

DANMARKS NATIONALBANK
Monetary Review - 2nd Quarter 1998

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Recent Monetary Trends	1
DEBES - The Danish Part of TARGET by Thomas Angelius, Søren Lundsby Hansen and Jesper Mærsk, Payment Systems Department	15
<i>The article outlines the structure of DEBES, the Danish part of the future euro-payment system TARGET, as well as the conditions for participation.</i>	
Revision of the Weights for Calculation of the Nationalbank's Effective Krone Rate Index by Erik Haller Pedersen, Economics Department	26
<i>Danmarks Nationalbank has updated the weights in the effective krone-rate index. New countries have been added. The revision gives no significant changes in the development of the Danish manufacturing industry's competitiveness.</i>	
The Banks' Earnings by Michael Olsen and Morten Linnemann Bech, Financial Markets Department	41
<i>In recent years the banks' earnings have been influenced by moderate loan loss provisions. This emphasizes the need for continued tight cost control.</i>	
Wage Development in Denmark by Niels Lynggård Hansen, Economics Department	54
<i>The article examines the factors behind Danish wage trends since 1975. There are no indications that the relatively moderate wage increases in recent years are attributable to a structural shift.</i>	
Speech by Governor Bodil Nyboe Andersen at the Annual Meeting of the Association of Danish Mortgage Banks on April 23, 1998	73
Press Releases	77
Danmarks Nationalbank on the Internet	79
Tables Section	

Recent Monetary Trends

This review covers the period from February 1998 to the middle of May 1998.

In view of the first signs of higher growth in Germany and France the overall cyclical position of the EU member states now appears to be more favourable, and economic and financial convergence has continued. Convergence of interest and exchange rates accelerated particularly after it was decided during the weekend of May 1-3, 1998 that 11 countries will enter the third stage of EMU on January 1, 1999.

The Danish krone has tended to weaken and was subject to increasing pressure up to the beginning of May when the Nationalbank reacted by raising the official interest rates by ½ per cent. After this unexpected raising of interest rates foreign-exchange conditions stabilized.

The Danish economy continues to grow more strongly than those of Denmark's trading partners. Domestic consumption indicators rose further at the beginning of 1998, capacity utilization reached the level of the upswing in the 1980s and the balance of payments deteriorated strongly. It is thus necessary to maintain a tight fiscal policy in order to keep down domestic demand.

International background

Overall the dollar weakened by approximately 3 per cent against the D-mark and strengthened by almost 6 per cent vis-à-vis the Japanese yen. Having appreciated strongly against the D-mark in 1996 and 1997, the dollar is nonetheless still relatively strong, viewed over a five-year period. Up to the end of March the pound sterling strengthened by almost 4 per cent against the D-mark, but weakened again in April and May by more than 7 per cent.

To a degree the effects of the crisis in Asia and the dollar's appreciation in 1997 have dampened the otherwise very strong expansion in the US economy. The level of activity continues to be strong, with annual GDP growth of almost 4 per cent, driven primarily by investments and private consumption. Unemployment is at its lowest level for more than 20 years and there are signs of pressure on wages. Inflation is still low, kept down partly by declining prices for raw materials, particularly oil, but also some metals in the wake of the crisis in Asia.

In *Japan* prospects are bleak and many observers fear a new recession. Japan has faced major economic problems since 1992. In 1996 the Japanese economy rallied strongly for the first time in several years, with a growth rate of approximately 4 per cent. However, in 1997 growth was held back first by a tightening of fiscal policy and then by the crisis in Southeast Asia. These factors have by and large brought the economy to a halt. Both private consumption and the business sector's earnings and investments have receded. Consumer confidence is very low and imports are declining. The IMF and the OECD have reduced their forecasts of growth in Japan for 1998 to around zero. Low consumption and the very high propensity to save are among the major problems faced by the Japanese economy. The strong depreciation of real and financial assets has considerably reduced net worth. High savings are a means of re-establishing private wealth in Japan where the problems related to a shift in the age composition of the population, with elderly people in the labour force, are particularly strong. In the government's most recent package of assistance measures a supplementary scheme for around kr. 800 billion (approximately 3 per cent of GDP) provides for an increase in primarily public consumption, although the package also includes tax reductions. However, the low level of consumer confidence makes it likely that tax reductions will lead to higher savings rather than consumption. As a result the intended expansionary effect will not be achieved. With a discount rate of 0.5 per cent there is hardly any scope for further relaxation of monetary policy, and the long-term interest rate is likewise at a record low of less than 2 per cent. However, during the last six months the short-term market interest rates have been 20-100 basis points above the official rates as a consequence of a "Japan premium" (equivalent to the differential between the prices paid by Japanese and international banks for loans in Japan). The risk premium should be viewed in the light of the problems faced by the Japanese financial sector, whose credit ranking continues to decline. The traditional economic-policy instruments now provide little scope in Japan's situation. Structural-policy reforms and a restructuring of the financial sector are important and necessary means to bring Japan out of the crisis.

In the last few years a number of *European countries* have experienced sound economic growth and declining unemployment. In particular these are Norway, Denmark, the Netherlands, the UK, Ireland and recently also Finland and Spain.

On the other hand, the large continental European countries, *Germany* and to a certain degree *France*, have seen low growth and, until recently,

rising unemployment. Growth in these two countries is sustained by exports and to some extent also stockbuilding. This contributes to segregation of the business community into enterprises which manufacture for export and enterprises which sell their products on the domestic market. Exporting enterprises enjoy a large new-order intake and a high level of investment, while prospects for domestic-market oriented enterprises are less favourable. However, indicators of consumer confidence and business enterprises' expectations do show that the tide is turning. In France private consumption and investments have risen strongly in the most recent quarters. Unemployment is a major problem faced by both countries. In Germany the unemployment level is as high as 11.4 per cent of the workforce. Unemployment in western Germany is approximately 9.5 per cent and falling, but in eastern Germany it exceeds 19 per cent and is still rising. There have recently been weak signs of improvement since during the last 4 months the number of unemployed in Germany overall has fallen. In France, a 35-hour working week will be introduced during the next few years, but there is considerable uncertainty regarding the consequences for cost levels. This may lead business enterprises to adopt a wait-and-see attitude. For example, it has not yet been clarified what the level of wage compensation will be, nor has the future structure of overtime pay been determined.

Currently both German and French inflation are at the lowest levels for 10 years. In March the annual rate of increase in consumer prices in Germany was as low as 1.1 per cent, which should be viewed mainly against the background of high German unemployment and the drop in oil prices. In April German inflation rose again to 1.4 per cent. This can be attributed to a raising of the standard VAT rate from 15 to 16 per cent with effect from April 1, 1998. A greater increase in inflation was expected because this VAT rate applies to approximately 60 per cent of consumer expenditure. This indicates that in the first instance the VAT increase was only partly reflected in prices. It is expected to take some time for it to be fully passed on.

The convergence situation in the EU member states

Within the ERM two exchange-rate realignments took place during the last quarter. Firstly, the Greek drachma joined the ERM on March 16, 1998 at a central rate of GDR 4,733 per kr. 100. As for the other participants the fluctuation band is +/- 15 per cent. On the same occasion the market price for the drachma depreciated by approximately 10 per cent against

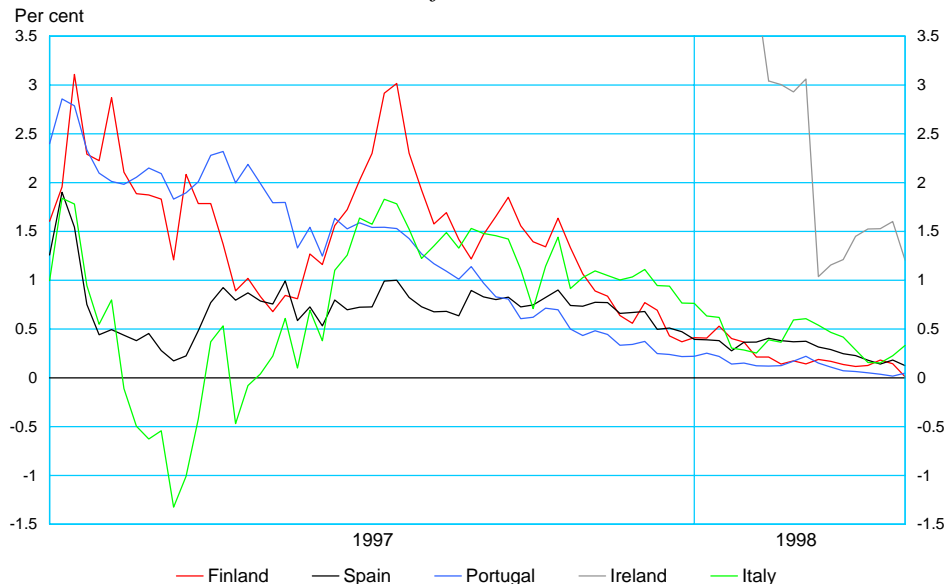
the krone. Greece's ERM entry should be viewed against the background of its wish to participate in the third stage of EMU in 2001. Like Denmark, Greece will participate in ERM2.

Secondly, on the same day the central rate for the Irish pound was revalued by 3 per cent against the other ERM currencies, to IEP 10.56 per kr. 100. This did not change the market rate for the Irish pound, which has since been relatively close to the ERM central rate. Ireland's revaluation emphasizes the convergence of all ERM currencies towards their central rates. The more volatile ERM currencies are now also very close to the central rate, cf. Chart 1.

Short-term interest rates have also continued to converge in 1998 when the southern-European countries gradually lowered their official interest rates. The level of short-term interest rates in southern Europe is now approximately 1-2 per cent higher than in the core countries. The convergence of long-term interest rates is even more pronounced and in mid-May the differential between 10-year government-bond yields in Italy and Germany was less than 25 basis points.

On May 2, 1998 the Council (Heads of State and of Government) resolved that 11 countries will participate in the third stage of monetary union, i.e. all EU member states except Denmark, the UK, Sweden and

Chart 1 *The currencies of selected countries vis-à-vis the D-mark*
Deviation from central rate



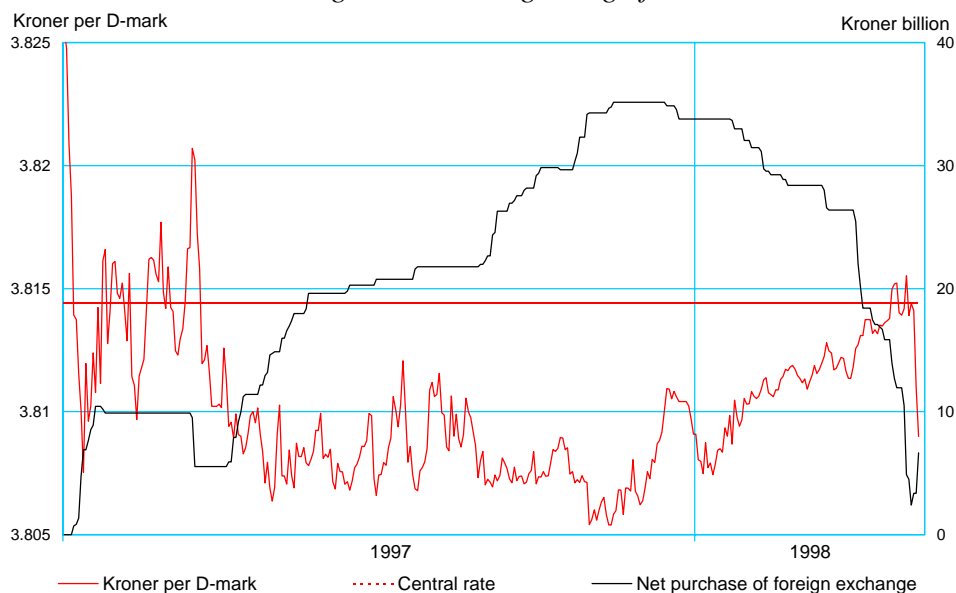
Greece. The decision was based on two convergence reports on each member state's fulfilment of the convergence criteria and other conditions for the introduction of the single currency. The reports were prepared and published by respectively the European Monetary Institute (EMI) and the European Commission. Both reports were published at the end of March. On the publication of these two reports a broadbased EMU with 11 participating countries already began to emerge. The Commission's report draws the clear conclusion that 11 countries fulfil all of the convergence criteria and have therefore achieved a high level of sustained convergence. With regard to Sweden it is stated that the country does not meet the criteria as a consequence of its non-participation in ERM and that Sweden has made inadequate progress in fulfilling its legal obligations. Greece does not meet any of the four convergence criteria, while Denmark and the UK are not included in the Commission's evaluation due to their Treaty-bound right to remain outside. In contrast to the Commission's report the EMI report solely presents an evaluation of the individual countries' convergence situation and does not conclude with any direct recommendations. The report focuses more on the high debt ratios in Belgium and Italy and the difficulties in reducing the debt ratio within an appropriate period in view of the current budget deficits.

Exchange-rate and interest-rate development in Denmark

With effect from May 6, 1998 the Nationalbank raised the discount rate and the current-account interest rate by $\frac{1}{2}$ per cent to 4 per cent. Interest rates for certificates of deposit and repurchase agreements were likewise raised by $\frac{1}{2}$ per cent to 4.25 per cent.

The background to this unilateral Danish raising of interest rates was the development in the krone rate against the D-mark and the Nationalbank's sale of foreign currency to support the krone. Since the beginning of 1998 the krone had weakened gradually against the D-mark and was approaching its central rate, cf. Chart 2. During the same period the Nationalbank supported the krone by selling foreign currency against kroner in order to ensure a stable course. Net sales of foreign currency totalled approximately kr. 25 billion in the period from February to mid-May 1998. Most sales took place in April and the beginning of May, cf. Chart 2. The krone's tendency to weaken was thus amplified considerably during April and the beginning of May. Several factors may have contributed to this, including uncertainty regarding the outcome of the referendum on the Amsterdam Treaty, the collective wage negotiations and ultimately the strike. A further

Chart 2 *The krone rate vis-à-vis the D-mark and the Nationalbank's accumulated net purchase of foreign exchange since the beginning of 1997*



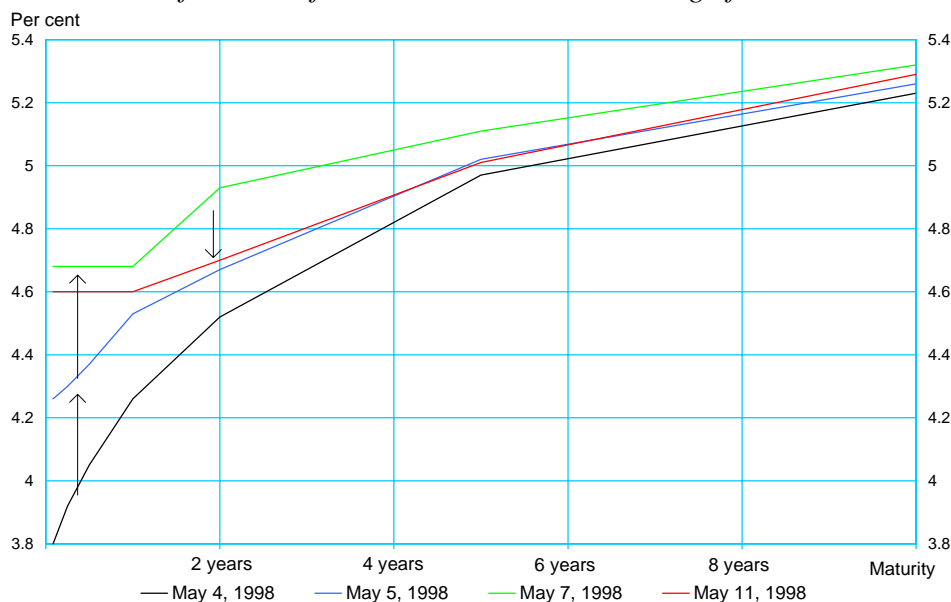
Note: Most recent observation is May 11, 1998.

contributing factor may have been some uncertainty concerning when and how the necessary fiscal-policy tightening will take place.

In connection with the raising of interest rates the short-term money-market rates rose immediately by an equivalent approximately $\frac{1}{2}$ per cent, which indicates that the raising of interest rates came as a surprise to the market, cf. Chart 3¹⁾. Already at the beginning of April the long-term money-market rates began to rise moderately, a trend which could also be observed in the other core countries. The immediate reaction of the long-term money-market interest rates was also somewhat less pronounced than for the very short-term rates. The raising of interest rates did not have any noteworthy impact on the long-term bond yields. On the days after interest rates were raised there was some transitory uncertainty in the market and the money-market interest rates rose further, cf. Chart 3. The conditions normalized in the course of a few days, however. The Nationalbank bought currency in the market and the krone strengthened against the D-mark to approximately kr. 380.90 per D-mark in mid-May.

¹⁾ See also "Market Reactions to Changes in the Danish Discount Rate", by Lisbeth Stausholm Pedersen, *Monetary Review*, 3rd Quarter 1997.

Chart 3 *The term structure of interest rates in the money and bond markets before and after the Nationalbank's raising of interest rates*

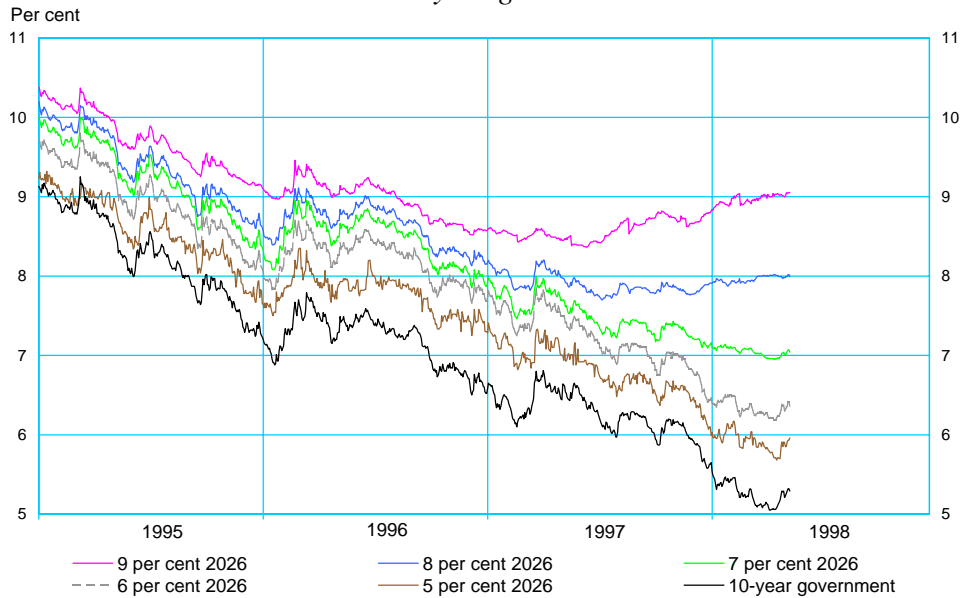


From February up to the beginning of May the short-term interest-rate differential to Germany stabilized at around 30 basis points. When interest rates were raised the short-term interest-rate differential widened to 80-100 basis points, while the long-term yield differential is close to 30 basis points.

As from the beginning of February to the end of April the yield on the benchmark 10-year government bond fell by almost $\frac{1}{2}$ per cent to just over 5 per cent. The interest rate thereby receded to a historically low level. With the drop in interest rates the interest-rate differential to Germany and the other core countries also narrowed to 20 basis points, which is the lowest differential ever. The yield on government bonds rose again slightly at the beginning of May and in mid-month was close to 5.30 per cent, while the yield differential to Germany was 30 basis points. So far, the yield differential to Germany has tended to narrow during periods of falling interest rates, and when interest-rate levels have been low the differential has also been low¹⁾. Therefore the long-term yield differential between the krone and the euro must also be expected to vary in the future.

¹⁾ See also "National and International Elements of the Development in Interest Rates in 1993-1995" by Niels Lynggård Hansen, Danmarks Nationalbank, *Monetary Review* - November 1995.

Chart 4 *Yields on 30-year mortgage-credit bonds with varying coupon rates and 10-year government bonds*



In 1998 the yield on the benchmark mortgage-credit bond with a coupon rate of 6 per cent, maturing in 2026, has fallen by less than the 10-year government-bond yield, cf. Chart 4. The widening of the differential between mortgage-credit and government bonds applies in particular to mortgage-credit bonds with a high coupon rate. For example, the yield on a 9-per-cent mortgage-credit bond maturing in 2026 has risen by approximately $\frac{1}{2}$ per cent during the past year, while the government-bond yield fell by $1\frac{1}{2}$ per cent over the same period. The widening of the differential between mortgage-credit and government bonds reflects primarily a higher conversion risk. The decline in interest rates during 1997 and 1998, together with borrowers' more active debt management, have contributed to increasing the volume of conversions significantly. This conversion activity is approaching the level during the wave of conversions in 1993-1994 when extraordinary loan redemptions totalled almost kr. 300 billion, although this time the development has been smoother. Moreover, the increase in turnover on the property market in 1997 and 1998 may be part of the reason for the large number of loans redeemed extraordinarily. The conversions in the first part of 1998 primarily concerned bonds with a coupon rate of 8 per cent or higher. However, conversions of bonds with a coupon rate of 7 per cent, for which the price rose to above par at the end of March, are also increasing.

Development in activity and the balance of payments

In 1997 real GDP grew by almost 3½ per cent overall, while domestic demand rose by more than 4.25 per cent and thus by far more than among Denmark's trading partners. Several indicators of domestic demand, e.g. consumer confidence, car sales and retail turnover, also point to continuing high consumption in the first half of 1998.

Private consumption has increased somewhat more than households' disposable incomes. The increasing propensity to consume must be attributed in particular to consumers' generally positive expectations among other things as a consequence of continued growth in prices for owner-occupied homes. From comparison of the 1st quarter of 1998 with the same period of the preceding year the Association of Danish Mortgage Banks has compiled the growth in cash prices for owner-occupied homes at just below 12 per cent. The strong decline in the level of interest rates has undoubtedly also affected the propensity to consume in view of the conversions of mortgage-credit loans to loans at lower interest rates. Although bond owners have suffered equivalent losses, where non-residents or institutional investors are involved there is no equivalent negative effect on consumption. The losses of institutional investors will not entail significantly lower pensions as the real-interest tax rate, and tax revenues to the Treasury, will decline.

Chart 5 *Capacity shortfall and employment*



Note: A positive net figure expresses a capacity shortfall.

Capacity utilization in industry has increased significantly as a consequence of the rise in activity, cf. Chart 5. At the close of 1997 the indicator of the capacity shortfall as compiled in Statistics Denmark's business survey was higher than in the mid-1980s when the previous economic upturn peaked.

Employment increased strongly in 1997 and the first months of 1998. In international terms the unemployment level is now very low. Applying the EU-harmonized definition unemployment is currently just below 6 per cent. Within the EU only Austria, Luxembourg and the Netherlands have lower unemployment rates.

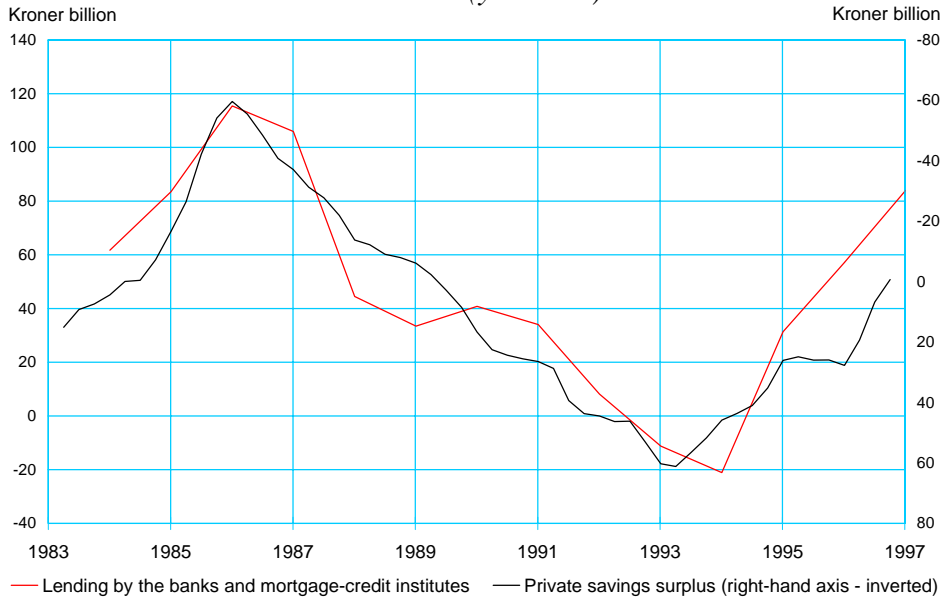
The stronger development of the Danish economy compared to Denmark's trading partners was reflected in a marked deterioration of the current account. The surplus in 1997 was just over kr. 7 billion, compared to approximately kr. 18 billion in 1996, i.e. a deterioration of kr. 11 billion in one year. At the beginning of 1998 the current account deteriorated further.

