denominated interest-rate swaps has emerged.

Global turnover of FRAs has risen by almost 75 per cent since 1998, which is a somewhat higher increase than in Denmark. However, this should be viewed in the light of the somewhat stronger increase in turnover of FRAs in Denmark than in the global market between 1995 and 1998.

Structure of global turnover

The proportion of global foreign-exchange trading taking place between reporting dealers was 59 per cent in April 2001, which is a smaller proportion than in 1998. The decrease is attributable mainly to the more widespread use of electronic broking in the interbank market and the consolidation of the global banking industry, cf. above. The proportion of customer transactions has likewise decreased to 13 per cent of turnover. On the other hand, trading with other financial institutions has gained ground. According to BIS, the reason is an increase in foreign-exchange trading with asset managers, while hedge funds' foreign-exchange activities are found to have decreased since the previous survey in 1998.

Like the Danish market, the global market for interest-rate derivatives is dominated by trading between reporting dealers. In April 2001, this trading accounted for 66 per cent of turnover, while customer transactions accounted for a modest share of 5 per cent.

Dollar-denominated transactions are even more dominant in global foreign-exchange trading than in the Danish market. In April 2001, the dollar was part of 90 per cent of trades in the global foreign-exchange markets, followed by euro and Japanese yen with trading shares of respectively 38 and 23 per cent.¹

The euro dominates the global markets for interest-rate derivatives, followed by the dollar. In April 2001, 47 per cent of traded interest-rate derivatives were related to an interest rate denominated in euro, and approximately 30 per cent to a dollar-denominated interest rate. The euro plays a particularly dominant role in the market for interest-rate swaps.

Turnover in the national markets

The UK still constitutes by far the largest market for both foreign exchange and derivatives, cf. Table 6. In both cases the UK market is greater than the 2nd and 3rd ranking markets together. Denmark ranks 13th with regard to both the foreign-exchange and derivatives market, with shares of respectively 1.4 and 0.8 per cent of global turnover.

¹ See note 1, p. 59.

TURNOVER IN THE 20 LARGEST MARKETS IN APRIL 2001

Table 6

Turnover of foreign exchange per banking day	Billion dollars	Percentage share	Turnover of OTC derivatives per banking day	Billion dollars	Percentage share
UK	504	31.1	UK	275	36.0
USA	254	15.7	USA.....	135	17.7
Japan	147	9.1	Germany	97	12.7
Singapore	101	6.2	France.....	67	8.8
Germany	88	5.4	Netherlands	25	3.3
Switzerland	71	4.4	Italy	24	3.1
Hong Kong	67	4.1	Japan.....	22	2.9
Australia	52	3.2	Spain	21	2.7
France	48	3.0	Switzerland.....	15	2.0
Canada.....	42	2.6	Belgium.....	14	1.8
Netherlands	30	1.9	Canada.....	13	1.7
Sweden	24	1.5	Australia.....	12	1.6
Denmark.....	23	1.4	Denmark.....	6	0.8
Italy.....	17	1.0	Singapore.....	6	0.8
Luxembourg.....	13	0.8	Ireland.....	6	0.8
Norway.....	13	0.8	Luxembourg.....	5	0.7
Belgium.....	10	0.6	Austria.....	5	0.7
Korea	10	0.6	Hong Kong.....	4	0.5
Russia	10	0.6	Sweden.....	4	0.5
South Africa.....	10	0.6	Norway.....	3	0.4

Source: BIS, Press Release of 9 October 2001.

It should be noted that Japan accounted for 2.9 per cent of derivatives trading in April 2001. This is a considerable reduction from its 8.8 per cent of turnover in 1998. The relatively weak activity in the Japanese derivatives market in April 2001 can be attributed to widespread expectations at that time that for the foreseeable future Japanese interest rates would evolve in a very narrow band.

The ranking in Table 6 changes when each country's turnover is viewed in relation to the size of its economy. In GDP terms, the UK, Singapore and Luxembourg constitute the largest markets for foreign exchange and derivatives, while countries such as the USA, Japan and Germany are placed much lower on the list. In GDP terms, Denmark's foreign-exchange market is the 8th largest in the world, while its derivatives market is the 10th largest.

Firstly, this reflects the concentration of foreign-exchange and derivatives market activities in the financial centres, with London as the biggest centre by far. Secondly, in relative terms, foreign-exchange trading is naturally greater in small, open economies like Denmark than in larger and less open economies such as the USA and Japan. Furthermore, a larger proportion of the major countries' trading is invoiced in the national currency. This reduces the need to trade foreign exchange and hedge exchange-rate risks as a consequence of foreign trade.

Gridlock Resolution in Payment Systems

Morten Linnemann Bech, Payment Systems, and Kimmo Soramäki, Bank of Finland.

INTRODUCTION

During the last few decades, most industrialised countries have introduced real-time gross settlement (RTGS) systems for settlement of large, time-critical inter-bank payments. Denmark was among the first; the DN Inquiry and Transfer System was introduced in 1981, and in 1999 DEBES, as part of TARGET¹, was launched for euro² payments. The two Danish systems were integrated in connection with the implementation of KRONOS on 19 November 2001.

In an RTGS system, payments are settled individually in real time, and the payments are final and irrevocable upon settlement. The advantage of RTGS systems is that they eliminate the credit risks and also the consequential potential systemic risk associated with other types of payment systems such as netting systems. A drawback of RTGS systems is that, compared to netting, the liquidity requirements increase when the payments are settled individually in real time. Mobilising the required liquidity imposes costs on the banks, and all other things being equal, the banks have an incentive to economise on liquidity and may prefer to wait for incoming payments before sending their own payments. This can lead to delays and *gridlocks*, i.e. situations where several payments each await settlement of the others.

This article describes the phenomenon of gridlock in relation to payment systems, and discusses a resolution mechanism that has been implemented in connection with KRONOS. The results of a number of simulations using actual data from Denmark and Finland are also presented in order to quantify the effects of the gridlock resolution mechanism.

GRIDLOCKS IN PAYMENT SYSTEMS

From time to time, banks have insufficient liquidity on their settlement accounts at Danmarks Nationalbank to settle payments in KRONOS at the

¹ Trans-European Automated Real-Time Gross Settlement Express Transfer System.

² See Angelius, Hansen and Mærsk (1998), and Berg and Christensen (1999).

same pace as payment orders are received from customers or as a result of the banks' proprietary operations in the currency, securities and money markets. Insufficient liquidity to settle these transactions on an individual basis leads to settlement queues. Delays in payments might not only be costly for the bank with insufficient liquidity, but also to other banks because of the recycling of liquidity in an RTGS system. In most RTGS systems the majority of the liquidity used for settling payments comes in the form of incoming payments, and a delay in receiving these might cause liquidity problems for other banks in the system.

Such formations of queues are referred to as *gridlocks* if the formation of queues can be attributed to the requirement for payments to be settled individually. If the formation of queues can be attributed to a lack of liquidity, they are referred to as *deadlocks*. These concepts and a description of how gridlocks may be resolved are illustrated in the following example. General definitions of gridlock, deadlock and the gridlock resolution problem are given in the appendix.

EXAMPLES OF GRIDLOCK AND DEADLOCK

Assume that there are three banks: A, B and C, which are to send payments to each other. Chart 1 illustrates three situations: no queue, gridlock and deadlock.

In the first instance, bank A has kr. 15 on its settlement account and must send exactly kr. 15 to bank B, which in turn has kr. 5 at its disposal and must send kr. 20 to bank C. Finally, bank C has kr. 10 on its settlement account and must send kr. 25 to bank A. In this situation the payment "circle" presents no problems, provided that bank A decides to send its payment.

In the second instance, bank A's settlement account balance has been reduced by kr. 5, and bank B's funds have been increased equivalently. In other words, the overall liquidity in the system is the same as in the first instance. However, this exchange of liquidity between the two banks means that the payments circle now cannot be settled.

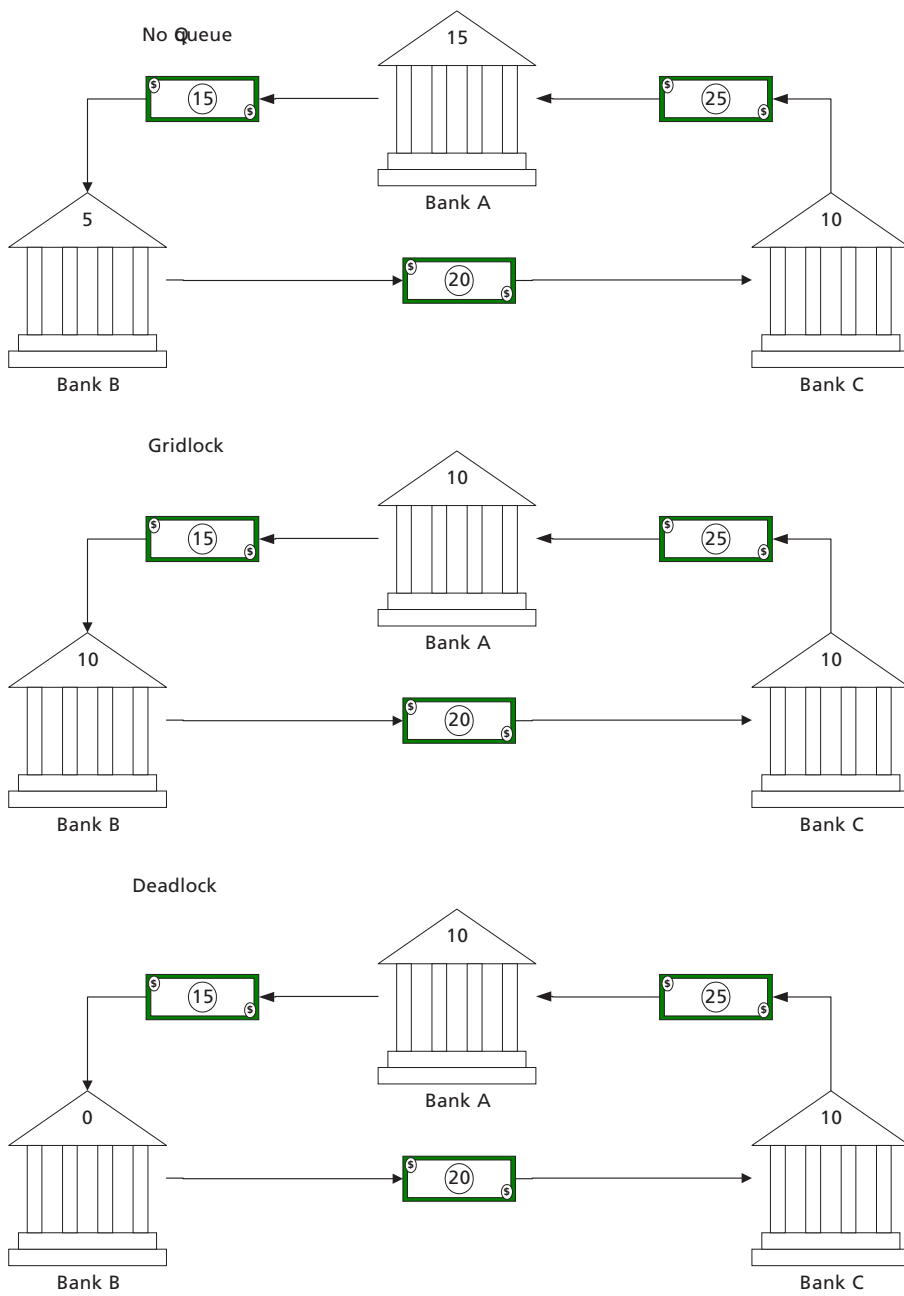
This problem arises even though all banks will have a positive balance in their settlement accounts once all payments have been effected. In other words, the system is gridlocked, as transactions are mutually awaiting each other.

