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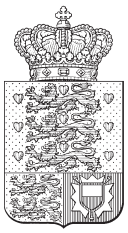
Danmarks Nationalbank

Financial stability

2002

DANMARKS NATIONALBANK 2002



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The small picture on the cover shows a characteristic section of Danmarks Nationalbank's building, Havnegade 5 in Copenhagen. The building, which was constructed in 1965-78, was designed by the architect, Arne Jacobsen (1902-71).

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Explanation of symbols:

- \- Magnitude nil
- 0 Less than one half of unit employed
- • Category not applicable
- … Numbers not available

Details may not add due to rounding.

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Introduction and Summary

Like other national central banks, Danmarks Nationalbank performs systematic analyses of financial stability. In 2000 and 2001 the analyses were included in the Monetary Review for the 2nd Quarter[1]. From 2002 Danmarks Nationalbank will publish annual financial-stability reports for Denmark. The purpose of analysing financial stability is to assess whether the financial sector is sufficiently robust so that problems in this sector will not impede the functioning of the financial markets as efficient providers of capital for companies and households. The report is in two parts. The first part deals with the trends in financial stability, while the second part of the report elaborates on four current issues of relevance to financial stability. The approach is to consider risks and stability in the financial system, not the individual institutions in the financial sector.

Financial stability primarily depends on the development in the banking institutions. The banking institutions' financial situation is closely linked to the general economic trend in Denmark, particularly the finances of Danish companies and households.

Trends in the real economy

The subdued economic growth in 2001 in most of Denmark's major trading partners has only had a relatively moderate effect in Denmark. The strong growth seen in 2000 was expected to subside in 2001, but actual growth turned out to be slightly lower than expected, at only 1 per cent in 2001.

The general robustness of the Danish economy is reflected in a steadily increasing rate of employment throughout most of 2001, and a decline in unemployment to the lowest level for decades. For some years, the annual rate of increase for consumer prices has been around 2 per cent, which was also the case in 2001 and the first months of 2002. Hourly wages rose by just over 4 per cent, implying growth in real income by about 2 per cent. Hourly productivity rose by just over 1 per cent in 2001 against 4 per cent in the preceding year. Presumably this merely reflects fluctuations in economic growth in a tight labour market and is thus unlikely to be an expression of lower underlying productivity growth.

At 2.5 per cent of the gross domestic product (GDP) the government surplus was on a par with the result in 2000. Proceeds from taxation of

[1] See Financial Stability, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2000 and 2nd Quarter 2001.

pension yields declined to almost zero owing to falling stock prices, but this was offset by increased income from corporate tax. Government debt declined to approximately 44 per cent of GDP.

The current-account surplus increased from approximately 1.5 per cent of GDP in 2000 to 2.5 per cent in 2001. This reflects a good export performance in an international perspective, since Danish exports are less sensitive to global economic fluctuations than the exports of most other countries. Exports also contributed to sustained positive growth in corporate investments.

The KFX index of the most liquid Danish shares basically followed the trend in the international stock markets and decreased by 20 per cent in 2001, irrespective of the more positive economic development in Denmark than abroad.

The krone was stable vis-à-vis the euro, remaining close to the central rate in ERM2, and in general Danish interest rates have followed the corresponding European rates. Since early 2000 bond yields have been more or less stable, as declining yields in the summer of 2001 and immediately after the terrorist attacks in the USA were followed by an upward trend late in the year and early in 2002. Danmarks Nationalbank followed suit when the ECB lowered its interest rates and has also narrowed the spread between its lending rate and the ECB's minimum bid rate to 0.3 per cent.

The effective krone rate has been relatively stable since January 2001, but occasional fluctuations in particularly the Swedish krona may have affected Danish companies in direct competition with Swedish companies.

Financial savings in the private sector, i.e. gross savings less gross investments, balanced in 2001 after a financing requirement had been seen in the preceding few years. The improvement amounted to approximately 1 per cent of GDP. Since growth in households' consumption was significantly lower than growth in income, and since housing investments declined considerably from the very high level in 2000 (resulting from repairs of the damage caused by the hurricane in December 1999), the households' savings balance improved slightly more than that of the private sector overall. The excess savings of the corporate sector diminished correspondingly.

Financial-sector trends

The economic slowdown in 2001 had no impact on the overall result of the Danish banking institutions. Higher interest income offset the declining value adjustments and increased losses and provisions. The credit quality deteriorated in 2001, and banking institutions expect higher credit losses in the future, but an economic upturn may dampen further increases in losses and provisions.

The banking institutions' lending rose more strongly than deposits in 2001, which led to an increase in the deposit deficit. Growth in lending is

increasingly financed via debt to other credit institutions. This source of financing is less stable than deposits, and financing risks may therefore have increased for a number of institutions.

For most banking institutions, costs increased in 2001, which has contributed to lower operating income over operating expenses.

Overall, capital adequacy increased slightly in 2001, although a number of small and medium-sized banks saw a decline in capital adequacy.

On the basis of current earnings, banking institutions as a whole are deemed to be robust, but not quite as robust as in 2000.

Trends in the corporate sector and the households

The incidence of compulsory liquidations has increased in recent years, reflecting the fact that the strong economic growth seen in the last half of the 1990s has subsided.

The analysis shows that some sectors are particularly exposed, including IT and telecom, as well as trade, hotels and restaurants. On the basis of the economic slowdown in 2001 the financial situation in the corporate sector is, however, deemed to be fairly good. An improved economic climate may alleviate the pressure on the exposed companies.

Overall, the households have sound net assets, but when pension savings are excluded, they have relatively modest net debt. However, the average figures conceal considerable individual differences. The most debt-ridden home-owners have become more vulnerable to declining income.

Owing to the low short-term interest rates at present, floating-rate loans have become immensely popular. Such loans offer home-owners lower immediate payments in comparison with traditional fixed-rate loans. When applied with caution and awareness of the potential risks, this trend will not have significant effect on financial stability. However, home-owners should be aware of the increased financial risk associated with floating-rate loans.

Trends in the financial markets

The events on 11 September 2001 showed that generally the financial institutions were able to resist major shocks in the financial markets. However, the pension sector was severely affected by plummeting share prices and low interest rates in the autumn of 2001.

The events in the autumn of 2001 highlighted the financial risk factors. The need for stress tests has been emphasised in connection with the assessment of the stability of financial institutions.

The negative trend in the stock markets in 2001 meant a fall in both the number of share issues and the total value of share issues on the Copenhagen Stock Exchange in comparison with 2000.

Issues related to financial stability

Pension companies play an important role in the financial sector, by smoothing out risks among pension savers and as managers of long-term savings. When compared with banks, the effect of pension companies on financial stability is, however, assessed to be more indirect. Pension companies may affect financial stability via the financial markets, via group ties with banks or via other types of risk transfer between banks and pension companies. The events in the autumn of 2001 showed that although there were problems in this sector, the impact on financial stability was limited.

Excess capital reserves and a good earnings capacity both help to safeguard banks and thus ensure financial stability. Banks constantly strive to achieve the optimum relationship between earnings capacity, capital base and risk profile. Capital-allocation models, as implemented by several major banks, are found to be very useful in this connection. Such models can be good strategic tools which can enhance the banks' risk management when combined with traditional credit rating.

Settlement of payments is an important function for the banking institutions and of great importance to financial stability. Payment systems can spread credit or liquidity problems from one banking institution to another. Simulations have been performed of various failure scenarios in the two major Danish payment systems, Kronos and the sum clearing. The objective of the simulations was to quantify the extent to which problems experienced by the largest single participant may spread to other system participants. The simulations show that other participants are only affected to a limited degree, but that ample liquidity in the systems is a decisive factor.

Banking institutions evolve over time, and therefore methods for analysing financial stability must also be continuously adjusted and improved. The individual analyses cannot shed full light on the situation in the sector, but by piecing together the results an overall picture can be gained, which can, with some caution, be taken as an expression of the robustness in the sector and thus an indication of the conditions for financial stability.

Financial stability analysis

Trends in the Financial Sector

The banking institutions assume various risks in the course of their business. Credit risk associated with loans and guarantees is the most significant risk. The banking institutions' losses and provisions on loans and guarantees increased in 2001, but from a very low level. This development reflects some deterioration of the current credit quality, also reflecting expectations of higher future credit losses. The economic slowdown had no impact on the banking institutions' overall result, and an economic upturn might dampen further increase in losses and provisions.

The banking institutions' earnings continue to be robust, although the analysis indicates a slight decrease in the robustness compared to 2000.

FINANCIAL GROUPS

The largest Danish banks are part of financial groups. Their operation, return on equity and risks are thus closely linked to the other companies in the group, which could be other banks, mortgage-credit institutes or insurance companies. In the following, the trends for seven Nordic financial groups are presented as the background to the development in the Danish financial groups[1]. It should be noted that comparisons of the financial statements of the Nordic financial groups should be interpreted with great caution[2].

Trends in the groups' financial statements

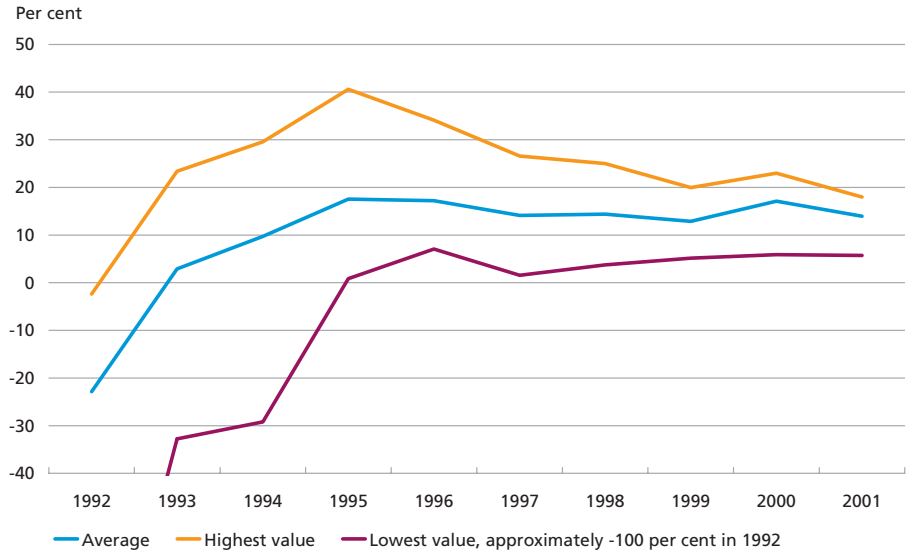
With one exception the groups' ordinary operating result before tax tended to be lower in 2001 than in 2000. On average, the groups' return on equity in 2001 corresponded to the average in the period since 1995, cf. Chart 1.

In 2001, the groups' earnings from deposit and lending activities increased owing to greater volumes, among other factors, while fee and commission income decreased due to such factors as lower income from investment banking and asset management, including decreased securities trading. Investment banking activities include IPOs (Initial Public Offerings), mergers and acquisitions and stock market analysis, while asset management activities include portfolio management for private and institutional customers.

[1] The groups analysed are Danske Bank, Den norske Bank, FöreningsSparbanken (Swedbank), Nordea, Nykredit, Skandinaviska Enskilda Banken (SEB) and Svenska Handelsbanken.

[2] See Box 2 on p. 28 in Financial Stability, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2001.

RETURN ON EQUITY POST TAX FOR THE LARGEST NORDIC FINANCIAL GROUPS 1992-2001 Chart 1



Note: The data set consists of the seven analysed groups plus the companies which were previously independent of, but are now included in, the present groups. Return on equity is calculated as profit after tax as a ratio of equity.
Source: Annual accounts and BankScope.

Declining stock prices entailed losses on the groups' share portfolios in 2001. However, this was more than offset by positive value adjustments on the far more substantial bond portfolios.

Throughout 2001 the groups' losses and provisions increased overall compared to 2000. Several groups attribute this to weaker international business cycles in 2001 than in the preceding years.

There was no clear trend in costs, which can be explained by e.g. the rationalisation programmes implemented in some groups these years.