This deterioration in the balance of payments also reflects that the public savings surplus has not increased sufficiently to compensate for the decline in the private sector's savings surplus.

The private sector's savings balance is often reflected in the development in demand for loans, cf. Chart 6. A decline in the private sector's savings surplus will thus typically entail a higher financing requirement in the private sector, and thereby an increase in borrowing. This trend has also been apparent during the present upswing. In the mid-1980s the savings balance deteriorated significantly over a very short period. During this upswing the savings balance has likewise deteriorated considerably, but from a significantly more favourable starting point. Growth in lending to non-residents by the banks and mortgage-credit institutes has increased during the last three years and has now reached an annual growth rate of approximately 8 per cent. However, the growth in lending has not reached the extremely high level which prevailed during the upswing in the mid-1980s when the taxation rules entailed a generally negative real interest rate after tax.

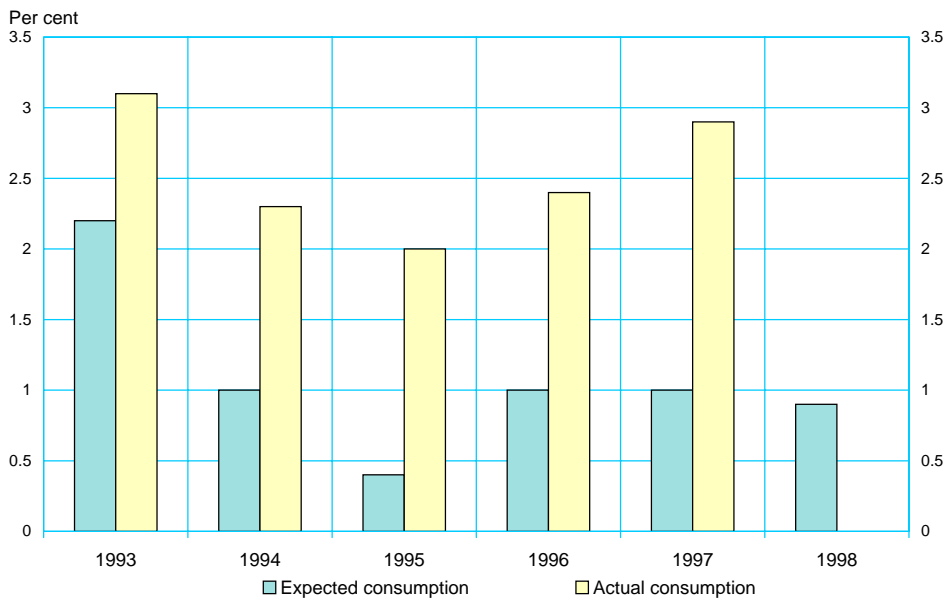
The indications of a further increase in consumption, the high level of capacity utilization, the recent strong deterioration of the current account, and not least the more relaxed financial conditions which are a consequence of the fixed-exchange-rate policy require that the announced tight public budget policy in 1998 be maintained, and that a real tightening take place in 1999. Since 1993 public consumption has risen every year by approximately 1½ per cent more than expected when the Finance Act was

Chart 6 *The private sector's savings surplus (end of quarter) and the change in lending by the banks and mortgage-credit institutes (year-end)*



Note: Krone- and foreign-exchange denominated lending to residents.

Chart 7 *Growth in public consumption*



Note: 1995-97 preliminary figures. Growth was particularly high in areas such as childcare which are subject to considerable user charges.

Table 1 *Development in consumer prices and net prices*

	Con- sumer- price index	Index of net retail prices	Energy	Imports	Domestic prices				
					Total	Food- stuffs	Rent	Public services	Other factors
					Weighting				
					1.000	0.085	0.142	0.773	0.160	0.233	0.046	0.334
Year-on-year growth, per cent									
1991	2.4	2.6	1.6	2.7	2.7	0.5	3.4	4.4	3.1
1992	2.1	2.1	- 3.8	2.5	2.5	1.8	2.0	2.9	3.2
1993	1.3	1.4	- 0.9	0.0	1.9	- 0.2	2.1	1.7	2.7
1994	2.0	1.6	- 3.1	2.1	2.0	3.0	1.6	2.4	1.6
1995	2.1	1.9	- 2.5	2.5	2.2	3.1	1.8	2.5	2.0
1996	2.1	2.0	6.6	0.1	1.9	1.7	1.6	1.1	2.4
1997	2.2	2.2	2.7	0.9	2.4	3.6	2.8	2.2	1.8
1996 1st qtr. .	1.8	1.7	4,1	0.8	1.6	1.1	1.4	1.9	1.8
2nd - ..	2.0	1.8	5.9	0.1	1.8	1.2	1.4	1.5	2.4
3rd - ..	2.3	2.1	7.0	- 0.2	2.1	2.1	1.4	0.4	3.0
4th - ..	2.4	2.2	9.5	- 0.2	2.1	2.3	2.0	0.5	2.5
1997 1st qtr. .	2.2	2.3	5.8	0.3	2.3	2.0	2.6	1.7	2.6
2nd - ..	2.1	2.1	1.6	0.6	2.4	3.5	2.8	2.2	1.8
3rd - ..	2.4	2.5	3.4	1.1	2.6	4.4	2.9	3.4	1.6
4rd - ..	2.1	2.1	0.1	1.7	2.3	4.3	2.7	1.7	1.3
1998 1st qtr. .	2.0	1.8	- 1.7	1.4	2.3	4.1	2.5	- 0.4	1.6

Note.: Weighting basis as of September 1996. The compilation of import prices includes a lag.

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

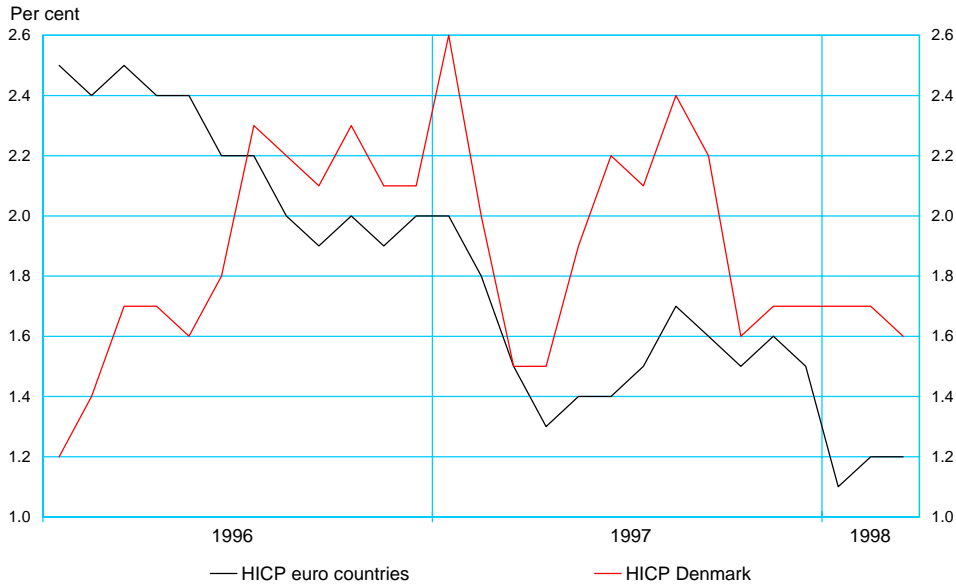
"Other factors" is a measure of domestic market-determined inflation. "Other factors" normally increases faster than the index of net retail prices due to an overweight of services for which the price development is typically stronger than for other commodities, due to such factors as traditionally lower growth in productivity in the service sector than in other sectors. At the same time the demand for services viewed in a more long-term perspective will typically increase faster than the demand for other products.

adopted, cf. Chart 7. In the present cyclical situation a tight fiscal policy is necessary to keep total domestic demand down. The unexpectedly large decrease in the current-account surplus can be attributed among other things to the more relaxed fiscal policy than planned in recent years.

Development in wages and prices

Inflation has been relatively moderate. In the 1st quarter of 1998 the year-on-year rate of increase in consumer prices (CPI) was 2 per cent, which is lower than in 1997, cf. Table 1. The decline in the rate of increase in consumer prices (CPI) is to a high degree attributable to falling energy prices. The dampening should also be viewed against the very strong food-

Chart 8 *Harmonized consumer price inflation (HICP) in Denmark and the euro area (EU 11)*



price increases in 1997, whereas increases in the 1st quarter of 1998 have been more moderate. Finally, most recently charges for public services have shown weak development. Import prices rose throughout 1997, but appear to have flattened out at the beginning of 1998 when particularly prices for a number of raw materials declined, among other things as a reaction to the downturn in Asia.

The relatively moderate level of inflation is higher than among our trading partners, however. Considering the harmonized index of consumer prices (HICP), calculated since 1995, it will be seen that since mid-1996 Denmark's harmonized consumer-price inflation has been on average 0.3 per cent above the consumer-price inflation in the future euro area, cf. Chart 8. The harmonized index of consumer prices for the euro area is a new index which covers inflation in the countries participating in the third stage of EMU as from January 1, 1999. The index is calculated as a weighted average of the harmonized index of consumer prices from each country. The joint index is expected to be a significant indicator for monetary policy in the euro area.

The rate of increase in wages in Denmark is still high and on a year-on-year basis has been around 4 per cent since 1994. With an increase of

around 4 per cent the wage increases in Denmark are approximately 1½ per cent higher than in the other core countries, and approximately 2½ per cent higher after adjustment for exchange-rate fluctuations. It is to be hoped that this difference will disappear once the differing cyclical positions are eliminated. The tighter labour market and wage increases beyond those in other countries clearly reflect the complications which arose during this year's collective bargaining. The bottleneck problems do not yet appear to be as great as during the upswing of the 1980s, even though employment is rising quickly from a high level.

The collective negotiations took an unexpected turn when the conciliation proposal put forward by the official conciliator (Forligsmanden) was rejected by a ballot of union members, resulting in a strike as from April 27. The strike ended on May 7 when the government took steps to intervene since the parties to the labour market had not yet come to any agreement and there was prospect of a prolonged strike. These measures entailed that the cost structure for employers remained by and large as set out in the rejected conciliation proposal. For example, the agreed average annual rates of increase in respectively the minimum wage and the normal wage of approximately 2.6 per cent and 3 per cent were retained. On the other hand, the increase in the pension contribution was reduced in favour of extra days of leave. In order to avoid an increase in employers' costs as compared to the rejected conciliation proposal viewed over a two-year period with effect from January 1, 1999 the employee sickness tax was reduced by almost kr. ½ billion.

DEBES - The Danish Part of TARGET

by Thomas Angelius, Søren Lundsby Hansen and Jesper Mærsk, Payment Systems Department

1. Introduction

DEBES - the Danish part of the future euro-payment system TARGET - is halfway through the testing phase and the activities related to the implementation of the system are under way.

The purpose of this article is to present a brief overview of the structure and functions of DEBES, as well as the conditions for participation. The article generally corresponds to the memorandum distributed by Danmarks Nationalbank to potential participants in the system at the beginning of April 1998 as the basis for their consideration of whether they wish to participate in DEBES.

The design of DEBES has been subject to ongoing discussion with the financial sector, including the TARGET working group of the Danish Bankers Association, the TARGET user group of Danmarks Nationalbank and Danmarks Nationalbank's "Working Group on the Danish euro-payments infrastructure". The system is a significant innovation. DEBES will thus in central areas facilitate cross-border settlement of payments in the same way as today's domestic payment-settlement system.

This article outlines the most significant aspects of the structure of and participation in DEBES, including functions, administration, participants, legal conditions and technical requirements, and interfaces with other systems.

2. DEBES

In connection with the future Economic and Monetary Union on January 1, 1999 all 15 EU member states will introduce the common European payment system, TARGET¹⁾. The Danish part of TARGET is called DEBES: Danmarks EuroBetalingsSystem.

In the following a distinction is made between DEBES (the Danish system) and TARGET (the entire European system).

2.1 TARGET - the structure of the system

TARGET is a real-time gross-settlement system²⁾ which allows participants - financial institutions throughout Europe - to transfer euro-denomina-

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

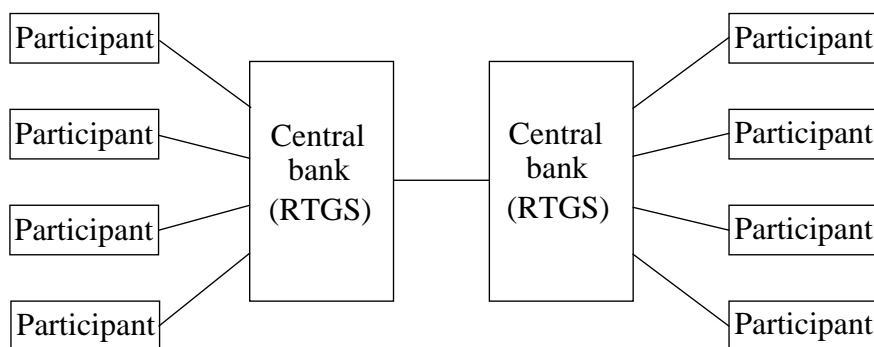
²⁾ Also called an RTGS system (Real Time Gross Settlement).

ted payments to each other with immediate effect. The payments are transferred between the central-bank accounts of the participants and the system can handle inter-bank payments for participants' own or customers' accounts. Each payment is handled individually, with immediate confirmation of execution.

TARGET is being established to provide a fast and safe system for execution of cross-border euro-denominated payments, including facilitation of the monetary-policy transactions of the future European Central Bank (ECB). TARGET will be implemented in all 15 EU member states. The system is designed primarily for transfer of large-value payments, but may also be used for retail payments.

Technically, TARGET comprises the national systems of all 15 member states interlinked by a S.W.I.F.T.-based¹⁾ communication network between the 15 central banks. The Chart below shows the structure of TARGET.

Chart 1 *The overall structure of the TARGET system*



As the Chart shows, all payments are transferred via the domestic central bank, which besides operation of the system is responsible for the book-keeping. For Danish participants amounts are thus booked to euro-denominated accounts with Danmarks Nationalbank.

2.2 *DEBES - the structure of the system*

The Danish part of TARGET is called DEBES. Like Danmarks Nationalbank's system for krone-denominated payments, the DN Inquiry and Transfer System, DEBES is a real-time gross-settlement system.

¹⁾ S.W.I.F.T. is the most widely used communication network for international financial transactions. S.W.I.F.T. is owned by the participating banks and its head office is located in Belgium.

In practice, DEBES payments are made in much the same way as normal S.W.I.F.T. payments, i.e. traditional international payment transfers. In the case of a domestic DEBES payment a normal S.W.I.F.T. message is transmitted to the recipient via a closed part of the S.W.I.F.T. network (a "closed user group") which solely comprises DEBES participants. During the process, Danmarks Nationalbank checks the availability of funds and books the transfer to the accounts of the two participants. When the payment recipient receives the S.W.I.F.T. message the funds have been credited to that party's account with Danmarks Nationalbank.

For a payment to a TARGET participant outside Denmark (a cross-border payment) the payment order is transmitted via S.W.I.F.T. (and the closed user group) directly to Danmarks Nationalbank. The identification of the recipient is stated in the payment order itself. Danmarks Nationalbank will check the availability of funds, book the transfer and transmit the payment to the recipient's national central bank, which will book the amount to the recipient's account and relay the message in the domestic format.

Any amounts received in the DEBES system are credited to accounts with Danmarks Nationalbank.

The participants are linked to DEBES via a S.W.I.F.T. interface and terminal-based access. Payments may only be made via S.W.I.F.T., but the participants may choose whether they wish to use the terminal or S.W.I.F.T. for service functions (payment statements, queue functions, etc.). The participants may thus choose between:

- ◆ a pure S.W.I.F.T. solution where the S.W.I.F.T. interface is used for payments as well as for "service functions" (payment statements, queue functions, etc.) or
- ◆ a combined solution where the S.W.I.F.T. interface is used to make payments, and the terminal-based access is issued for service functions.

DEBES is a technical advance on the DN Inquiry and Transfer System in the following respects:

- ◆ use of standard S.W.I.F.T. messages, including the possibility of attaching information concerning the payments,
- ◆ enhanced "Straight Through Processing", i.e. end-to-end processing of the payment without any manual handling, and
- ◆ a queue function.

2.3 Queue function

DEBES contains a queue function which is activated automatically when payments are executed. Should a DEBES participant transmit a payment without having the necessary euro-denominated liquidity available, the payment concerned (and any subsequent payments) is automatically placed in a DEBES payment queue. Each participant has constant access to view his own queue and may also influence the content of the queue, the order of the payments, etc.

Since DEBES is a real-time settlement system, it is not possible to place payments in the queue for settlement on subsequent days. However, there is nothing to prevent each DEBES participant from establishing such a queue in the participant's own system and waiting to transfer the payments to DEBES on the required settlement day.

2.4 Opening days and hours

In 1999 DEBES will be open every day except weekends, December 25 and January 1 (corresponding to all international TARGET opening days).

The participating central banks may choose to close on national holidays. On such national closing days participants in the relevant country will neither be able to send nor receive payments via the system. The possibility of national closing days means that the systems of the respective countries will not necessarily have the same opening days, although it seems extremely likely that the major markets will arrange to stay open on all possible days. Danmarks Nationalbank is not at present aware of any requirements for the Danish DEBES participants to have staff available on the opening days which are Danish public holidays. The final list of national closing days will be published in September 1998. This list will only apply to 1999. Prior to August 1 each year the national central banks must inform the ECB of the opening days of their national euro-payment systems in the following year.

DEBES will be open for customer payments from 7 a.m. to 5 p.m. and for inter-bank payments from 7 a.m. to 6 p.m., corresponding to the international TARGET opening hours.

It should also be stated that the DN Inquiry and Transfer System will retain its present opening days and hours (from 8 a.m. to 3.30 p.m. on banking days).

2.5 Intra-day liquidity

The EU central banks are continuing their preparations for TARGET. All EU member states will be connected to TARGET irrespective of

whether they participate in the single currency or not. However, many factors indicate that the member states outside the euro area will participate on more restrictive terms than the euro countries.

The most significant restriction is that limits will probably be imposed on the intra-day liquidity made available to the central banks of the member states outside EMU. So far, three models are being considered in connection with access to intra-day credit¹⁾:

1. Fines and other sanctions in the event of uncovered overdrafts at the end of the day.
2. Maximum limits (possibly zero) for intra-day credit supplied by central banks in the euro area to central banks outside the euro area.
3. Earlier closing time for credit to TARGET participants (central banks and credit institutions) outside the euro area in order to allow time for overdrafts to be covered before the rest of the system closes.

The exact terms will not be known until the ECB has made its decision in this regard later in the year. The Danish participants must prepare their systems to accommodate any restrictions on intra-day liquidity.

If only limited or no access to euro liquidity is offered to DEBES participants it will be possible to obtain euro liquidity either by awaiting incoming euro-denominated payments or by purchasing or borrowing euro from other participants in Denmark or abroad.

2.6 Provision of collateral and drawing limits

Any intra-day liquidity provided for Danmarks Nationalbank will be made available to DEBES participants against provision of sufficient collateral. Any intra-day liquidity will probably be distributed among DEBES participants in proportion to the fixed charges paid by the participants.

Any liquidity is made available to the DEBES participants against advance provision of collateral as the deposit of securities (as in the DN Inquiry and Transfer System). A separate euro-denominated safekeeping account will be established for such collateral. This solution has been chosen so as to be able to handle any special requirements for the provision of collateral for euro-denominated credit and to avoid creating excessive ties between the krone and euro systems.

It has not yet been determined which securities may be used as collateral for any euro-denominated credit. The clarification awaits an ECB decision.

¹⁾ The basis of all the models is to ensure that intra-day credit does not extend over several days.

Danmarks Nationalbank is expected to be able to accept krone-denominated securities registered with the Danish Securities Centre.

2.7 *The euro-account structure*

Direct participants in DEBES are required to hold a euro-denominated main account with Danmarks Nationalbank. DEBES payments are booked to this account. Separate euro settlement accounts will be established for other payment systems (euro securities settlement clearing and euro retail clearing). Any transfer of funds from the main euro account to the euro settlement accounts may take place only via DEBES.

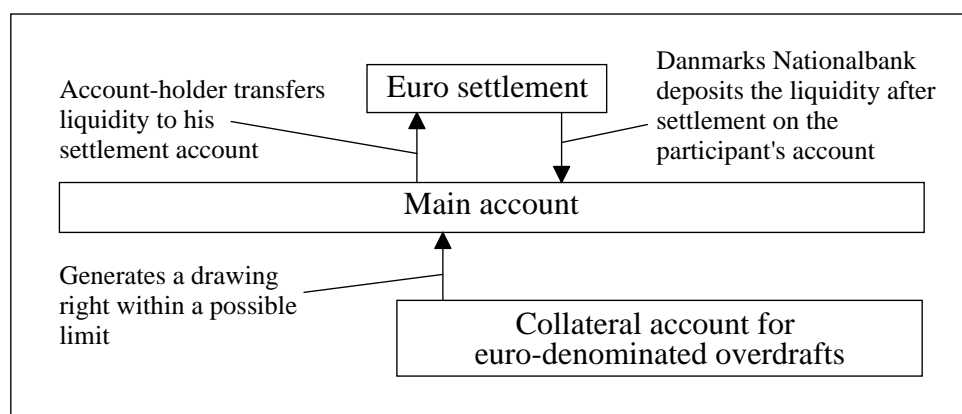
Euro-denominated accounts with Danmarks Nationalbank will not accrue interest.

2.8 *DEBES participants*

No special requirements have been agreed for access to TARGET. The general requirements for payment systems as agreed by the EU central banks will be applied. These are set out in the EMI report "Minimum Common Features for Domestic Payment Systems" of November 1993. This report states that, as a general rule, only credit institutions have direct access to payment systems. However, other institutions subject to supervision (e.g. mutual funds) and quasi-public enterprises may also be direct participants.

Danmarks Nationalbank's access requirements, which have been adjusted to the international requirements, are set out in Danmarks Nationalbank's account regulations ("Regulations Concerning Current Accounts with Danmarks Nationalbank"). Credit institutions and mutual funds

Chart 2 *Outline of the euro-account structure at Danmarks Nationalbank*



covered by the second banking directive and the investment services directive comply with the access requirements. The same applies to other branches in Denmark of equivalent foreign institutions subject to the supervision of the Danish Financial Supervisory Authority. Finally, access to hold accounts may be extended to other parties complying with the international requirements which are deemed by Danmarks Nationalbank to play a significant role in the settlement of payments.

There are expected to be approximately 5,000 direct and approximately 35,000 indirect participants in TARGET throughout Europe. This will make it possible to transmit payments to approximately 40,000 recipient banks and their customers. In September 1998 S.W.I.F.T. will publish a list of the institutions which can be addressed via TARGET.

2.9 Indirect participants

It is possible to become an indirect DEBES participant. An indirect participant holds no euro-denominated main account with Danmarks Nationalbank, but may send and receive TARGET payments via a direct DEBES participant (holding a main account). An indirect participant may participate via one direct participant only.

Indirect participants are displayed alongside direct participants in S.W.I.F.T.'s list of institutions which can be addressed via TARGET.

Indirect DEBES participants may be listed as recipients of cross-border payments since DEBES will automatically book the payment to the account of the institution recorded in DEBES as a direct participant. Only direct DEBES participants may send payments.