A gridlock can be resolved by settling the payments simultaneously, i.e. as one block at the same time. Hereby, the banks' balances can be calculated *ex ante*, and overdrafts can be avoided *ex post*.

However, the payments are still credited and debited individually to the banks' settlement accounts. In the example, the banks will have de-

GRIDLOCK AND DEADLOCK

Chart 1



posits of respectively kr. 20 (bank A), kr. 5 (bank B) and kr. 5 (bank C) if the payments are settled simultaneously.

In the third instance, bank B has no money in its settlement account, and the payments circle cannot be effected, even if the payments were settled simultaneously. Bank B would end up with a kr. 5 overdraft. This

creates a system deadlock, as more liquidity is required before settlement can take place.

This example illustrates that a gridlock may be resolved by settling the payments simultaneously, or by one or more banks supplying additional liquidity to the system. A deadlock, however, can only be resolved via an additional supply of liquidity. In the example, resolution of the deadlock would as a minimum require that bank B mobilised kr. 5. In that case it would be possible to settle the payments simultaneously, whereas bank A would also have to mobilise kr. 5 if payments were to be settled individually.

GRIDLOCK RESOLUTION

In the real world, the number of both banks and payments is naturally greater than three, and the problem of identifying and resolving gridlocks can become fairly complex. For practical purposes, gridlock resolution requires that the central bank has access to information about pending payments. For instance, banks may use a built-in queuing feature in the RTGS system.

The challenge for optimal resolution is to find the largest subset of pending payments that can be settled without any bank ending up with an overdraft (or if an overdraft facility is available as in Kronos, exceeding the overdraft limit). Furthermore, banks often wish to settle payments in a specific order, as some payments are more important than others. The central bank thus cannot pick and choose among pending payments, but must respect the priorities defined by the banks.

The Department of Informatics and Mathematical Modelling at the Technical University of Denmark has assisted Danmarks Nationalbank in developing an algorithm to resolve this problem. On the basis of the payments queued in KRONOS, the algorithm selects the largest subset which can be settled simultaneously without any bank incurring an overdraft and without deviating from the banks' requested settlement order.

The algorithm always finds the optimum solution and is fair in that the solution does not favour any bank(s). Moreover, the algorithm is so fast that settlement of payments is not delayed as a result of Danmarks Nationalbank's attempts to resolve the gridlock. The algorithm has been described by Bech and Soramäki (2001).

SIMULATIONS

The purpose of simulations is firstly to illustrate the relationship between the liquidity available within the system and the delay of pay-

ments, and secondly to illustrate the effect of implementing the above gridlock resolution mechanism.

Simulations were conducted by running 3-4 months of actual payments data from the Danish and Finnish systems through a computer program that simulates the handling and bookkeeping of payments in an RTGS system¹. The simulations comprise a number of different scenarios for each country, with varying liquidity available to the participants and with the mechanism activated or deactivated.

The liquidity available is measured relative to an upper and a lower bound. The lower bound (LB) corresponds to the liquidity required by the system if all payments are to be settled collectively at the close of the day. In other words, the lower bound corresponds to the liquidity requirement in a netting system with end-of-day settlement. The upper bound (UB), on the other hand, is the amount of liquidity required to settle all payments immediately. Six liquidity levels were operated with for simulation purposes. They were calculated as follows:

$$L(\alpha) = UB - \alpha(UB - LB) \quad (1)$$

where $\alpha = \{ 0, 0.2, 0.4, 0.6, 0.8, 1 \}$. A liquidity level below the lower bound implies that some payments cannot be settled, and a liquidity level above the upper bound implies that the additional liquidity is never used. In the simulations below the liquidity available has been calculated as a percentage of the total value of transactions in the course of the day.

The delay in the settlement of payments was calculated using an indicator, ρ^2 . If all payments are settled immediately, $\rho = 0$, whereas $\rho = 1$ if all payments wait until the close of the day. The expected trade-off between liquidity and delay is illustrated in Chart 2. It is easiest to read the chart by starting with a liquidity level equivalent to the upper bound and then looking at the consequences of reducing the liquidity by approaching the lower bound.

The marginal increase in the delay is seen to rise as liquidity is reduced, and *ceteris paribus* the indicator for delay (y-axis) is lower in systems with a gridlock resolution mechanism. In addition, the effect of gridlock resolution is expected to be greater when liquidity is scarce.

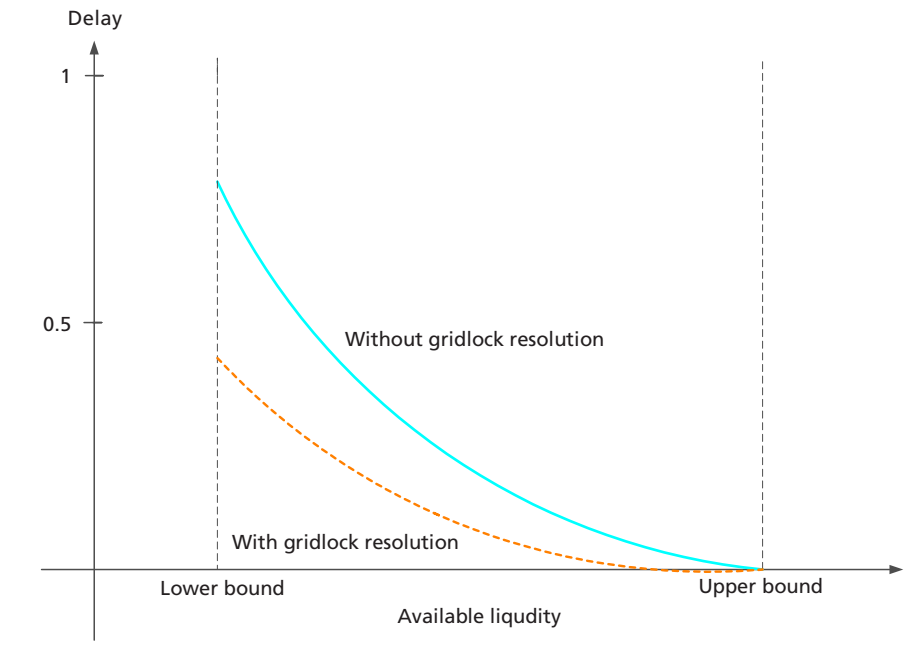
DATA

Simulations were made with data from both the DN Inquiry and Transfer System and the Finnish BoF³-RTGS system. The DN Inquiry and Transfer

¹ For a description of the simulator used, see Koponen and Soramäki (1999).

² See Bech and Soramäki (2001) for a detailed description of the delay indicator ρ .

³ Bank of Finland.



System is the former RTGS system for Danish kroner, while BoF-RTGS is part of TARGET and therefore operates in euro.

DN Inquiry and Transfer System

The Danish data set comprises account entries from the last three months of 1999, equivalent to 64 business days. The data set purely comprised transfers between settlement accounts, and not e.g. transfers to the special settlement accounts used in connection with the daily settlements in the Danish Securities Centre (VP) and the retail clearing¹. In the period analysed, 146 settlement-account holders sent or received payments. Daily turnover fluctuated between kr. 10 billion and kr. 103 billion, with a daily average of kr. 63 billion. The low turnover on some days could be attributed to Christmas and New Year. The number of payments settled per day fluctuated between 490 and 2,342, with an average of 925. There was a high degree of concentration in that the three largest participants accounted for almost 90 per cent of the total value of the payments.

¹ See Financial Institutions' Accounts at and Pledging of Collateral to Danmarks Nationalbank, page 23 of this *Monetary Review*.

TURNOVER IN DN INQUIRY AND TRANSFER SYSTEM AND BoF-RTGS							Table 1
Billion euro	DN			BoF-RTGS			
	Min.	Max.	Avg.	Min.	Max.	Avg.	
Individual transaction.....	0.001	1,227	10	0.001	2,098	10	
Daily turnover.....	1,358	13,783	9,352	4,638	32,718	15,045	
Daily no. of transactions	490	2,342	925	558	1,872	1,428	

Source: Own calculations.

BoF-RTGS

The Finnish data set comprises account entries from the last 100 banking days of 2000. The Finnish system had 13 participants in the period analysed, and the number of account holders was thus considerably lower than in Denmark. In Finland, the respective associations of savings banks and co-operative banks act as central clearing institutes for their members. This reduces the number of direct members of the Finnish system.

Daily turnover in the Finnish system fluctuated between euro 4.6 billion and euro 32.7 billion, with an average of euro 15 billion. Approximately 32 per cent of the turnover was related to cross-border TARGET payments.

The number of payments per day fluctuated between 558 and 1,872, with an average of 1,428. These figures did not include transfers in connection with the Finnish equivalent of the retail clearing, and cross-border TARGET payments to and from the Bank of Finland. The average turnover in the Finnish system was thus somewhat greater than in the Danish system, cf. Table 1. Average payments were in the same size range in the two systems, i.e. approximately euro 10 million or kr. 74 million.

RESULTS

When interpreting the results of the simulations it is important to bear in mind that data reflects the banks' choices as to e.g. timing of payments on a given day, taking into account the liquidity available. It is therefore highly probable that these choices would be different under other circumstances.