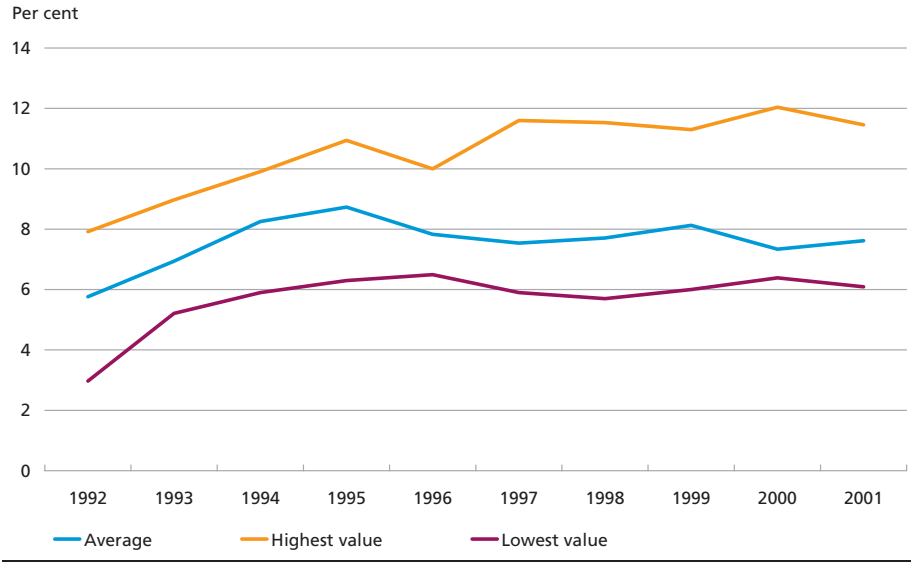
The groups' aggregated balance sheet increased by 7 per cent from 2000 to 2001, which can be attributed to growth in existing business areas as well as acquisition of financial companies. A proportion of the groups' earnings is generated by off-balance-sheet activities such as investment banking. As a result, the balance sheet is not necessarily a good indicator of the groups' actual business volume and earnings potential.

The capital adequacy of the Nordic groups

Most of the analysed Nordic groups strengthened their capital base in 2001. According to the Basle Committee's[1] capital-adequacy rules of

[1] The Basle Committee, whose secretariat is at the Bank for International Settlements, BIS, was established at end-1974 for the purpose of strengthening the stability of the international financial system. The Committee includes representatives of the following countries: Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the UK and the USA

CORE CAPITAL RATIO FOR THE LARGEST NORDIC FINANCIAL GROUPS
1992-2001 Chart 2



Note: The data set consists of the seven analysed groups plus the companies which were previously independent of, but are now included in, the present groups. The average core capital ratio is calculated by dividing the analysed groups' overall core capital after deductions by the risk-weighted assets. The data set is incomplete.
Source: Annual accounts and BankScope.

1988 banks must have a solvency ratio[1] of at least 8. The solvency ratio of the Nordic groups was between 9.1 and 11.4 at end-2001. Overall, the average core capital ratio[2] of the Nordic groups has decreased since 1995, although it increased marginally during 2001, cf. Chart 2.

In order to create shareholder value some groups bought back their own shares in 2001. Most of the groups state that they intend to adjust their capital structure through share buy-backs again in 2002. The increased focus on the banks' capital structure may on the one hand contribute to enhancing efficiency and profitability. On the other hand a reduction of the capital base will – all other things being equal – also reduce the banks' buffer against unexpected losses. The banks' capital adequacy is described in the chapter on the banks' capital adequacy and earnings.

[1] The solvency ratio is defined as "liable capital" as a ratio of total risk-weighted items. "Liable capital" consists mainly of the core capital after deductions plus supplementary capital, less capital investments and subordinate capital in certain types of financial companies. Total risk-weighted items consist of risk-weighted assets and off-balance sheet items as well as market risks.

[2] The core capital ratio is defined as core capital after deductions as a ratio of total risk-weighted items. The core capital after deductions includes paid-up share or guarantee capital, as well as premium on issue and reserves less the portfolio of own shares, intangible assets and the current deficit for the year.

NUMBER OF EMPLOYEES IN FINANCIAL GROUPS, END-OF-PERIOD Table 1

	2000	2001
Danske Bank	19,906	18,521
Den norske Bank	7,052	6,932
FöreningsSparbanken	13,002	16,068
Nordea	39,068	42,017
Nykredit	2,844	2,917
SEB	21,280	20,696
Svenska Handelsbanken	8,574	9,239

Note: The numbers of employees in Nykredit and Svenska Handelsbanken are averages for the year.
Source: Annual accounts.

Structural trends

2001 saw a general trend towards continued consolidation and extension of the strategic cooperation among the players in the Nordic financial sector.

Svenska Handelsbanken acquired Midtbank in 2001. At the time of acquisition Midtbank was a major category-2 bank[1].

When Nykredit's annual accounts for 2001 were published, the group announced that it would enter into strategic cooperation with Jyske Bank. The principal element of the cooperation will be a joint IT operation company and an agreement for Jyske Bank to promote Nykredit mortgage-credit loans to private customers alongside Totalkredit mortgage-credit loans. In addition, Nykredit must acquire up to 9.9 per cent of Jyske Bank's share capital. As an element of the cooperation, the parties have agreed that Nykredit should exercise the voting rights entailed by the acquired shares as requested by the Board of Directors of Jyske Bank.

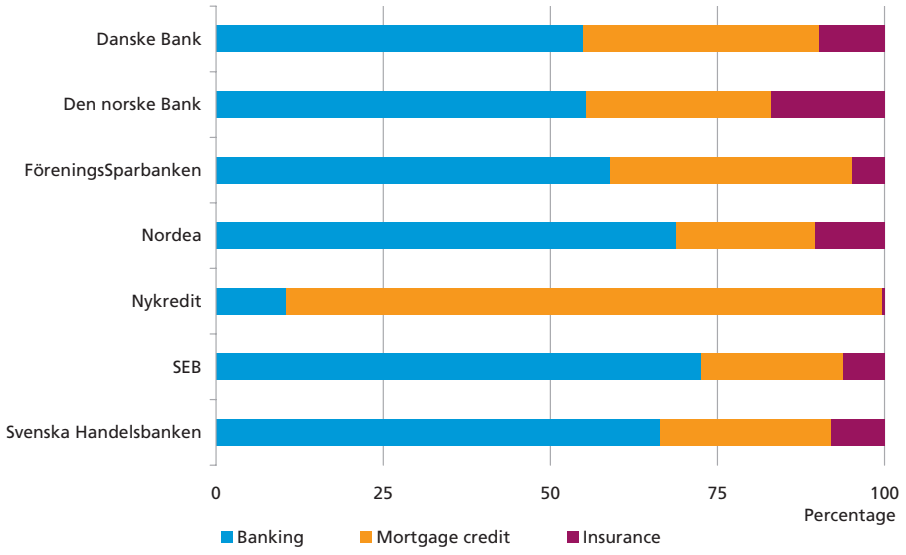
Nordea has acquired the Swedish Postgirot Bank at a value of approximately kr. 3.3 billion. According to Nordea, this acquisition will contribute to strengthening the groups' payment settlement competence.

At the beginning of 2002, Den norske Bank in Norway acquired the asset management division of Skandia in Sweden. According to Den norske Bank, one of the purposes of the acquisition was for Den norske Bank to become a leading supplier of asset management services for institutional and private customers in the Nordic region.

In the spring of 2001 the two Swedish groups, SEB and FöreningsSparbanken, announced merger plans which were nevertheless abandoned in September 2001. According to the two groups, the merger was aban-

[1] The Danish Financial Supervisory Authority divides the banking institutions into 4 categories based on working capital investments. Working capital consists of: deposits, issued bonds, etc., subordinate capital and equity. Category 1: banking institutions with a working capital of kr. 25 billion and above (4 banking institutions). Category 2: banking institutions with a working capital from kr. 3 billion to kr. 25 billion (16 banking institutions). Category 3: banking institutions with a working capital from kr. 250 million to kr. 3 billion (78 banking institutions). Category 4: banking institutions with a working capital of less than kr. 250 million (92 banking institutions). The 98 banking institutions in categories 1-3 cover more than 99 per cent of the banking institutions' overall balance sheet.

BREAKDOWN OF THE FINANCIAL GROUPS' BALANCE SHEETS BY BUSINESS AREA, END-2001 Chart 3



Note: The shares are calculated on the basis of the annual accounts of the groups and subsidiaries with activities in the areas of banking, mortgage credit and/or insurance which are deemed to be part of the group's overall strategy. In view of varying accounting principles in the Nordic countries the groups' shares should be compared with great caution. Mortgage credit comprises mortgage-credit lending financed via bonds and mortgage-credit related products. Insurance activities comprise life insurance and general insurance. The shares for SEB are calculated on the basis of accounts data at end-2000.
Source: Annual accounts and BankScope.

doned because the approval requirements of the European Commission would impose costs on SEB and FöreningsSparbanken of such a magnitude that the value of the merger would be lost

Structural trends influence the composition of the business areas of the various financial groups. Chart 3 shows a breakdown of the groups' balance sheets by business area. The breakdown by business area should be interpreted with caution, since several factors make it difficult to achieve a uniform definition. Table 1 shows the number of employees in the groups.

THE DANISH BANKING INSTITUTIONS

The Danish banking institutions constitute a heterogeneous group, so the average development may conceal considerable variations between the individual players[1]. A number of indicators reflect a tendency to polarisation whereby the average is pushed in a certain direction by one or

[1] The analyses primarily apply data for banking activities, including banking institutions which are part of financial groups. The development in profitability and capital adequacy is presented on the basis of data for the group as a whole for banking institutions which are part of groups, while data for other banking institutions are included in the analysis on an individual basis. The term "banking institutions" is used in the main text as well as in charts covering banking activities only. The term "banks" is used in analyses based on consolidated figures.

more major banking institutions in deviation from the general trend for most banking institutions. This presentation seeks to take these factors into account. The background to and the methodology used in the analysis of the Danish banking institutions are described in the chapter on analysis of banks in relation to financial stability.

Danish banks' financial results in 2001

On an aggregated level the Danish banking institutions' profits in 2001 increased by kr. 1.8 billion over 2000, cf. Box 1. The increase can be attributed mainly to higher interest income and reduced costs, which more than offset increased losses and provisions and a decline in value adjustments and income from commission and fees.

Despite the increase in profits the banks' average return on equity has decreased slightly, cf. Chart 4. For 90 per cent of the banks the return on equity is even below the average of 12.8 per cent, while the return on equity for half the banks (represented by the median) is below 8.8 per cent[1]. The 10th percentile shows the return on equity for the lowest 10 per cent of the banks.

The increase in net interest income can be attributed primarily to growth in deposits and lending, even though growth in lending has been on the decrease, combined with a higher proportion of interest-bearing assets on the banks' balance sheet. For the largest banks the decline in fee and commission income is explained by lower activity in the areas of investment banking and asset management, while growth in raising and re-mortgaging of mortgage-credit loans generally made a positive contribution.

Losses on the banking institutions' share portfolios reduced their financial results. However, this decrease was more than offset by value adjustments of the banking institutions' bond portfolios, whereby the overall value adjustments remained positive.

In 2001, the trends in costs varied considerably between the individual banking institutions. The overall decrease in the banking institutions' costs can be attributed to significant cost reductions in the largest banking institutions against the background of such factors as considerable merger costs in 2000. Most banking institutions' costs increased in 2001. For most banking institutions, earnings from the increasing level of activity were not sufficient to offset the higher costs. Recent years' investments in information technology and the resulting improved efficiency do not appear immediately from the relationship between earnings and costs in the banking institutions' financial statements, cf. Chart 5.

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[1] Up to and including 2000 the analyses are based on accounts from 54 banking institutions in categories 1, 2 and 3, covering approximately 95 per cent of the market. For 2001 the reporting population comprises 50 banking institutions. The reduced reporting population is due to e.g. mergers and acquisitions.