2.10 Limited (domestic) participation

The Danish Bankers Association has inquired whether it will be possible to segregate participation in the domestic part from cross-border participation in order to reduce the costs of access solely to effect domestic payments. This is a necessary function for participation in future euro settlements in the retail-clearing and securities settlement clearing systems.

This segregation is not possible due to the limitations imposed on pricing by the European Monetary Institute (EMI)¹⁾. The EMI has decided that charges for cross-border payments must be collected solely via a transaction price. It is thus not possible to divide entry fees and periodic fees into fees for respectively cross-border participation and for national participation. These fees may only be charged for participation in the national

¹⁾ The predecessor of the ECB.

systems. However, the fees are at a level which will not be a barrier to participation.

2.11 Remote participation

Physical location in Denmark is not a condition for DEBES participation. Any credit institution established in and subject to the supervision of another EU member state or EEA country may thus become a remote participant in DEBES.

2.12 Capacity and transaction time

The system has been developed to process a very large number of transactions. TARGET is thus expected to be able to handle without difficulty the millions of TARGET transactions every year expected by the EMI.

Both DEBES and the entire TARGET system are real-time systems. So under normal circumstances no more than a few minutes are expected to elapse from the debiting of the account of the sending bank to the crediting of the account of the recipient bank.

2.13 Availability and security

Great efforts have been made to ensure high availability of DEBES and the entire TARGET system. The requirement is no more than one breakdown of maximum one hour's duration per month for each national system. In the event of a disaster at Danmarks Nationalbank's data processing centre, DEBES must be re-established at another location within four hours. This requirement also applies to the TARGET systems of the other EU member states.

The emergency communication procedures between the participants and Danmarks Nationalbank are expected to correspond to the current procedures for the DN Inquiry and Transfer System, i.e. a telefax-based solution.

Furthermore, great importance is attached to the security of the TARGET system. The EMI has conducted two extensive security analyses developed by the EMI and based on the British safety standard BS7799, which is considered to define a market standard.

2.14 Control procedures

Cross-border payments are subject to very extensive control procedures for the central banks' administration of the system in connection with the closing at the end of the day. The purpose of these procedures is for example to ensure that all bilateral transactions between the central banks are matched. No central bank may close down before the ECB has authorized

the closedown and checked that all payments have been processed. The report "End of Day Procedures in TARGET"¹⁾ presents a description of the procedures.

Cross-border payments are also subject to very extensive control procedures for the central banks' administration of the system in connection with "abnormal" situations such as delayed closing or disasters. However, these procedures concern the relations between the central banks and are not expected to be of significance to the participants.

2.15 Bank-to-bank charges for customer payments

In order to avoid misunderstandings concerning the size of the original payments, TARGET participants should credit their customer accounts with the full amount of the payment. Any fees should thus be collected separately, i.e. either from the customer or from the sending bank.

2.16 Legal conditions

Danish law and choice of legal venue shall apply to the business aspects (including legal rights and obligations), operational matters and division of liability between Danmarks Nationalbank and the DEBES participants.

2.17 Irrevocable and final payments

Payments in TARGET (and thereby in DEBES) are irrevocable when debited to the account of the sending bank.

Domestic payments are final when credited to the recipient's account. Cross-border payments are final when debited to the sender's account by the sending central bank and credited to the recipient central bank's account (internal set-off account).

In the event of difficulties after transfer to the recipient central bank (for example if the recipient RTGS member is not found), the amount will be reversed as a set-off TARGET payment.

The "Finality directive" will support the legal basis for TARGET.

2.18 The EMU transition phase

In the period between 1999 and 2002 it will be possible to specify both euro and e.g. DEM amounts in payment messages. S.W.I.F.T. has designed a "standard" for financial institutions' indication of euro-related information in the payment message. This standard is called Euro-Related Information (ERI) and is supported by DEBES.

¹⁾ The report can be obtained from Danmarks Nationalbank's Payment Systems Department (extension 6152).

2.19 Help desk

Danmarks Nationalbank is responsible for the day-to-day administration of DEBES. In this connection Danmarks Nationalbank will establish a "help desk" which DEBES participants can contact regarding payments, etc. Danmarks Nationalbank will assist with troubleshooting, i.e. by identifying errors in the system from the sending to the recipient bank. Any errors in the connection from the recipient bank to the recipient customer, e.g. due to an error in the account number, must be clarified bilaterally between the sending and recipient banks. However, at present the EMI is investigating opportunities to support transmission of separate customer-to-customer messages.

3. Relations with other systems

3.1 The DN Inquiry and Transfer System

The DN Inquiry and Transfer System, the present RTGS system of the Danish banks, will not be immediately affected since DEBES can only handle euro-denominated payments. However, within the next few years it is planned to implement a new version of the DN Inquiry and Transfer System (KRONOS) with S.W.I.F.T. functionality as in DEBES.

3.2 Retail clearing

The Danish Bankers Association is planning to establish a euro-denominated retail-clearing system according to the same principles as the present krone-denominated retail-clearing system. The euro retail-clearing system will be independent of the krone retail-clearing system and will be able to process payments as in an electronic clearing system. However, of these payments it has initially only been decided to process account-to-account transfers. This means that from the outset the euro retail-clearing system is not planned to include e.g. payment service transfers by Danish Payment Systems Ltd. (PBS). The settlement time has been set provisionally at 10.30 a.m. The final time will depend inter alia on the VP settlement system for euro-denominated securities.

The euro retail-clearing system is planned to be implemented on May 15, 1999. Direct participation in the euro retail-clearing system requires direct participation in DEBES, cf. section 2.7 on Danmarks Nationalbank's euro-account structure.

3.3 VP clearing

The Danish Securities Centre (VP) and Danmarks Nationalbank are working on a model for settlement of securities against euro. This work is expected to be concluded later this year. A condition for participation as a primary liquidity provider in the euro VP clearing system (direct participant in the liquidity-settlement system) is direct participation in DEBES, cf. section 2.7 on Danmarks Nationalbank's euro-account structure.

3.4 The FUTOP system

Currently no euro products, and thereby euro-settlement in the FUTOP system, are planned.

3.5 Interrelation between the retail clearing and VP clearing systems

The system for intra-day settlement of euro payments will as far as possible be designed along the same lines as the krone-payment system, so that payments to mortgage-credit institutes can be used as disbursements to bond holders.

4. Future euro payments

TARGET will be one of around half a dozen payment systems for settlement of large-value euro-denominated payments in Europe.

TARGET is distinguished by real-time settlement, a high level of security and probably also a very large number of participants. On the other hand the liquidity requirement for TARGET will be greater than a "netting" system and the transaction costs will probably be higher than in most other systems.

References to EMI reports¹⁾

The TARGET Report, May 1995.

The Single Monetary Policy in Stage Three - Specification of the Operational Framework, January 1997.

First Progress Report on the TARGET Project, August 1996.

Second Progress Report on the TARGET Project, September 1997.

End of Day Procedures in TARGET, September 1997.

¹⁾ The reports can be obtained from the Information Desk of Danmarks Nationalbank (extension 7000).

Revision of the Weights for Calculation of the Nationalbank's Effective Krone Rate Index

by Erik Haller Pedersen, Economics Department

Introduction

Danmarks Nationalbank regularly publishes an index of the development in the strength of the krone, called the effective krone-rate index. Changes in trading patterns make it necessary from time to time to recalculate the weights at which the individual exchange rates are weighted together when the index is calculated. This took place most recently in 1992 using a set of weights based on trade in manufactured goods in 1989¹⁾. As from June 2, 1998 the Nationalbank will publish an effective krone-rate index calculated using weights based on trade in manufactured goods in 1995.

The new index is linked to the previous index as of May 30, 1997, i.e. the krone-rate index has been recalculated for the last year. There are no changes in the published index prior to the date of linkage.

The new set of weights includes four new countries, South Korea, Poland, the Czech Republic and Hungary, bringing the number of countries up to 25. No other changes have been made to the basic method of calculating the index.

As a consequence of the revision, at the beginning of May 1998 the krone-rate index using the new weights was approximately $\frac{3}{4}$ per cent higher than the previously published index, primarily due to the depreciation of the South Korean currency, the won, against the previous year.

What is an effective exchange rate?

In the currency market a large number of currencies are traded directly or indirectly against the Danish krone. Often the krone will strengthen against certain currencies while simultaneously weakening against others. By weighting the exchange rates together the effective krone rate provides an overall measure of the development in the international value of the krone as a consequence of fluctuations in the individual bilateral exchange rates. This requires a set of weights which shows the relative importance of each currency. How these weights are to be calculated is not determined beforehand since it depends on the problems to be studied.

¹⁾ See "The Effective Krone Rate and Competitiveness" by Christian Ølgaard, Danmarks Nationalbank, *Monetary Review* - February 1992.

Table 1 *Weights for the Nationalbank's effective krone-rate index*

	Double-weighted export weights	Bilateral import weights	95 weights	89 weights	83 weights
	60.3	39.7	100		
Germany (DEM)	26.6	28.6	27.4	25.6	24.8
Sweden (SEK)	6.7	13.7	9.4	11.7	12.4
UK (GBP)	8.3	9.2	8.6	9.8	10.6
USA (USD)	9.5	4.3	7.5	8.7	9.0
France (FRF)	7.6	6.0	7.0	6.8	6.5
Japan (JPY)	7.5	3.5	5.9	6.7	7.8
Netherlands (NLG)	3.9	8.0	5.5	4.6	5.2
Italy (ITL)	5.1	5.7	5.4	5.3	4.9
Belgium (BEF)	3.3	4.5	3.8	3.5	3.2
Norway (NOK)	4.1	3.0	3.7	3.9	5.3
Finland (FIM)	2.9	3.3	3.1	3.6	3.0
Switzerland (CHF)	2.5	2.2	2.4	2.7	2.8
Spain (ESP)	2.3	1.1	1.8	1.8	1.2
Austria (ATS)	1.7	1.4	1.6	1.7	1.5
Portugal (PTE)	0.6	1.5	0.9	1.0	0.5
Ireland (IEP)	0.9	1.1	0.9	0.7	0.6
Canada (CAD)	0.8	0.2	0.5	0.7	0.7
Australia (AUD)	0.8	0.0	0.5	0.5	...
Greece (GRD)	0.3	0.2	0.3	0.4	...
Iceland (ISK)	0.2	0.0	0.1	0.2	...
New Zealand (NZD)	0.1	0.0	0.1	0.1	...
Poland (PLN)	1.6	1.4	1.5	...	...
South Korea (KRW)	1.9	0.5	1.4	...	...
Czech Republic (CZK)	0.5	0.4	0.4	...	...
Hungary (HUF)	0.3	0.2	0.3	...	...

Note: The weighting together of the export and import weights to the total set of weights is to more decimal places than shown in the table.

The basis for the Nationalbank's effective krone rate is the international price competitiveness of Danish industry. It is assumed that the costs of Danish and foreign manufacturers, including wage costs, are to a great extent determined in national currencies. Since domestic manufacturing enterprises sell their products in competition with foreign enterprises the exchange rate is of central importance to the relative competitiveness of the Danish enterprise.

However, fluctuations in the effective krone rate can only be taken to indicate an equivalent change in Danish industry's competitiveness if costs in Denmark rise in step with those of our competitors. Otherwise adjustment must be made for the development in the relative wage costs in the same currency. This is the role of the real effective exchange rates. But it should

also be emphasized that an index of effective exchange rates by no means reflects all aspects of competitiveness as a concept.

Effective exchange rates are overall measures which do not express the change in the competitive situation of an individual company. Relevant bilateral exchange rates are often more suited to this purpose.

In the following the new set of weights is first presented and then the principles behind the Nationalbank's choice of methodology are outlined. The more technical aspects of the calculation can be found in the Appendix.

The new krone-rate weights

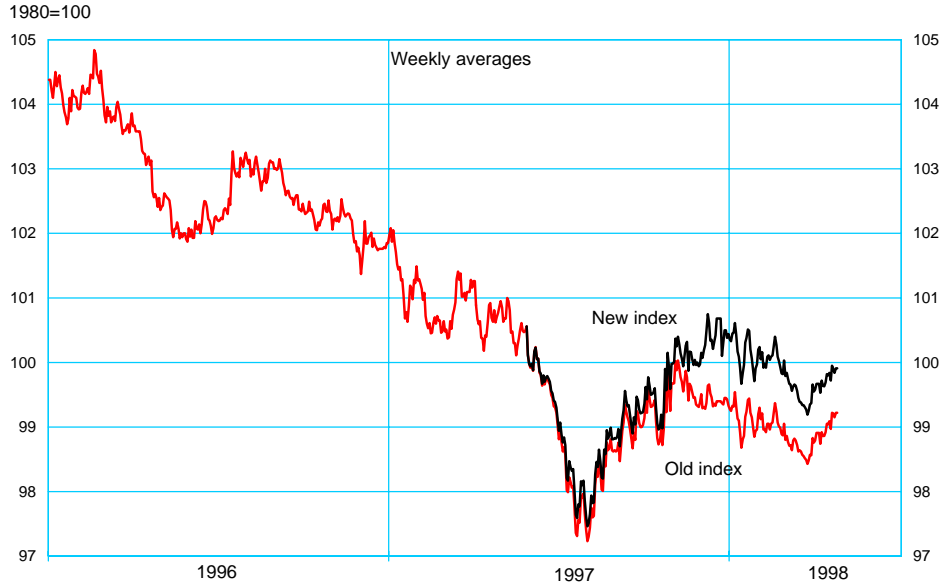
In order to arrive at the final weights, as before a set of export weights (double-weighted export weights) is weighted together with a set of import weights (bilateral import weights), with greatest weighting given to the export side. The double weighting of the export weights reflects that competition with a given country not only concerns that country's domestic market, but also international markets. This is described further in the Appendix.

The set of weights based on trade in manufactured goods in 1995 is presented in Table 1. The general picture is of slightly more pronounced changes in the weights this time than on the last revision of the weights. During the intervening period all EU trade statistics have been re-organized in connection with the introduction of the EU single market in 1993. This has given rise to data quality problems.

The inclusion of additional countries will naturally entail an underlying trend for the weights for the individual countries to be reduced from the 89 set of weights. For some countries, however, the weights have decreased considerably more than can be attributed solely to the inclusion of the additional countries. This applies in particular to Sweden, the UK and the USA, but this is merely a continuation of a historical trend, cf. the Table. With regard to Sweden the entire decrease lies by and large on the export side, which quite certainly also reflects the economic downturn in Sweden at the beginning of the 1990s, and thereby low demand for foreign goods. The weighting of the Japanese yen has also diminished. This is due exclusively to a decrease in the import share, while the export weight is unchanged from the last revision of the weights.

The relatively large decrease in the weights for the four aforementioned countries is counteracted by a comparatively strong increase in the weights for Germany and the Netherlands. In the case of Germany this e.g. reflects the consequences of the German reunification. The increase in exports to

Chart 1 *Previous and new effective krone-rate indices*



Germany has an extra strong impact on the overall krone-rate weighting, since in the 95 set of weights the export side is weighted more strongly on calculation of the final weighting than was the case in the 89 set of weights (60.3 per cent against 53.1 per cent). This reflects that exports are becoming increasingly more important to Danish industry.

In the new set of weights the overall weighting for the countries participating in the euro is just below 60 per cent. With the addition of countries which can be presumed to seek to maintain a generally stable exchange rate against the euro bloc the percentage reaches more than 70. This entails considerable cushioning of the future fluctuations in the effective krone rate. The possible inclusion of the four new countries, whose total weighting is 3.6 per cent, is a counteracting factor. In the event of very strong exchange-rate fluctuations this weighting is sufficiently high to have a marked impact on the overall index.

Comparing the development in the previous and new krone-rate indices the latter is approximately $\frac{3}{4}$ per cent higher at the beginning of May 1998, cf. Chart 1. This reflects among other things the depreciation of the South Korean won during the period, cf. also the breakdown in Table 2. Even though the South Korean currency is included with only a moderate weighting its very strong depreciation still has a marked impact on the overall index.

Table 2 *Contributions to the change in the effective krone rate during the period June 2, 1997 to May 1, 1998*

	Index points
Currencies of the core countries	- 0.12
Pound sterling	- 0.63
US dollar	- 0.41
Swedish krona	- 0.47
South Korean won	0.49
Other currencies	0.49
Change in effective krone rate	- 0.65

- reflects a strengthening of the currency against the krone.

The inclusion of countries with strongly depreciating currencies in an effective exchange-rate index is not without its drawbacks, since usually such countries also have a high price- and wage-increase rate. Even in the short term this can make the value of the nominal effective exchange rate a problematic indicator of the development in competitiveness since the index will tend systematically to show relatively poorer development in competitiveness than is actually the case.

In order to make adjustment for the deviating development in the relative prices and wages in the same currency real effective krone rates with the four new countries have been calculated, including the two real krone-rate indices which are published regularly by the Nationalbank with respectively consumer prices and hourly wages in manufacturing as deflator¹⁾.

The real effective krone rate with prices as deflator shows the same overall development as the nominal index, cf. Chart 2, but the rate of price increases in South Korea has doubled during the last six months and the price-increase rate in the three eastern-European countries included in the krone-rate index is also rather high (10-20 per cent).

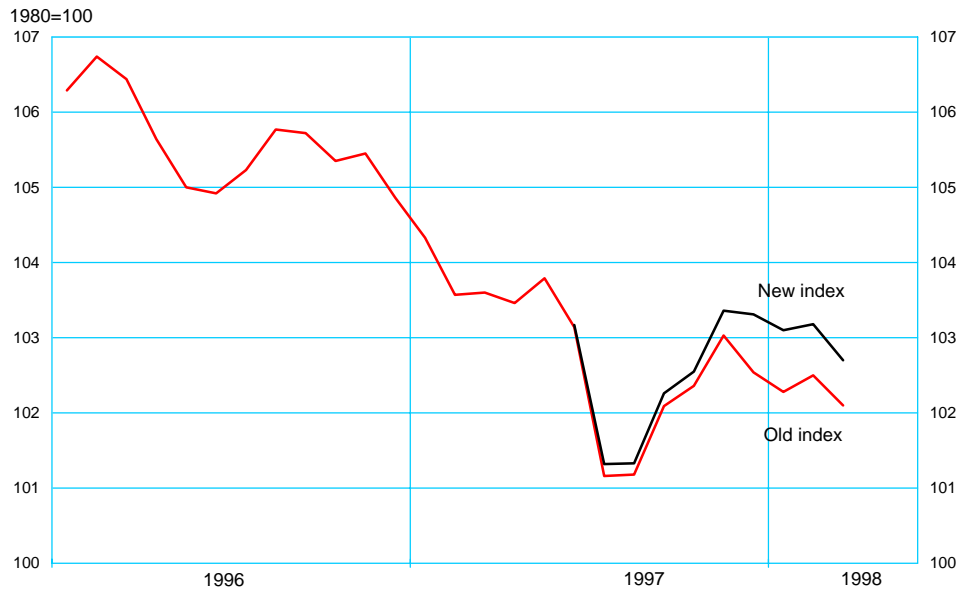
It must be concluded overall that the revision of the krone-rate index does not significantly change the picture the index gives of the development in the competitiveness of Danish industry in recent years, not even with further retrocative projection of the date of linkage.

The basis for calculation of the Nationalbank's effective krone rate

When effective exchange rates are calculated a number of choices must be made - both operational and concerning issues of principle. The most

¹⁾ See "Real Effective Exchange Rates" by Erik Haller Pedersen, Danmarks Nationalbank, *Monetary Review* - May 1996 for a more detailed account of different real effective krone rates.

Chart 2 *Real effective krone rate*



important are the delineation of which countries to include in the index, the choice of base year, and the goods composition. Moreover, the date of linkage with the previous index must be determined.

Since the effective krone-rate index is designed to measure the development in industry's competitiveness, the weights in the index should reflect the breakdown by country of trade in manufactured goods. In practice, the trading pattern does not change significantly from year to year, but considerable shifts may take place over a period, calling for revision of the weights. Ultimately the weights could be updated every year, although this might make interpreting the index more difficult, since a given change might now be due to both the exchange rate and/or changes in the weights. The choice of 1995 as the base year for the Nationalbank's index was made exclusively on pragmatic grounds, since it is the last year covered by the OECD trade statistics at the required level of detail.

Compared to previously, in recent years the importance of regions outside the group of industrialized countries to trade in manufactured goods has also grown steadily¹⁾. However, as before, the delineation of countries has been limited to the OECD countries. Since the last revision of the weights the OECD has been enlarged to include South Korea, Poland, the

¹⁾ For further discussion see OECD (1994) Economic Outlook No. 56, pages 38-49.

Czech Republic and Hungary, and these countries are thus included in the calculation of weights. Mexico and Turkey are also OECD members, but are excluded since they are both characterized by strongly depreciating currencies and high inflation. Countries outside the OECD group are not included on operational grounds, i.e. problems in obtaining data with a sufficient level of detail and of a sufficiently high quality, and also for reasons of principle. In this regard two factors are involved. If countries with high inflation and continuously depreciating currencies are included a nominal exchange-rate index will be distorted, as previously described, and there is more focus on the real exchange-rate index, which in practice is more difficult to calculate and will only be available after a certain delay. Secondly, it is problematic to include countries with an industrial structure which differs significantly from Denmark's, i.e. actual low-wage countries. This aspect is discussed in more detail in the Appendix. In reality, there is no clear distinction between which countries to include and which not.

As stated, the basis for the calculation of weights is trade in manufactured goods. Denmark's substantial agricultural exports are thus not included. The reason is not a lack of statistics, but rather the extensive subsidy schemes and quantitative restrictions in this area which make the impact of exchange-rate fluctuations more difficult to isolate, since prices are not fully market-determined. The growing international trade of services is not included either. However, this is due to a lack of data. Manufactured exports constitute approximately 70 per cent of total Danish goods exports and 50 per cent of total exports. The proportions on the import side are a little higher.

In relation to some of Denmark's trading partners it is vital whether all trade in goods is included, or only trade in manufactured goods. This applies for example to trade with a country such as Russia. Measured in terms of total trade of goods this country is one of Denmark's largest trading partners in eastern Europe and the previous Soviet area. However, if only trade in manufactured goods is included, exports to Russia constitute only 1/3 of manufactured exports to e.g. Poland. The difference is even greater on the import side.

The inclusion of South Korea in the set of weights is the basis for the recalculation of the index for the most recent year, in contrast to the procedure last time the weights were changed. In autumn 1997 the Korean currency depreciated strongly in line with a number of other South-east-Asian currencies. It is the assessment that in South Korea's case at any rate this depreciation far exceeded what could be attributed to the real

economic situation. Inclusion of the won only after the depreciation took place will make the krone-rate index biased when the currency begins to re-appreciate. If the weaker level of the won proves to be longstanding this will not present any problem in relation to the krone-rate index. However, in recent months the won has already recovered some of its former strength.

The single currency, the euro, will be introduced by a number of European countries as of January 1, 1999. This raises the question of the weighting given to the euro area in the krone-rate index. One possibility is to add together the new weights for the participating countries, another to calculate a new set of weights covering the euro area as one. This would eliminate the inter-regional trade flows in the euro area. The two methods do not give quite the same set of weights, which is a small disadvantage of the double-weighting methodology. In the first instance the Nationalbank intends to use the first-mentioned procedure in view of the wish to continue to use the price and wage statistics from the individual countries in the euro area to calculate real effective krone rates.

Appendix

Danish companies face competition from companies abroad on both the domestic and export markets. The breakdown of this competition by country cannot be determined precisely, but when effective exchange rates are calculated it is normally assumed that competition on individual export markets and on the domestic market is directly proportional to each country's market share. The starting point is thus trade flows, whereas normally which currency the trade is invoiced in is without significance.

As a starting point two sets of weights are calculated, one representing the distribution of competition on export markets (double-weighted export weights) and one for the domestic market (bilateral import weights).

Double-weighted export weights

Calculation of a set of double-weighted export weights assumes that each country's market share is known, including its domestic market share, i.e. the diagonal in the matrix. The calculation is based on a trade matrix for manufactures (SITC 5-9), as illustrated below.