On average, the lower bound totalled respectively 10.7 per cent and 4.3 per cent of the total value of transactions for the Danish and Finnish systems, cf. Table 2. The corresponding upper bounds were 37.2 per cent and 27.4 per cent. For both countries, the span between the upper and lower bounds was in the range of 25 percentage points, which illustrates that an RTGS system requires considerably more liquidity than a netting

UPPER AND LOWER LIQUIDITY BOUNDS Table 2

Billion euro	DN			BoF-RTGS		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Upper liquidity bound	634	4,925	3,421	639	5,957	2,746
- in per cent of payment flow	29.2	50.7	37.2	15.9	48.9	27.4
Lower liquidity bound	269	2,276	958	11	3,233	423
- in per cent of payment flow	4.1	24.0	10.7	0.1	26.6	4.3

Note: The lower bound equals the liquidity requirement in a netting system with end-of-day settlement.
 The upper bound equals the liquidity requirement in an RTGS system with immediate settlement of all payments.
 Source: The table is based on data from the 4th quarter of 1999 for the DN Inquiry and Transfer System, and for BoF-RTGS the period from September up to and including December 2000.

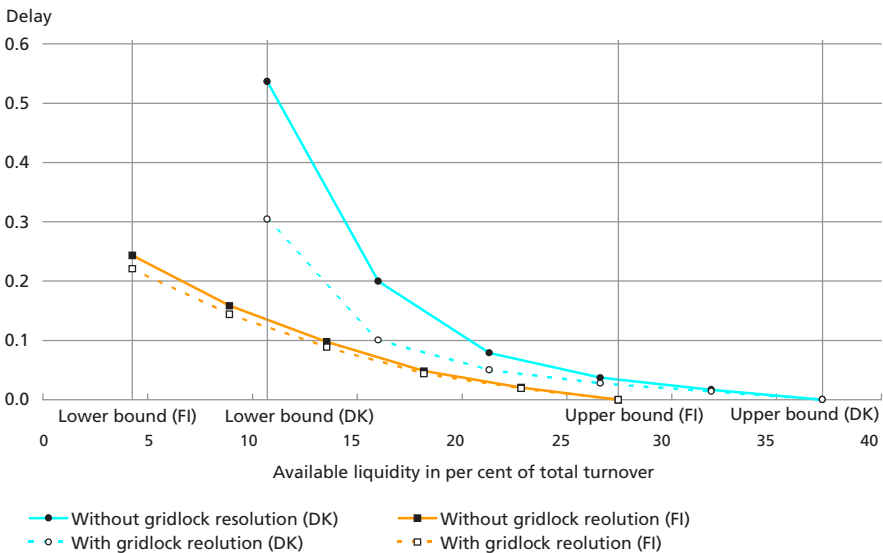
system to be able to settle the same volume of payments. On the other hand the payments are settled much sooner.

The lower values for both the lower and upper bounds for the Finnish system are, among other things, attributable to the smaller number of participants. This means that liquidity is spread among fewer participants and is thereby, all other things being equal, re-used to a higher degree during the day.

Trade-off between liquidity and delay

The average trade-off between liquidity and delay for the two possible system configurations is shown in Chart 3. The horizontal axis shows the liquidity available within the system relative to the total value of transactions on the day in question. The vertical axis shows the delay indicator, ρ , described above.

TRADE-OFF BETWEEN LIQUIDITY AND DELAY Chart 3



All simulated curves are convex, reflecting the expected decrease in the marginal effect of increased liquidity in terms of delayed settlement of payments. As Chart 3 also illustrates, the proposed gridlock resolution mechanism reduces this delay in payments settlement at all liquidity levels. The greatest reduction is achieved in a situation with very scarce liquidity. Moreover, the mechanism is seen to be considerably more effective in the Danish system than in the Finnish system.

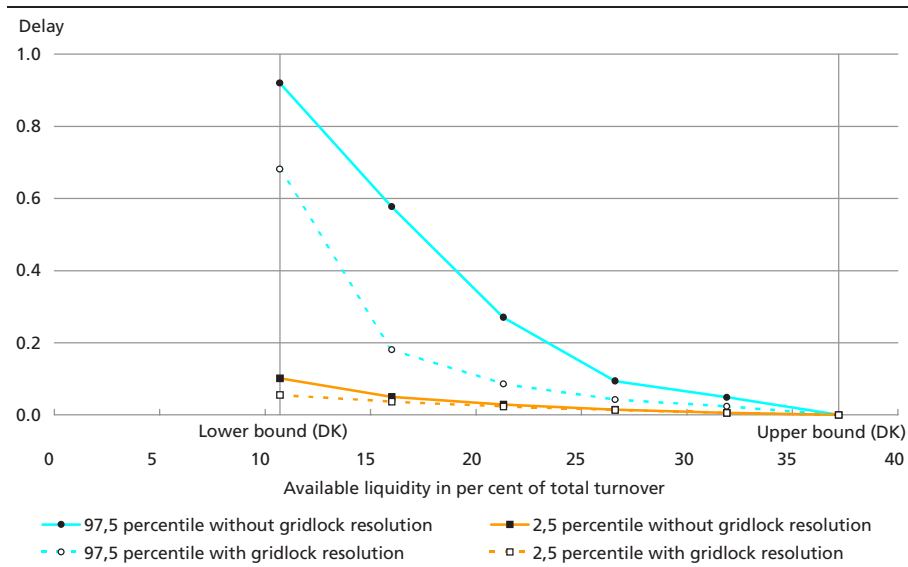
One reason for this is that the Finnish system is part of TARGET. This means that a number of the payments sent by Finnish banks via BoF-RTGS are to banks in other European countries. As payments arriving from the TARGET network do not queue in BoF-RTGS, these payments were never included in the gridlock resolution as they were settled immediately. This means that from a liquidity point of view, out-going cross-border payments are a dead weight in terms of gridlock resolution.

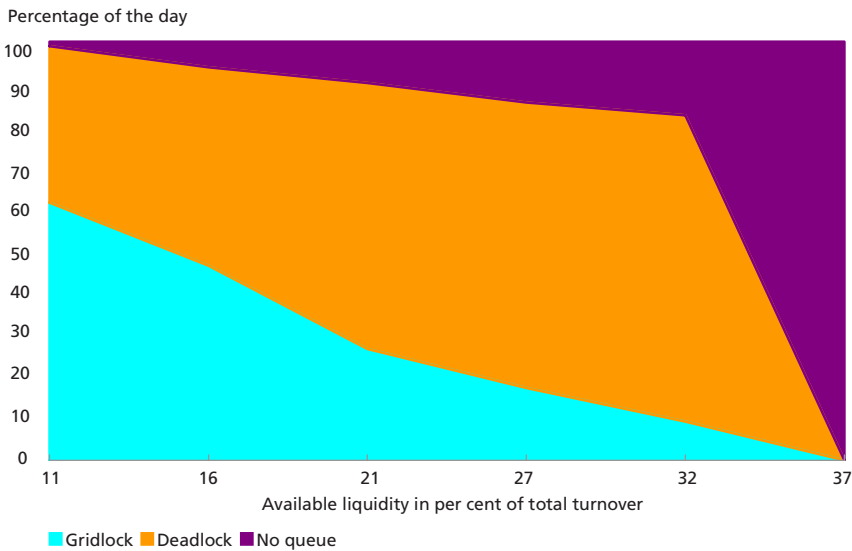
Not only does the delay increase when system liquidity is reduced, the variation in the delay from day to day also increases. This is illustrated for the Danish system in Chart 4, where the variation in the delay is measured as the span between the 2.5 and 97.5 percentiles for daily delays.

The span increases as liquidity is reduced. This reflects the fact that scarce liquidity affects settlement differently from day to day. On some days it is of no importance, as the 2.5 percentile only increases marginally when liquidity is reduced. On other days, however, considerable delays occur, which is reflected in a significant increase in the 97.5 per-

VARIATION IN DELAY

Chart 4





centile when liquidity becomes scarce. The gridlock resolution mechanism is found to considerably reduce the number of "problematic" days, i.e. days when settlement is delayed considerably.

In addition to quantifying the trade-off between liquidity and delay, the simulations also describe the state of the system, cf. Chart 5. The Chart shows the percentage of the day when the system respectively has no queues, is gridlocked or is deadlocked. At the upper bound, by definition there is no queue at any time of the day. As liquidity is reduced, first primarily deadlocks begin to appear as only few transactions are queued. Later on, the number of gridlocks increases as more transactions are queued and some of them mutually await each other's settlement.

At the lower bound, the Danish system is gridlocked for more than 60 per cent of the day. In a system with a gridlock resolution mechanism, the system either has no queues, or is in a deadlock, which can only be resolved by supplying additional liquidity.

SUMMARY

In an RTGS system, situations may arise where payments mutually await each other's settlement. Such delays in the settlement of payments can be reduced by using a suitable algorithm. Simulation runs using Finnish and Danish data showed that the algorithm implemented in KRONOS can reduce such delays, especially on days with scarce liquidity.

At present, gridlocks are not deemed to be a major problem in the Danish system. This view is supported by the fact that close to 80 per cent of DN Inquiry and Transfer System payments were settled by noon on a normal day¹. The reason is that the banks have considerable bond holdings, which can be used as collateral, so that the alternative cost of raising liquidity is assessed to be relatively low on a normal day.

However, the situation may be changing. The trend is for the banks to have to provide collateral in a growing number of cases and that they must be able to raise liquidity at shorter notice. Consequently, it is not improbable that we may see 'crisis' days or periods of the day where liquidity is scarce. In this type of situation, the simulations show that the gridlock resolution mechanism is effective in preventing delays in the settlement of payments and in ensuring smoother operation of the payment system.

¹ See Financial Stability, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2001, page 77.

APPENDIX

In order to provide a formal definition of gridlock, deadlock and the gridlock resolution problem, a little mathematical notation is necessary. Assume that there are n banks, and let Q_i be the set of payments in bank i 's queue. The total queue in the RTGS system is expressed as $Q = \cup_{i=1}^n Q_i$. In the same way, the subset of payments to be settled simultaneously is expressed as $X = \cup_{i=1}^n X_i$, where X_i is the contribution from the individual bank's queue. The ex ante and ex post balances including overdraft facilities on the individual bank's settlement account are expressed as B_i and $B_i(\circ)$, respectively. The value of the payments received by bank i is expressed as $R(X_{-i})$, and the value of the payments remitted by bank i is expressed as $S(X_i)$. Let \succ_i express the preference relation for bank i in terms of the order in which payments are to be settled.

Definition 1 (Gridlock)

A *gridlock* is a situation where $Q \neq \emptyset$ and there is a non-empty subset $X \subseteq Q$, which means that if the payments in X are settled simultaneously, then

$$B_i(B_i, X) = B_i - S(X_i) + R(X_{-i}) \geq 0, \quad \text{for } i = 1, \dots, n \quad (2)$$

and

$$\forall x \in X_i \nexists q \in Q_i \setminus X_i \text{ so that } q \succ_i x, \quad \text{for } i = 1, \dots, n \quad (3)$$

The first condition (the liquidity condition) stipulates that if the payments in X are settled simultaneously, the ex post balance would not be negative for any bank. The ex post balance is expressed as the ex ante balance less the value of payments remitted by bank i $S(X_i)$ plus the value of payments received by bank i $R(X_{-i})$. The second condition stipulates that the priority by which banks want payments to be settled must be observed.