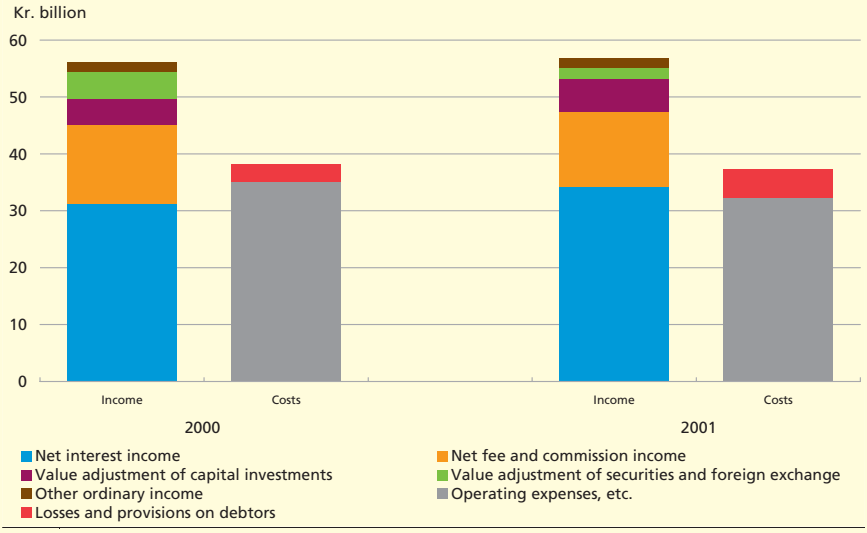
THE BANKING INSTITUTIONS' FINANCIAL STATEMENTS 2000-2001 Box 1

EXTRACT OF FINANCIAL STATEMENTS 2000-2001 FOR BANKING INSTITUTIONS IN CATEGORIES 1-3

Kr. billion	2000	2001	Change
Selected items from the profit and loss account			
Net interest income	31.2	34.2	3.0
Net fee and commission income	14.0	13.3	-0.7
Value adjustments of securities and foreign-exchange income	4.6	1.9	-2.7
Operating expenses	33.3	30.5	-2.8
Provisions for bad and doubtful debts	3.1	4.9	1.8
Value adjustment of capital investments	4.6	5.8	1.2
Profit before tax	17.8	19.6	1.8
Selected balance-sheet items			
Loans and advances	778.8	837.2	58.4
Bonds	355.6	461.7	106.1
Shares, etc.	44.8	37.9	-6.9
Deposits	760.0	805.3	45.3
Shareholders equity	116.8	117.0	0.2
Balance-sheet total	1,745.4	1,913.0	167.6

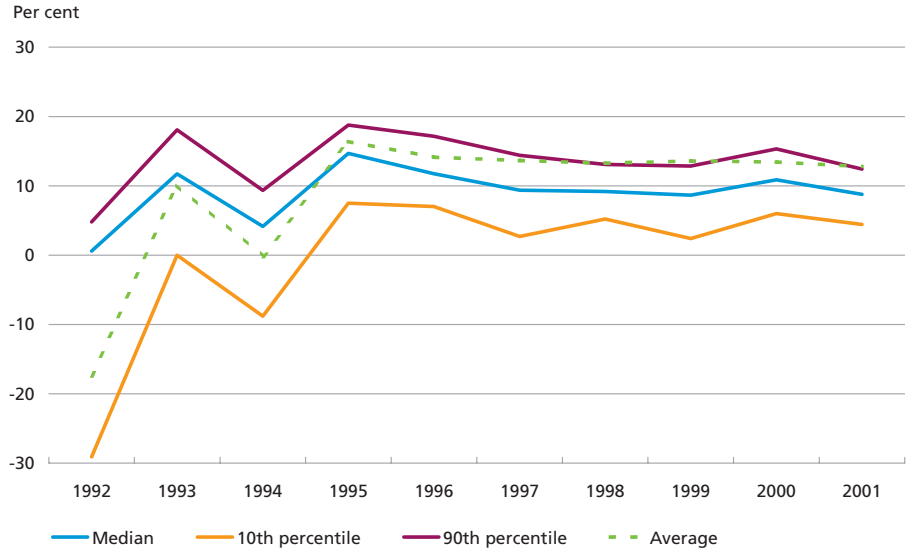
Source: The Danish Financial Supervisory Authority.

THE BANKING INSTITUTIONS' FINANCIAL RESULT 2000-2001



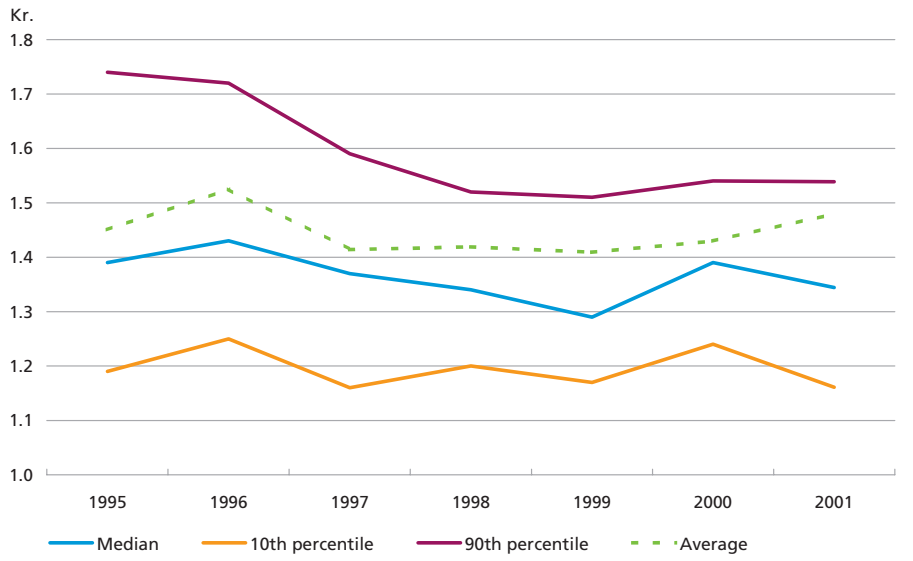
Source: The Danish Financial Supervisory Authority.

RETURN ON EQUITY POST TAX, 1992-2001 Chart 4



Source: Annual accounts and the Danish Financial Supervisory Authority.

OPERATING INCOME OVER OPERATING EXPENSES, 1995-2001 Chart 5



Note: Operating income over operating expenses is defined as the financial result as a ratio of costs, including personnel and administration expenses, depreciation and losses and provisions.
Source: Annual accounts and the Danish Financial Supervisory Authority.

Losses and provisions on debtors[1] as a ratio of the banks' loans and guarantees increased in 2001 to the highest level since 1996.

The solvency ratio rose by 0.5 percentage points to 10.4 per cent in 2001 after a declining trend in 2000. Overall, the core capital ratio increased a little to 7.5 in 2001. A number of banks, small and medium-sized banks in particular, saw a decrease in the core capital ratio in 2001.

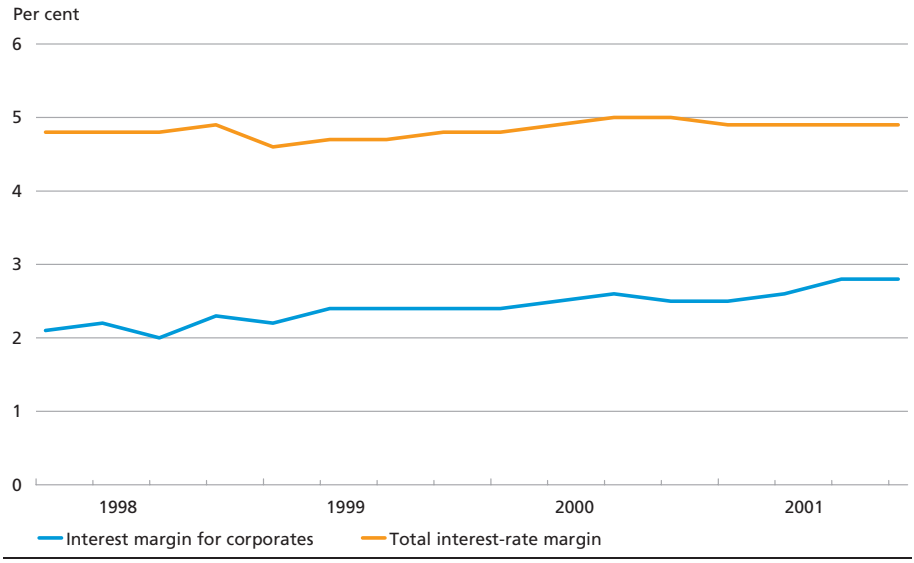
The banking institutions' interest income

In 2001, the banking institutions' net interest income rose by kr. 3.0 billion to kr. 34.2 billion.

The banking institutions' lending has increased strongly since the mid-1990s and more strongly than deposits. This tendency continued in 2001 and led to an increase in total net interest income from deposits and lending. The trend was strongest for a number of medium-sized banking institutions.

The interest margin between the banking institutions' average rate of interest for deposits and lending has shown a slightly increasing trend since the late 1990s. The general increase slowed down in 2001, but the interest margin widened for lending to and deposits from companies, cf. Chart 6. Especially the largest banking institutions, including those with

THE BANKING INSTITUTIONS' AVERAGE INTEREST-RATE MARGIN, 1998-2001 — Chart 6



Note: The average interest-rate margin is based on quarterly observations.
Source: Statistics Denmark.

[1] Losses and provisions for the year constitute a net item. See Financial Stability, Danmarks Nationalbank, *Monetary Review,* 2nd Quarter 2000, Box 2, p. 33.

a relatively large proportion of lending to companies, were able to widen the average interest margin.

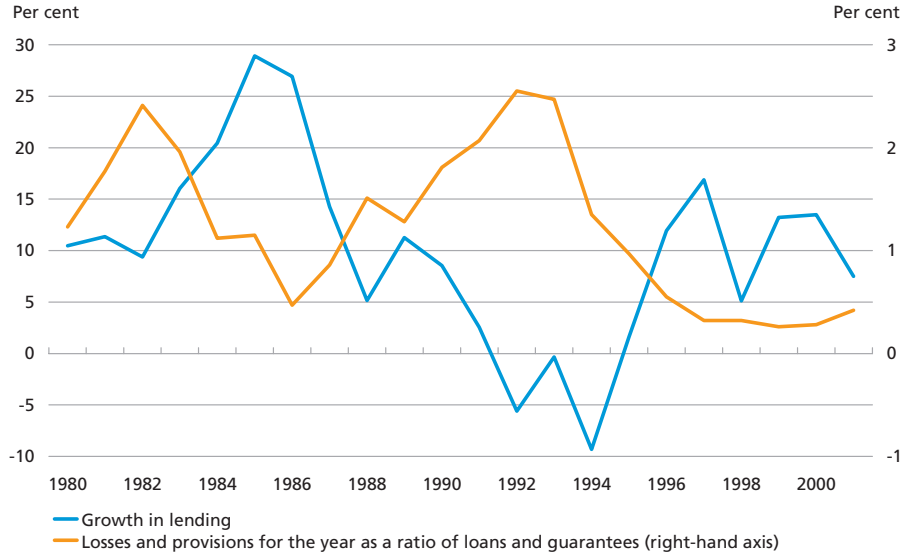
The widening of the interest margin for the corporate sector could be a result of recent years' efforts in the sector to achieve a better match between price and risk. The widening may thus reflect a higher risk premium. This is supported by an overall decline in the level of interest rates in 2001, which is generally reflected in the banking institutions' deposit rates, while the lending rate for the corporate sector only declined slightly.

Compared to 2000 bonds account for a larger proportion of the banking institutions' overall balance sheet, and most banks increased their interest-rate risk[1] in 2001.