From country	To country				
	1	2	...	25	RoW
1	a _{1,1}			a _{1,25}	a _{1,26}
2					
...					
25	a _{25,1}			a _{25,25}	a _{25,26}
Total	1			1	1

Note: RoW stands for "Rest of World".

$a_{i,j}$ indicates the export share of manufactures from country "i" to country "j". The basis is thus the export statistics, which are normally considered to be more correct than the import statistics.

The diagonal elements in the matrix indicate total deliveries to the domestic market from country "i"'s industry in relation to the total inflow of manufactures to country "i", i.e. including imports from other countries:

$$a_{i,i} = \frac{PV_i - X_i}{PV_i - X_i + M_i}$$

PV_i = Production value in manufacturing sector in country "i"

X_i = Value of manufactured exports from country "i"

M_i = Value of manufactured imports to country "i"

One of many problems with regard to the layout of the matrix is that national accounts and foreign-trade statistics must be collocated.

It should be noted that there is no row for "Rest of World" (RoW). The underlying assumption is that where RoW includes industry it does not compete with industry in Denmark or the other 25 countries, for example because it manufactures other categories of goods which are not close substitutes for products from industrialized countries. This is a simplified assumption for calculation purposes.

On the other hand, there is a column for RoW comprising the 25 countries' export shares to RoW. Here the assumption is that Danish manufacturers' exports to RoW compete solely with exports from the 25 countries, but not with industry in RoW.

The aforementioned assumptions are, as stated, necessary for the calculation, but at the same time do have a certain relevance. The greater the divergence between the stages of industrial development of the countries included, the more difficult it becomes to interpret changes in the effective exchange rate as reflecting any change in competitiveness, since often there is no close substitution between the manufactured goods. This problem is *inter alia* discussed in the OECD (1994)¹⁾ and emphasizes that an effective exchange-rate index will not necessarily be "better" simply because many countries are included in the calculation. Nonetheless, the international development is towards including new countries in the calculation of weights, as more and more newly industrialized countries become players in the world market for manufactured goods. The Southeast-Asian countries' share of world trade in manufactured goods has thus doubled from 1985 to 1995, and now constitutes almost 25 per cent. However, this is partly offset by a decrease in the share of other non-OECD countries, so that the OECD countries' total share of world trade has declined only moderately during the period.

The matrix of market shares describes the extent to which Danish manufactured exports compete with the 25 other countries in the 26 markets where RoW is considered as one. To gain an overall impression of competition with each country the shares on the individual markets must be weighted together. This is based on the collocation of Danish manufactured exports distributed by country, i.e. using bilateral export weights (b_j).

¹⁾ Op. cit.

The double-weighted export weight for country "i" (w_i^x) is generated as follows:

$$w_i^x = \sum_{j=1}^{26} a_{i,j} \cdot b_j$$

If "i" is e.g. Germany, the double-weighted export weight is Germany's share of the US market multiplied by the share of Danish exports to the USA, plus Germany's share of the Japanese market multiplied by the share of Danish exports to Japan, plus Germany's domestic-market share multiplied by the share of Danish exports to Germany, plus Germany's share of the market in RoW multiplied by the share of Danish exports to RoW.

Since industry's production value in country "i", PV_i , to a certain extent comprises output sold to the domestic market but in real terms does not compete with imports from other countries (a case in point is newspapers), in practice the domestic-market share is overestimated. In other words, the double-weighted export weights entail a bias towards bilateral export weights not subject to simple adjustment.

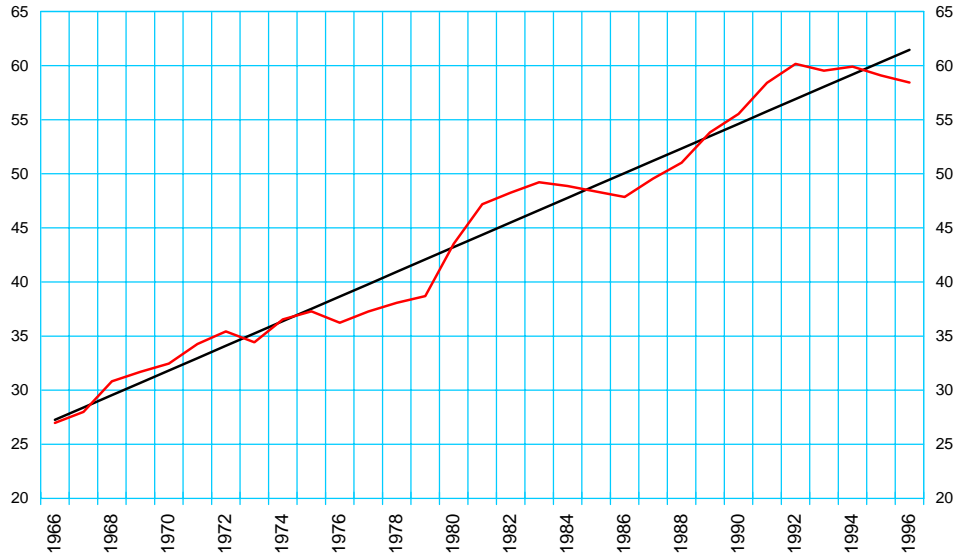
Bilateral import weights

Danish industry's domestic-market sales take place in competition with foreign companies, as is the case for the export markets. Equivalent to the treatment on the export side, competition on the domestic market from each country is assumed to be directly proportional to that country's share of Danish manufactured imports. The impact of foreign competition on the domestic market is therefore represented by a set of bilateral import weights (w_i^m). RoW is not included in the set of weights on the import side due to the assumption that industry in RoW does not compete with either Danish enterprises or enterprises in the other 25 countries.

Overall set of weights

In order to obtain an overall set of weights the double-weighted export weights (w_i^x) and the bilateral import weights (w_i^m) must be weighted together. The method is not determined beforehand. The Nationalbank has chosen to weight the export side with the proportion of the value of manufactured output which is exported. As a consequence of the greater international division of work this proportion has been increasing in historical terms, but with fluctuations over time, inter alia as a consequence of varying cyclical development in Denmark and abroad. The actual trend, cf. Chart 3, is therefore used. It might be argued that a similar adjustment should be made on calculating the market-share matrix and the bilateral

Chart 3 *Export share of value of manufactured output*
Per cent



sets of weights. However, it is the assessment that the greater uncertainty this will entail for the calculation exceeds the advantages.

The total set of weights for country "i" is now:

$$w_i = a^e \cdot w_i^x + (1 - a^e) \cdot w_i^m$$

where a^e is the trend-determined export share in the base year, i.e. 1995. This is estimated at 60.3 per cent. The resulting set of weights is shown in Table 1.

Calculation of the effective krone-rate index

Given the set of weights as calculated above, the nominal effective krone-rate index (NEER) is now:

$$\text{NEER} = 100 \cdot \prod_{i=1}^{25} \left(\frac{S_i(t)}{S_i(t_0)} \right)^{w_i}$$

where $\sum_{i=1}^{25} w_i = 1$, and $S_i()$ is the bilateral krone rate vis-à-vis currency "i" compiled as foreign currency per krone to time t and basis time t_0 .

In other words the effective krone-rate index is calculated by weighting indices for the value of one krone vis-à-vis the various currencies using the calculated weights. An effective exchange rate is therefore born as an index and has no meaning in absolute terms at any given time, since only the

development over time can be subject to interpretation. An increase in the effective krone-rate index reflects a strengthening of the krone. It will be seen that a geometrical weighting is used. The advantages of this are described in the Box.

The index is linked to the old index as of May 30, 1997, when the value was 100.563246, so that 1980 is still equal to 100. Effective krone rates from before June 2, 1997 are thus unchanged.

The real effective exchange rate (REER) is as follows:

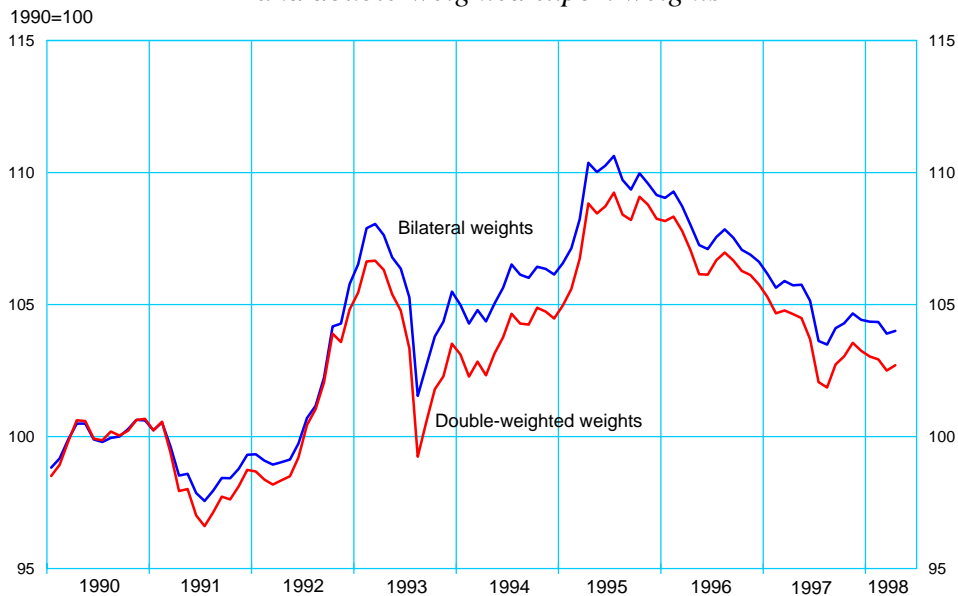
$$\text{REER} = \text{NEER} \cdot \frac{P_{\text{DK}}}{P_{\text{abr}}}$$

where $P_{\text{abr}} = \prod_{i=1}^{25} P_i^{w_i}$ and P_{DK} is a price index for Denmark, and P_i equivalently a price index for country "i".

The consequences of not double weighting the export weights

While calculation of an effective krone rate based on bilateral weights can apply Danish data exclusively, double weighting requires detailed statistics from all countries involved, which makes it more difficult to involve many countries and to construct up-to-date weights. On the other hand the advantage is that the theoretical basis for double-weighted export weights

Chart 4 *Effective krone rate calculated with respectively bilateral and double-weighted export weights*



Box

Background to the use of a geometrical average

It is assumed that we wish to construct an effective exchange-rate index with only three countries, Denmark and two others. It is also assumed that the two foreign countries carry equal weight in the index. This assumption is not decisive for the result, but makes the calculation easier. It is assumed that in the chosen base year one Danish krone can buy 100 units of the currency of country x, in the next year 200 units and in the third year 400 units. Vis-à-vis country y the equivalent figures are 40, 20 and 10 units in the three years. The krone thus strengthens continuously vis-à-vis the currency of country x and weakens against the currency of country y. From year one to year two, one krone can buy twice as many units of the currency of country x, but only half as much of the currency of country y. How has the krone's overall strength developed? The intuitive result must be that since the two countries carry equal weighting, the overall strength of the krone is unchanged. This is exactly the result given by geometrical weighting, but not by the usual arithmetical weighting.

Using an arithmetical average the effective krone rate is calculated as a simple average of the krone's fluctuation vis-à-vis each of the two currencies in relation to a chosen base year as follows:

$$\text{Year 1 } \frac{1}{2} \cdot (100/100 + 40/40) \cdot 100 = 100$$

$$\text{Year 2 } \frac{1}{2} \cdot (200/100 + 20/40) \cdot 100 = 125$$

$$\text{Year 3 } \frac{1}{2} \cdot (400/100 + 10/40) \cdot 100 = 213$$

However, with geometrical weighting the result is:

$$\text{Year 1 } (100/100 \cdot 40/40)^{1/2} \cdot 100 = 100$$

$$\text{Year 2 } (200/100 \cdot 20/40)^{1/2} \cdot 100 = 100$$

$$\text{Year 3 } (400/100 \cdot 10/40)^{1/2} \cdot 100 = 100$$

The conclusion is that the arithmetical average entails a bias in relation to the geometrical average. In the example shown the bias is very great due to the huge changes in the exchange rates. The basis for this bias is that on using an arithmetical weighting currencies which strengthen against the krone will achieve greater and greater weighting on calculation of the index (even though their formal weight is unchanged) in relation to currencies which weaken. The latter will be gradually "crowded out". The greater the exchange-rate fluctuations, the greater these effects.

Another advantage of a geometrical average is that the index gives the same increase between two dates, irrespective of the base year chosen.

is considerably stronger than for the bilateral weights, but the latter can very well be used as a supplement in certain situations.

Chart 4 shows the result of omitting double weighting for the period 1990 to 1998. 89 weights are used, but the 95 set of weights would give an equivalent result. Although the overall development is the same there are deviations of up to 1.50 index points between the two indices over the period considered. The deviations become particularly significant in periods of strong fluctuation in the Swedish krona or Japanese yen, the two currencies accounting for the greatest difference between the bilateral and double-weighted export weights.

Earnings of Danish Banks

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Department

Introduction

In each of the three last years the banks reported pre-tax profits of around kr. 13 billion. To a significant degree these results were attributable to capital gains on securities and foreign exchange and to reduced loan loss provisions.

Competition for customers has intensified in the 1990s. The new climate of competition and the drop in the level of interest rates have led to a narrowing of the interest margin, while the cost/income ratio is almost unchanged.

Measured in terms of core earnings¹⁾ return on equity was 9-12 per cent in the last four years. However, it is doubtful whether core earnings at this level can be maintained. Indications are that a normalization of the level of loan loss provisions and expectations of increasing domestic and foreign competition will put more pressure on the banks' earnings in the coming years. At the same time, the core earnings of recent years may be overestimated.

This article first considers the interrelations between competition, the interest-rate level and the banks' interest margin. It then turns to value adjustment of securities and foreign exchange, including maturity-related capital gains/losses, which especially in 1997 played a significant role. This is followed by a review of the development in the cost/income ratio and in loan loss provisions. Finally, the article considers the development in core earnings and how the banks' financial statements reflect their reaction to the competitive situation.

Competition, interest-rate level and interest margin

During the 1990s competition between banks has intensified. One reason is a greater degree of transparency in the market for lending and deposits which has made it easier for customers to monitor and compare lending and deposit rates. Another significant factor is the underlying development in the economy where the downturn at the beginning of the 1990s made it

¹⁾ Core earnings = net interest income (+) net income from fees (+) other ordinary income (+) value adjustment of foreign exchange (-) personnel and administration expenses (-) depreciation of assets (-) other ordinary expenses (-) loan loss provisions.

difficult for borrowers to change banking relations. For many bank customers this situation has changed in recent years, reflected for example in the extremely low level of enforced property sales and bankruptcies, and thereby also the low level of the banks' loan loss provisions. Concurrently customers have become increasingly aware of the opportunity to change banking relations. The intensified competition has added to the pressure on the banks' interest margin.

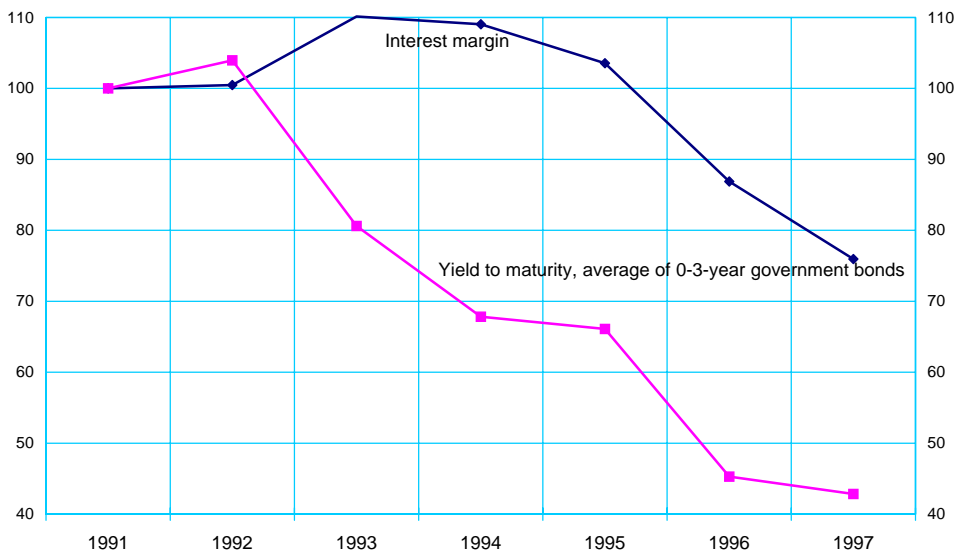
The interest margin has also been subject to pressure from a falling interest-rate level as the lower limit for the deposit rate de facto is 0 per cent, whereas the lending rate is still under pressure.

Banks have other interest income and expenditure than that arising from loans and deposits. For example, banks draw considerable interest income from their bond portfolios. Coupon rates on the banks' ongoing bond investments will decrease in line with the declining level of interest rates since bonds are normally issued within the limits for "blue-stamping"¹⁾ pursuant to the Danish taxation rules. Interest income from bonds is thus affected adversely by a drop in interest rates, but with the time lag attribut-

Chart 1

Interest margin

1991 = index 100



Note: Interest margin: total interest income to average interest-bearing assets less total interest expenses to average interest-bearing liabilities.
Annual yield to maturity as an average of 0-3-year government bonds.

¹⁾ Bonds with a coupon rate equivalent to or above the minimum coupon rate at the time of issue are popularly called "blue-stamped", while bonds with a coupon rate below the minimum coupon rate are called "black-stamped" bonds.

able to the lower coupon rate on the restructuring of the portfolio as bonds mature or are subject to conversion or ongoing restructuring. Since the purpose of this article is to evaluate the core earnings in the sector the focus in the following is on the development in the interest margin for all interest-bearing assets and liabilities, cf. Chart 1.

During the period the average annual yield to maturity on 0-3-year government bonds fell from 9.9 per cent to 4.2 per cent. The interest margin decreased from 3.0 per cent to 2.3 per cent. The development in the interest margin shows that it was not affected by the decline in the level of interest rates at the beginning of the period. A possible explanation is that competition for customers was less pronounced at the beginning of the 1990s than in recent years. Concurrently the weak cyclical development enabled the banks to reduce their financing costs and thereby interest expenditure by more than the drop in lending rates and bond yields, entailing a relatively greater reduction in interest expenditure than in interest income. On the other hand, the more intense competition and greater mobility of customers, together with the falling interest rates as from 1995, have led to a considerable narrowing of the interest margin.

This development is reflected in the banks' profit and loss accounts. The falling interest rates and the narrowing of the interest margin thus have an impact as from 1993 when *net interest income*, cf. Table 1, began to decrease.

Until 1994, where the banks' fee-based income was particularly high due to the banks' involvement in conversions of mortgage-credit loans, the total *net income from interest and fees* was rising. Since that year net income from interest and fees has been around kr. 36 billion. The increase in fee-based income and the declining interest margin thus both entail that fees are of increasing importance to overall earnings. A significant part of fee-based income is derived from securities trading and custody. Fee-based income accounted for 14 per cent of total net income from interest and fees in 1991. The proportion had risen to 24 per cent in 1997. Due to this diversification in earnings the banks have become less dependent on interest income.

Value adjustment of securities and foreign exchange

The Executive Order on Presentation of Accounts issued by the Danish Financial Supervisory Authority contains the concept of financial current

Table 1 *Key items from the financial statements of banks in group 1-3*

	1991	1992	1993	1994	1995	1996	1997
	Kr. billion						
Profit and loss account							
Net interest income	29.5	29.1	31.3	30.6	28.9	28.0	27.5
Net dividend and fee income	5.0	5.4	5.7	7.4	6.9	8.0	8.6
Net income from interest and fees	34.4	34.5	37.1	38.1	35.8	36.0	36.1
Value adjustment of securities and foreign exchange	4.6	-3.0	9.2	-5.0	6.4	4.6	2.0
Personnel and administration expenses	21.2	20.9	20.0	20.0	20.0	20.1	20.5
of which personnel expenses	15.4	15.4	14.7	14.9	14.7	14.5	14.6
Loan loss provisions	13.6	15.8	15.1	7.4	5.5	3.7	2.6
Value adjustment of capital interests	0.6	-0.8	0.1	-0.1	2.7	2.3	2.8
Extraordinary items, net	-0.4	-1.1	-0.8	-1.3	-2.2	-1.8	-0.6
Pre-tax profit	-0.1	-11.7	6.1	0.0	13.0	12.9	12.7
Tax	0.3	0.2	2.1	0.4	2.3	2.1	1.2
Net income	-0.4	-11.8	4.0	-0.3	10.8	10.8	11.5

Note: Statistics reported to the Danish Financial Supervisory Authority.

At end-1997 group 1-3 consisted of banks with working capital (deposits, issued bonds, subordinated capital and equity) exceeding kr. 250 million. The statistics for 1997 include the 92 largest banks, which accounted for 99 per cent of the total balance sheet. Before 1997 the limit for group 1-3 was working capital in excess of kr. 100 million. The statistics for 1996 comprise 117 banks. The difference in the number of banks is of no significance to the comparison of figures in Table 1.

assets, which account for the largest share of the banks' securities portfolios. The latter are marked to market in the banks' accounts. This Danish accounting policy entails that "value adjustment of securities and foreign exchange, etc." in the profit and loss account in principle comprises the value adjustment of the securities portfolio for the year.

However, value adjustment of securities and foreign exchange, etc. in total comprises three subcomponents: earnings derived from customer transactions¹⁾, value adjustments under unchanged market conditions²⁾ and value adjustments due to changes in market conditions³⁾.

It can be argued that an analysis of the development in the banks' core earnings should include earnings derived from customer transactions as

¹⁾ Earnings derived from customers e.g. originate from trading in securities where the bank on sale adds a small premium to the customer price compared to the market price (trading margin).

²⁾ Value adjustments under unchanged market conditions arise e.g. in the event of reduced time to maturity and premature redemption.

³⁾ Value adjustments due to changes in market conditions express actual changes in interest and exchange rates where e.g. falling interest rates entail capital gains on fixed-yield bonds.

income from fees and commission, since customer-derived earnings depend on the bank's trading and capital-market activities. Likewise value adjustments under unchanged market conditions, which depend on the choice of coupon rate for the bond portfolio, should be accounted for as an adjustment of interest income. The remaining actual value adjustments, which should be kept separate from core earnings, are thus solely value adjustments due to changes in market conditions¹⁾.

The banks' large portfolios of fixed-yield bonds entail that the overall result is very sensitive to changes in the level or term structure of interest rates. Changes in the market value of shares do not affect the result as strongly since the banks' own portfolios are modest compared to their bond holdings.

As shown in Table 1, *Value adjustment of securities and foreign exchange, etc.* yielded considerable gains as well as considerable losses during the period. In 1993 net gains totalled kr. 9.2 billion, while in the following year the net capital loss was kr. 5.0 billion. Since 1995 capital gains have been positive but declining. In 1997 the banks' total capital gains on securities and foreign exchange, etc. amounted to kr. 2.0 billion, compared with kr. 4.6 billion in 1996. The decrease is related primarily to capital losses on bonds and derivatives, whereas capital gains on both shares and foreign exchange were considerable. It is important to isolate the banks' pooled pension funds' share of the value adjustment of bonds, shares, mortgage deeds, foreign exchange and other financial instruments from the respective bank's value adjustment of its own securities portfolio. Otherwise value adjustments are obscured.