Definition 2 (Deadlock)

A *deadlock* is a situation where $Q \neq \emptyset$, and X , as defined in definition 1, is empty, i.e. $X = \emptyset$

The gridlock resolution problem consists of selecting the largest possible subset of payments queued that can be settled simultaneously without breaking any of the two conditions in equations (2) and (3).

Definition 3 (Gridlock resolution)

Let $V(X)$ express the value or number of transactions in X . The gridlock resolution is $\max_{X \in Q} V(X)$, provided that the liquidity condition stated in (2) and the priority condition stated in (3) are observed.

The solution to the problem in definition 3 is the same whether the value or the number of transactions is applied.

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Argentina's Crises

Morten Roed Sørensen, International Relations

INTRODUCTION

Argentina is in the throes of a recession that has lasted for more than 3 years. In 2001, the IMF has had to grant Argentina two loans to ensure that the foreign debt could be serviced. A steady build-up of debt during the 1990s has contributed to the impending suspension of payments. The foreign government debt has gradually reached a level where its sustainability has repeatedly been questioned.

Regrettably, the present crisis is by no means a unique event in the economic history of Argentina – in fact, crises have come in rapid succession throughout most of the 20th century.

This was hardly the development anticipated in the early 1900s. At that time, Argentina was among the richest countries in the world, and the favourable economic climate attracted both immigrants and capital. In several ways the Argentina of that time resembled Denmark. Incomes were at more or less the same level, and the wealth of both countries was based on agricultural exports.

As the century progressed, the comparison between Denmark and Argentina has become increasingly irrelevant. In Argentina's case it was a period characterised by significant relative economic decline. In 1913, Argentina ranked among the top 15 nations in the world in terms of wealth, on a par with e.g. Italy. In 1999, it ranked 56th, at the level of e.g. Hungary and the Czech Republic (Maddison 1989 and World Development Report 2001).

This article outlines Argentina's unusual economic history through the last 100 years, focusing on the successive crises seen in this period.

ECONOMIC GROWTH IN THE 20TH CENTURY

At the beginning of the 20th century Argentina's position was favourable. The Pampas – a large, fertile plain – gave the agricultural sector good conditions and were the basis for strong, export-oriented growth within primary produce (mainly wool, wheat, maize and beef). As the

ARGENTINA'S GDP PER CAPITA RELATIVE TO 16 OECD COUNTRIES¹

Table 1

Per cent	1900	1913	1929	1950	1973	1987	2000
Argentina's relative GDP per capita	71	80	75	65	47	32	45

Note: Adjusted for differences in purchasing power. The 2000 figure relates to GNP per capita. The present recession is not yet fully reflected in the figures. Thus Argentina's relative level in 2001 must be expected to be lower than the 2000 level.

Source: Maddison (1989, p. 19) and World Development Report 2002 for the year 2000.

¹ Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom and USA. Unweighted average.

country was also short of both people and capital, the high yields on these resources brought massive immigration and high investment rates. The population increased from 3.3 million in 1890 to 7.5 million in 1913, corresponding to average annual growth of 3.5 per cent. In the same period, the capital stock grew by 4.8 per cent annually (Taylor 1992). The standard of living was also high. At the turn of the century, Argentina's GDP per capita was 71 per cent of the average for 16 present OECD countries, cf. Table 1. By 1913, this figure had increased to 80 per cent.

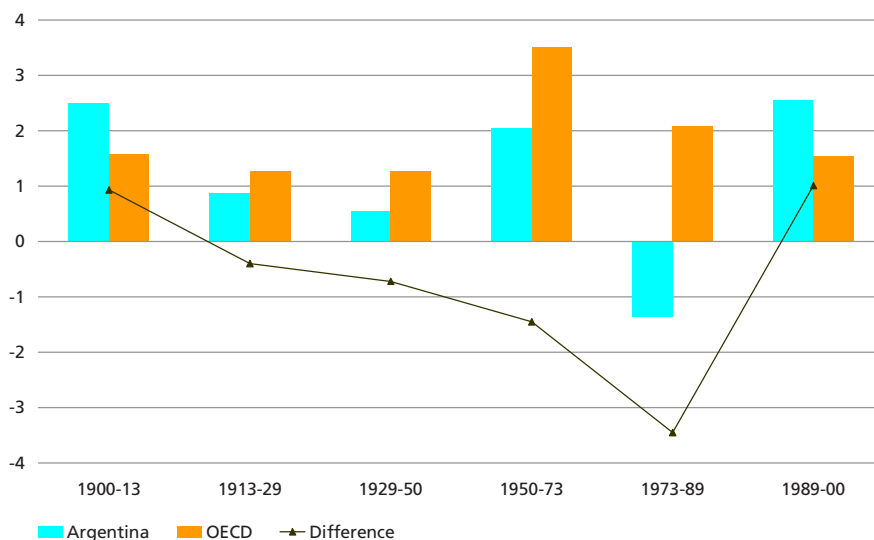
From 1913, the trend for convergence towards the western standard of living began to change, however. Initially, it was a weak, but consistent declining trend. In the second half of the century, the divergent trend accelerated, and in the 1980s Argentina's standard of living reached an all-time low in relation to the OECD countries. In spite of the present recession in Argentina, the 1990s have on average terms been characterised by high growth, and over the decade the standard of living has converged towards that of the OECD countries. In 2000, GNP per capita was 45 per cent of the OECD average.

Chart 1 also illustrates Argentina's relative decline. As can be seen, the period 1950-73, when Argentina did very poorly compared with the western countries, was actually characterised by relatively high annual growth of around 2 per cent in GDP per capita. However, Argentina had only a small share in this golden age for western countries (and for the East Asian tiger economies¹). Furthermore, the period 1973-89 was exceptionally poor, with an average annual decline in GDP per capita of about 1 per cent. Viewed against the background of these later periods, Argentina's relative decline in the first half of the 20th century becomes less pronounced. But a decline it was, and it had dire consequences for the real economy and for economic policymaking that later in the century was to lead to even more significant decline.

¹ Hong Kong, Singapore, South Korea and Taiwan.

GROWTH IN GDP PER CAPITA IN ARGENTINA AND 16 OECD COUNTRIES

Chart 1



Note: The 16 OECD countries are specified in Table 1. For the period 1973-2000, Germany is not included in the calculations owing to the statistical problems related to unification.

Source: Maddison (1989, p. 19), IMF and own calculations.

PROBLEMS IN AN OPEN ECONOMY, 1914-34

With the outbreak of the First World War, Argentina faced problems. International trade contracted during the war, and agricultural exports were hit. When peace came, markets reopened, and Argentina was able to sell its produce once again. However, growth in the 1920s never reached the pre-war level.

In the 1920s the vulnerability of Argentina's open economy became increasingly apparent. Two problems were very evident. Firstly, an economy based on the export of only half a dozen agricultural products is highly dependent on the development in the world-market prices of these products. Economic development in Argentina in the 1920s was thus mainly driven by the development in terms of trade, which in turn was influenced by the price development for a number of agricultural products.

Secondly, Argentina was dependent on foreign capital investments, as domestic savings were limited.¹ Before the First World War, it had been fairly easy for Argentina to procure foreign capital, but this became more

¹ The low rate of domestic savings in Argentina may be attributable to its demographic structure at that time. The population was very "young" – in the years 1914-29 approximately 36 per cent of the entire population was under the age of 15. A high percentage of young people tends to reduce savings and increase consumption (Taylor 1992).

difficult after the war.¹ This was, inter alia, reflected in the development in the foreign ownership share of Argentina's capital stock. In 1913, 48 per cent of Argentina's capital stock was in foreign hands; by 1929, this share had dropped to 32 per cent (Taylor 1992). As a consequence of the lack of foreign capital inflows, investments declined. In the period 1890-1913, the capital stock had grown by 4.8 per cent annually; in the period 1913-29, it grew by only 2.2 per cent and the opportunities for creating economic growth dwindled correspondingly.

Towards the end of the 1920s, the two sensitive variables – terms of trade and foreign capital investments – both developed negatively, bringing Argentina on the verge of a recession already in 1928 (i.e. before the Wall Street crash in October 1929). The prices of Argentinian agricultural produce dropped owing to higher production and increasing protectionism in the West. Foreign capital tended to be more attracted to the then booming Wall Street, making it more and more difficult to service the foreign debt. In the following year the situation deteriorated as most of the world was plunged into a recession, and crops failed in Argentina. Even the upswing, when it finally came in 1933-34, was caused by external factors. Fiscal policy was procyclical in the worst years of the recession, and monetary policy was only moderately expansive (but still to some extent able to counteract the deflationary trends via devaluation (della Paolera et al. 1998)). Instead, it took droughts in the USA, Canada and Australia – raising prices for agricultural produce and improving terms of trade – to pull Argentina out of the recession.

CONSEQUENCES OF THE RECESSION, THE 1930S

A recession as deep as that seen in Argentina in the late 1920s and early 1930s had to have some long-term effects. The structure of the economy changed. Less international trade meant that agriculture and exports became less important. Exports as a percentage of GDP thus fell from 24 per cent in the years 1925-29 to 19 per cent in the years 1935-39. The importance of foreign capital investments declined further. Combined with lower growth and incomes, this led to a lower level of investment.

The recession also had political consequences. Government intervention replaced *laissez-faire* in the field of economic policy. Intervention was inevitable in a world that was increasingly abandoning free trade in favour of bilateral trade agreements. However, a higher degree of government intervention also created a basis for a subsequent protec-

¹ By the end of the war, Britain had lost its dominant position in the international financial markets, and the new financial power, the USA, was not inclined (or able) to act as lender to the rest of the world to the extent that Britain had done (Taylor 1992).

tionist economic policy (import substitution), which in time was to become too excessive.

Monetary policy also changed. Like many other countries at the time, Argentina used the gold standard, although the exchangeability of banknotes for gold was suspended for long periods (1914-1927 and again, finally, from 1929). In 1931 a decisive step away from the gold standard was taken, as the money supply was from then on increased independently of movements in the central bank's gold reserves. From a present-day point of view this was a sensible step, as the recession required an easing of monetary policy. The monetary-policy measures taken by the government and the central bank in 1935 were somewhat more doubtful, although presumably inevitable. At this point, the government took over all "bad debts" accumulated by the unregulated banking sector during the 1920s and 1930s. In reality, this step was financed via monetary financing and totalled approximately 4 per cent of GDP (della Paolera et al. 1999). This paved the way for the extreme, inflationary monetary policy seen in later periods.