The banking institutions' losses and provisions

Losses and provisions give an indication of the development in the quality of the banking institutions' credit portfolio. Actual losses and the need for provisions for future losses on loans and guarantees depend on the business cycle, cf. Chart 7. Losses and provisions are typically low in periods of

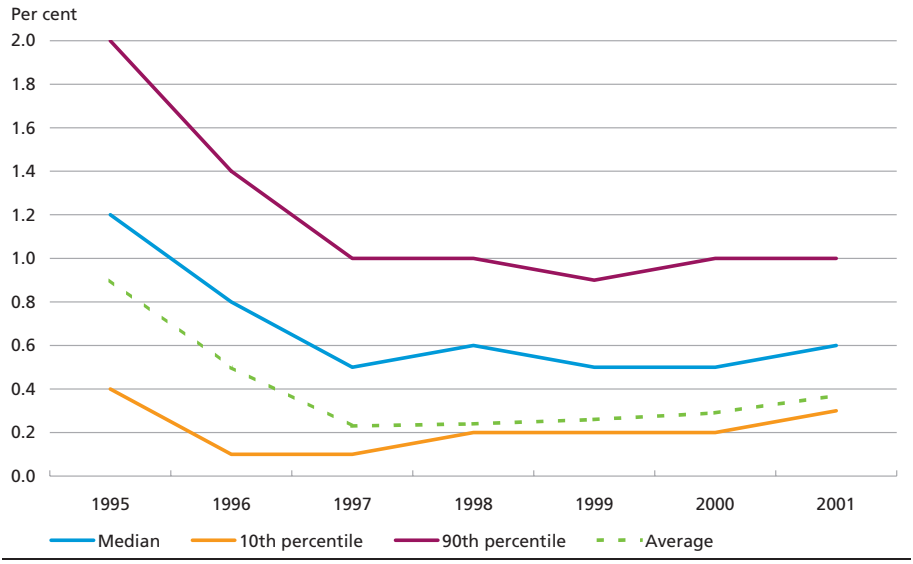
GROWTH IN LENDING, AND LOSSES AND PROVISIONS AS A RATIO OF LOANS AND GUARANTEES, 1980-2001 Chart 7



Note: The ratio of losses and provisions for the year is losses and provisions for the year as a ratio of loans and guarantees at end-of-period.
Source: The Danish Financial Supervisory Authority.

[1] Evaluated on the basis of the key performance indicators of the Danish Financial Supervisory Authority, which show the proportion of the core capital after deductions lost if interest rates rise by 1 percentage point.

THE BANKING INSTITUTIONS' LOSSES AND PROVISIONS AS A RATIO OF LOANS AND GUARANTEES, 1995-2001 Chart 8



Source: Annual accounts and the Danish Financial Supervisory Authority.

strong economic activity due to such factors as reversal of previous provisions for expected losses when it is established that the risk of losses on the exposures in question no longer exists. Experience shows that the credit quality tends to deteriorate gradually in periods of high growth in lending, leading to increased losses and provisions in the following periods.

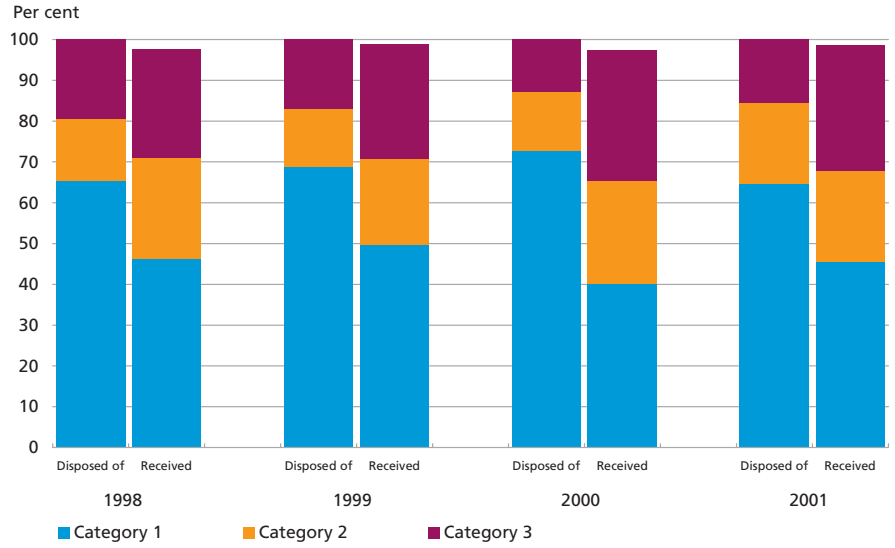
In 2001, losses and provisions for the year as a ratio of loans and guarantees (ratio of losses and provisions) rose to the highest level since 1996, cf. Chart 8. However, the level is still low[1] in a historical perspective. The banking institutions with an already relatively high ratio of losses and provisions compared to the average for the sector saw the strongest increase in provisions.

A major part of the – mainly small and medium-sized – banking institutions with the strongest growth in lending in the period 1996-2000 accounted for the largest increase in losses and provisions in 2001.

Losses and provisions for the year are a net item which in most banking institutions' financial statements does not reflect the individual components, including unexpected losses and new provisions as well as reversal of previous provisions. This makes it difficult to separate the development in actual losses from the development in the banking institutions' expected future losses.

[1] The banking institutions' ratio of losses and provisions was 1.2 on average for the period 1975-1997.

TRANSFERRED PROVISION EXPOSURES, 1998-2001 Chart 9



Note: Each year the Danish Financial Supervisory Authority examines the amount of exposures transferred to other banking institutions for which a provision of at least kr. 100,000 has been recorded in the disposing banking institution. The survey comprises the banking institutions in categories 1, 2 and 3. In 2001, 1,576 exposures were reported (compared to 2,016 in 2000), corresponding to kr. 1,519 million (kr. 1,382 million in 2000). Total provisions amounted to kr. 738 million (kr. 752 million in 2000). Some of the provision exposures disposed of by banking institutions in categories 1-3 are received by banking institutions in category 4 or branches of foreign banks, so that received exposures do not add up to 100 per cent of disposed exposures.

Source: The Danish Financial Supervisory Authority.

However, provisions do indicate how the banking institutions perceive the risk of credit losses[1]. New provisions increased in 2001. Reversal of previous provisions in 2001 remained at the level of 2000 after an increase for a number of years in step with new provisions.

Transfers of provision exposures between banking institutions may provide an indication of the development in credit quality among the categories. Chart 9 shows that category-1 banking institutions continue to dispose of more provision exposures than they receive, while the opposite is the case for banking institutions in categories 2 and 3, although with a narrower margin between disposed and received exposures for banking institutions in category 2. Transferred provision exposures amount to only kr. 1.5 billion in total.

Naturally, banking institutions receiving a provision exposure do not expect the received exposure to lead to credit losses. The exposure may have been transferred in connection with improvement of the debtor's financial situation. The receiving banking institution may e.g. have

[1] Some banking institutions prefer to write off inevitable losses immediately on the profit and loss account, while others make provision for such losses in the form of B-provisions. These are provisions for losses found to be inevitable, although the magnitude remains to be fully assessed. The purpose of A-provisions is to counter probable future losses.

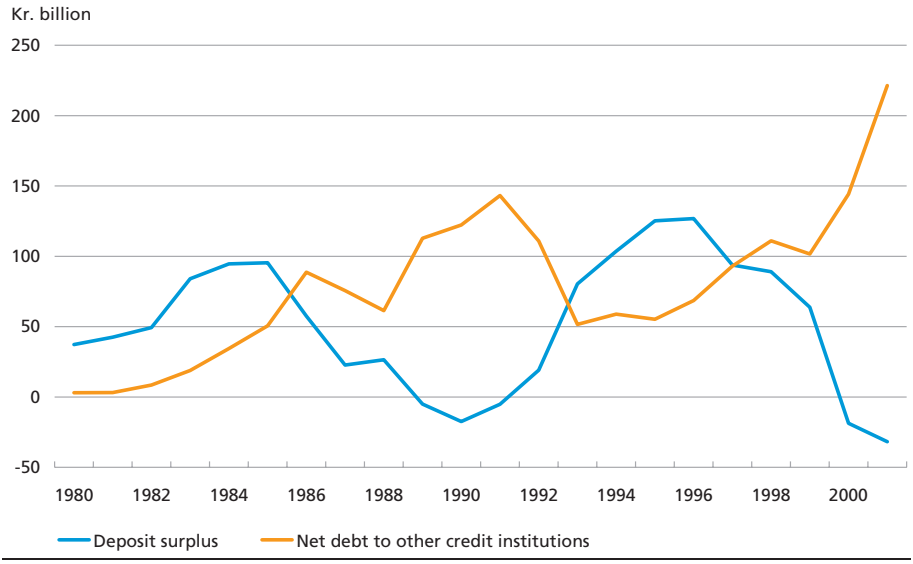
greater confidence in the debtor than the disposing banking institution, or the receiving banking institution can obtain a higher risk premium on the exposure. Furthermore, the calculation of transferred provision exposures does not consider the volume of total transfers among banking institutions in individual years, i.e. the share of received exposures subject to provisions.

The banking institutions' accounts with other credit institutions

After a decrease in the banking institutions' deposit surplus a deposit deficit has prevailed since 2000, cf. Chart 10. This implies that debt to other credit institutions has gained significance as a source of financing of the banking institutions' growth in lending. Furthermore, the volume of bond issues by the major banking institutions has grown in recent years.

The banking institutions' net debt to other credit institutions has risen steadily since the beginning of the 1990s. The increases were significant in 2000 and 2001 and could be attributed to such factors as significant growth in deposits from non-resident credit institutions in a number of the banking institutions. Other important factors which contributed to the increase in 2001 were deposits from mortgage-credit institutes and a decrease in the banking institutions' net claims on Danmarks Nationalbank.

THE BANKING INSTITUTIONS' DEPOSIT SURPLUS AND NET DEBT TO OTHER CREDIT INSTITUTIONS, 1980-2001 Chart 10



Note: The deposit surplus is defined as the banking institutions' deposits less lending. Net debt to other credit institutions is defined as the banking institutions' debt to other credit institutions and central banks less claims on other credit institutions and central banks.

Source: The Danish Financial Supervisory Authority.

In a tighter credit environment, debt to other credit institutions can be a less stable source of financing than deposits. Deposits from other credit institutions are therefore subject to a greater refinancing risk than ordinary deposits from customers, which have a longer maturity in real terms. Box 2 details the banking institutions' liquidity.

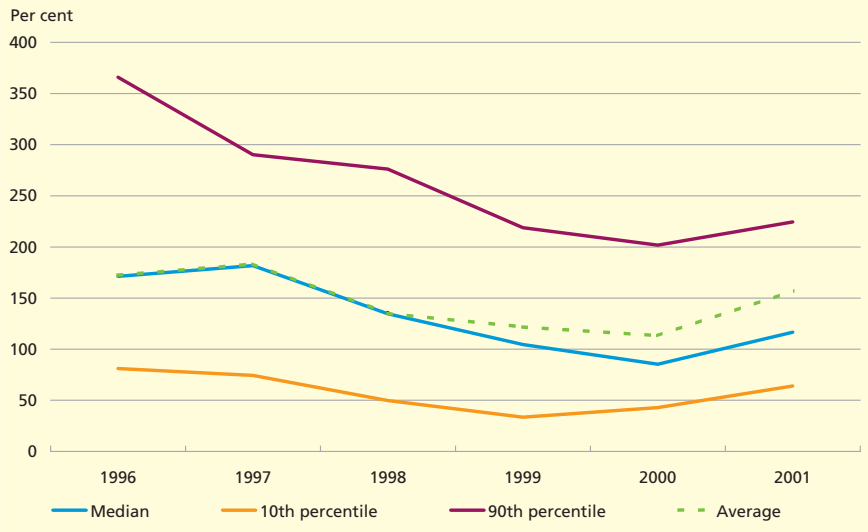
THE BANKING INSTITUTIONS' LIQUIDITY — Box 2

The liquidity of a financial claim reflects the use of that claim as a means of payment. Banknotes and coins are direct means of payment, as are demand deposits at a bank. Securities have to be sold in the market or used as collateral for loans before means of payment can be received. It can be necessary to reduce the price if the security in question must be sold quickly. Since the functioning of different securities markets varies considerably, the time it takes to sell a securities portfolio without having to reduce the price also varies. A liquid security can be sold within a relatively short period without the price declining.

The liquidity concept is closely associated with the banks' role as intermediaries between depositors and borrowers. The banks' sources of financing – deposits, loans from other credit institutions, bond issues, etc. – form the basis for their lending. If lending and other assets cannot be realised as quickly as is required by depositors and other creditors, the bank's liquidity could be insufficient.

According to Section 28 of the Commercial Banks and Savings Banks, etc. Consolidated Act a credit institution must have adequate liquidity. Liquidity includes cash in hand, fully secure and liquid claims at call on Danish and foreign credit institutions, and the portfolio of secure, easily marketable unpledged securities and credit instruments.