The substantial negative value adjustments of the banks' bond portfolios are primarily due to maturity-related value adjustments, i.e. value adjustments related to a reduction of remaining maturity and to early redemption. The reduction of remaining maturity is the value adjustment arising when a bank e.g. holds bonds with coupon rates higher than the market yield. These bonds are traded above par, leading to negative value adjustment solely because the price approaches par as the maturity date of the bonds draws nearer. The early redemption of bonds at high coupon rates which are traded above par likewise entails a capital loss because the bonds are redeemed at par. Since, in 1997, the coupon rates for especially short- and medium-term bonds exceeded market yields due to the significant drop in

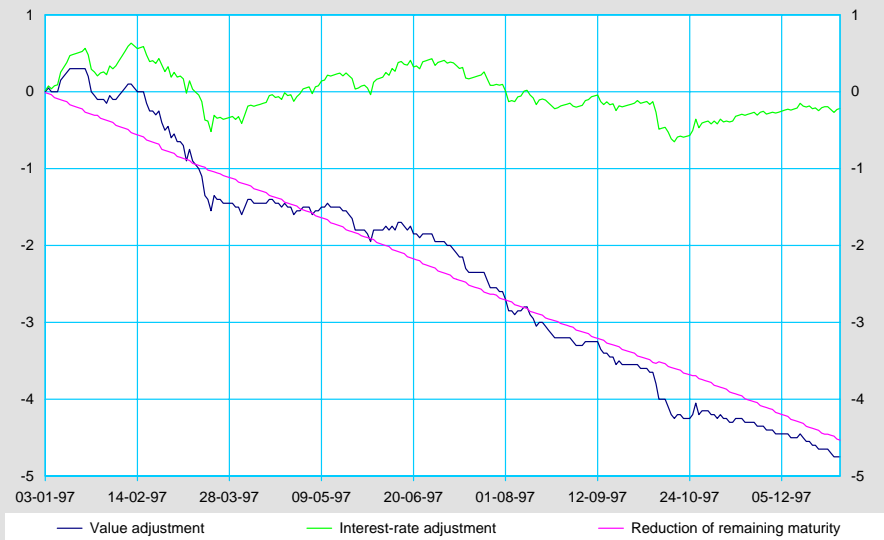
¹⁾ Some banks publish certain subcomponents in their annual accounts, but no banks publish all three.

Box 1

Example of reduction of remaining maturity

The Chart shows the price fluctuation in 1997 in a 9-per-cent bullet issue 1998 in relation to the beginning of the year. The value adjustment is broken down into a contribution from the reduction of remaining maturity and a contribution from the change in the level of interest rates. The two contributions are compiled from the daily calculations of the price of the bond on the following trading day at an unchanged yield to maturity. The difference between the calculated price and the price on the previous trading day reflects the effect of the reduction of remaining maturity. The difference between the calculated price and the actual price on the following trading day expresses the proportion of the value adjustment which is due to the change in the interest-rate level.

On January 2, 1997 the price was kr. 108.65 per 100. Since the loan expires on November 15, 1998 the bond had just under two years to drop by 8.65 price points to par.

Value adjustment during 1997, 9-per-cent government bond 1998

The total price drop in 1997 was 4.75 price points, of which 4.54 price points could be attributed to the reduction of remaining maturity and the remaining 0.21 price points to the rise during the year at the short-term end of the term structure of interest rates, cf. Chart 2.

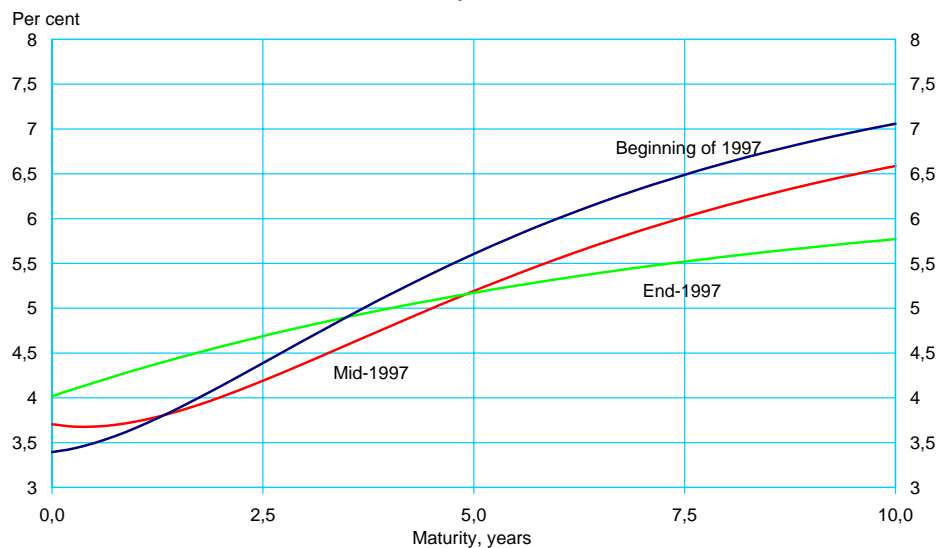
interest rates in recent years, the banks have incurred considerable maturity-related capital losses on their bond portfolios, which have offset the banks' relatively high interest income on bonds.

Since the banks are no longer obliged to compile their maturity-related capital gains or losses in their financial statements it is not possible to determine the extent of these capital losses in 1997. However, an estimate can be made on the basis of data from Statistics Denmark concerning the bond holdings of the financial sector distributed by maturity segment. On this basis the maturity-related capital losses are estimated at around kr. 2 billion in 1997.

Total capital gains on securities and foreign exchange, etc. in 1997 also conceals a large difference between the development in the first and second half-years. During the first half-year the banks achieved capital gains on securities and foreign exchange, etc. of kr. 3.2 billion, but a capital loss of kr. 1.2 billion in the second half-year.

During the second half of 1997 a number of banks chose to reduce the interest-rate sensitivity of their bond portfolios in view of expectations that interest rates would rise. One way of reducing sensitivity to changes in interest rates is to purchase short-term government securities. Another is to purchase mortgage-credit bonds at high yields which are therefore likely to be converted. After adjustment for the conversion probability the expected maturity of these securities is relatively short.

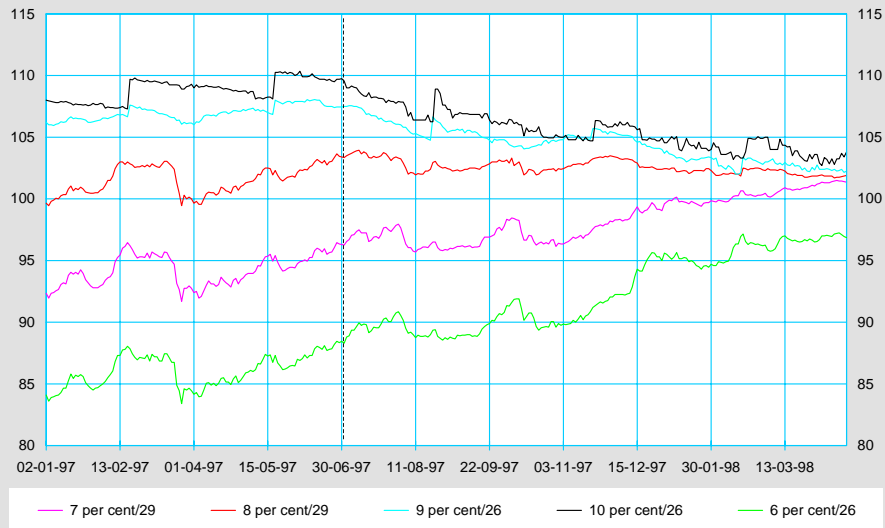
Chart 2 *Term structure of interest rates, 1997*



Box 2

High-yield mortgage-credit bonds

High-yield mortgage-credit bonds are sensitive to shifts in the term structure of interest rates, like that which occurred during the second half of 1997. The reason was firstly that the drop in long-term interest rates increased the conversion gain to home-owners, giving them a greater incentive to convert their mortgage-credit loans. On conversion the outstanding bonds are redeemed at par, with a capital loss to the owner of the bond which is traded at a premium due to the high coupon rate. The second reason is that the bond owner suffers a loss since the disbursed amount must be reinvested at a lower yield. Thirdly, the increase at the short-term end of the term structure reduced the value of a redeemed bond. As from the date of publication the bonds to be redeemed on the forthcoming interest-settlement date must be regarded as short-term zero-coupon bonds whose value drops when the short-term interest rate rises. All three factors contributed to the decrease in the price for the high-yield mortgage-credit bonds in the second half-year, in contrast to the low-yield mortgage-credit bonds, cf. the Chart.

Mortgage-credit bond prices

Note: Nykredit bonds.

However, during the second half of 1997 the term structure of interest rates flattened out. Short-term interest rates rose, whereas long-term interest rates dropped, cf. Chart 2.

The development in interest rates in the second half-year meant that yields were higher on long-term than on short-term bonds and that an investment strategy favouring purchase of short-term bonds and sale of medium- and long-term bonds gave substantial capital losses. Banks with high-yield mortgage-credit bonds were affected particularly, cf. Box 2.

In general the banks do not divulge their capital gains on trading activities in securities and foreign exchange, etc. so that the overall amount for the financial sector is not known. In the light of the high level of activity on the financial markets in 1997 these capital gains can be assumed to have been considerable.

In overall terms the value adjustments under unchanged market conditions and value adjustments as a consequence of a change in the market conditions for the banks' bond portfolios made a negative contribution to earnings in 1997. This was only partly offset by earnings derived from customer transactions.

The accounting principles imply overestimation of interest income in relation to core earnings since the maturity-related capital gains/losses, which are interpreted as being equivalent to interest income, are omitted. On the other hand, core earnings are underestimated since e.g. earnings on trading margins in connection with securities and foreign-exchange trading, etc. are included under value adjustments. The overall impact of the aforementioned factors on core earnings must be assumed to be negative.

Cost/income ratio

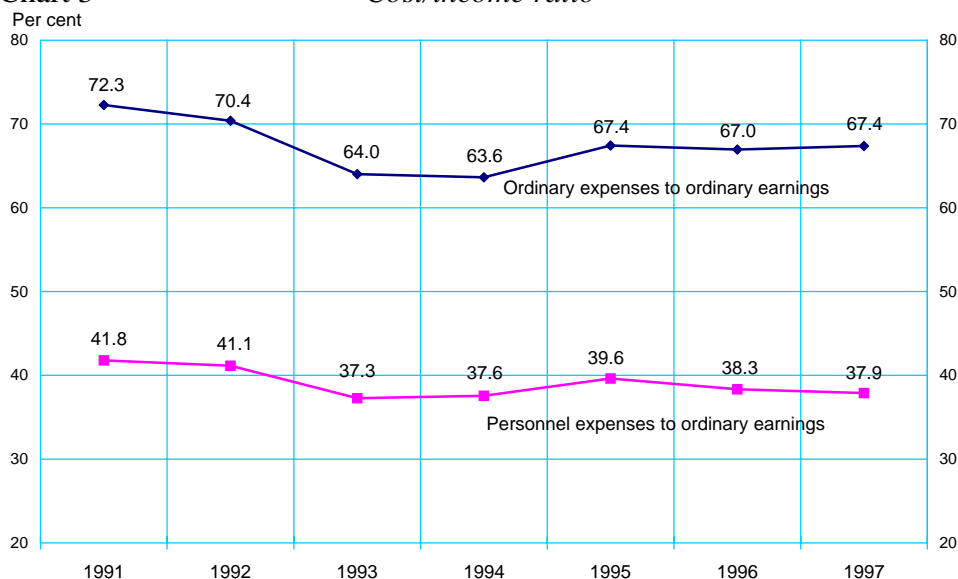
In absolute terms the level of costs has been receding compared to the beginning of the 1990s. However, on comparison with income the picture is less clearcut.

The *cost/income ratio* expresses the ability to match costs to the level of earnings. The Danish Financial Supervisory Authority defines the cost/income ratio as ordinary expenses¹⁾ to ordinary earnings²⁾. The calculation is based on data reported to the Financial Supervisory Authority. Chart 3 shows the development in the cost/income ratio, together with personnel expenses to ordinary earnings.

¹⁾ Personnel and administration expenses (+) depreciation of assets (+) other ordinary expenses.

²⁾ Net income from interest and fees (+) value adjustment of foreign exchange (+) other ordinary income.

Chart 3

Cost/income ratio

The cost/income ratio fell significantly up to the end of 1994 and has since remained stable as a consequence of moderate increases in expenses and income. The effect of the reductions in the number of staff is a decrease in personnel expenses to ordinary earnings over the entire period. However, the overall cost/income ratio shows that falling personnel expenses have been replaced by other operating expenses in recent years. The new expenses are related to e.g. information technology and to expansion or restructuring of distribution channels. Expenses of this type must be expected to be a significant element of banking activities in the years to come.

Table 1 shows that total *personnel and administration expenses* were very stable at kr. 20-21 billion throughout the period, but with a slightly rising trend from the low in 1995. The sector's adjustment of resources and costs has thus resulted in stable expenses in nominal terms, disregarding non-recurring expenses, for example severance pay. The reduction of the number of branches and employees has also contributed to the development in personnel and administration expenses.

Loan loss provisions

The amount of loan loss provisions is a normal indicator of the quality of the loan portfolio and the state of the economy. *Loan loss provisions* also

fluctuated strongly in the period 1991-1997. The related expenses were historically high in both relative and nominal terms in 1992 when the banks recorded expenditure of kr. 15.8 billion, cf. Table 1. Thereafter loan loss provisions have decreased gradually to kr. 2.6 billion in 1997. These two extremes correspond to loan loss provisions/loans and guarantees of respectively 2.5 and 0.3 per cent (the provisions ratio).

Since loan loss provisions are accounted for in net terms it is not possible to see the amount of new loan loss provisions because they are netted with surplus provisions, which are carried back. Provisions are carried back if the previously evaluated risk of loss is reduced, for example as a consequence of the cyclical development.

In a historical perspective the level of losses and provisions in recent years is hardly sustainable. The average provisions ratio was 1.2 per cent in the period 1975-1997. The natural level of provisions in the future will not necessarily correspond to the historical level, but will be related to the risk profile as well as the balance-sheet structure. The following is a more detailed analysis of the development in the financial result in 1991-1997 on application of an average provisions ratio of 1.2 per cent.

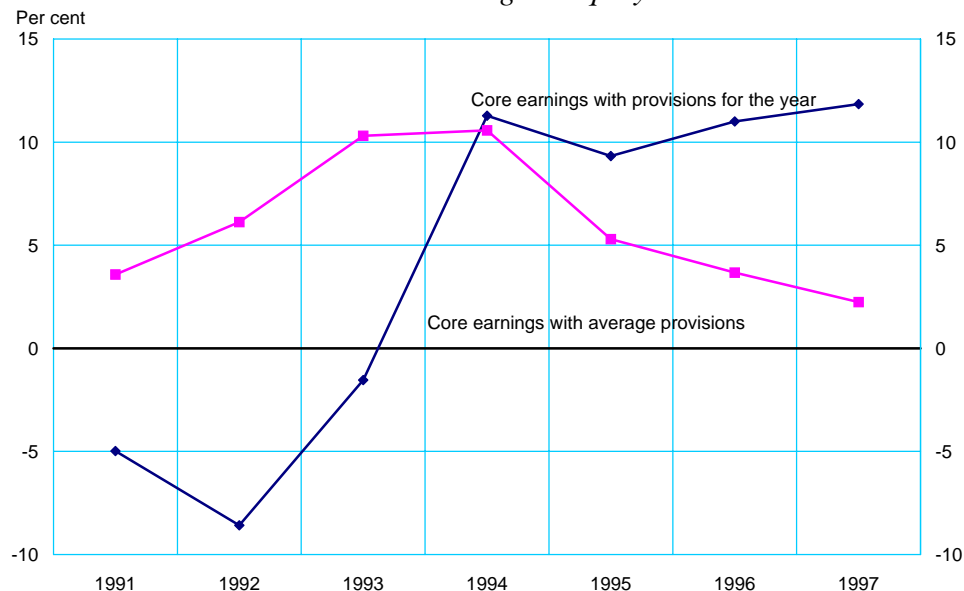
Core earnings

The development in the financial result can be measured as the return on equity through core earnings. Chart 4 compares core earnings to equity with actual losses and provisions for the year, and with theoretical core earnings based on average provisions of 1.2 per cent of loans and guarantees.

The difference between the two curves in the Chart illustrates that the low level of provisions in the last three years contributed to improving core earnings to equity. With provisioning requirements closer to the historical average the banks' financial statements would have shown more clearly that in reality core earnings have been under pressure in recent years. In addition, core earnings may be overestimated as a consequence of maturity-related capital losses, cf. the section on value adjustments.

The greater pressure on earnings has led several banks to engage in new business areas, for example mortgage-credit products, or to strengthen their activities in e.g. trading and various types of project or corporate financing. Any earnings from these strengthened activities are typically included in core earnings, with the exception of earnings derived from customers, cf. the section on value adjustments, whereas *earnings from new activities* concerning new products are stated separately in the item

Chart 4

Core earnings to equity

Note: Core earnings with actual losses and provisions for the year (i.e. according to the definition of the Danish Financial Supervisory Authority) compared to theoretical core earnings with the provision ratio fixed at 1.2.

"value adjustment of capital interests". This item is a result of value adjustment of the business enterprises on whose operational and financial management the bank directly or via intra-Group companies exerts a significant influence.

Particularly at the beginning of the period the value adjustment of capital interests fluctuated from positive to negative amounts. Since 1995 there has been a clear change to a contribution to earnings of kr. 2-3 billion, cf. Table 1. It would seem that earnings related to this erosion of sectoral barriers may make a fixed contribution to the banks' earnings. However, the size of the earnings will depend on the competitive situation in the "new sector". In addition, the barriers between various types of financial enterprise are generally being eroded, entailing intensified competition in all sectors.

In connection with the new activities and products the banks, in some cases, charge fees or commission for services rendered to companies within the same financial group. These intra-Group payments are included directly in core earnings under net fee income in the banks' financial statements. In correctly consolidated accounts intra-Group transactions will be eliminated. In line with the growing significance of the activities of finan-

cial subsidiaries to a group's total earnings the consolidated accounts should be used as the basis for analysis, rather than the banks' accounts.

Summary

To a certain degree low loan loss provisions and negative maturity-related capital gains conceal that the banks' core earnings are subject to pressure as a consequence of greater competition and a lower level of interest rates.

There seems to be little prospect of less competition from either domestic or foreign operators in the financial sector. This may increase pressure on the interest margin and thus on core earnings in the coming years. Tight cost control will therefore still be required.

Competition and the low level of interest rates are positive trends for the development in the economy and for customers. In recent years the banks have reacted mainly by expanding their activities within either traditional banking operations or new activities.

Wage Development in Denmark

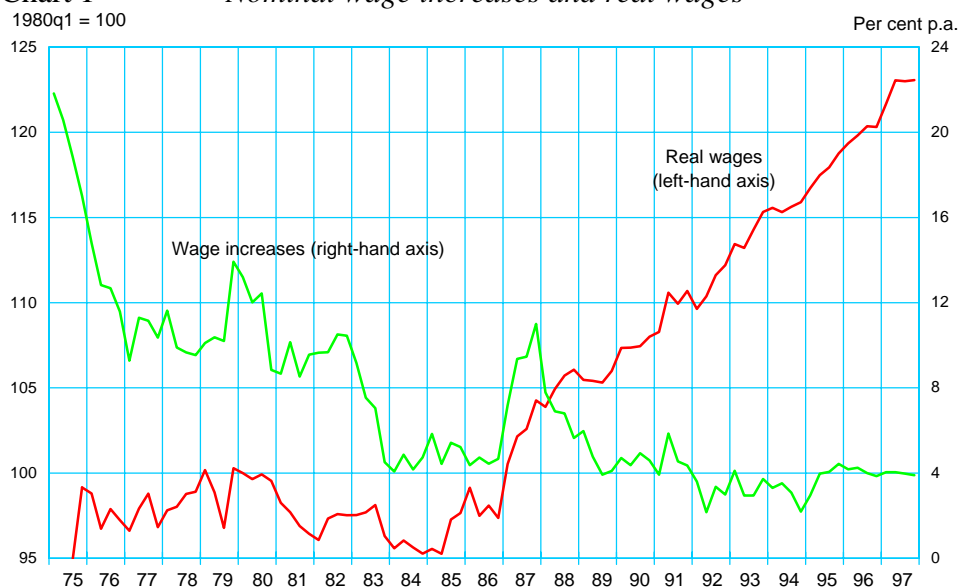
by Niels Lynggård Hansen, Economics Department

Introduction

In recent years wage increases in Denmark have been at a historically low and stable level. From mid-1995 to the end of 1997 hourly wages for workers in manufacturing, which are the topic of this article, thus rose at a by and large unchanged rate of approximately 4 per cent per annum, cf. Chart 1. From the end of 1991 to 1995 the wage increases were even lower, ranging from 2 to 4 per cent per annum, a level otherwise not seen since 1950. This level of Danish wage increases to a great extent reflects an international trend following the general reduction in the inflation rates of many countries since the 1980s. In concrete terms, Danish prices have developed somewhat more slowly than wages in recent years, so that despite the low nominal wage increases real wages have risen. At the beginning of the 1990s the nominal wage development in Denmark was more subdued than for Denmark's most important trading partners. As from the start of 1995 this development reversed. The higher Danish wage increases coincide with stronger economic growth than in most trading-partner countries, and thereby a far more favourable development in unemployment than in other countries since 1993.

Chart 1

Nominal wage increases and real wages



In a small open economy like Denmark's wage formation plays a central role in the ability of the economy to adapt to changes in external conditions, not least due to the great impact of wage formation on competitiveness. In the slightly longer term the effects of economic policy, including fiscal policy, are to a significant degree determined by the extent and speed that wages react to e.g. changes in output and employment. However, a number of other factors, including price formation in the commodities market, confidence and the development in interest rates, are also important in that context. The scope for manoeuvre of economic policy thus depends on other factors besides wage formation. This does not change the fact that it is important to have a clear idea of wage formation with regard to the compilation of Danish economic forecasts and when planning economic policy. The experience from the mid-1980s, when strong wage increases in 1987 made a decisive contribution to ending the economic upswing and to the onset of a long period of low growth, has had a strong impact. During 1997 unemployment fell to that same low level, with no indication of equivalent wage acceleration. These conditions in themselves call for a closer study of wage formation in Denmark. It should be noted that the wage relation so far used by Danmarks Nationalbank in modelling the economy has not shown any signs of being off course. An important issue in this connection is whether the reaction pattern today is nonetheless different from that of the 1980s, including whether wage formation has undergone a structural shift, or the wage reaction is merely delayed as the labour-market dispute in the spring of 1998 might indicate.

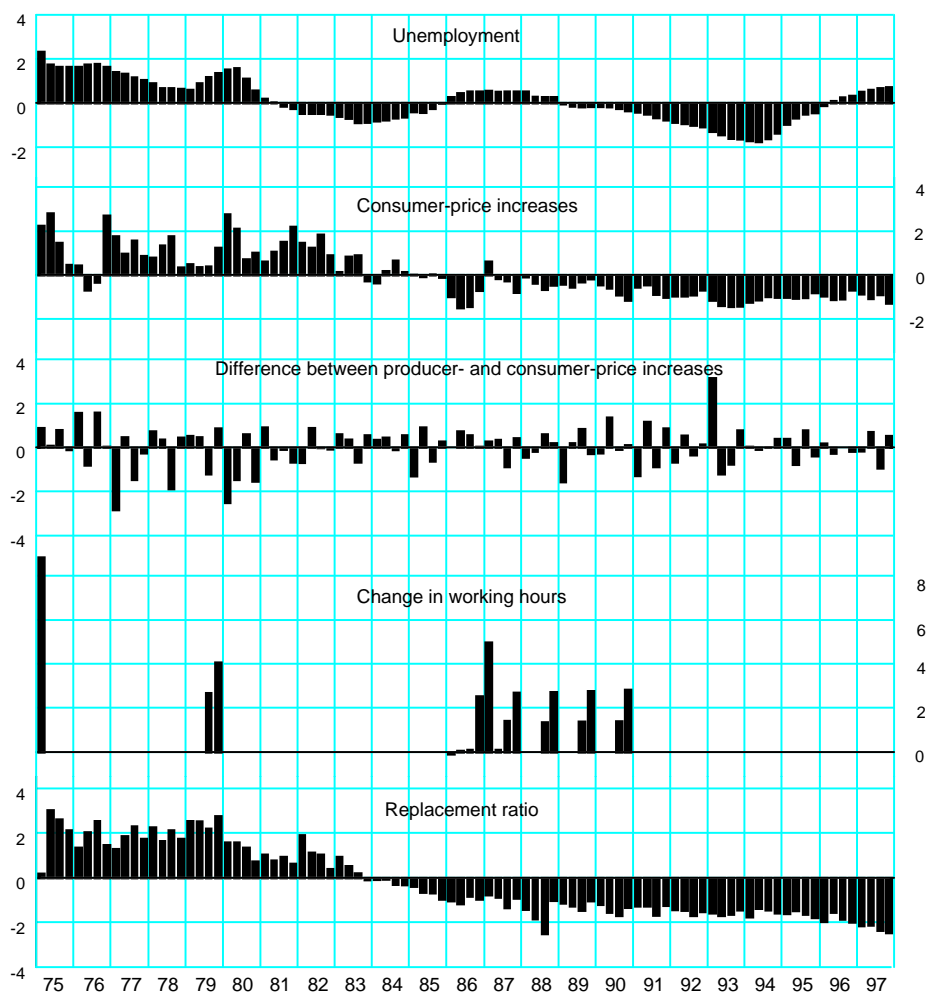
This article describes an empirical analysis of hourly wages in manufacturing which takes alternative wage-formation hypotheses as the starting point. The first section reviews the results of the econometric analysis. Then follows a discussion of the stability of the estimated relationship, in particular whether a structural shift in the wage formation may have taken place. This is followed by concluding remarks. The actual empirical analysis of wage formation is described in the Appendix.