The recession also brought political instability. In September 1930, the military assumed power for the first time in the 20th century, and subsequently Argentina was alternately ruled by military and civil governments (often elected on a doubtful basis). Not until 1989 did a civil government again replace another civil government.

THE OPEN ECONOMY CLOSES, 1933-76

The economic decline in Argentina and the rest of the world in the early 1930s triggered a process which was to convert Argentina from a very open to a very closed economy over a 20-year period. Exports as a percentage of GDP dropped from 24 per cent in 1925-29 to 7 per cent in 1950-54. Even today, exports still make up no more than approximately 11 per cent of GDP.

Initially, the development was related primarily to external circumstances. A sharp decline in terms of trade in the early 1930s resulted in a shortage of foreign currency in Argentina, a net debtor. As a result, a dual exchange-rate system was introduced in 1933 whereby the exchange rate for debt repayment and payments for selected imports was more favourable than for other payments. Customs tariffs were also raised during the 1930s in an attempt to protect the emerging domestic industrial sector.

The industrial sector did in fact grow at a good rate in the 1930s. From 1928 to 1939, industrial output increased by an annual 3.2 per cent (de Paiva Abreu 1982). The degree to which this was attributable to gov-

ernment intervention is difficult to say, however. In some respects, the dual exchange-rate system and customs tariffs backfired, as the system was eventually used to subsidise British imports rather than to promote the imports needed for industrialisation (O'Connell 1984).

Argentina's preferential treatment of Britain was a result of the Roca-Runciman Treaty signed by the two countries in 1933. With this treaty, Britain succeeded in gaining access to the Argentinian market on favourable terms, cf. the above, while Argentina had access to the British market on the same terms as previously (de Paiva Abreu 1982). The negotiating power of Britain was based mainly on its large trade deficit vis-à-vis Argentina, and the result of the negotiations triggered strong anti-British feeling in Argentina.

Within a few months of the outbreak of the Second World War the European export markets closed, with dire consequences for the Argentinian agricultural sector. The trade disputes with Britain in the 1930s, as well as the diplomatic disputes with the USA, resulted in a divided nation that sympathised with both the Allies and Germany.

The tension eventually brought General Juan Perón to power in 1943 in a military coup that finally sealed Argentina's import substitution strategy. Several circumstances influenced the choice of this introspective strategy. Perón was immensely popular among the urban working classes, who would benefit from industrial expansion, while the collective memory of the crisis in the 1930s that was driven by external developments, presumably also played a role. In addition, there was some suspicion between Argentina and the Allied victors after the Second World War (declaring war on Germany in March 1945 did not seem to help Argentina much). Nowadays this strategy may appear more ill-advised than it did then. At that time it was not obvious that in the post-war years world trade would experience a new boom in favour of more open economies.

The import substitution strategy meant that for the next decade every ounce of energy was put into building up domestic industry at the expense of exports. However, the plan was not all that well-conceived – existing industrial enterprises were protected via currency and import restrictions, regardless of their efficiency, and the export sector was more or less neglected. The agricultural sector faced huge difficulties in procuring imported factors of production (e.g. tractors and fertilisers) and the government neglected research into agricultural improvements. On the other hand, a large automobile industry was built up, despite a limited domestic market.

Not only was the strategy badly implemented, it was also founded on a questionable theoretical basis. Firstly, industrialisation requires regular

foreign-exchange revenues for the import of key goods (e.g. machinery). More export-friendly policies would have facilitated access to foreign exchange. Secondly, customs tariffs and currency restrictions distort relative prices and create a basis for misallocation of invested resources. Taking into account the external unrest in the 1930s, it cannot be excluded that such distortion – in a brief period of industrial establishment – had its advantages. However, maintaining, and even enhancing, such distortions after the initial industrial establishment phase was inexpedient. It led to continued misallocation and did not give the protected businesses any incentive to streamline production.

In the early 1950s it became clear, even to Perón, that the strategy had failed. Exports continued to decline, and in 1952 – a year of drought – the point was reached where Argentina had to import wheat. Once again, economic policy began to focus on agriculture and exports, but it was not easy to overcome the well-established distortions in relative prices. Industrial interests carried much weight (e.g. in the military and the Peronist party), whereas agriculture by then employed less than 20 per cent of the labour force. In spite of the difficult circumstances, Argentina did manage to achieve annual growth in GDP per capita of around 2.2 per cent up to the early 1970s, cf. Chart 1. However, compared to the rest of the world in the same period, this was a poor result.

DEBT CRISIS AND HYPERINFLATION, 1976-91

Finally abandoning the import substitution strategy in the mid-1970s did not bring renewed growth to Argentina. On the contrary, the situation became even more unstable – politically and economically. The political instability had violent consequences. In 1976 the military assumed power once again, and in the years that followed political dissidents were pursued mercilessly. In 1982, this development culminated in the Falklands War between Argentina and Britain.

Another consequence of the political instability was the absence of a stable economic policy. The various regimes, not to mention the various ministers of economic affairs, only had brief spells in office, and one crisis succeeded another (as did the stabilisation plans). Against this background it is hardly surprising that the growth in GDP per capita was negative between 1973 and 1989, as illustrated in Chart 1.

Although the economic development worsened in this period, the economy was still characterised by the "stop-go" cycles seen in Argentina since the late 1940s. An upswing would soon lead to larger deficits on the balances of trade and payments, which in turn would bring a

foreign-exchange crisis and a recession. To re-establish equilibrium, the announced fixed exchange rate would be devalued. The higher inflation resulting from devaluation would be pushed up further by strong trade unions negotiating compensation in the form of wage increases. In addition, during this period the government made widespread use of monetary financing of budget deficits, leading to further inflation (and thereby more compensatory wage increases).¹

After an extraordinarily strong cycle in the mid-1970s the military assumed power and launched an economic policy which can be seen as the final showdown with the import substitution strategy. Prices, foreign trade and capital movements were liberalised, and the banking sector was deregulated. The budget deficits were reduced, but not eliminated. While the deficits in 1975 and 1976 had been 15.6 and 10.6 per cent of GDP, respectively, the deficit was 5.0 per cent in 1977 – a level which was sustained for the next few years. The rate of inflation was relatively soon reduced from more than 300 to less than 200 per cent. To dampen inflation further, a crawling-peg arrangement was introduced in 1979 whereby the pre-announced devaluation rate was reduced over time. In time, the gradual reduction of the devaluation rate would dampen the direct inflationary effect of devaluation, and it was hoped that pre-announcement would enhance the credibility of the government's disinflationary policy.

With the introduction of the exchange-rate system, inflation fell to below 100 per cent, but was still higher than the ongoing depreciation of the currency. This meant that competitiveness declined steadily. In the early days of this regime – while people still had confidence in it – there was a large inflow of foreign exchange, as interest rates in Argentina were considerably higher than the world-market level.

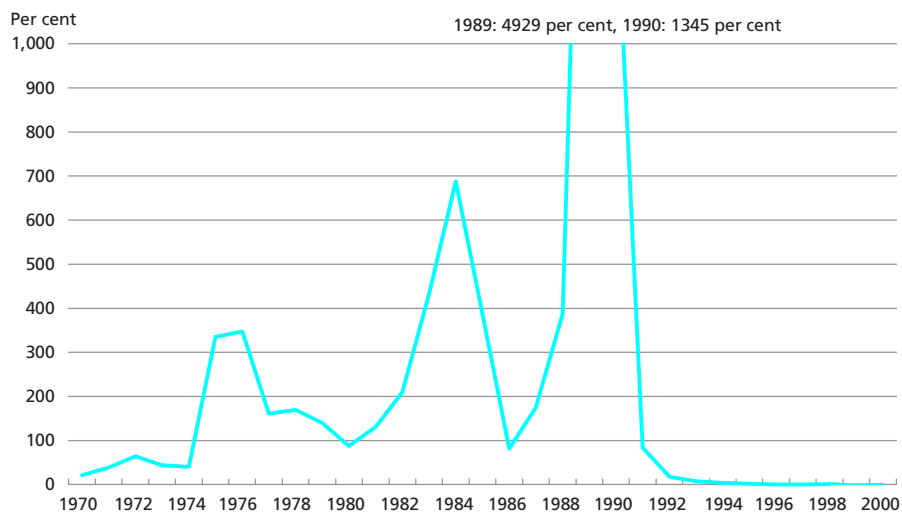
Competitiveness continued to diminish, however, and gradually faith in the exchange-rate system was lost. This led to a massive capital flight, which there was nothing to prevent, as capital flows had just been fully liberalised. The central bank and the government did not immediately abandon the exchange-rate regime. Instead, huge sums were borrowed abroad and sold to support the regime. This could, however, only postpone the inevitable collapse, and in 1981 the currency was devalued three times, by 10, 20 and 20 per cent, respectively.

The devaluations led to huge problems in the real economy. Businesses and banks, which were largely unregulated, as in the banking crisis during the 1930s, collapsed, and the government ended up taking over

¹ For instance, the budget deficit in 1975 was 16 per cent of GDP, which to a high degree was financed via monetary financing. Consequently, the rate of inflation was also high: 335 per cent.

INFLATION

Chart 2



Source: IMF.

large elements of the private sector's debt. In 1980, the public sector accounted for approximately half of the external debt. By 1985, this figure had risen to 82 per cent.

Another extreme economic cycle had hit Argentina; another stabilisation plan had failed. Once again, the rate of inflation soared to three-digit figures, the budget deficit as a percentage of GDP went into two-digit figures, and external debt rose from approximately 20 per cent of GDP in 1977 to 60 per cent in 1982.

The following years were to bring yet another couple of failed stabilisation plans based on using the exchange rate as a nominal anchor (the Austral plan and the Primavera plan in 1985 and 1988, respectively). Neither plan, both of which had been designed by democratically elected governments, brought public finances under control, and consequently they were followed by foreign-exchange crises and even higher inflation rates. The collapse of the Primavera plan even led to hyperinflation in 1989-90.

This hyperinflation was the culmination of the disastrous economic policy of the 1970s and 1980s, which led to increasingly volatile "stop-go" economic cycles. The increasing volatility was reflected in the inflation rates, which "peaked" at higher and higher levels during the period, cf. Chart 2. A consequence of the high inflation was frequent currency reforms, each one reducing the number of zeros on the banknotes in circulation, cf. Table 2. Since 1970, a total of 13 zeros have been eliminated in this way.