DEVELOPMENT IN THE BANKING INSTITUTIONS' LIQUIDITY



Note: The development in the banking institutions' excess liquidity after compliance with the minimum statutory requirement (10 per cent under the Commercial Banks and Savings Banks, etc. Consolidated Act).
Source: The Danish Financial Supervisory Authority and annual accounts.

CONTINUED Box 2

Liquidity must account for at least 15 per cent of the credit institution's debt commitments payable on demand or at a notice shorter than one month, irrespective of any payment exemptions. Furthermore, liquidity must account for at least 10 per cent of the credit institution's total debts and guarantees.

Liquidity is affected by several factors and can change rapidly, so the banking institutions' liquidity varies constantly. Liquidity must therefore be interpreted with great caution.

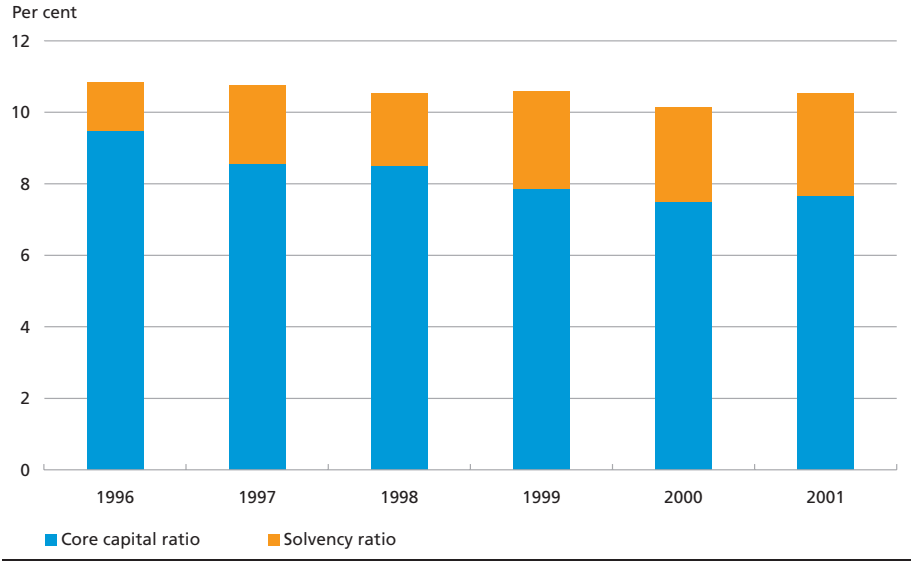
The Chart shows the development in the banking institutions' excess liquidity after compliance with the minimum statutory requirement (10 per cent according to the Commercial Banks and Savings Banks, etc. Consolidated Act) as a percentage of the minimum statutory requirement. Liquidity has decreased for most of the banking institutions viewed over the entire period since 1996. However, liquidity strengthened in 2001, compared to 2000.

Danish banks' capital adequacy

Danish banks' total capital adequacy increased in 2001, cf. Chart 11, but the aggregate conceals very different trends for the individual banks.

The overall solvency ratio rose in 2001, and the growth was primarily driven by the banks in category 1 and some banks in category 2. The banks in category 2 showed no clear trend, whereas the solvency ratio decreased for most of the banks in category 3.

SOLVENCY AND CORE CAPITAL RATIOS, 1996-2001 Chart 11



Note: The data set is not complete for 1996.
Source: Annual accounts and BankScope.

The core capital ratio declined constantly in the period 1996-2000, but stabilised in 2001 at a level around 7.5. The trend was not clear, but there was an evident indication of the banks in category 3 reducing their core capital ratio in 2001, which is also the reason for the declining solvency ratio in this category. The banks in category 3 still enjoy by far the highest capital adequacy on average.

SENSITIVITY ANALYSIS AND STRESS TEST

The sensitivity analysis examines how various changes in accounting items affect the banking institutions' financial results one year ahead. For the banking institutions with negative scores in the individual tests the solvency ratio is calculated on the assumption that the negative result is deducted from liable capital and that any losses on a balance-sheet item are fully deducted from the risk-weighted assets. This is to give an indication of whether the excess capital reserves[1] are sufficient to withstand the losses which cannot be covered by the earnings for the year. Only the direct effects are considered. For example, the fact that an increase in interest rates can have an adverse impact on credit quality is thus not considered. Otherwise the observations are "all-other-things-being-equal" observations.

The stress test shows the losses the banking institutions can suffer – without the financial result moving into negative territory – and still in compliance with the solvency requirement. The stress test gives an indication of the current earnings and capital buffers of the banking institutions.

The sensitivity analysis and the stress test are based on accounts data for 50 banking institutions in categories 1-3, cf. the footnote on p. 18.

Sensitivity analysis

The basis is the ordinary operating result for 2001 of kr. 18.2 billion. All items not included in the individual tests are kept unchanged from 2001. The analysis indicates the result if the scenarios had been realised. The scenarios of the sensitivity analysis are based on variations in the individual accounts items of a magnitude seen in the period 1980-2001 for the average of Danish banking institutions, or variations which could reasonably be expected to occur. Box 3 explains the background to the individual tests. The test results appear from Table 2.

Tests 1 and 2: The banking institutions' interest income has increased in the last two years after being stable for a period. In the first test the

[1] Excess capital reserves are the capital exceeding the statutory solvency requirement of 8 per cent.

SCENARIOS IN THE SENSITIVITY ANALYSIS Box 3

The first tests indicate what would happen in case of a decline in the banking institutions' interest or fee and commission income. The first item considered is the interest margin, which may come under pressure due to such factors as increased competition or a general decrease in interest rates. The average interest margin declined by 0.5 percentage point between 1994 and 1995. In the second test net fee and commission income is assumed to decrease by 25 per cent to a level corresponding to the level in 1998. A decrease in net fee and commission income could be attributed e.g. to declining interest in securities trading and/or a slowdown in remortgaging activities.

Tests 3 and 4 show what would happen if the interest-rate level were to rise. Losses in connection with an interest-rate increase could be e.g. capital losses on fixed-yield bonds. Experience over the last 10 years shows that interest-rate increases of both 1 and 3 percentage points are realistic.

In test 5 the price of the banking institutions' share portfolios decreases by 30 per cent.

In tests 6-8 losses and provisions are assumed to be various ratios of loans and guarantees. In test 6 losses and provisions as a ratio of loans and guarantees are set to be the average level in the period 1990-2000 of approximately 1 per cent. In test 7 losses and provisions are assumed to be 2.5 per cent of loans and guarantees, which is close to the highest average level for the sector in the period 1990-2000, i.e. 2.6 per cent in 1992. Some banking institutions showed even higher losses and provisions in 1992. 10 per cent of the banks had losses and provisions accounting for almost 5 per cent, or more, of loans and guarantees. In test 8 different levels of losses are assumed for households and corporate customers, respectively. At the beginning of the 1990s the losses and provisions on exposures with corporate customers were generally higher than on exposures with households. Losses and provisions are assumed to be 1 per cent for households and 2.5 per cent for corporate customers.

The last 4 tests assume simultaneous occurrence of several events. This is not unrealistic, but in the sensitivity analysis the results should be interpreted with caution, since it is not immediately possible to create realistic correlations between the individual events. For example, a widening of the implicit interest margin would be most realistic in a period with a high level of losses and provisions, since higher risk premia apply.

interest margin[1] is set to decline by 0.5 percentage point. This would lead to a decrease in the banking institutions' overall ordinary operating result from kr. 18.2 billion to kr. 10.3 billion. In the second test net fee and commission income is set to decline by 25 per cent. The lowest calculated solvency ratio for banking institutions with deficits in the first two tests would be just over 9, i.e. still somewhat higher than the statutory requirement of 8 per cent.

Tests 3 and 4: Since the banking institutions increased their interest-rate risk in 2001 compared to 2000, two tests are included to indicate

[1] The interest margin is calculated as interest income as a ratio of total interest-bearing assets less interest expenditure as a ratio of total interest-bearing liabilities.

SENSITIVITY TEST OF THE BANKING INSTITUTIONS' OPERATING RESULT Table 2

Test	Overall operating result before tax/kr. billion	Number of banking institutions with a negative ordinary result before tax Figures in parenthesis are figures for 2000					
		Category 1		Category 2		Category 3	
Basis, operating result in 2001	18.2	0	(0)	0	(0)	0	(0)
1. A decrease in the interest margin by 0.5 percentage point	10.3	0	(0)	2	(1)	1	(0)
2. A decrease in net fee and commission income by 25 per cent	15.3	0	(0)	1	(0)	0	(0)
3. An increase in interest rates by 1 percentage point	14.7	0	(0)	2	(0)	3	(1)
4. An increase in interest rates by 3 percentage points	7.7	0	(0)	8	(6)	11	(5)
5. A decrease in stock prices by 30 per cent	16.6	0	(0)	0	(1)	2	(0)
6. Losses and provisions of 1 per cent	11.2	0	(0)	1	(2)	0	(0)
7. Losses and provisions of 2.5 per cent	-6.1	4	(4)	10	(11)	24	(13)
8. Losses and provisions of 1 per cent for households and 2.5 per cent for corporate customers	-1.8	4	(2)	5	(3)	5	(0)
9. Tests 1 and 2 simultaneously	7.4	0	(0)	3	(2)	3	(0)
10. Tests 1, 2 and 6 simultaneously	0.4	3	(1)	7	(4)	5	(0)
11. Tests 3 and 5 simultaneously	13.1	0	(0)	4	(4)	8	(4)
12. Tests 3 and 6 simultaneously	7.7	0	(0)	4	(4)	4	(1)

Note: The capital loss from a possible increase in interest rates is calculated on the basis of the key performance indicators for interest-rate risk of the Danish Financial Supervisory Authority. The calculation with an interest-rate increase of 3 percentage points does not consider convexity, i.e. the estimated capital loss is too low (see also the chapter on financial-market trends). Value adjustments of the share portfolio are calculated on the basis of the share portfolio excluding pools and capital investments in associated and affiliated companies. 4 institutions from category 1, 13 from category 2 and 33 from category 3 are included.

Source: Annual accounts and own calculations.

what the banking institutions' financial results would have been if interest rates were to increase by 1 and 3 percentage points respectively. At an interest-rate increase by 1 percentage point the results of 5 banking institutions would become negative. At an interest-rate increase by 3 percentage points the overall financial result would fall to kr. 7.7 billion and the results of 19 banking institutions would become negative. In the latter situation the solvency ratio of 3 banking institutions in category 2 would be just over 9, while it would be more than 10 for the other banking institutions.

Test 5: Value adjustments of shares traditionally show a high degree of volatility. At a 30-per-cent decline in stock prices the overall ordinary operating result would fall to kr. 16.6 billion. The calculated solvency ratio for the 2 banking institutions with a deficit would be just under 11.

Tests 6-8: In the sixth test losses and provisions are assumed to be 1 per cent of loans and guarantees. In the seventh test losses and provisions are assumed to account for 2.5 per cent of loans and guarantees. The

result would be kr. -6.1 billion, and the results of 38 of the 50 banking institutions would become negative. In the various categories the lowest solvency ratio would be just under 10 in category 1, just over 8 in category 2 and just over 10 in category 3. In the eighth test losses and provisions are assumed to account for 2.5 per cent of loans and guarantees to corporate customers and 1 per cent of loans and guarantees to households. The overall result would be kr. -1.8 billion and 14 institutions would move into deficit. The lowest calculated solvency ratio among the 14 banking institutions would be 8.4.

Tests 9-12: In the ninth test both interest margin and net fee and commission income decrease, whereby 6 institutions would move into deficit. In the tenth test, tests 1 and 2 are applied simultaneously and losses and provisions are set to be 1 percentage point of loans and guarantees. The ordinary operating result of 15 institutions would become negative, and the lowest solvency ratio among these would be 8.4. In the eleventh test interest rates increase by 1 percentage point, while stock prices decrease by 30 per cent. This implies a decrease in the overall result to kr. 13.1 billion and the lowest solvency ratio among the 12 banking institutions with a deficit would be 10. In the last test interest rates rise by 1 percentage point and losses and provisions are set to be 1 per cent of loans and guarantees. In this case the overall result before tax would fall to kr. 7.7 billion and the results of 8 banking institutions would become negative. The lowest solvency ratio among the 8 banking institutions would be 9.1.