A wage equation for Denmark

The econometric analysis supports that the rate of wage increases can be described as a relatively stable function of the unemployment rate and price increases, as in a more traditional Phillips curve¹⁾. Together with the

¹⁾ The Phillips curve is named after A.W. Phillips (1958), The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957, *Economica*, vol. 25, November 1958. In this study the rate of wage increases is explained solely in terms of the unemployment rate. In many later studies the Phillips curve is expanded to include the rate of inflation as an explanatory factor. In this article the rate of wage increases is furthermore described in terms of a number of other explanatory variables and the wage relation is thus complicated further in relation to the Phillips curve.

Chart 2 Contribution of explanatory factors to wage increases, per cent p.a.



Note: The contributions of the individual factors to the explanation of wage formation, represented by columns, is standardized to a total effect of zero over the estimation period, 1975-1995. The only exception is the number of working hours, which have been constant for most of the period. The effect on the growth rate of wages is therefore in this case represented by zero in most quarters.

difference between producer- and consumer-price increases, the changes in the number of annual working hours and the replacement ratio of unemployment benefits these factors in overall terms give a satisfactory description of the wage development from the mid-1970s until today. The preferred equation, cf. Table 5 of the Appendix, can be written as follows:

$$\begin{aligned} \Delta w_t = & 0.05 + 0.10 \cdot \Delta p_{C,t-2} + 0.16 \cdot \Delta p_{C,t-3} + 0.13 \cdot (\Delta p_{Y,t-3} - \Delta p_{C,t-3}) \\ & - 0.78 \cdot \Delta h_t - 0.13 \cdot UR_{t-1} + 0.05 \cdot r_{t-1} \end{aligned}$$

w is the hourly wage rate for workers in manufacturing, p_c is the consumption deflator, p_y is the deflator for GDP at factor prices for the nonagricultural private sector, h is the number of annual working hours, UR is the unemployment rate, and r is the replacement ratio on unemployment¹⁾. Chart 2 shows the contribution to the wage development from each explanatory component in the wage relation.

The reaction of wages to economic cycles is captured primarily via the unemployment rate. In this connection it is noteworthy that in 1997 hourly wages increased considerably more slowly than in the second half of the 1980s, when unemployment fell to by and large the same level as today. According to the model the most significant explanation for this difference is the successive reductions of working hours which took place in the second half of the 1980s. These were partly the result of political decisions and were to a great extent granted with full wage compensation to wage-earners.

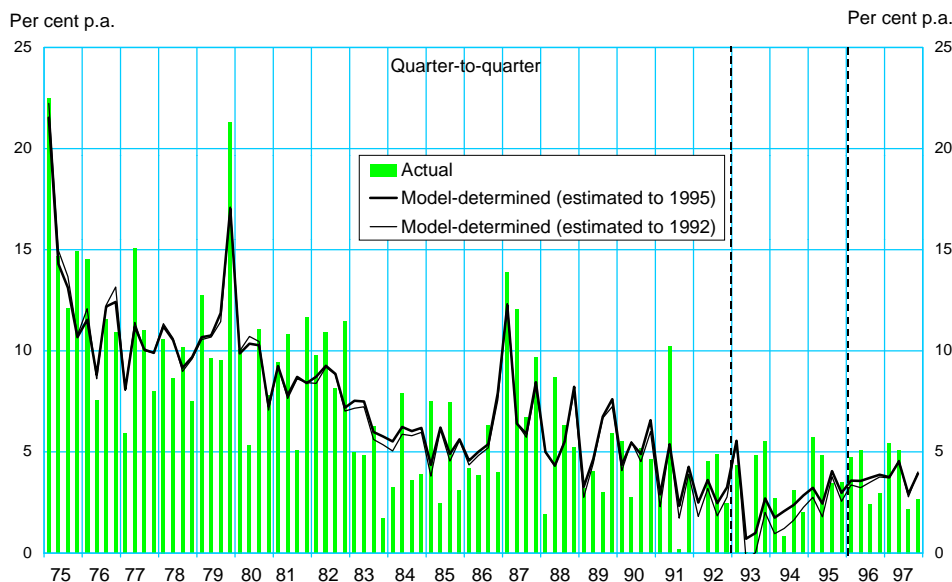
The inflation rate has fallen considerably during the period considered and has been lower in the 1990s than in the 1980s. This dampens inflation expectations and therefore the rate of increase in consumer prices contributes to explaining the change in the level of the rate of wage increases. The same applies to the average replacement ratio on unemployment, which today is lower than in the mid-1970s.

Moreover, wage increases are determined by the growth in producer prices since the offered wage will depend on the price development from the producer's viewpoint. In concrete terms the wage equation comprises the difference between the rates of increase in respectively producer and consumer prices. This element does not affect the trend of the wage development since in the longer term the two price series will move in parallel. However, in the short term the influence of this factor may be significant.

In general, the estimated relationship gives a good description of the wage development. The overall wage movements within the estimation period are captured, whereas major fluctuations from one quarter to the next are not always reflected, cf. Chart 3. Outside the estimation period the wage increases of recent years are likewise predicted with reasonable accuracy. It is noteworthy that during the most recent upswing the model-determined rate of wage increases is hardly affected, even if the estimation period stops in 1992 instead of 1995. This shows that the wage development in re-

¹⁾ Both here and in the Appendix letters in small type describe the logarithm of the corresponding large-type letters. The subscript t is a time index, and Δ is the differential operator. On small changes the log difference, $\Delta x_t = \ln X_t - \ln X_{t-1}$, corresponds approximately to the percentage change in X_t .

Chart 3 *Actual and estimated wage increases*



cent years does not give problems for the estimated relation and thus that the development can be explained without recourse to the hypothesis of a structural shift in wage formation.

Structural shift in wage formation?

The current debate on "new economics"¹⁾, i.e. the idea that output and employment can rise without an upturn in the inflation rate, due to such factors as intensified competition and globalization, may imply that the Phillips curve has become flatter, i.e. a reduction of the marginal reaction of the rate of wage increases on changes in unemployment.

An obvious explanation for this structural shift might be a growing awareness that high wage increases have a tendency to be absorbed by equivalent price increases and a decrease in employment. Experience from the most recent decades shows that real wages have increased particularly in periods of low wage increases, cf. Chart 1.

The coincidence of low wage increases and a significant drop in unemployment might also be explained by a less tight labour market than the change in the unemployment figures might indicate. It could be the case that the labour-market policy pursued in recent years has reduced the level of unemployment at which wages normally begin to accelerate. This

¹⁾ Cf. the discussion in Development in Inflation in the USA and EU - "New Economics"?, by Tom Nordin Christensen (1998), Danmarks Nationalbank, *Monetary Review*, 1st Quarter 1998.

corresponds to a sideways shift to the left of the Phillips curve. The most remarkable results have been achieved in combatting youth unemployment, which has fallen considerably. The decline in unemployment has furthermore been distributed broadly across different sectors, and bottleneck problems on the same scale as during the upswing of the 1980s have not yet been seen.

A further possible explanation might be that the decline in unemployment to a significant degree is due to the transfer of the unemployed to leave schemes, transitional allowance and early-retirement benefit. In so far as this concerns unemployed with relatively loose ties to the labour market, who therefore have not made any significant contribution to keeping wages down, unemployment may have declined without leading to greater pressure on wages. This also corresponds to a shift of the Phillips curve to the left.

Overall, the estimated relation shows a stable relationship between the rate of wage increases and its explanatory factors, cf. the analysis of the stability properties in the Appendix, hence implying the absence of a structural shift in wage formation. However, the slope of the Phillips curve, i.e. the coefficient of unemployment, has evened out a little after 1993.

In an empirical analysis it is generally difficult to distinguish between the different explanations for the lower wage increases in recent years than during the upswing in the 1980s. However, there is no doubt that changes in annual working hours play a significant role. In formal terms all reductions of working hours have been accompanied by immediate wage compensation, although it is possible that this effect might be reduced subsequently. The most significant individual wage increases from one quarter to the next, i.e. in 1975, 1979 and 1987, thus took place in quarters with significant reductions of working hours, cf. the comparison of Charts 2 and 3.

Conclusion

It is shown that a limited number of factors can describe the wage development since the mid-1970s. There appear to be no significant problems in using the wage equation to explain the historically modest wage increases up to end-1997. However, as always, the results of the econometric analysis must be interpreted with caution and it cannot be denied that a more accelerated wage development is "waiting around the corner", in step with the increasingly tighter labour market in the present economic upswing. However, at the same time wage increases of around 4 per cent per annum must be assessed to be problematic in view of the latest collective wage agreements in Germany and the generally low wage increases abroad.

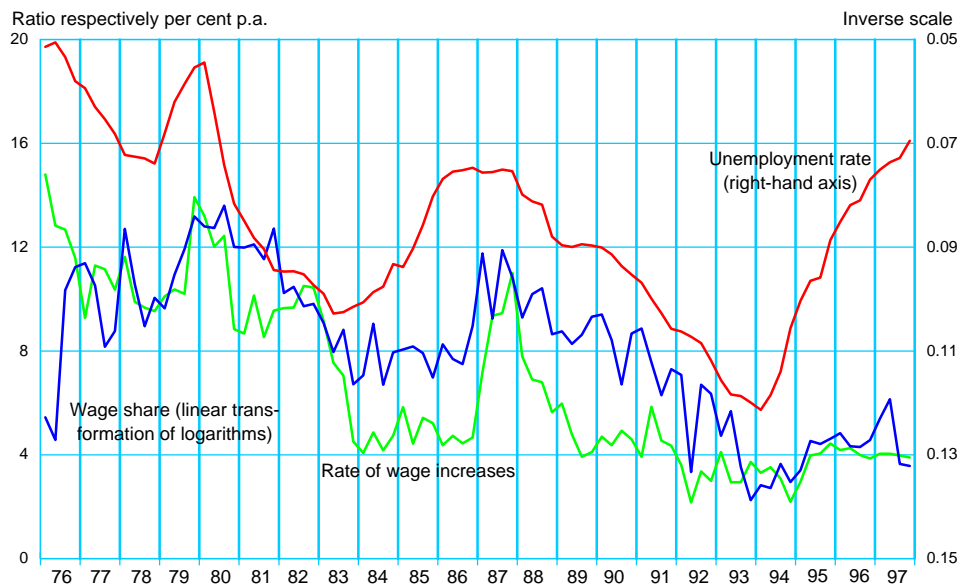
Appendix

This Appendix reviews an econometric analysis of wage formation in Denmark. The analysis is based on hourly wages in manufacturing. The following section gives a brief discussion of alternative models to explain wage formation, as the basis for the econometric analysis. Then follows a description of data and methodology. The article then reviews the estimation of each model separately, and tests the models against each other. Finally, the statistical properties of the preferred model are discussed, including stability and forecast properties.

Model framework

As mentioned previously, the basis for the analysis is alternative hypotheses, each of which has played a central role in existing empirical studies of the development in both Danish and foreign wages. The Phillips curve comes first chronologically and describes the rate of wage increases as a function of inflation and the unemployment rate. It has played a central role in many macroeconomic models, although it is often criticized for a lack of theoretical basis and sometimes also for empirical instability. The counterpart of the Phillips curve is equations which describe a relationship between real wages/wage share and e.g. unemployment. Chart 4 indicates that both Phillips curves and real-wage models might be of empirical interest, since both the rate of wage increases and the wage share appear to

Chart 4 *Rate of wage increases, wage share and unemployment*



have a negative correlation with the unemployment rate. However, in recent years this correlation appears to be broken. Whether there is a structural break will be investigated in the following.

In essence, the Phillips curve describes the rate of wage increases, Δw , as a function of expected inflation, Δp^e , and the unemployment rate, UR , and possibly also the change in the unemployment rate, ΔUR ,

$$\Delta w = \alpha \cdot \Delta p^e + f(UR, \Delta UR) , \quad 0 \leq \alpha \leq 1 , \quad f_1 \leq 0 , \quad f_2 \leq 0$$

Expected inflation is normally approximated by lagged values of actual inflation, Δp . Other explanatory variables might well be included. As previously stated the Phillips curve has been criticized for giving a too simple description of wage formation. One of the most important points of criticism is that it does not explain the level of real wages at a given unemployment rate, but only the rate of increase in nominal wages. However, in a wider model context the Phillips curve does not necessarily imply that real wages are indeterminate. They may very well be included in both supply and demand for labour. In that case the Phillips curve will merely be the mechanism ensuring adjustment of real wages and creating equilibrium in the labour market. It should also be stated that the existence of a well-determined long-term level of unemployment does not necessarily imply a vertical Phillips curve, i.e. $\alpha=1$. With fixed exchange rates, unemployment in equilibrium must result in the same rate of wage increase as in the anchor area. This appears from e.g. multiplier simulations using the Nationalbank's macroeconomic model¹⁾.

Wage bargaining models represent a more recent theory of wage formation. Real wages are determined by negotiation between trade unions and employers and will therefore depend on the relative bargaining power of the unions. The unemployment rate is used as a proxy, so that $W/P=g(UR)$, $g'<0$. Real wages are normally also influenced by other factors such as payroll and corporate taxes, productivity, the replacement ratio of unemployment benefits, etc.²⁾ As the basis for empirical determination of a model for real wages we will use the following log-linear specification where the expected sign of the parameters is stated:

$$w - p_C = f(q , h , UR , t_i , t_p , r , p_Y - p_C)$$

+ - - + - + +

¹⁾ Cf. e.g. Wage Flexibility and Macrostability - An Analysis of Mona-multipliers, unpublished manuscript by Niels Lynggård Hansen (1998).

²⁾ A well-known example of this idea is S.J. Nickell and M. Andrews (1983), Unions, Real Wages and Employment in Britain 1951-79, *Oxford Economic Papers*, 508. The theoretical motivation for real-wage models is also found in e.g. the theory on efficiency wages.

p_c indicates consumer prices, p_y producer prices, q labour productivity, h weekly working hours, t_i average income-tax rate, t_p payroll taxes, i.e. employers' indirect wage costs¹⁾, and r the replacement ratio. The wedge, WW , between the employers' product real wages, $W_1=W \cdot T_p / P_Y$, and the employees' consumption real wages, $W_2=W \cdot T_i / P_C$, i.e. $ww = p_c \cdot p_y + t_p \cdot t_i$, is of relevance since employers and employees do not normally focus on the same wage concepts. The relevance of the wedge can be illustrated by the following wage equation with disposable consumption real wages on the left-hand side:

$$w - p_c + t_i = \mu_1 \cdot (p_y - p_c) + \mu_2 \cdot t_i + \mu_3 \cdot t_p + \dots$$

$$\text{where } 0 \leq \mu_1 \leq 1, \quad 0 \leq \mu_2 \leq 1, \quad -1 \leq \mu_3 \leq 0$$

If $\mu_1=\mu_2=\mu_3=0$, the consumption real wages will be invariant to changes in the wedge components, whereas product real wages are invariant if $\mu_1=\mu_2=-\mu_3=1$. Ultimately, the size of the coefficients is determined by the bargaining power of the unions, i.e. their ability to pass on changes in income tax and consumer prices to wages, and equivalently prevent business enterprises from passing on changes in indirect wage costs to wages. A tax symmetry in the wage formation might be envisaged, i.e. $\mu_1=\mu_2=-\mu_3$, so that a simple restructuring of the tax system has no real effects through changes in real wages, although this need not be the case.

Data and methodology

Quarterly data from the Nationalbank's Mona model are used. The estimation period is from the 1st quarter of 1975 to the 4th quarter of 1995, whereas data until end-1997 is used for out-of-sample predictions. The following series are used:

- W hourly wage index for workers in manufacturing²⁾
- P_C private consumption deflator
- P_Y deflator for GDP at factor prices for the private sector, excluding agriculture, energy and housing

¹⁾ In practice t_i signifies one less the income-tax rate and thus the ratio between wage-earners' income before and after tax, while t_p signifies the ratio between business enterprises' total wage costs, including and excluding indirect wage costs. This implied notation is used throughout the article.

²⁾ At the end of 1993 wage statistics for the manufacturing sector were restructured from a monthly to a quarterly basis. The restructuring implies that the wage concept now includes pension contributions. The first significant contributions to labour-market pension schemes were adopted in the collective agreements of 1993. The only retrospective correction for pension payments therefore concerns 1993. In conjunction with the restructuring of the wage statistics the hourly-wage index for industrial workers as applied in this article and the monthly-wage index for industrial white-collar workers are discontinued by the end of 1997. These indices are replaced by sectoral indices covering the entire private sector.

- T_p payroll taxes¹⁾
 T_i average income tax, including gross tax²⁾
 UR unemployment rate
 Q average hourly productivity in the private non-agricultural sector, excluding energy
 H maximum agreed annual working hours
 R average replacement ratio

In the first instance a unit root test is used to study the integration order of the time series. For this purpose an augmented Dickey-Fuller test based on the following equation is used. A time trend, t , is included when relevant in economic terms as an alternative to a stochastic trend.

$$\Delta x_t = \alpha + \beta \cdot t + \gamma \cdot x_{t-1} + \sum_{i=1}^p \delta_i \cdot \Delta x_{t-i}$$

The study of the series' order of integration indicates, cf. Table 1, that it is uncertain whether the nominal wage is integrated of first or second order, whereas the other nominal variables, consumer and producer prices, are more unequivocally integrated of first order. The working hypothesis is that all nominal variables are integrated of first order. The real variables such as real wages, wedge, unemployment, working hours and payroll and income taxes are integrated of first order³⁾. In view of the test statistics productivity might appear to be stationary, but is assumed to be integrated of the same order as the other real variables.

The empirical analysis will be based on Johansen's multivariate cointegration model⁴⁾. A p -dimensional VAR model, written in the error-correction form, is given as

$$\Delta X_t = \Pi \cdot X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \cdot \Delta X_{t-1} + \Phi \cdot D + \varepsilon_t, \quad t = 1, \dots, T$$

¹⁾ In concrete terms payroll taxes, i.e. business enterprises' indirect wage costs, are determined using the formula $T_p = 1 + (aud + (alba \cdot (0.82 \cdot qp - 145) + atpa \cdot 0.82 \cdot qp + invb) / 1000000) / (ywby + ywla)$, *aud* is the AUD contribution (kr. billion) (abolished as from 1994), *alba* is the employers' contribution to unemployment insurance (kr.), *atpa* is the employers' contribution to ATP (kr.), *qp* is employment in the private sector (1.000 persons), *invb* is other social contributions (kr. billion), and *ywby* and *ywla* are total wage costs for respectively the private non-agricultural sector and the agricultural sector (kr. billion).

²⁾ The average income-tax rate is determined using the formula $T_i = (1 - bsda) \cdot (1 - arbsats)$. *bsda* is the average income-tax rate and *arbsats* is the gross tax (0 until the end of 1993).

³⁾ In principle the unemployment rate, the income-tax rate and payroll taxes should be stationary since by their nature these variables can only vary within a certain range. In the concrete sample the variables nevertheless appear to be non-stationary and will be regarded as such in the analysis.

⁴⁾ Cf. Søren Johansen (1995), *Likelihood-based Inference in Cointegrated Vector Autoregressive Models*, Oxford University Press, Oxford.

Table 1 Unit root tests (Augmented Dickey-Fuller test), 1975-1995

Variable	Level			1st difference		
	Det. terms	Augm.	ADF	Det. terms	Augm.	ADF
Wages	<i>K, TR</i>	3	-2.15	<i>K</i>	1, 2	-3.03**
Consumer prices	<i>K, TR</i>	-	0.02	<i>K</i>	1, 5	-3.54***
Producer prices	<i>K, TR</i>	1	-0.04	<i>K</i>	1, 2	-4.50***
Consumption real wage	<i>K, TR</i>	3	-1.91	<i>K</i>	-	-9.04***
Product real wage	<i>K, TR</i>	1	-3.04	<i>K</i>	-	-11.71***
Unemployment rate	<i>K</i>	1	-1.88	<i>K</i>	5	-4.18***
Payroll taxes	<i>K</i>	3	-1.37	<i>K</i>	1, 2	-7.15***
Income tax	<i>K</i>	1, 2	-1.37	<i>K</i>	1	-9.59***
Productivity	<i>K, TR</i>	1	-3.53**	<i>K</i>	-	-12.95***
Working hours	<i>K, TR</i>	1	-2.25	<i>K</i>	2	-5.51***
Replacement ratio	<i>K</i>	-	-1.41	<i>K</i>	4, 5	-11.74***
Wedge	<i>K, TR</i>	1	-0.56	<i>K</i>	-	-12.64***

Note: ***, ** and * indicate significance at respectively 1, 5 and 10 per cent levels. The deterministic terms include a constant, *K*, and in certain cases a linear trend in time, *TR*. Critical values are taken from J.G. MacKinnon (1991), Critical Values for Cointegration Tests, in Engle og Granger (eds.), *Long-Run Economic Relationships - Readings in Cointegration*, Oxford University Press.

k is the number of lags in the VAR model and t is an index of time. D signifies the deterministic terms. The error term ε is assumed to be identically, independently and normally distributed with the covariance matrix Ω , $\varepsilon_t \sim \text{i.i.d. } N_p(0, \Omega)$. Relevant variables in the long-term correlation are nominal wages, consumer prices, average hourly productivity, rate of unemployment, the wedge between enterprises' product real wages and the disposable consumption real wages, and the average replacement ratio, i.e. $X = \{w, p_C, q, UR, ww, r\}$.

The long-term multipliers of the model are contained in the 6*6 matrix Π . As mentioned above X_t is integrated of first order, i.e. $X_t \sim I(1)$. The assumptions behind the VAR model imply that the above model describes a balanced system where all elements are stationary. Hence this means that Π must be of reduced rank, $\text{rank}(\Pi) = \rho$, and can thereby be divided into two matrices, α and β , both 6* ρ matrices of full column rank, where $\Pi = \alpha \cdot \beta'$. In other words $\rho < 6$, when X is non-stationary. The situation $\rho = 0$ corresponds to no cointegration and the model is reduced to a traditional VAR model in first differences, whereas in a situation where $0 < \rho < 6$, ρ independent cointegrating relationship can be found between the $I(1)$ variables in X .

Each column in β describes a cointegration relationship, and α the corresponding loadings, i.e. the coefficients of the cointegration relationships in the individual equations. If there is more than one cointegration relationship the coefficients in α and β will not be identified and identifying restrictions must be imposed on the system in order to derive correlations which can be given an economic and structural interpretation.

Estimation results

Table 2 shows results from the cointegration analysis. On the basis of e.g. various information criteria a lag length of 2 has been chosen. The replacement ratio is assumed to be exogenous from the start with respect to the long-term parameters, and hence the system is partial in that only five out of six variables are perceived as endogenous. The trace test is generally favourable to a rank of 2¹⁾.

The misspecification tests indicate that overall the model is well-specified. The classical distributional assumptions can now be applied to the ongoing statistical analysis, since Π consists of 2 cointegrating, and thereby stationary, relations. The first test is for exogeneity with respect to the long-term parameters and for whether the variables can be removed individually from the cointegration space²⁾. On the other hand, it does not make sense to apply tests to individual coefficients in α and β , since as stated they are not identified. A test on the rows in α shows that productivity, unemployment and the wedge are exogenous, whereas no variables can be removed from the cointegration space.