ARGENTINA'S CURRENCY REFORMS

Table 2

Currency	Year of introduction	Rate vis-à-vis former currency	
Peso Moneda Nacional	1881	-	
Peso Ley	1970	1 Ley	= 100 Moneda Nacionales
Peso Argentino	1983	1 Argentino	= 10,000 Leyes
Austral	1985	1 Austral	= 1,000 Argentinos
Peso	1992	1 Peso	= 10,000 Australes

Source: Central Bank of Argentina.

STABILISATION (WELL, ALMOST), 1991-2001

The hyperinflation meant that the new president elected in 1989, Carlos Menem of the Peronist party, took office earlier than planned. His first 18 months as president did not bring any decisive changes, however. Hyperinflation continued. Then, in 1991, a disinflationary programme was implemented which was finally to put an end to Argentina's perpetually high inflation and chronic "stop-go" economy.

The cornerstone of the disinflationary programme was the introduction in April 1991 of a currency board, which pegged the Argentinian peso to the dollar on a 1-to-1 basis.¹ Unlike previous stabilisation plans, this one was incorporated in an Act committing the central bank to exchange dollars for pesos at the fixed exchange rate. In addition, the Act required the central bank to hold liquid international reserves at its disposal that (almost) covered 100 per cent of base money.² This central element of the Act prevented monetary financing of the budget deficit, which had previously time and again led to persistent high inflation in Argentina.

In principle, the Act makes it virtually impossible to devalue, which increases the credibility of the regime. Devaluation would require a new Act to be passed by Argentina's Congress, but by the time the Bill had been debated, the reserves of the central bank would have evaporated because of capital flight. If the Bill were debated over a bank holiday instead, the government would be liable to private actions for damages.

The introduction of the Act should be seen in the light of the recent hyperinflation, which brought a strong demand for stability among the Argentinian population. Presumably the development in the early 1990s

¹ For a detailed description of currency boards, see Bie and Hahnemann (2000).

² However, the central bank still has a little room for manoeuvre. For instance, it may purchase Argentinian government bonds denominated in dollars, provided that the stock of international reserves (excluding government bonds) does not fall below 2/3 of the base money. In addition, the central bank may change the reserve requirements imposed on the banks.

MACROECONOMIC INDICATORS		Table 3		
Per cent	1989	1994	2000	
Real GDP growth	-6.2	5.8	-0.5	
Inflation	4,928.6	3.9	-0.7	
Current account of the balance of payments ¹	-1.8	-3.7	-3.2	
Government budget balance ¹	-21.8	-2.3	-3.6	
Unemployment ²	7.1	12.2	14.7	

Source: IMF.

¹ As a percentage of GDP.

² As a percentage of the labour force.

has boosted support for the currency board. Inflation was virtually eliminated, cf. Chart 2, and in the early 1990s more and more loans were denominated in dollars. Consequently, any devaluation will affect households, businesses and the public sector severely.

President Menem initiated other reforms at the start of the 1990s. Gradually, attempts were made to open up the economy, e.g. through participation in the MERCOSUR free-trade community with Brazil, Paraguay and Uruguay. However, the economy remained relatively closed. The banking sector was liberalised (once again), but unlike before effective banking supervision was also introduced.¹ Menem also succeeded in reducing the budget deficit drastically up to 1993, but without any actual reform of public finances. Instead, the budget improvements were achieved via e.g. privatisation gains and a falling level of international interest rates, which alleviated Argentina's debt burden.²

The reform measures in the early 1990s led to remarkable macroeconomic stability and a good rate of growth in the years 1991-94. This dramatic economic stabilisation is illustrated in Table 3. The most noteworthy result was the reduction of inflation and the lower budget deficit, whereas unemployment increased as a result of extensive structural reforms.

Stability also brought a return of foreign capital to Argentina, leading to strong credit expansion. However, setbacks in both 1995 and 1998 showed that the economy was still vulnerable. Both setbacks were brought on by sudden changes in international capital flows stemming from crises in other new growth economies. In 1995, the crisis arose in Mexico ("the Tequila crisis"); in 1998 in Russia ("the Russian crisis"). The crises resulted in a significantly higher level of interest rates, which dampened investments and led to negative growth.

¹ In the late 1990s, Argentina's banking supervisory authority was deemed to be among the best in the new growth economies (Calomiris et al. 2000).

² The debt burden was also alleviated via a debt scheme with Argentina's creditors, which was implemented in 1992 under the Brady plan.

The domestic financial sector was not sufficiently developed to be able to compensate for the decline in foreign capital investment, quite the contrary in fact. In connection with both crises, increasing uncertainty led to a fall in bank deposits, resulting in a lower rate of private domestic lending.¹

The adverse effects of the crises have been greater in Argentina than in most other new growth economies. Apart from Mexico, Argentina was one of the few countries to be affected by the Tequila crisis, and the Russian crisis brought on the present 3-year recession in Argentina. One reason for this enhanced vulnerability is that Argentina stood alone with its fixed-exchange-rate policy (currency board), whereas the floating currencies of its neighbours have depreciated significantly.² This has reduced Argentina's competitiveness considerably and impeded an up-swing.

The lengthy recession in the wake of the Russian crisis has strained public finances. Tax revenues have been declining due to the negative development in earnings, and it has proved difficult to reduce public expenditure (although public-sector salaries exceeding 500 pesos per month were reduced by 13 per cent in July 2001). This has resulted in an increasing budget deficit and government debt.

Towards the end of 2000, Argentina's ongoing economic problems led to increasing uncertainty as to the sustainability of Argentina's debt burden. Investors became more reluctant to invest in Argentinian government bonds, as they seemed to believe that the risk of Argentina suspending its payments had risen considerably. Argentina's problems resulted in a \$14 billion loan³ from the IMF in January 2001. This – briefly – calmed down the financial markets. However, sustained poor key economic indicators for the Argentinian economy and political instability led to a new crisis of confidence in July, and a further \$8 billion loan from the IMF in September.

The two IMF loans granted in 2001 cannot be said to have been exceptional. Historically, Argentina has made considerable use of the IMF's lending facilities, cf. Table 4 which sums up recent IMF loans to Argentina. The most recent loans to Argentina have been significant – both in relation to previous loans to Argentina and in relation to Argentina's capital contribution to the IMF.

¹ This could be uncertainty as to e.g. the survival of the currency board, but also fear that the government might impose a tax on bank deposits (a method of taxation previously used in Argentina). In addition, uncertainty as to the solvency of banks may play a role, although today the banking sector is generally well-founded. However, a few banks collapsed in connection with the Tequila crisis.

² This is particularly true of the Brazilian currency following the Russian crisis.

³ Including an IMF loan granted in 2000 which Argentina had not made use of at the time that the new loan was granted.

ARGENTINA'S RECENT IMF LOANS

Table 4

SDR ¹ million	Amount	Percentage of quota ²
1984	1,183	106
1987	948	85
1989	736	66
1991	780	70
1992	2,149	193
1993 ³	334	162
1995 ³	1,537	262
1996	720	47
1998	2,080	135
2000	5,399	255
2001, January ³	5,187	500
2001, September ³	6,351	800

Source: IMF.

¹ Special Drawing Rights (SDR) are an international reserve unit created by the IMF as a supplement to existing reserves. The value of an SDR is determined on the basis of a basket of main currencies. In 2000, the average value of an SDR was 1.32 dollars.

² Percentage of quota refers to the size of the loan in relation to Argentina's capital contribution to the IMF – i.e. Argentina's quota.

³ This was an increase of a former loan. The figure in the amounts column is the increase, whereas the figure in the last column is the size of the total loan relative to Argentina's IMF quota. In 1993 the size of the loan relative to the quota declined in spite of an increase in the loan. This is a result of a revision of quotas in 1992.

CONCLUSION

Argentina's crises in the 20th century have had different causes and origins. In the first third of the century, Argentina's openness backfired when world trade contracted. After the Second World War, Argentina was too closed in a world that was becoming increasingly open. Somehow Argentina has not got its timing right.

In the latter third of the century, instability – political as well as economic – has made things more than difficult for the severely tried country. Developments in the early 1990s gave grounds for optimism. Politically, democracy had finally prevailed, and economic reforms brought the necessary stability. However, setbacks later in the decade have shown that the country is still vulnerable.

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Press releases

PUBLICATION OF EXCHANGE RATES BY DANMARKS NATIONALBANK

As from 1 January 2002 Danmarks Nationalbank will no longer publish exchange rates for the national currencies in the euro area. Since 1 January 1999 the euro has been the single currency of these 12 countries. After the introduction of euro banknotes and coins as from 1 January 2002, the previous national banknotes and coins will quickly cease to circulate. Danmarks Nationalbank will continue to publish exchange rates for the euro. The locked conversion rates of the 12 national currencies against the euro can be seen on Danmarks Nationalbank's web site www.nationalbanken.dk under Euro.

In view of the expansion of trade with a number of eastern and central European countries, as well as some countries in Asia, as from 1 January 2002 Danmarks Nationalbank will publish exchange rates for 8 new countries.

AS FROM 1 JANUAR 2002 THE LIST OF EXCHANGE RATES WILL INCLUDE THE FOLLOWING CURRENCIES:

Euro area	Euro	EUR	
USA	Dollar	USD	
UK	Pound sterling	GBP	
Sweden	Krona	SEK	
Norway	Krone	NOK	
Iceland	Krone	ISK	
Switzerland	Franc	CHF	
Canada	Dollar	CAD	
Japan	Yen	JPY	
Australia	Dollar	AUD	
New Zealand	Dollar	NZD	
Estonia	Kroon	E EK	new
Latvia	Lats	LVL	new
Lithuania	Litas	LTL	new
Poland	Zloty	PLN	new
Czech Republic	Koruna	CZK	new
Hungary	Forint	HUF	new
Hong Kong	Dollar	HKD	new
Singapore	Dollar	SGD	new
	SDR (calculated)	XDR	

As from 1 January 2002 the list of exchange rates will include the following currencies:

Danmarks Nationalbank's exchange rates are normally fixed on the basis of information received from other central banks at 2.15 p.m. They are published for information purposes. It is not possible to either purchase currency from Danmarks Nationalbank or sell currency to Danmarks Nationalbank at the published exchange rates.

As from 1 January 2002 the exchange rates will be published at approximately 2.30 p.m.

ON 18 SEPTEMBER 2001 ON INTEREST RATES REDUCTION

The discount rate and the rate of interest on the banks' current accounts with the Nationalbank are lowered by 0.50 per cent to 3.75 per cent. The Nationalbank's lending rate and the rate of interest on certificates of deposit are lowered by 0.50 per cent to 4.15 per cent.

The reduction takes effect as from 18 September 2001.