The sensitivity analysis shows that the banking institutions' earnings are still robust, although slightly less so than in 2000. The analysis also shows that the solvency ratio of the banking institutions remains above the statutory limit in all the tests. In the sensitivity analysis the excess capital reserves are thus sufficient to absorb any losses which cannot immediately be covered by earnings.

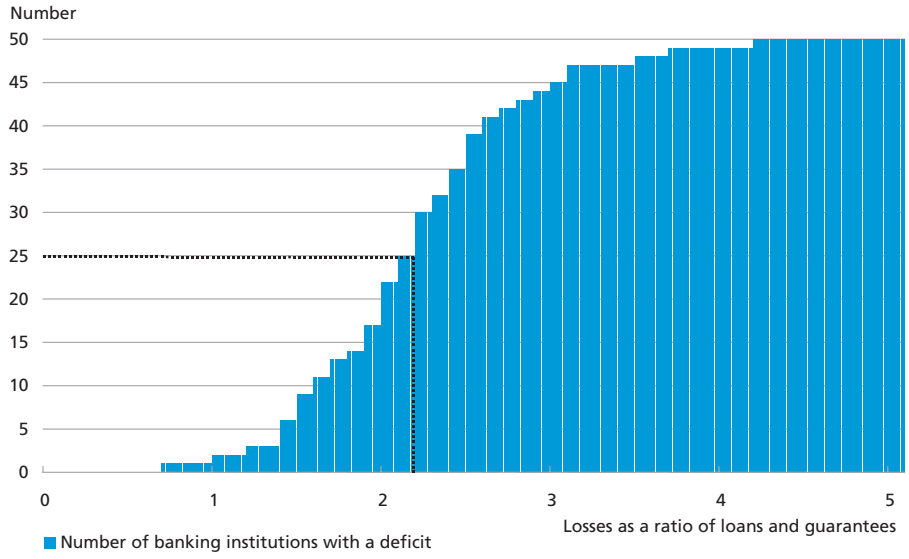
Stress test

The following simple stress test gives an impression of the ability of the banking institutions' earnings and capital adequacy to withstand losses on loans and guarantees. The stress test will thus show how much losses can increase before the result becomes negative and before the solvency ratio falls below the statutory limit.

The result of the stress test in Chart 12 shows how many banking institutions would get a deficit in case of rising losses on loans and guarantees. The most exposed banking institution would get a deficit when losses account for 0.7 per cent of loans and guarantees. The dotted line in the

NUMBER OF BANKING INSTITUTIONS WITH A DEFICIT AT LOSSES ON LOANS AND GUARANTEES

Chart 12



Source: Annual accounts.

Chart shows that the percentage of losses on loans and guarantees must reach 2.1 before half of the banking institutions move into deficit.

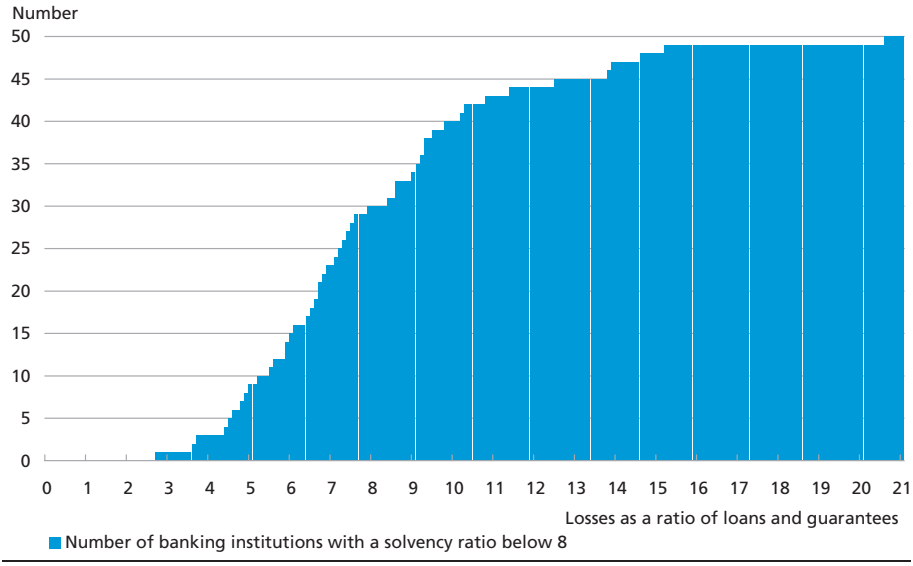
The calculation of the effect on capital adequacy assumes that the negative result is deducted from liable capital and that the loss is fully deducted from risk-weighted assets. Capital adequacy is not affected until the banking institution's income becomes negative.

Chart 13 shows how many banking institutions would fall below the statutory limit for capital adequacy when losses on loans and guarantees increase. The first banking institution would encounter problems at a loss of 2.7 per cent of loans and guarantees. The least robust banking institutions are in category 2, but there is no clear correlation between the size of the banking institutions and their ability to withstand losses.

The highest average ratio of losses and provisions for the year in the period 1980-2001 was 2.6 per cent in 1992, but the variation among the institutions was considerably greater than now. In 1992, 10 per cent of all banking institutions had a ratio of losses and provisions of almost 5 per cent, or more. All of the analysed banking institutions could still comply with the solvency requirements if losses as a ratio of loans and guarantees were to rise to 2.6 per cent. Even in case of very significant losses of 5 per cent of loans and guarantees few of the analysed banking institutions would have problems complying with the solvency requirement.

NUMBER OF BANKS WITH A SOLVENCY RATIO BELOW 8 AT LOSSES ON LOANS AND GUARANTEES

Chart 13



Source: Annual accounts.

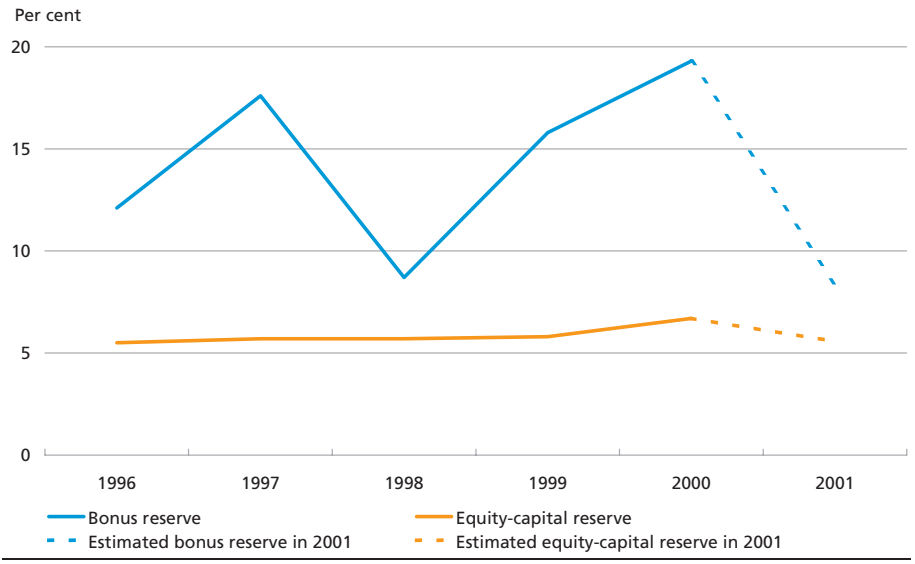
DEVELOPMENT IN THE PENSION COMPANIES

The pension sector was severely affected by the strong drops in stock prices and low interest rates after the terrorist attacks in the USA in the autumn of 2001, cf. the chapter on trends in the financial markets. Against this background the Danish government initiated amendment of tax rules, the solvency order and the accounting regulations. The initiatives included moving forward measures already adopted, but scheduled to enter into force at the beginning of 2002. Issues related to the pension companies[1] are described in further detail in the chapter on pension companies and financial stability.

Market and regulatory trends complicate an assessment of the tendencies for the pension companies' results and balance sheets. However, the development in the two key consolidation indicators, bonus reserve[2], and equity capital reserve[3] may provide an indication of the development in the pension companies' total buffer capital to withstand any future earnings problems or fluctuations in returns. In terms of the two key indicators, the life-insurance companies' buffer capital weakened in 2001, cf. Chart 14. This development should be interpreted with caution,

1 "Pension companies" is used as a generic term for life-insurance companies and pension funds.
2 The bonus reserve is undistributed reserve as a percentage of the life-insurance provisions.
3 The equity capital reserve is the equity capital surplus reserve as a percentage of life-insurance provisions.

BONUS AND EQUITY-CAPITAL RESERVES OF LIFE-INSURANCE COMPANIES, 1996-2001 Chart 14



Note: The figures for 2001 are estimates based on a number of published annual accounts for 2001.
Source: The Danish Financial Supervisory Authority and annual accounts.

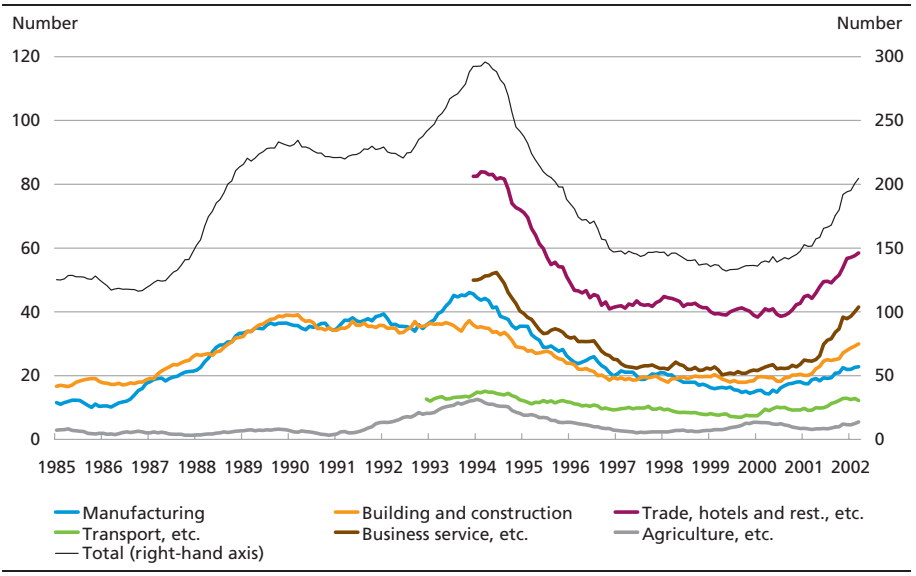
since the figures for 2001 are estimates based on data from half the life-insurance companies' reporting for the period 1996-2000. Furthermore, the key consolidation indicators do not consider the degree to which life-insurance companies have hedged market and insurance risks.

Trends in the Corporate Sector and the Households

Stability in the financial sector depends on customers' financial circumstances. In general, the corporate sector and the households have been resilient to the economic slowdown in 2001. However, there seem to be indications of a tightening in all sectors, which was e.g. reflected in an increased number of compulsory liquidations. Some sectors appear to be under pressure, e.g. the IT and telecom sector. The financial situation of marginal households has worsened, which has reduced their ability to meet payments. An improved economic climate may alleviate the pressure on exposed companies and households.

The banks' domestic lending increased by just over 12 per cent to kr. 588 billion in 2001. Total lending to companies and the self-employed was kr. 229 and 74 billion, respectively, in 2001, while lending to households totalled kr. 176 billion.

INCIDENCE OF COMPULSORY LIQUIDATION IN THE CORPORATE SECTOR Chart 15



Note: The number of declared compulsory liquidations is calculated as a 12-month moving average. It is not possible to construct 12-month moving averages for transport, etc. before 1993 and for business service, etc. and trade, hotels and restaurants, etc. before 1994. The IT and telecom sector cannot be shown separately. The sectoral breakdown in the Chart is not identical to that in the analysis later in this chapter, which is based on data supplied by the Danish Business Information Bureau.