The analysis now continues on the basis of a partial system with nominal wages and consumer prices as the endogenous variables, cf. Table 3. Overall the system appears to be well-specified and will be the basis for the ongoing analysis of the cointegrating relationships. The two cointegration vectors, β_1 and β_2 , are normalized, but still not identified. The explanatory cointegrating relationships, which conform to the theory, may be the result of linear combinations of β_1 and β_2 .

The following focuses on identification of the estimated cointegrating relations, against the background of the theoretical considerations outlined above. Table 4 shows the results of tests of identifying assumptions. A pre-

¹⁾ The eigenvalues for the second and third eigenvectors may appear to be rather close to each other, so a rank of 1 or 3 respectively was also investigated. The analysis with *rank*=1 unequivocally supports the Phillips curve and therefore generally corresponds to the conclusions using *rank*=2, cf. below. On application of *rank*=3 the third cointegrating relation is included solely in the productivity equation, which would otherwise be exogenous. This analysis has not been pursued further.

²⁾ In practice exogeneity with respect to the long-term parameters implies that the relevant rows in α , and thus in Π , solely contain zeros, whereas a variable can be removed completely, i.e. will not be included in any cointegration relation, if the relevant column in Π consists solely of zeros.

Table 2 Cointegration analysis in a partial system, 1975-1995

H_0 : Rank (Π) =	.. 0	.. 1	.. 2	.. 3	.. 4					
Eigenvalues	0.54	0.28	0.25	0.11	0.06					
Trace	132.4	67.0	39.6	15.1	5.5					
Trace (adjusted for degrees of freedom) ¹⁾	116.6	59.0	34.9	13.3	4.8					
Critical values, upper ²⁾	87.0	62.9	42.2	25.5	12.2					
95 per cent, lower ³⁾	78.5	55.4	35.3	19.4	6.0					
Eigenvectors	β_1	β_2	β_3	β_4	β_5					
w	1.00	-0.27	0.37	-1.27	-0.93					
$p_c^{-t}i$	-1.64	1.00	-0.35	0.88	1.53					
UR	-1.33	0.55	1.00	2.43	-1.13					
q	0.23	-1.09	-0.45	1.00	0.57					
ww	-2.33	2.65	-0.08	0.00	1.00					
r	0.62	0.70	-0.25	-0.25	2.76					
Equation	Loading factors wrt. ...					Std. dev. σ	Misspecification tests ⁴⁾			
	.. β_1	.. β_2	.. β_3	.. β_4	.. β_5		AR _{1,5} ⁶⁾ F(5,60)	ARCH ₄ ⁶⁾ F(4,57)	Hetero. ⁷⁾ F(22,42)	Norm. ⁸⁾ $\chi^2(2)$
Δw .. α_1	0.046	0.046	-0.039	0.009	-0.016	0.0065	2.06	1.11	0.47	1.55
Δp_c .. α_2	0.056	-0.007	-0.033	-0.023	0.031	0.0073	1.72	2.34	1.64	1.16
ΔUR .. α_3	0.006	-0.009	-0.054	-0.011	-0.009	0.0024	0.39	0.07	0.68	5.75
Δq .. α_4	-0.032	0.034	0.791	-0.067	-0.024	0.0154	0.47	0.44	0.91	2.32
Δww .. α_5	0.033	-0.046	0.269	0.090	-0.044	0.0150	1.83	0.66	1.09	16.00**

¹⁾ Adjusted for degrees of freedom, see H.-E. Reimers (1992), Comparison of Tests for Multivariate Cointegration, *Statistical Papers*, vol. 33, pp. 335-359.

²⁾ No drift in the partial system ($c=0$). c indicates the drift in the partial system relative to the drift in the marginal system standardized by means of the covariance in the respective systems, cf. I. Harboe, S. Johansen, B. Nielsen and A. Rahbek (1995), Test for Cointegration Rank in Partial Systems, Mimeo, Institute of Mathematical Statistics, University of Copenhagen.

³⁾ $c=\infty$.

⁴⁾ *, **: Test statistics significant at 5 per cent and 1 per cent levels.

⁵⁾ LM-test for autocorrelation of order 1-5, F-distributed.

⁶⁾ LM-test for ARCH of 4th order, F-distributed.

⁷⁾ F-test based on H. White (1980), A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity, *Econometrica*, 48.

⁸⁾ Bera-Jarque test for normality, $\chi^2(2)$ -distributed.

vious study based on quarterly data from Mona finds a relation for wage formation where the rate of wage increases, inter alia, is explained by two non-stationary variables, i.e. unemployment and the replacement ratio¹⁾.

¹⁾ Cf. Dan Knudsen (1992), Wage Formation in Mona, Working Paper, Economics and Statistics Department, Danmarks Nationalbank.

Table 3 *Cointegration analysis in a partial system, 1975-1995*

H_0 : Rank (Π) =	.. 0	.. 1						
Eigenvalues	0.51	0.22						
Trace	81.3	21.2						
Trace (adjusted for degrees of freedom) ¹⁾	77.4	20.2						
Critical values, upper ²⁾	39.6	20.4						
95 per cent, lower ³⁾	30.6	11.1						
Eigenvectors	β_1	β_2						
w	1.00	-0.73						
$p_c - t_i$	-1.37	1.00						
q	-0.24	0.04						
UR	-0.59	-0.73						
r	0.64	0.14						
ww	-1.55	1.59						
Equation	Loading factors wrt. ...		Std. dev. σ	Misspecification tests ⁴⁾				
	β_1	β_2		AR _{1,5} ⁶⁾ F(5,60)	ARCH ₄ ⁶⁾ F(4,57)	Hetero. ⁷⁾ F(22,42)	Norm. ⁸⁾ $\chi^2(2)$	
$\Delta w \dots \alpha_1$	0.058	0.070	0.0066	1.83	1.24	1.00	1.14	
$\Delta p_c \dots \alpha_2$	0.072	-0.049	0.0061	1.21	0.53	2.08	1.18	

Note: See notes to Table 2.

Therefore these constitute a formal cointegrating relationship. In practice we are probably in a grey area since it is an open question whether the rate of wage increases is stationary or integrated of the first order. It is therefore likely that in the longer term the rate of wage increases is negatively correlated and cointegrated with the unemployment rate and positively correlated with the replacement ratio. Columns 1 and 2 show that it still cannot be ruled out that unemployment and the replacement ratio constitute a cointegrating relationship which might also be the only factor affecting the wage equation, with a correct sign.

It is also possible to compile an economically reasonable relationship to describe the real-wage curve, cf. columns 3 and 4. However, this relationship is included in the wage equation with an incorrect sign since the first element of α_1 turns out to be positive in this case, equivalent to no error correction in wage formation. Furthermore, a statistical test shows that in this case the long-term relationship is not the only such term included in

Table 4 *Tests of hypotheses on α and β , 1975-1995*

Eigen- vectors	1.		2.		3.		4.		5.		6.		7.	
	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2
w	0	1	0	1	1	1	1	1	1	0	1	0	1	0
p - t . .	0	-1.37	0	-1.37	-1	-1.43	-1	-1.37	-1	0	-1	0	-1	0
q	0	-0.16	0	-0.18	-1	-0.06	-1	-0.18	-1	0	-1	0	-1	0
UR . . .	1	1.19	1	-0.05	-9.41	1.26	-13.20	-0.06	5.44	1	-10.90	1	0.78	1
r	-0.70	-0.50	-0.56	0.36	5.47	-0.36	7.21	0.36	-2.59	-0.75	5.97	13.54	0.84	-0.56
ww . . .	0	-1.82	0	-1.76	1.71	-2.25	2.73	-1.76	-1.12	0	2.10	0	-1.01	0
Loading factors:														
Δw α_1	-0.11	-0.02	-0.15	0	0.01	-0.00	0.01	0	-0.02	-0.03	0.01	0	0	-0.15
Δp α_2	-0.14	0.10	0	0.11	0.01	0.09	0	0.11	0.07	-0.35	0	0.01	0.08	0
LR-test ^{a)}	$\chi^2(3)=1.13$	$\chi^2(4)=2.40$	$\chi^2(1)=0.11$	$\chi^2(2)=0.13$	$\chi^2(5)=9.72$	$\chi^2(6)=25.87$	$\chi^2(6)=11.36$							
	[0.77]	[0.66]	[0.74]	[0.94]	[0.08]	[0.00]	[0.08]							

Note: Statistics in square brackets indicate marginal significance levels.

the wage equation. It should be noted that certain coefficients in the real-wage equation, e.g. to the replacement ratio, have values impossible to interpret if they are estimated freely. This must of course be seen against the background of the fact that the coefficients for the unemployment rate and the replacement ratio are not identified in the real-wage equation in column 5, so interpreting these coefficients is not relevant. On this basis the real-wage curve cannot be rejected.

In the remaining columns the two types of relationship are identified simultaneously in the cointegration space. A Phillips curve equivalent to β_2 in column 7 also appears to dominate here, cf. a comparison of LR-tests of the overall set of overidentifying restrictions in columns 6 and 7.

The initial cointegration analysis appears to favour the Phillips curve specification rather than a real-wage equation. Nevertheless, the dynamic analysis continues to apply both hypotheses, cf. Table 5. This analysis is based on single-equation estimations¹⁾ and on the *general-to-specific* principle.

In principle, a real-wage equation with reasonable statistical properties can be estimated. However, conventional encompassing tests show clearly

¹⁾ The unlagged consumer prices are clearly not significant. This also applies to productivity without lags, and both variables are therefore removed from the wage equation.

Table 5 *Dynamic wage equations, 1975-1995. Endogenous variable: Δw .*

Exogenous	1.	2.	3.	4.	5.	6.
Constant	0.05 (5.76)	0.06 (6.47)	0.06 (6.25)	0.05 (5.83)	0.05 (7.65)	0.05 (7.54)
Δp	0.14 (1.57)			0.10 (1.23)		
Δp	0.19 (2.11)	0.20 (2.21)	0.20 (2.18)	0.16 (1.81)	0.18 (2.07)	0.18 (2.06)
$\Delta(p - p)$	0.12 (2.83)	0.14 (3.11)	0.14 (3.08)	0.13 (2.96)	0.14 (3.16)	0.14 (3.15)
Δh	-0.77 (-4.29)	-0.84 (-4.85)	-0.84 (-4.80)	-0.78 (-4.39)	-0.84 (-4.86)	-0.85 (-4.83)
ΔUR			-0.02 (-0.10)			-0.06 (-0.27)
UR_{-1}	-0.14 (-2.62)	-0.14 (-2.49)	-0.14 (-2.47)	-0.13 (-2.36)	-0.13 (-2.37)	-0.13 (-2.37)
r_{-1}	0.05 (3.10)	0.06 (3.88)	0.06 (3.75)	0.05 (2.97)	0.06 (3.82)	0.06 (3.70)
ec_{-1}	-0.02 (-1.25)	-0.01 (-0.78)	-0.01 (-0.74)			
Test statistics:						
R^2	0.72	0.71	0.71	0.71	0.70	0.70
σ	0.0060	0.0061	0.0061	0.0061	0.0061	0.0061
DW	2.33	2.34	2.34	2.33	2.34	2.34
Auto-correlation ²⁾	0.82	1.02	1.00	0.85	1.02	1.01
ARCH ³⁾	1.11	1.29	1.30	1.33	1.29	1.35
Heterosce. ⁴⁾	1.03	0.76	0.63	0.94	0.61	0.51
Norm. ⁵⁾	4.42	3.75	3.81	2.27	2.66	2.84

¹⁾ $ec = w - [p_c - t_i + q + \beta \cdot (p_y - t_p - p_c + t_i)]$. The results in this table are based on $\beta=1$, corresponding to a long-term relationship between *product* real wages, unemployment and level of compensation. However, other values of β give generally equivalent results.

²⁾ LM-test for autocorrelation of order 1-5, F-distributed.

³⁾ LM-test for ARCH of 4th order, F-distributed.

⁴⁾ F-test based on White (1980), op.cit.

⁵⁾ Bera-Jarque normality test, $\chi^2(2)$ -distributed.

that the Phillips curve dominates the real-wage equation, since the equivalent coefficient to the wage share is not significant (columns 1 and 2). Furthermore, a test for hysteresis¹⁾ (columns 3 and 6) was made by studying in the traditional way whether changes in unemployment rather than levels determine the wages. This does not seem to be indicated. On the basis of the above analysis a Phillips curve (columns 4 and 5) is preferred.

The preferred equation (column 4) has satisfactory statistical properties. There are no signs of autocorrelation and it cannot be ruled out that the error

¹⁾ Hysteresis describes the empirical observation that in the 1970s and 1980s unemployment in many western-European countries showed only a very weak tendency to revert to the level from before the oil-price increases.

term is normally-distributed white noise. It should be noted that a standard deviation in the quarterly logarithmic changes of 0.0061, or approximately 0.6 per cent, converted into percentage year-on-year changes is equivalent to just over 1.2 per cent. This is of course a relatively large degree of uncertainty, but it should be viewed in the light of the relatively volatile quarterly rate of wage increases. In general, the model-determined wage development seems overall to give a satisfactory description of the actual development within the estimation period, cf. Chart 3, although it does not capture all fluctuations.

Stability and forecast properties

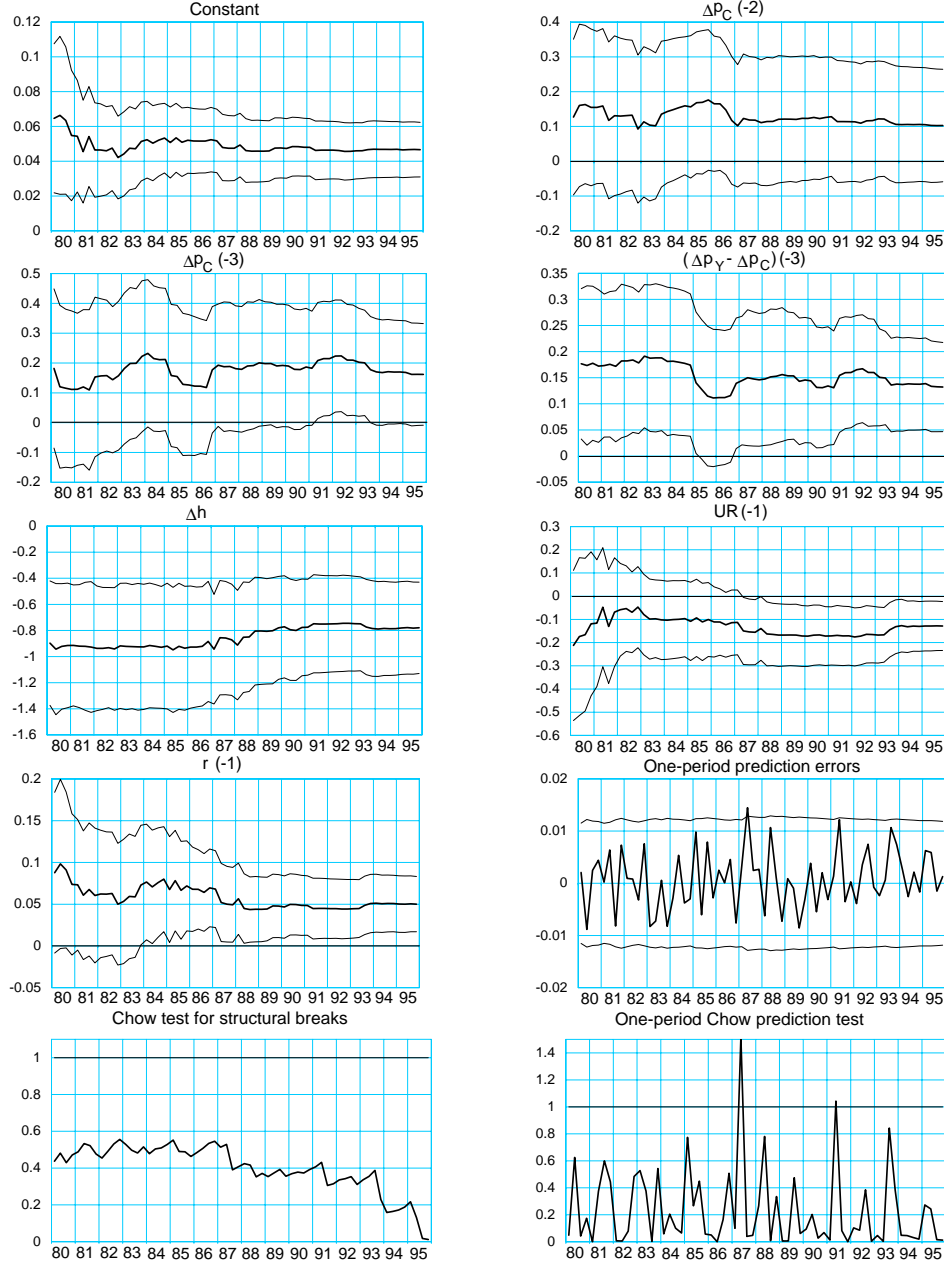
Outside the estimation period, i.e. from expiry of the estimation period at end-1995 to the 4th quarter of 1997, which is the latest statistics-based period, the estimated Phillips curve also performs relatively well, cf. Chart 3. The forecasts are not especially accurate all the way through, but the curve does come close to the "peaks" of the quarterly wage increases in 1993 and 1995, and not least the dampened wage development in the second half of 1996. It should furthermore be noted that even when the estimation period runs only to 1992 the Phillips curve gives a relatively good description of the wage increases throughout the 1990s.

On the basis of the recursive estimates in Chart 5 the stability properties of the estimated Phillips curve appear to be satisfactory. The various Chow tests do not indicate any significant problems of structural breaks in the estimation period¹⁾. The coincidence of low wage increases in recent years and a continuing decline in unemployment does not appear to give the model problems, although a small absolute drop in the coefficient for the unemployment rate after 1993 is observed. At present the unemployment rate is at the same level as the low in the mid-1980s, while the current price increases contribute to lower wage increases than previously. However, the fact that the model-determined rate of wage increases is not higher is due primarily to the absence of any contribution from reductions of working hours, as was the case in 1987-1991, cf. Chart 2.

Regarding the obvious stability of the Phillips curve in the period from 1975 until today it should be stated that the wage reaction to changes in the unemployment rate is more than trebled when the years 1972-1974 are included in the estimation period. This has no significant impact on the other

¹⁾ A Chow test for constant parameters with one-period predictions is not as such a test of the model specification, but nevertheless provides a measure of whether the model parameters are constant.

Chart 5 Recursive parameter estimates and test for structural breaks



Note: In the uppermost charts the bold lines indicate recursive coefficient estimates, i.e. coefficient values from recursive re-estimation of the equation with a fixed starting point and variable end point, whereas the thin lines indicate plus/minus 1.96 times the standard deviation. The charts in the lowest row represent F-distributed test statistics for traditional Chow tests for parameter stability, standardized with critical values at a 5-per cent significance level. The left-hand chart indicates test for structural breaks at various times, while the right-hand chart indicates the test for constant parameters in the case of one-period predictions, cf. D.F. Hendry and J.A. Doornik (1996), *Empirical Econometric Modelling Using PcGive 9.0 for Windows*, International Thomson Business Press.

coefficients and the stability properties of the equation likewise seem good. This indicates that during the first oil crisis the Danish labour market, like many other western European countries, experienced a change in regime from an unemployment rate of around 2 per cent to a situation where the unemployment rate more than trebled, simultaneously with a strong upswing in the rate of wage increases. This may have led to a structural break in the Phillips curve, and hence favours the use of a sample which starts in 1975.

Speech by Governor Bodil Nyboe Andersen at the Annual Meeting of the Association of Danish Mortgage Banks on April 23, 1998

In around one week's time the historical series of meetings will commence at which the formal decisions will be taken concerning the start of the third stage of Economic and Monetary Union. The outcome of these meetings is not likely to be a surprise. It has already been clear for some time that 11 of the 15 member states of the European Union will introduce the single currency on January 1, 1999.

Just a few years ago there were many sceptics who did not believe that EMU could become a reality. Even among EMU optimists the prevailing view was that maximum 6-8 countries would be able to participate from 1999.

However, in recent years the EU member states have achieved remarkable convergence of their economic performance. The statistics have been analyzed and evaluated in the various convergence reports appearing over the past month.

The focus of public debate has been on fiscal-policy convergence in particular. 14 EU member states have reduced their government-budget deficits to below the magical limit of 3 per cent of GDP. Reducing government debt is by nature a rather more protracted process and for a couple of the expected participants is anticipated to take quite a number of years.

However, the convergence criteria do not concern government finances alone. It is important that the participating member states have by and large equivalent inflation and interest rates and that their mutual exchange rates have been stable. This is a logical requirement of countries which are to share a single currency. At the beginning of the 1990s, when the Treaty was written, a further wish was to maintain the results achieved by the core European countries during the 1980s in terms of lower inflation and exchange-rate stability. After the considerable exchange-rate unrest at the beginning of the 1990s the core countries quickly re-established exchange-rate stability based on the central rates which have prevailed since 1987. The other countries which are expected to participate in the currency union have only in recent years achieved exchange-rate stability in relation to each other and to the core countries.

However, low inflation rates in the 1990s is not a unique EU phenomenon, but can be seen in most other OECD countries.

Even strong economic growth and low unemployment have not led to the strong price increases seen in previous times, and this has surprised most economic forecasters. It has given rise to many deliberations in articles and speeches by academics, politicians and central banks. The concept of "new economics" has been launched as one explanation.

New economics are not, or at any rate not yet, a comprehensive theory which might be an alternative to traditional economic theory. New economics are rather a generic term for a number of ad hoc explanations for the apparent shift in the nature of the well-known relations between growth, unemployment and inflation. Particularly the technological development is used to explain a change in reaction patterns among both commercial enterprises and wage-earners.

However, so far it would appear that overall the economic development can be explained on the basis of the traditional economic models.

Low inflation has influenced the debate in other ways too. Suddenly concern has arisen that inflation is falling too much and that prices may fall. For most people "deflation" is a code word for the economic problems of the inter-war years. Particularly during the world crisis in the 1930s the threat of deflation was perceived as a vicious circle of price drops, wage drops and strongly rising unemployment.

The development in Japan in particular gives grounds for concern. Even though packages of economic measures are adopted at frequent intervals it has so far proved impossible to stimulate demand.

The situation in our part of the world is very different. Real wages show good increases and the very low inflation figures in many countries are due to such factors as price drops on individual commodities. Many raw materials, such as energy, are subject to very strong price fluctuations. Therefore in some periods these commodities will contribute to reducing the price index.

Prices for other products drop over extended periods due to the very rapid technical development. The most common example is computers. However, price drops for these high-tech commodities do not indicate a crisis situation, perhaps the contrary in fact. Even though experience tells us that it is possible to buy a better product at half the price if one is patient enough to wait a year or two, this does not appear to have a negative impact on demand for these products.

So even if inflation were to drop even further, and even if price indices may be falling in some periods, it is hard to see how this could lead to the same problems for our society as those seen in the 1930s.

Denmark has chosen to remain outside the third stage of EMU, but nonetheless the Danish economy was also evaluated in the convergence reports. We can be satisfied that these evaluations are extremely positive. They boost the financial markets' confidence and it is pleasing to note that the yield differential between 10-year Danish and German government bonds is now below $\frac{1}{4}$ per cent. It is obvious to regard this $\frac{1}{4}$ per cent as the current best estimate of the future yield differential to euro-denominated bonds. However, there is a tendency for the yield differential to narrow in periods of falling interest rates and for it to be small if interest-rate levels are low. Therefore the yield differential between krone-denominated and euro-denominated bonds must also be expected to vary over time, as has been the case with the yield differential between Danish and German government bonds.

The narrow yield differential is related to the favourable economic fundamentals as well as market confidence that the Danish krone's exchange rate will be very stable against the euro.

In contrast to many other countries in Europe Denmark's problem is that the economic growth is currently too strong. Consumption is rising strongly, against the background of very optimistic expectations of the future. This might be termed a *de luxe* problem, but unfortunately it does have consequences for the balance of payments, which is the Achilles heel of the Danish economy. There is a considerable risk of a current-account deficit in 1998. Even if a small surplus should be the result, the reality is that the foreign debt is no longer being reduced.