Following the terrorist attack on the USA several central banks, including the Federal Reserve and the European Central Bank, have lowered official interest rates by 0.50 per cent to counter the greater uncertainty concerning the economic development. The Nationalbank's reduction of interest rates is a result of this international development. The interest-rate differential between Denmark and the euro area is thus maintained.

ON 8 NOVEMBER 2001 ON INTEREST RATE REDUCTION

The discount rate and the rate of interest on the banks' current accounts with the Nationalbank are lowered by 0.50 per cent to 3.25 per cent. The Nationalbank's lending rate and the rate of interest on certificates of deposit are lowered by 0.50 per cent to 3.60 per cent.

The reduction will have effect as from 9 November 2001.

The interest rate reduction is a consequence of the lowering by 0.50 per cent to 3.25 per cent in the European Central Bank's minimum bid rate on the main refinancing operations.

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Danmarks Nationalbank's Statistical Publications

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 can 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: 14 December 2001.

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 1-7, 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 8-12, apart from the exchange-rate series in Table 10, for which Danmarks Nationalbank is the source.

INTEREST RATES AND SHARE-PRICE INDEX

Table 1

Effective end-of-year/ from	The Nationalbank's interest rates		End of period	Inter-bank interest rate, 3-months uncollateralized	Bond yields		The Copenhagen Stock Exchange share-price index (total) KAX 31.12.95 =100
	Discount rate	Lending and certificates of deposit			10-year central-government bond	30-year mortgage-credit bond	
1996	3.25	3.50	1996	3.57	6.52	7.87	130
1997	3.50	3.75	1997	3.93	5.63	7.28	184
1998	3.50	3.95	1998	4.05	4.35	7.10	175
1999	3.00	3.30	1999	3.57	5.64	7.45	214
2000	4.75	5.40	2000	5.33	5.20	7.30	248
Aug. 31, 2001	4.25	4.65	2000 Nov	5.41	5.37	7.31	252
Sep. 18, 2001	3.75	4.15	2001 Jun	4.85	5.36	7.23	246
Oct. 5, 2001	3.75	4.10	Jul	4.82	5.18	7.17	244
Nov. 9, 2001 ...	3.25	3.60	Aug	4.57	5.06	7.10	225
			Sep	4.02	5.01	7.06	199
			Oct	3.80	4.65	7.04	206
Dec. 14, 2001	3.25	3.60	Nov	3.54	4.76	7.07	210

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			
1996	85.2	36.6	35.0	30.9	15.6	33.8	12.6
1997	129.7	38.7	34.0	52.7	18.5	19.9	51.3
1998	101.4	41.0	37.1	34.8	12.6	29.8	17.6
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
2000 Nov	123.7	43.0	38.0	66.2	11.5	43.9	33.8
2001 Jun	119.6	45.1	59.4	65.2	3.5	55.7	12.9
Jul	119.5	45.1	66.8	53.2	14.5	62.8	4.8
Aug	122.5	44.6	68.7	62.1	2.9	58.4	6.6
Sep	143.4	44.4	83.6	73.1	2.8	63.1	12.8
Oct	146.1	44.4	82.1	63.0	11.9	58.3	16.6
Nov	147.8	44.8	61.1	71.6	3.6	37.7	37.5

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 Nationalbank	The Nationalbank's net bond purchases	Other factors	The banks' and the mortgage-credit institutes' net position with the Nationalbank	
	Domestic gross financing requirement	Sales of domestic central-government securities	Liquidity effect				Change in net position	End of period
	Kr. billion							
1996	94.7	96.0	-1.2	25.9	-0.1	-3.8	20.8	12.6
1997	73.8	73.0	0.8	43.2	-1.5	-3.8	38.7	51.3
1998	64.1	68.0	-3.8	-28.7	3.2	-4.5	-33.7	17.6
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
2000 Nov	22.2	0.4	21.7	-3.1	0.6	-1.1	18.1	33.8
2001 Jun	4.8	13.7	-8.9	1.2	-0.2	-0.5	-8.4	12.9
Jul	4.0	13.5	-9.5	2.0	-0.3	-0.3	-8.1	4.8
Aug	3.2	3.9	-0.6	1.7	0.9	-0.2	1.7	6.6
Sep	-3.9	10.1	-14.0	20.0	0.0	0.2	6.2	12.8
Oct	15.8	15.2	0.5	3.7	0.6	-1.0	3.7	16.6
Nov	15.6	-7.3	22.9	-0.1	0.2	-2.1	20.9	37.5

SELECTED ITEMS FROM THE CONSOLIDATED BALANCE SHEET OF
THE MFI SECTOR AND THE MONEY STOCK

Table 4

End of period	Total balance	of which:					
		Domestic lending			Holdings of domestic securities other than shares	Foreign assets, net ¹	Money stock (M3)
		Total	of which:				
			House-holds	Non-financial companies			
Kr. billion							
1996	1,931.2	1,266.6	772.8	370.0	149.2	172.7	467.4
1997	2,140.0	1,362.4	843.5	383.8	138.3	159.0	504.5
1998	2,407.2	1,491.0	929.6	408.2	153.3	154.6	523.2
1999	2,612.8	1,578.2	994.0	420.0	125.8	163.7	523.0
2000	2,806.0	1,757.8	1,066.7	499.1	114.0	56.2	510.6
2000 Oct	2,951.8	1,739.2	1,050.9	497.9	112.8	103.3	545.8
2001 May	2,950.7	1,830.7	1,089.2	545.4	127.0	3.7	559.5
Jun	2,964.8	1,847.8	1,102.9	546.8	126.2	12.7	556.3
Jul	2,919.2	1,847.0	1,102.8	547.2	136.7	-11.5	566.7
Aug	2,937.7	1,847.3	1,112.7	544.3	138.3	-15.4	578.7
Sep	3,018.9	1,878.0	1,120.7	559.6	141.5	-2.4	577.3
Oct	2,954.9	1,883.9	1,125.9	564.1	143.1	-23.3	587.2
Change compared with previous year, per cent							
1996	7.0	5.7	6.8	2.1	-7.5	11.5	10.5
1997	10.8	7.6	9.1	3.7	-7.3	-7.9	8.0
1998	12.5	9.4	10.2	6.4	10.8	-2.8	3.7
1999	8.5	5.8	6.9	2.9	-17.9	5.8	0.0
2000	7.4	11.4	7.3	18.8	-9.4	-69.7	-2.4
2000 Oct	10.8	11.7	7.5	19.3	-14.0	-51.9	2.8
2001 May	10.2	9.1	6.7	19.0	14.2	-95.7	2.7
Jun	6.0	8.4	6.5	17.6	4.2	-92.7	2.8
Jul	4.2	7.6	7.1	10.0	21.1	-108.7	6.1
Aug	2.7	7.8	7.8	10.1	25.0	-111.8	5.6
Sep	3.4	8.3	6.8	11.8	26.7	-102.0	7.6
Oct	0.1	8.3	7.1	13.3	26.9	-122.6	7.6

Note: The MFI sector includes Danish *Monetary Financial Institutions*, i.e. banks and mortgage-credit institutes, other credit institutions, money-market funds and Danmarks Nationalbank.

¹ The net forerforeign assets of the MFI sector has been compiled as the differencen between all assets and liabilities vis-a-vis non-residents.

THE BANKS LENDING

Table 5

End of period	From banks in Denmark				From Danish owned banks abroad			Total lending
	To Danish residents, total	of which:		To non-Danish residents	Total	of which:		
		Households	Non-financial companies			To Danish residents	To non-Danish residents	
	Kr. billion							
1996	305.8	167.2	86.1	86.3	171.6	73.9	97.6	563.6
1997	334.1	178.3	96.4	113.7	220.0	84.6	135.4	667.7
1998	379.0	194.7	112.5	74.8	248.1	96.4	151.7	701.8
1999	399.8	203.2	117.2	105.0	345.4	123.2	222.1	850.2
2000	525.9	236.4	187.0	104.7	312.5	66.2	246.3	943.2
2000 Oct	516.6	225.1	184.5	116.2	...	...	...	...
2001 May	552.7	234.3	211.7	115.2	...	...	...	...
Jun	568.8	244.3	215.7	130.9	331.3	52.5	278.8	1,031.0
Jul	561.8	239.3	215.6	118.5	...	...	...	...
Aug	553.4	240.8	211.2	117.5	...	...	...	...
Sep	578.1	244.3	221.5	121.2	308.0	47.3	260.7	1,007.3
Oct	573.1	241.0	222.6	109.6	...	...	...	...
Change compared with previous year, per cent								
1996	5.9	5.2	1.8	26.5	18.0	-0.6	37.5	12.2
1997	9.2	6.7	11.9	31.8	28.2	14.4	38.7	18.5
1998	13.4	9.2	16.7	-34.2	12.8	13.9	12.0	5.1
1999	5.5	4.4	4.2	40.4	39.2	27.9	46.4	21.1
2000	31.5	16.3	59.5	-0.2	-9.5	-46.3	10.9	10.9
2000 Oct	31.1	13.0	57.4	-1.4	...	...	...	...
2001 May	14.9	9.8	36.6	34.5	...	...	...	...
Jun	10.3	9.0	19.9	48.5	5.1	-34.7	18.7	9.1
Jul	9.3	7.1	11.9	21.2	...	...	...	...
Aug	9.4	9.4	12.5	8.3	...	...	...	...
Sep	11.2	7.6	16.4	2.6	-8.8	-33.2	-2.4	2.1
Oct	10.9	7.1	20.7	-5.7	...	...	...	...

Note: Lending to households includes lending to self-employed individuals.

SELECTED ITEMS FROM THE BALANCE SHEET OF
THE MORTGAGE-CREDIT INSTITUTES

Table 6

End of period	Total balance	of which:				Debt securities issued
		Domestic lending 1				
		Total	of which: Lending to households 2	of which: Interest adjusted lending	of which: Lending in foreign currency	
Kr. billion						
1996	970.5	846.7	602.4	...	...	945.6
1997	1,054.8	909.9	661.9	...	...	1,038.5
1998	1,172.2	987.8	731.0	...	1.4	1,122.4
1999	1,222.9	1,050.9	785.8	59.7	9.6	1,116.2
2000	1,341.1	1,095.9	823.5	99.8	15.5	1,212.9
2000 Oct	1,225.7	1,089.0	818.5	96.2	13.6	1,116.5
2001 May	1,289.0	1,129.5	847.9	130.3	22.5	1,162.6
Jun	1,293.0	1,131.9	851.6	139.7	25.3	1,188.6
Jul	1,265.5	1,139.5	856.5	149.8	28.7	1,175.3
Aug	1,291.0	1,148.9	864.5	162.6	31.1	1,194.9
Sep	1,321.8	1,153.3	868.9	172.6	34.2	1,223.0
Oct	1,330.2	1,164.1	877.6	187.7	39.1	1,251.1
Change compared with previous year, per cent						
1996	5.0	5.8	7.2	...	...	7.9
1997	8.7	7.5	9.9	...	...	9.8
1998	11.1	8.6	10.4	...	...	8.1
1999	4.3	6.4	7.5	...	...	-0.6
2000	9.7	4.3	4.8	67.3	61.2	8.7
2000 Oct	5.5	4.7	5.6	89.7	63.9	4.1
2001 May	7.7	5.7	5.8	52.4	92.6	6.4
Jun	4.8	5.1	5.1	52.5	107.6	8.5
jul	4.6	6.0	5.8	61.4	132.6	7.5
Aug	5.7	6.3	6.3	72.9	145.8	8.1
Sep	7.1	6.5	6.7	81.8	159.8	10.0
Oct	8.5	6.9	7.2	95.1	188.2	12.1

1 The distribution of lending to households, interest adjusted lending and lending in foreign currency may coincide. Therefore, some lending has been included in more than one of the above categories.