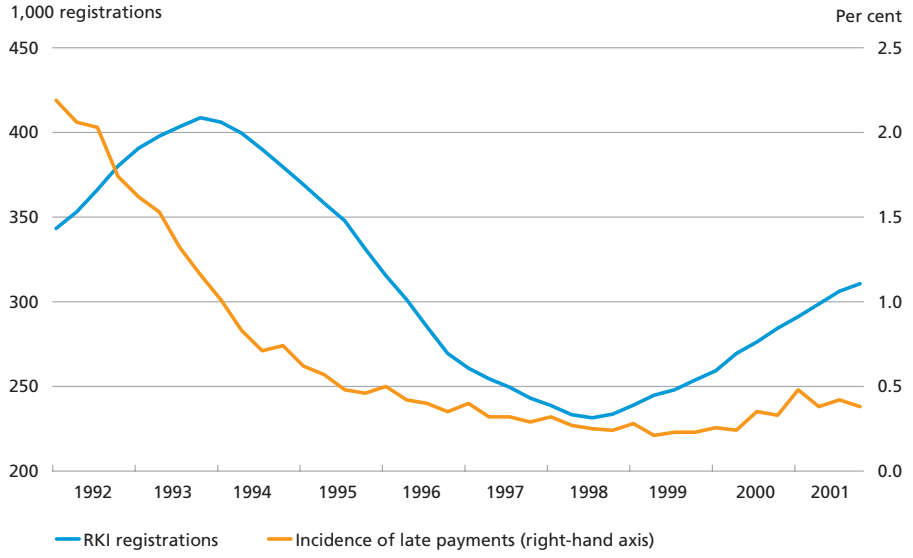
Source: Statistics Denmark.

The banks' potential risk of loan losses is lower than the value of their lending, as loans are often granted against collateral, e.g. in a company's buildings or plant and equipment or in a household's house or car. Especially the development in the Danish corporate sector affects the banks, whereas the household sector only poses a risk of major losses to banks if many households are affected at the same time.

The number of declared compulsory liquidations has increased since mid-1999, although from a low level. March 2002 saw the highest level since 1995, cf. Chart 15. The increase partly reflects the large number of new companies set up in the late 1990s, as new companies tend to be more at risk than established companies. On average, less than half the new companies are still in business after four years, but there are considerable variations from sector to sector. Among retailers, only a third of the new companies survive the first four years[1].

In 2001, the rise in the incidence of compulsory liquidation was particularly high within business service, etc., as well as trade, hotels and restaurants. Statistics Denmark does not specify the number of liquidations in the IT and telecom sector, but data from the Danish Business Information

REGISTRATION OF LATE PAYMENT INCIDENTS AND LATE MORTGAGE-CREDIT PAYMENTS — Chart 16



Note: RKI Kredit Information states that approximately 8 per cent of registrations relate to small businesses, the rest are non-payment of bills by private individuals. The average number of incidents per registered person was approximately 2 at end-2001. On average, each person has thus been registered more than once, possibly by several creditors. RKI registrations also include registrations relating to the self-employed. The incidence of late payments indicates the percentage of overdue mortgage-credit payments in relation to total mortgage payments on loans for owner-occupied homes.

Source: RKI Kredit Information and the Association of Danish Mortgage Banks.

[1] Statistics Denmark.

Bureau show that the number of compulsory liquidations in this sector increased significantly in 2001 over 2000, but from a low level.

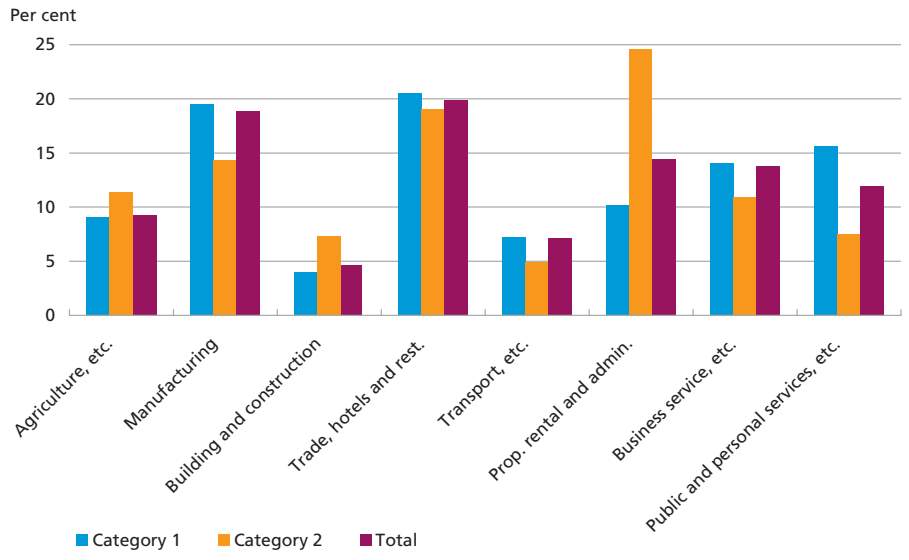
Households generally seem to be financially robust, but there are indications of a squeeze on marginal groups. This is particularly a problem in connection with a decline in income as a result of unemployment, divorce or similar. Often households' payment problems are initially indicated by non-payment of small, short-term, non-recurring obligations to private retailers, whereas servicing of e.g. housing loans usually has a high priority. In recent years the number of late payment incidents has risen, while the amount of late mortgage-credit payments is still small, cf. Chart 16.

CORPORATE SECTOR

Banks' lending and the corporate sector's debt

In 2001, loans to the corporate sector accounted for approximately 39 per cent of the banks' total domestic lending. A sectoral breakdown shows that institutions in category 1 mainly grant loans to trade, hotels and restaurants as well as manufacturing, while institutions in category 2 mainly lend to property rental and administration as well as trade, hotels and restaurants, cf. Chart 17.

LENDING TO THE CORPORATE SECTOR BY BANKS IN CATEGORIES 1 AND 2, END-2001 — Chart 17

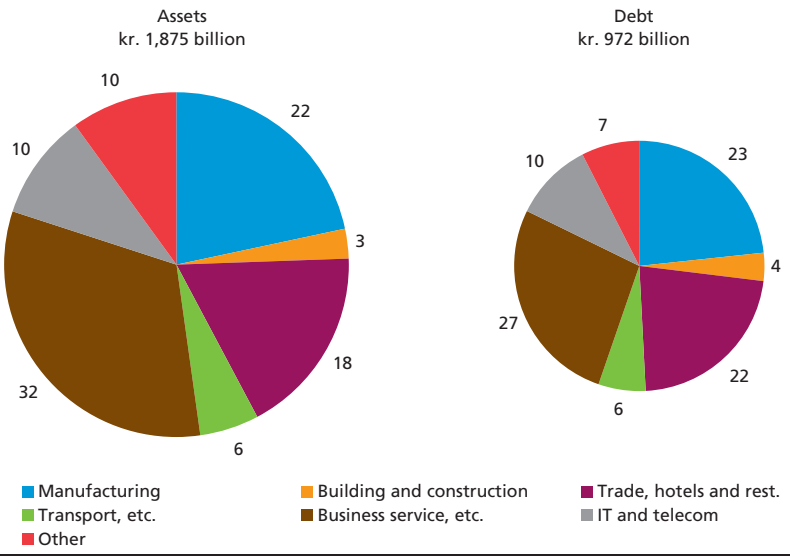


Note: Lending to the corporate sector by banks in categories 1 and 2 is calculated as lending in relation to total lending to the non-financial sectors. Domestic lending comprises loans from Danish banks as well as Danish branches of foreign banks. The sectoral breakdown in the Chart, which is based on the MFI balance-sheet statistics, is not identical to the sectoral breakdown in the analysis later in this chapter, as the latter is based on data supplied by the Danish Business Information Bureau.

Source: Danmarks Nationalbank.

SECTORAL BREAKDOWN OF CORPORATE ASSETS AND DEBT IN 2001, PERCENTAGES

Chart 18



Note: Corporate debt includes more than bank debt, e.g. supplier credits, mortgage credit and foreign borrowing. Business service, etc. includes non-financial holding companies. Such companies hold 44 per cent of the total assets and 31 per cent of the total debt in the sector.

Source: The Danish Business Information Bureau.

Business service[1], etc. is the largest sector in terms of both assets and debt, while building and construction is the smallest, cf. Chart 18. Debt ratios largely correspond to the asset ratios of the individual sectors. The data and the method applied in the analyses below are described in Box 4.

Operating result

The average return on assets has declined slightly since 1995. The decline has been most significant in the IT and telecom sector[2], but has also been observed in trade, hotels and restaurants, as well as transport, etc.

The pattern is the same for the companies with the lowest return on assets, cf. Chart 19. Again the weakest companies have fared worst in the IT and telecom sector. Compulsorily liquidated companies are not included in the statistics, which means that the figures may underestimate the trend, as the poorest companies regularly drop out of the data set.

On average, the small companies have a low return on assets, cf. Chart 20, which shows that the weakest 10 per cent of the companies within the six sectors account for considerably less than 10 per cent of total assets and total debt.

[1] Business service, etc. includes e.g. business related to real property, car rental, machines, plant and equipment, etc., research and development, legal services, consultancy, cleaning services and non-financial holding companies.

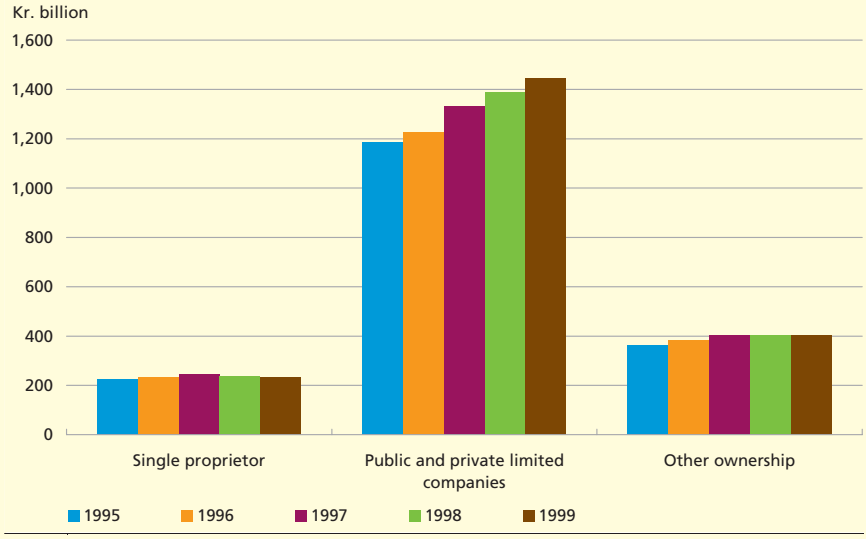
[2] The IT and telecom sector comprises production of and trade in computer equipment, as well as telecommunication and data-processing equipment.

DATA AND METHOD Box 4

Data

The analysis of the corporate sector is based on accounts data for Danish public and private limited companies compiled by the Danish Business Information Bureau. The 1999 data cover around 90 per cent of VAT-registered public and private companies. In 1999 VAT-registered public and private companies accounted for around 70 per cent of total turnover in VAT-registered companies, see the Chart below, but only made up approximately 18 per cent of all VAT-registered companies.

TURNOVER IN VAT-REGISTERED COMPANIES BY OWNERSHIP FORM



Note: "Other ownership" comprises partnerships and limited partnerships, cooperative societies, foundations, etc.
Source: Statistics Denmark.

In connection with the accounts analysis in this chapter a number of uncertainties should be noted:

Delayed accounts. The Danish Business Information Bureau regularly receives new accounts from the Danish Commerce and Companies Agency. Delayed reporting etc. may mean that some annual accounts are not available for the final analysis. Such accounts may be included in later analyses, leading to an adjustment of the accounts data. However, this is of minor significance in connection with the analysis of key financial indicators.

Accrual. Companies do not all publish their accounts at the same time of the year. This means that accounts published in the same calendar year may not cover the same period of activity. For an analysis of the companies' financial development the same period should be specified for all companies. In the analysis a company's annual accounts are included in the calendar year when they were published, except for 2001 accounts.

Continued

CONTINUED Box 4

2001 figures comprise observations from companies which published their accounts between 1 July 2000 and 30 June 2001 (due to non-availability of accounts published in the second half of 2001). As 2001 therefore includes accounts also included in 2000, the 2001 data should be interpreted with particular caution.