Two years ago, at this same occasion, I stated that it appeared to be a basic characteristic of the Danish economy that the balance of payments deteriorates if our growth is stronger than abroad's. The last two years have confirmed this relation.

It is therefore very important that the fiscal policy adopted for 1999 includes a decisive tightening - and that it does take place. In recent years public expenditure during the course of the year has unfortunately risen more strongly than planned.

Planning the overall fiscal policy for 1999 will begin very soon with agreements between government and local governments. These agreements are of very great significance to the economy, since most of the public sector's activity takes place under local governments and it must be ensured that the agreed expenditure levels are complied with in both 1998 and 1999.

The record-low bond yields do not make it easier to maintain balance in

the economy, since the financial conditions have an expansionary effect. This is a consequence of the fixed-exchange-rate policy, combined with a low level of interest rates throughout Europe.

One year ago many people expected that market interest rates would rise over the year. However, the development has taken quite the opposite path, among other reasons because uncertainty concerning the development in the Far East has dampened expectations of coming years' growth.

The drop in interest rates in 1993 led to a wave of loan conversions after decades in which conversions were only part of economic history. The wave of conversions in 1993 and 1994 in most cases significantly reduced home-owners' debt service payments. There is no doubt that the consumption-stimulating effects are a significant part of the explanation for the economic upswing in Denmark as from 1993.

The conversions made ordinary home-owners aware of opportunities to restructure their debt. In addition, the development of new software programs has made it easy to calculate the consequences, turning loan conversion into a national sport. However, in most cases the gains released by today's loan conversions are significantly lower than 4-5 years ago, since some of the loans which are now being refinanced were raised during the last few years. The impact on consumption will therefore be considerably less than during the last wave of conversions. On the other hand, the situation today is that we most certainly do not need any stimulation of demand.

A number of home-owners accept loan-conversion offers even though the actual saving is no more than a few hundred kroner per month, once charges have been paid. This creates employment and earnings for banks and mortgage-credit institutes, but the final bill is paid by the bond owners when the bonds are redeemed at par. This may have consequences for the future strategies of the more professional Danish and foreign investors.

A key aspect of my speech today is that it will be necessary for Denmark to keep total domestic demand down by carrying out a significant tightening of fiscal policy. This should be an element of the planning of the credit institutes' lending policy, even though the possibility of losses on mortgage-credit loans may appear to be theoretical in the present situation.

It has often been said, but it cannot be repeated often enough: the credit policy pursued in the good times will be the seed of future crises.

The Nationalbank's Press Releases

March 16, 1998 on realignment of exchange rates within the EMS

As a consequence of the realignment of exchange rates within the European Monetary System (EMS) the central rate of the Irish pound has been revalued by 3 per cent.

The Greek drachma has joined the Exchange-Rate Mechanism of the EMS with a fluctuation band of +/-15 per cent.

As from Monday, March 16, 1998 the following intervention rates between Danmarks Nationalbank and foreign-exchange dealers apply to the Irish pound and the Greek drachma.

	Danish kroner per 100 units	
	Lower limit	Upper limit
Irish pound	815.774	1,099.95
Greek drachma	1.81948	2.45331

The intervention rates between the other ERM currencies will remain unchanged.

This implies adjustment of the central rates of all ERM currencies vis-à-vis the ECU. The new central rates are as follows:

Denmark	1 ECU =	7.54257	DKK
Germany	1 ECU =	1.97738	DEM
France	1 ECU =	6.63186	FRF
Belgium	1 ECU =	40.7844	BEF
Netherlands	1 ECU =	2.22799	NLG
Ireland	1 ECU =	0.796244	IEP
Spain	1 ECU =	168.220	ESP
Portugal	1 ECU =	202.692	PTE
Austria	1 ECU =	13.9119	ATS
Finland	1 ECU =	6.01125	FIM
Italy	1 ECU =	1957.61	ITL
Greece	1 ECU =	357.000	GRD

The theoretical central rate for the pound sterling, which does not participate in the Exchange-Rate Mechanism, is as follows:

UK	1 ECU =	0.653644	GBP
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May 5, 1998 on the interest rate increase

With effect from May 6, 1998 the discount rate will be raised by ½ per cent to 4 per cent. The rate of interest on the banks' current accounts with the Nationalbank is also raised by ½ per cent to 4 per cent. On May 6 the rate of interest on the Nationalbank's certificates of deposit and the repo rate will be 4.25 per cent, an increase of 0.50 per cent.

During recent months the Danish krone has tended to weaken. Since February the Nationalbank has sold foreign exchange to support the krone. Since the beginning of April the tendency has been more pronounced and the sale amounted to DKK 16 billion in April. The sale of foreign exchange has continued in May. The foreign-exchange reserve is, however, still substantial, more than DKK 100 billion.

The objective of the foreign-exchange-rate policy is to maintain a stable krone rate against the D-mark and the other core currencies. This is achieved through the use of the short-term interest rates and interventions in the foreign exchange market.

The continuing and increasing requirement to support the krone through sale of foreign exchange during recent months has made it necessary to increase the Nationalbank's interest rates.

For further information please contact Ms Kirsten Mordhorst on telephone +45 33 63 60 21.

Danmarks Nationalbank on the Internet

Danmarks Nationalbank has launched its homepage on the Internet. The address is:

www.nationalbanken.dk

The website presents an overview of the functions of Danmarks Nationalbank and provides access to the bank's press releases, publications, statistical data, etc. The website thus improves the access to information on the Nationalbank's tasks and policies and on Danish banknotes and coins.

The material is presented so as to meet the general public's need for information of a general nature and furthermore to provide the more detailed information required by professional users. Most of the website is available in an English version. The key areas are described below:

Welcome

Practical information and links to other websites.

About us

The tasks of the Nationalbank and its special position as Denmark's central bank are described. The management of the Nationalbank is presented and an outline is given of its internal organization. The history of the bank is related to economic-policy events during the last 200-300 years. The Nationalbank's building is also described, including photographs.

Press releases

The website includes the most recent press releases from the Nationalbank as well as some of the speeches made by the Governors. The aim is for material to be available on the Internet as soon as possible after it is published.

Publications

The Nationalbank's publications are presented as full-text versions.

Statistics

This section presents financial statistics and statistical information on external payments.

Markets

This section presents the information which the Nationalbank makes available on a day-to-day basis concerning e.g. exchange rates and interest rates.

Notes and coins

The Nationalbank is currently issuing new banknotes. This section presents the new note series. The present coin series and the most recent commemorative coin issues are also shown.

Government debt

The Nationalbank is responsible for the administration of domestic and foreign central-government borrowing. This section describes the principles for government debt management.

For further information please contact Mr. Bjarne Skafte on telephone +45 33 63 60 22.

Tables

Interest rates and share-price index	1
Selected items from the Nationalbank's balance sheet	2
Factors affecting the banks' net position with the Nationalbank	3
Selected items from the financial institutions' balance sheet, and the money stock	4
The banks' lending	5
External payments (net payments from abroad).....	6
GDP by type of expenditure	7
Principal items of the balance of payments (net revenues)	8
Prices and exchange rates	9
Selected monthly economic indicators	10
Selected quarterly economic indicators.....	11

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: July 3, 1998

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 1-6, 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 7-11, apart from the exchange-rate series in Table 9, for which Danmarks Nationalbank is the source.

Table 1

Interest rates and share-price index

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)
	Discount rate	Repurchase agreements and certificates of deposit			10-year central-government bond	30-year mortgage-credit bond	
	Per cent per annum			Per cent per annum		1.1.83 =100	
1993.....	6,25	6,75	1993.....	6,50	6,09	7,11	366
1994.....	5,00	5,50	1994.....	6,15	9,14	9,73	349
1995.....	4,25	4,60	1995.....	4,65	7,23	8,36	366
1996.....	3,25	3,50	1996.....	3,57	6,52	7,87	472
1997.....	3,50	3,75	1997.....	3,93	5,63	7,28	676
			1997 Jun	3,56	6,29	7,58	589
Oct. 10, 1997	3,50	3,75	1998 Jan.....	3,82	5,40	7,20	690
May 6, 1998	4,00	4,25	Feb.....	3,81	5,22	6,51	695
May 29, 1998	3,75	4,00	Mar.....	3,82	5,15	6,49	767
			Apr.....	3,91	5,29	6,56	727
			May.....	4,10	5,07	6,43	748
Jul. 3, 1998	3,75	4,00	Jun.....	4,02	4,94	6,36	734

Table 2

Selected items from the Nationalbank's balance sheet

End of period	The foreign-exchange reserve (net)	Notes and coin in circulation	The central-government's account with the Nationalbank	The banks' net position with the Nationalbank			
				Certificates of deposit	Deposits (current account)	Loans (repurchase agreements)	Total net position
1993.....	74,8	29,7	94,5	27,8	3,4	77,9	-46,8
1994.....	54,1	32,7	56,9	25,9	2,7	55,9	-27,4
1995.....	63,6	34,7	38,8	33,6	1,9	44,0	-8,5
1996.....	85,2	36,6	35,0	30,6	15,2	33,7	12,1
1997.....	129,7	38,7	34,0	52,1	18,0	19,8	50,3
1997 May.....	108,8	36,7	52,1	47,3	1,5	29,4	19,3
Dec.....	128,2	38,7	30,7	52,1	18,0	19,8	50,3
1998 Jan.....	154,3	36,9	52,1	68,5	2,1	15,3	55,3
Feb.....	142,8	36,6	45,7	61,8	1,5	13,1	50,2
Mar.....	139,6	37,2	52,1	49,4	13,5	18,7	44,2
Apr.....	119,1	39,0	47,5	41,7	15,8	31,8	25,7
May.....	117,9	39,0	72,0	30,3	4,0	34,4	-0,1

Table 3 *Factors affecting the banks' net position with the Nationalbank*

	Central-government finance			Net purchase of foreign exchange by the Nationalbank	The Nationalbank's net bond purchases	Other factors	The banks' net position with the Nationalbank	
	Domestic gross financing requirement	Sales of domestic central-government securities	Liquidity effect				Change in net position	End of period
1993	119,2	120,9	-1,6	-32,5	6,9	-4,8	-32,1	-46,8
1994	119,8	119,6	0,2	19,5	1,6	-1,9	19,4	-27,4
1995	138,8	137,2	1,6	32,9	-7,2	-8,4	18,9	-8,5
1996	94,7	96,0	-1,2	25,9	-0,1	-3,9	20,6	12,1
1997	73,8	73,0	0,8	43,2	-1,5	-4,3	38,2	50,3
1997 May ...	-15,8	13,0	-28,8	7,2	0,4	-0,4	-21,5	19,3
Dec	13,5	2,0	11,4	-0,1	-1,0	-2,2	8,1	50,3
1998 Jan	19,5	18,0	1,5	1,8	0,9	0,9	5,0	55,3
Feb.....	-7,1	-7,1	0,0	-5,1	0,0	0,0	-5,1	50,2
Mar	3,9	11,6	-7,7	-1,9	0,9	2,8	-6,0	44,2
Apr	9,9	9,8	0,1	-16,0	-0,5	-2,1	-18,5	25,7
May ...	-24,9	-0,4	-24,4	-1,2	0,1	-0,2	-25,8	-0,1

Table 4 *Selected items from the financial institutions' balance sheet, and the money stock*

End of period	Mortgage-credit institutes		The banks					Money stock
	Domestic lending		Domestic lending		Residents' deposits		Holdings of domestic bonds	
	Total	of which:	Total	of which:	Total	of which:		
		Owner-occupied dwellings		Private individuals		Private individuals		
Kr. billion								
1993	735,4	354,0	292,2	105,5	505,8	156,2	149,5	416,6
1994	756,3	379,5	274,9	106,0	475,2	152,5	172,8	394,0
1995	783,2	399,4	286,7	114,8	491,4	164,3	176,8	410,1
1996	828,4	434,1	302,7	122,3	527,8	172,8	181,0	439,8
1997	888,2	481,3	330,1	131,1	556,5	185,6	174,9	462,6
1997 May...	854,9	452,5	315,4	121,2	546,7	193,3	174,8	461,6
Dec ...	888,8	481,6	332,4	132,9	555,7	185,5	173,0	462,7
1998 Jan.....	905,4	489,3	324,2	130,3	580,3	193,7	176,3	485,7
Feb.....	916,9	495,7	332,6	129,3	567,1	196,1	186,4	473,2
Mar ...	916,2	495,2	339,7	135,4	551,3	189,6	203,0	458,4
Apr.....	926,4	504,2	338,1	133,1	586,7	201,0	189,1	494,9
May...	936,6	511,3	344,4	131,9	577,4	205,6	193,1	486,8
Change compared with previous year, per cent								
1993 .....	...	...	-9,0	-9,1	10,4	3,1	-6,3	11,2
1994	1,0	4,1	-5,6	1,7	-6,0	-2,3	21,8	-5,4
1995	4,1	5,4	6,1	8,7	3,2	7,6	-3,4	4,1
1996	5,1	7,9	6,8	6,9	7,2	5,1	-2,7	7,2
1997	6,8	9,9	9,9	8,8	5,3	7,4	-4,4	5,2
1997 May...	5,3	8,4	9,3	5,7	5,8	7,0	1,5	5,7
Dec ...	6,8	9,9	9,8	8,7	5,3	7,4	-4,4	5,2
1998 Jan.....	7,6	10,6	10,6	11,3	3,7	7,3	8,6	3,3
Feb.....	7,9	11,0	8,7	10,2	3,3	6,4	8,6	2,9
Mar ...	8,1	11,1	7,3	10,8	3,2	5,5	6,2	2,9
Apr.....	8,5	11,6	10,6	11,4	6,0	9,6	10,6	6,2
May...	8,6	11,7	10,0	10,4	5,5	6,3	9,3	5,5

Table 5

The banks' lending

End of period	From banks in Denmark				From Danish-owned banks abroad			
	To Danish residents		To non-residents		To Danish residents		To non-residents	
	In kroner	In foreign currency	In kroner	In foreign currency	In kroner	In foreign currency	In kroner	In foreign currency
	Kr. billion							
1993	277,0	15,3	47,7	37,0	21,1	76,1	4,4	73,3
1994	260,6	14,2	33,5	41,3	28,6	53,3	2,7	53,9
1995	272,4	14,3	35,5	31,4	27,6	46,8	2,8	68,3
1996	287,8	14,9	44,1	40,8	37,3	36,7	3,9	93,5
1997	312,7	17,4	61,7	49,9	46,4	38,2	3,4	132,0
1997 May...	299,3	16,1	51,6	38,3	43,2	33,5	3,8	112,3
Dec ...	314,9	17,5	61,8	50,0	46,4	38,2	3,4	132,2
1998 Jan....	306,2	18,0	59,9	46,9	45,0	36,7	3,1	129,6
Feb....	314,4	18,2	65,2	53,6	45,9	38,6	3,0	140,8
Mar ...	320,1	19,6	86,2	51,7	46,8	39,4	3,5	150,0
Apr....	317,9	20,2	79,2	52,1	49,0	38,4	3,1	144,0
May...	325,1	19,3	72,4	53,1	51,4	37,1	2,9	149,0
Change compared with previous year, per cent								
1993	-8,9	-11,5	295,3	-4,8	39,6	-22,1	39,9	10,8
1994	-5,6	-6,9	-29,7	11,8	35,5	-29,9	-38,2	-26,2
1995	6,5	0,6	6,4	-24,1	-3,2	-12,3	2,4	26,6
1996	6,8	5,5	24,4	29,5	34,8	-21,6	39,7	37,7
1997	9,5	17,3	40,3	22,7	24,5	4,2	-13,6	41,4
1997 May...	9,2	10,2	56,6	17,7	41,5	-19,9	28,1	44,5
Dec ...	9,4	17,1	40,2	22,7	24,5	4,2	-13,6	41,3
1998 Jan....	9,9	24,5	-3,7	21,1	14,4	8,4	-25,3	35,8
Feb....	8,6	11,8	3,9	35,2	13,8	15,9	-28,5	43,1
Mar ...	6,3	26,7	75,2	26,6	12,7	18,9	-15,8	39,8
Apr....	9,8	26,4	53,6	28,0	16,9	15,4	-10,8	33,3
May...	9,4	20,6	40,5	39,0	19,1	10,7	-24,0	32,9

Table 6

External payments (net payments from abroad)

	Current payments	Capital transfers	Financial payments				Errors and omissions	Increase in the foreign-exchange reserve
			Total	of which:		Danish krone-denominated bonds		
				Direct investments				
				Foreign in Denmark	Danish abroad			
Kr. billion								
1993.....	...	...	...	...	...	...	...	...
1994.....	...	...	...	...	...	...	...	...
1995.....	6,5	-0,5	1,6	21,5	-16,6	37,8	5,8	13,4
1996.....	14,2	0,2	14,6	2,3	-13,6	30,8	-8,2	20,8
1997.....	10,1	0,7	53,9	18,5	-27,8	44,8	-21,7	43,0
May 96 – Apr 97..	9,6	0,6	17,1	3,1	-8,9	7,8	-23,1	4,2
May 97 – Apr 98..	5,7	0,3	11,9	40,1	-31,1	57,0	-2,1	15,8
1997 Apr	2,4	0,1	6,0	0,6	-0,3	4,2	-1,1	7,4
Nov.....	-4,1	0,1	3,5	2,9	-0,8	-1,2	-6,8	-7,3
Dec.....	1,8	0,1	-2,8	5,0	-6,6	-1,9	0,3	-0,6
1998 Jan	2,7	0,3	24,8	21,9	-3,9	10,5	-3,2	24,6
Feb.....	1,0	0,5	-12,0	1,6	0,0	-2,4	-1,0	-11,5
Mar.....	-1,2	-0,8	-12,5	2,0	-2,3	2,2	11,2	-3,3
Apr.....	-2,0	0,1	-18,8	0,1	-1,2	1,4	0,2	-20,5

Table 7

GDP by type of expenditure

	GDP	Final domestic demand					Exports of goods and services	Imports of goods and services
		Private consump- tion	General- government consump- tion	Gross fixed capital formation	Change in inventories	Total		
1993.....	910,1	452,3	240,9	164,7	-6,6	851,3	317,8	259,0
1994.....	965,3	492,8	250,3	170,0	3,2	916,3	341,8	292,8
1995.....	1.012,9	513,1	259,7	189,3	10,3	972,5	358,4	317,9
1996.....	1.067,0	536,9	272,1	205,1	5,0	1019,0	376,4	328,5
1997.....	1.125,6	567,9	284,6	225,8	6,8	1085,1	406,6	366,1
1997 1. qtr	268,4	135,5	69,4	51,3	4,8	260,9	92,6	85,1
2. qtr	284,2	144,4	71,5	57,7	0,7	274,2	102,4	92,4
3. qtr	279,8	138,2	71,8	55,8	2,9	268,8	103,1	92,1
4. qtr	293,2	149,8	72,0	61,0	-1,6	281,2	108,5	96,5
1998 1. qtr	284,7	142,4	72,2	59,3	6,6	280,6	99,8	95,7
Real growth compared with previous year, per cent								
1993.....	1,5	1,5	3,1	0,8	...	1,6	0,2	0,2
1994.....	3,6	7,3	2,3	1,4	...	5,3	7,9	13,8
1995.....	3,1	2,7	2,0	12,0	...	4,6	5,3	9,7
1996.....	3,5	2,7	2,4	6,1	...	3,2	4,4	3,8
1997.....	3,5	3,6	2,2	8,1	...	3,8	5,3	6,5
1997 1. qtr	1,9	2,4	3,2	6,0	...	2,1	1,2	1,6
2. qtr	4,2	6,0	1,5	11,5	...	5,0	6,4	8,7
3. qtr	3,0	2,0	1,4	8,5	...	3,7	6,1	8,6
4. qtr	4,7	3,9	2,7	6,4	...	4,6	7,2	7,0
1998 1. qtr	3,7	3,2	2,0	12,9	...	5,5	5,8	10,7
Real growth compared with previous quarter (seasonally adjusted), per cent								
1997 1. qtr	1,2	0,6	0,7	1,5	...	0,9	1,7	1,1
2. qtr	1,8	1,7	0,1	5,5	...	2,6	1,1	3,2
3. qtr	0,5	-1,6	0,6	0,9	...	0,5	2,0	2,1
4. qtr	1,2	3,1	1,1	-1,0	...	0,5	2,1	0,5
1998 1. qtr	-0,3	-0,9	0,2	6,9	...	1,4	-2,1	2,4

Table 8 *Principal items of the balance of payments (net revenues)*

	Goods (fob)	Services	Goods and services	Wages and property income	Current transfers	Total current account
	Kr. billion					
1993.....	...	...	...	...	...	...
1994.....	...	...	...	...	...	...
1995.....	...	...	...	...	...	...
1996.....	...	...	...	...	...	...
1997.....	38,8	0,6	39,4	-21,1	-8,7	9,6
Apr 96 – Mar 97	...	...	...	...	...	...
Apr 97 – Mar 98	35,2	1,0	36,1	-22,7	-10,2	3,4
1997 Mar	3,9	-0,9	3,0	-3,7	-0,8	-1,5
Oct	3,4	0,5	3,8	-1,0	-1,0	1,9
Nov	3,7	0,5	4,2	-7,9	-1,3	-5,0
Dec.....	3,1	0,8	3,9	-2,9	-1,5	-0,6
1998 Jan.....	1,9	-1,3	0,6	-1,0	1,3	0,9
Feb.....	2,4	-0,5	1,8	-0,7	-0,5	0,6
Mar	1,0	0,4	1,5	-4,2	-0,3	-3,1

Table 9 *Prices and exchange rates*

	Consumer price index	Index of net retail prices	Wholesale price index	Kroner per DEM 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	
1993.....	1,2	1,4	-0,6	392,31	649,45	99,9	103,0
1994.....	2,0	1,6	1,4	391,94	635,23	99,9	102,5
1995.....	2,1	2,0	2,9	391,13	560,53	103,9	106,3
1996.....	2,1	2,0	1,1	385,42	579,59	102,9	105,6
1997.....	2,2	2,2	1,9	380,96	660,86	100,0	103,0
1997 Jun	2,4	2,4	2,0	380,79	657,42	99,9	103,2
1998 Jan.....	1,7	1,4	1,3	380,89	691,58	100,2	103,1
Feb.....	2,1	1,9	0,9	381,10	691,32	100,1	103,1
Mar	2,3	2,1	1,0	381,18	696,04	99,6	102,7
Apr.....	2,2	1,9	0,5	381,34	691,66	99,7	102,7
May.....	2,0	1,7	-0,6	381,07	676,46	100,7	104,0
Jun .....	...	...	...	380,89	682,91	101,0	...

Table 11

Selected quarterly economic indicators

	Employment		Hourly earnings in manufacturing industry	Real effective krone rate based on hourly earnings	Composite cyclical indicator for		Property prices (purchase sum, one-family dwellings)
	Total	Private			Industry	Building and construction	
	1000 persons		February 1996=100	1980=100	Balance per cent.		As a percentage of property value 1996
1993.....	2.533	1.760	...	99,7	-6	-19	83,8
1994.....	2.526	1.758	...	99,2	12	10	94,0
1995.....	2.566	1.796	...	103,6	1	10	101,1
1996.....	2.598	1.814	...	103,0	-4	7	112,0
1997.....	2.657	1.855	...	...	6	7	124,5
Seasonally adjusted							
1997 1.qtr.....	2.631	1.838	103,6	101,5	7	12	120,5
2.qtr.....	2.648	1.849	104,8	102,2	7	6	123,7
3.qtr.....	2.663	1.858	105,7	99,9	5	6	126,5
4.qtr.....	2.684	1.876	106,6	...	5	5	127,4
1998 1.qtr.....	2.691	1.879	...	...	2	16	...
Change compared with previous year, per cent							
1997 1.qtr.....	2,0	2,0	3,6	-2,2	...	...	12,4
2.qtr.....	2,0	2,0	3,8	-0,6	...	...	12,7
3.qtr.....	2,2	2,1	3,9	-3,1	...	...	11,8
4.qtr.....	2,8	3,0	3,8	...	...	...	8,1
1998 1.qtr.....	2,2	2,2	...	...	...	...	...