2 Lending to households includes lending to self-employed individuals.

EXTERNAL PAYMENTS (NET PAYMENTS FROM ABROAD)

Table 7

	Current payments	Capital transfers	Financial payments				Errors and omissions	Increase in the foreign-exchange reserve
			Total	of which:				
				Direct investments				
				Foreign in Denmark	Danish abroad	Danish kronedenominated bonds		
Kr. billion								
1996	13.2	0.2	14.2	2.7	-14.4	30.8	-6.8	20.8
1997	9.7	0.7	52.7	18.5	-27.8	44.8	-20.1	43.0
1998	-8.7	0.3	-18.7	52.0	-30.0	0.1	-2.1	-29.2
1999	9.9	0.9	63.7	111.0	-112.7	14.6	-10.2	64.2
2000	25.6	-0.1	-39.8	261.1	-196.9	-21.5	-28.6	-43.0
Nov 99 - Oct 00 ..	18.7	-0.3	-34.4	277.1	-186.8	-23.6	-23.2	-39.2
Nov 00 - Oct 01 ..	48.7	0.1	-39.1	68.3	-111.3	-35.9	14.5	24.2
2000 Oct	5.2	0.0	4.5	2.5	-2.1	-8.4	9.0	18.7
2001 May	8.3	0.0	-6.9	2.1	-5.5	-2.8	3.0	4.4
Jun	3.5	0.0	0.7	6.7	-2.1	12.8	-3.0	1.2
Jul.....	4.0	-0.1	-2.7	1.8	-5.5	-5.3	-1.3	-0.1
Aug	4.7	0.0	-10.3	1.5	-3.5	-2.2	8.6	3.0
Sep	1.5	0.0	20.9	4.3	-2.7	3.3	-1.5	20.9
Oct	3.5	0.0	-6.1	1.0	-2.8	-5.7	5.3	2.7

GDP BY TYPE OF EXPENDITURE

Table 8

	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						
1996	1,060.9	533.2	274.6	198.4	2.5	1,008.7	379.4	327.2
1997	1,116.3	560.9	284.5	220.5	11.2	1,077.1	406.9	367.7
1998	1,169.0	591.5	300.5	241.0	13.2	1,146.1	413.4	390.5
1999	1,229.6	609.7	313.3	250.1	-2.0	1,171.1	460.1	401.6
2000	1,315.5	628.1	325.9	285.6	-1.4	1,238.2	565.7	488.4
2000 Q3	325.5	154.5	82.1	71.7	-6.7	301.5	149.0	125.1
Q4	347.8	163.9	82.4	71.8	3.3	321.3	161.2	134.8
2001 Q1	332.8	158.1	83.4	68.1	0.2	309.8	149.1	126.1
Q2	341.3	162.0	86.1	70.5	1.6	320.2	152.1	131.0
Q3	338.6	159.0	87.1	67.5	-3.3	310.2	154.3	125.9
Real growth compared with previous year, per cent								
1996	2.5	2.5	3.4	4.0	...	2.2	4.3	3.5
1997	3.0	2.9	0.8	10.9	...	4.9	4.1	10.0
1998	2.8	3.6	3.1	7.6	...	4.5	2.4	7.4
1999	2.1	0.5	1.4	1.5	...	-0.6	9.7	2.2
2000	3.2	-0.1	1.0	9.9	...	2.6	11.6	10.8
2000 Q3	3.5	-0.1	0.5	13.6	...	2.0	15.3	12.7
Q4	2.9	-1.5	0.6	7.4	...	2.5	11.7	11.9
2001 Q1	1.8	0.7	0.8	-2.4	...	-0.5	11.4	5.9
Q2	0.8	0.9	1.1	-2.8	...	0.8	4.2	4.4
Q3	1.4	0.6	1.8	-7.1	...	0.4	1.5	-1.1
Real growth compared with previous quarter (seasonally adjusted), per cent								
2000 Q3	0.5	0.1	0.0	0.9	...	-0.3	4.3	2.5
Q4	0.8	-0.6	0.3	-3.0	...	1.0	1.1	0.4
2001 Q1	-0.5	1.3	0.4	-2.2	...	-1.6	-0.6	-0.9
Q2	0.4	0.1	0.5	0.2	...	1.5	0.0	1.9
Q3	0.9	-0.2	0.5	-1.8	...	-0.2	1.1	-2.3

PRINCIPAL ITEMS OF THE BALANCE OF PAYMENTS (NET REVENUES)

Table 9

	Goods (fob)	Services	Goods and services	Wages and property income	Current transfers	Total current account
Kr. billion						
1996	44.7	7.5	52.2	-21.4	-15.3	15.4
1997	38.4	0.8	39.2	-22.5	-12.3	4.4
1998	25.3	-2.0	23.3	-18.4	-15.2	-10.2
1999	44.9	12.4	57.3	-16.6	-20.6	20.2
2000	55.1	20.9	76.0	-29.1	-26.3	20.6
Nov 99 - Oct 00	52.5	15.9	68.4	-28.1	-23.8	16.5
Nov 00 - Oct 01	63.9	33.3	97.2	-30.7	-25.8	40.7
2000 Oct	5.3	2.6	7.9	-3.1	-2.8	1.9
2001 May	5.3	2.6	8.0	-1.3	-2.2	4.4
Jun	4.7	1.8	6.5	-0.3	-3.1	3.1
Jul.....	4.1	3.1	7.2	-2.1	-2.6	2.5
Aug	7.4	3.4	10.7	-1.6	-1.8	7.4
Sep	6.7	1.6	8.2	-0.8	-3.4	4.1
Oct	6.2	2.0	8.2	-4.7	-2.4	1.1

PRICES AND EXCHANGE RATES

Table 10

	Consumer price index	Index of net retail prices	Wholesale price index	Kroner per EUR 100	Kroner per USD 100	Effective krone rate	Real effective krone rate based on consumer prices
	Change compared with previous year, per cent			Average		1980=100	
1996	2.1	2.0	1.1	...	579.59	102.9	105.7
1997	2.2	2.2	1.9	...	660.86	100.0	103.1
1998	1.9	1.5	-0.6	...	669.70	101.3	104.6
1999	2.5	2.1	0.5	743.56	698.34	99.6	104.3
2000	3.0	3.1	5.9	745.37	809.03	95.6	100.6
2000 Nov.....	2.6	2.9	6.7	745.67	870.68	94.5	99.5
2001 Jun	2.3	2.5	3.2	745.37	872.19	95.8	100.6
Jul.....	2.4	2.4	2.7	744.49	865.71	96.3	101.0
Aug	2.6	2.5	1.5	744.52	826.77	97.2	101.9
Sep	2.2	2.2	0.7	744.14	817.05	97.6	102.5
Oct	2.1	2.2	-0.3	743.67	820.79	97.6	103.0
Nov.....	1.9	1.8	...	744.53	838.10	96.8	...

SELECTED MONTHLY ECONOMIC INDICATORS

Table 11

	Unemployment Per cent of labour force	Quantitative index for sales in sectors of		Con- struction projects com- menced 1,000 m2	New passenger car regis- trations Number	Consumer confi- dence indicator	Composite cyclical indicator for	
		Extraction of raw materials and manufac- turing 1995=100	Retail trade 1990=100				Industry	Building and construc- tion
1996	8.9	102	109.6	7,351	142,175	5	-8	8
1997	7.9	107	111.8	8,364	152,869	9	6	8
1998	6.6	109	114.3	9,052	162,708	2	-3	-2
1999	5.7	111	115.6	8,558	144,256	-2	-11	-8
2000	5.4	118	116.6	8,405	113,623	2	5	-1
Seasonally adjusted								
2000 Nov	5.5	120	116.4	717	8,008	2	9	-2
2001 Jun	5.2	118	117.2	613	8,435	1	-6	-13
Jul	5.1	124	117.3	702	7,921	-1	-6	-12
Aug	5.1	123	118.1	652	8,500	-2	-6	-13
Sep	5.0	120	119.4	613	7,814	-2	-9	-15
Oct	5.0	120	117.3	...	8,080	-3	-9	-15
Nov .....	...	...	...	...	7,999	-1	-9	-14

SELECTED QUARTERLY ECONOMIC INDICATORS

Table 12

	Employment		Hourly earnings in manufacturing industry Feb. 1996 =100	Real effective krone rate based on hourly earnings 1980=100	Property prices (purchase sum, one-family dwellings) As a percentage of property value 2000
	Total	Private			
	1,000 persons				
1996	2,573	1,792	101.4	102.2	82.3
1997	2,607	1,813	105.2	100.1	91.7
1998	2,643	1,834	109.8	103.1	100.0
1999	2,665	1,854	114.4	102.5	106.7
2000	2,686	1,873	118.4	98.5	113.3
Seasonally adjusted					
2000 Q3	2,685	1,872	118.9	97.9	115.1
Q4	2,686	1,873	120.0	98.0	116.2
2001 Q1	2,695	1,879	121.4	100.7	118.2
Q2	2,696	1,877	123.2	...	118.8
Q3	2,698	1,874	124.2	...	...
Change compared with previous year, per cent					
1996	1.3	1.3	3.8	-0.9	...
1997	1.3	1.1	3.8	-2.0	11.4
1998	1.4	1.2	4.4	2.9	9.0
1999	0.9	1.1	4.1	-0.5	6.7
2000	0.8	1.0	3.5	-4.0	6.2
2000 Q3	0.0	0.1	3.8	-3.8	6.5
Q4	0.5	0.7	3.5	-3.1	7.3
2001 Q1	0.3	0.4	3.6	0.9	7.9
Q2	0.3	0.2	4.8	...	5.6
Q3	0.5	0.1	4.5

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