Change of sector. In some cases, a company's activities change from year to year. This means that the company's original sectoral classification is not necessarily indicative of its current activities. In the worst case this may result in incorrect sector classifications. In the accounts analysis the sector definitions are wide, which minimises this problem. In 2001, the six sectors analysed included more than 90 per cent of all companies in the database.

Accounting principles. Companies may to some extent choose between different accounting methods. This makes comparison between companies uncertain. In addition, a change in accounting principles results in data inconsistencies which are difficult to take into account.

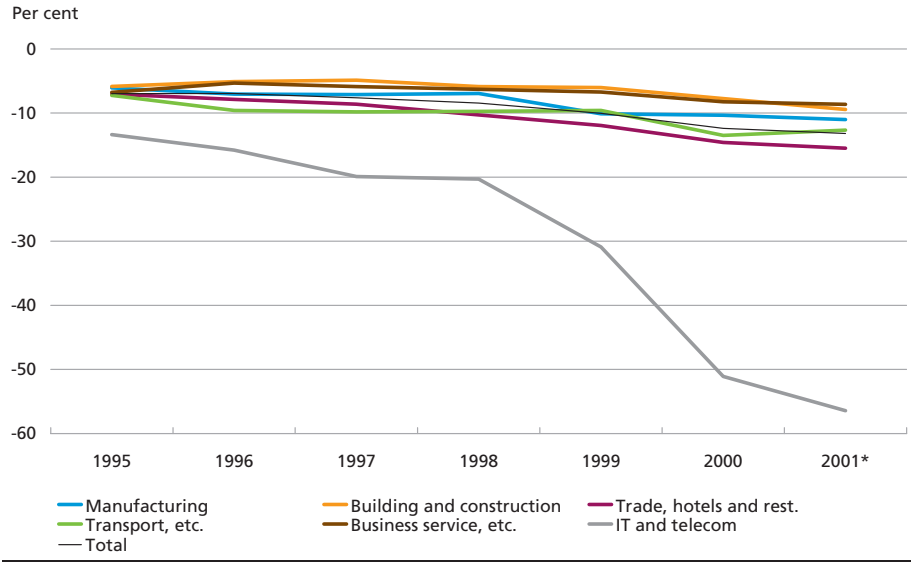
The database is constantly being developed to minimise such problems. In general the figures should be interpreted with caution, but if the changes over time are viewed, rather than the levels, the conclusions are assessed to be fairly robust.

Method

Return on assets is defined as primary operating result as a ratio of total assets. Return on assets indicates the companies' ability to yield a return on the invested capital, irrespective of the capital structure of the company. *The ability to meet financial net costs* is defined as primary operating result less financial net cost as a ratio of total debt. *Debt-servicing ability* is defined as primary operating result as a ratio of debt. *Solvency* is defined as equity capital as a ratio of total assets.

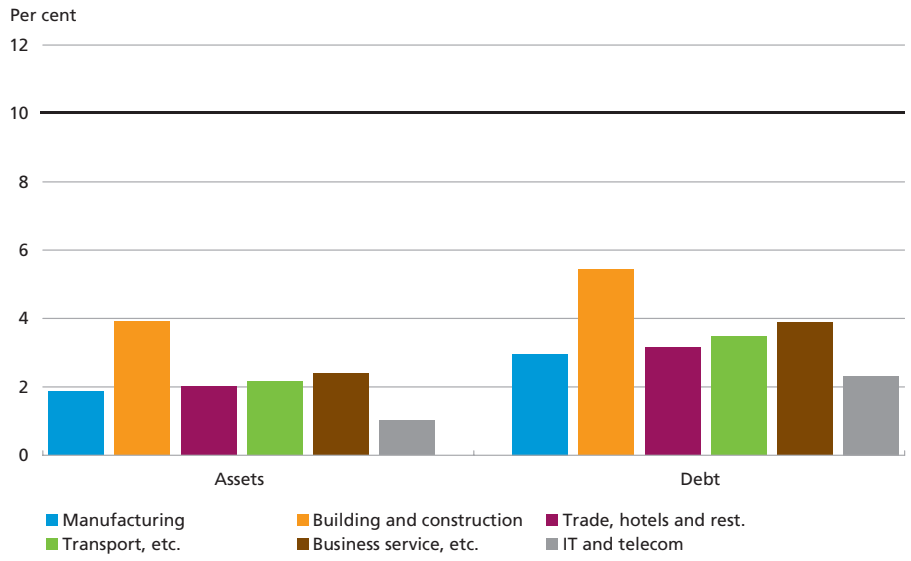
The average trend and the trend for the weakest companies are considered. The weakest companies are defined as the 10 per cent of the companies with the poorest performance for a given key indicator (the 10th percentile). It should be emphasised that such companies are not necessarily facing impeding liquidation. Only 20 per cent of the companies which were compulsorily liquidated, were subject to a winding-up petition, reached a composition with their creditors or suspended their activities in 2000 were in the weakest 10th percentile in terms of return on assets in 1999. 56 per cent of these companies were among the weakest 30 per cent of the companies in terms of return on assets.

RETURN ON ASSETS FOR THE LEAST PROFITABLE 10 PER CENT OF THE COMPANIES IN VARIOUS SECTORS — Chart 19



Note: The return on assets is defined as the primary operating result as a ratio of total assets. The Chart shows the 10th percentile. 2001* includes observations from companies which published their accounts between 1 July 2000 and 30 June 2001.
Source: The Danish Business Information Bureau.

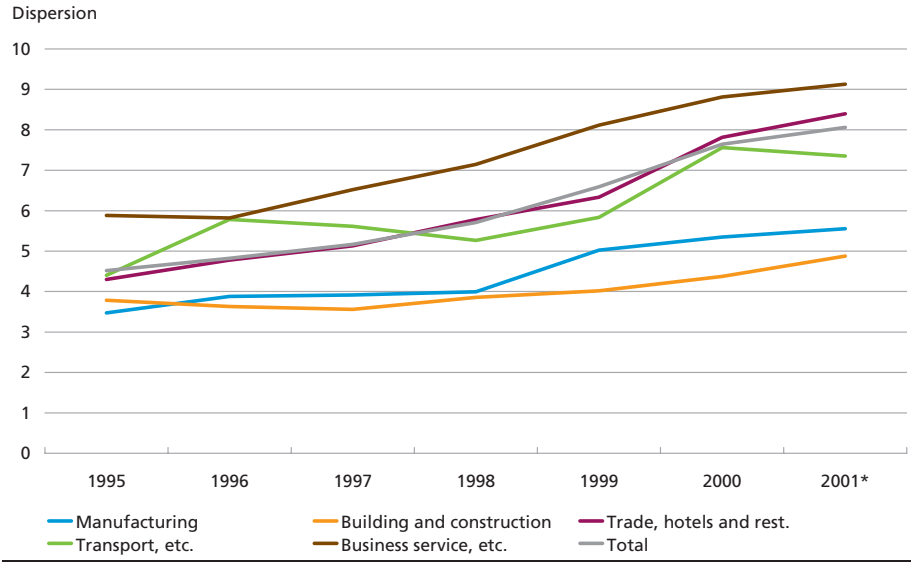
PROPORTION OF VARIOUS SECTORS' TOTAL ASSETS AND DEBT HELD BY THE LEAST PROFITABLE 10 PER CENT OF THE COMPANIES IN THE SECTOR, 2001 — Chart 20



Note: For each sector, the bars show the proportions of assets and debt, respectively, held by the weakest companies (10th percentile) in terms of return on assets as a ratio of total assets and debt in that sector.
Source: The Danish Business Information Bureau.

DISPERSION OF RETURN ON ASSETS AMONG COMPANIES IN VARIOUS SECTORS

Chart 21



Note: The dispersion is defined as the 90th percentile less the 10th percentile in relation to the median. No unit of measurement is used, so the dispersion level cannot be interpreted. IT and telecom has been left out, since the dispersion in this sector widens from approximately 9 in 1998 to 40 in 2001. 2001* includes observations from companies which published their accounts between 1 July 2000 and 30 June 2001.

Source: The Danish Business Information Bureau and own calculations.

While the weakest 10 per cent of the companies (the 10th percentile) had a lower return on assets in 2001 than in 1995, the 90th percentile is more or less unchanged. The dispersion[1] between the most and least profitable companies has thus widened in this period, cf. Chart 21. The dispersion is particularly wide in business service, etc., as well as trade, hotels and restaurants. In the latter sector the dispersion has widened considerably between 1999 and 2001 in relative terms. The dispersion is, however, widest in the IT and telecom sector (not shown in the Chart) where it increased from approximately 9 in 1998 to approximately 40 in 2001.

The Bank of England has analysed the relationship between the dispersion in British companies' earnings capacity and economic growth between 1974 and 1998[2]. The dispersion widened in periods of low growth and narrowed in periods of high growth. However, this correlation seems to change from the mid-1990s, where the dispersion continued to widen in an environment of high economic growth. This pattern is similar to that in Denmark during the latest boom.

[1] The dispersion is defined as the 90th percentile less the 10th percentile in relation to the median. This alternative dispersion indicator is used, since the traditional dispersion indicator is sensitive to extreme observations, i.e. a strong deviation of individual companies will have a disproportional effect on the figures.

[2] Bank of England, *Financial Stability Review*, "Stylised Facts on UK Corporate Financial Health: Evidence from Micro Data", June 2000.

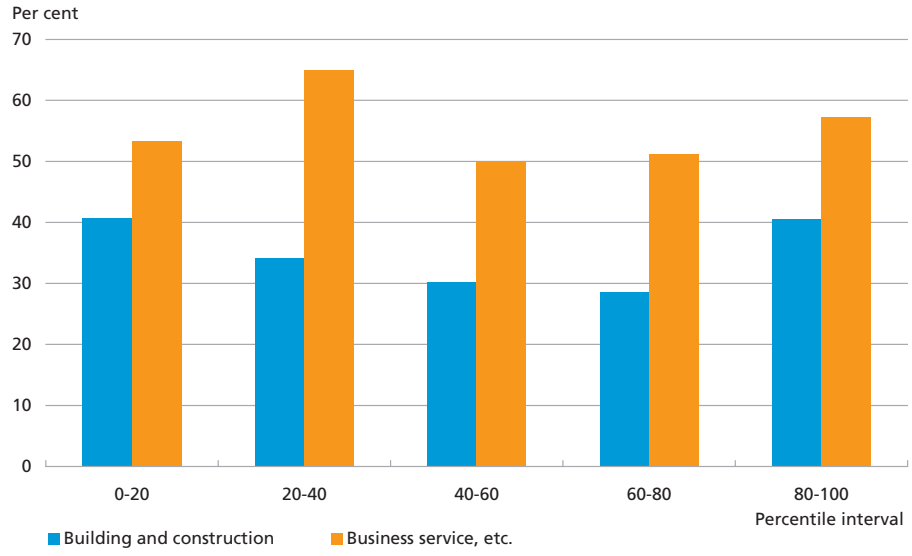
STABILITY OF COMPANIES' EARNINGS RATIO, 1999-2000 Table 3

Interval in 1999	Interval in 2000				
	0-20	20-40	40-60	60-80	80-100
0-20.....	48	18	11	10	13
20-40.....	16	50	19	10	6
40-60.....	12	17	41	22	8
60-80.....	10	10	22	40	19
80-100.....	10	7	9	21	53

Note: The 0-20 interval comprises the companies ranked among the weakest 20 per cent in terms of return on assets in the year in question. The 20-40 interval comprises the companies between the 20th and 40th percentiles in terms of return on assets in the year in question, and so forth. The rows indicate the companies' classifications in 1999 and the corresponding columns indicate the same companies' classifications in 2000. The analysis only includes companies existing in both 1999 and 2000, and all companies are given the same weighting, irrespective of size. Due to rounding, the rows may not add up to 100.
Source: The Danish Business Information Bureau and own calculations.

A stable level of earnings facilitates banks' credit rating of companies. It has been analysed whether the same companies remain at the same end of the scale over time. The analysis shows that around half the companies were in the same earnings interval in 2000 as in 1999, cf. the yellow fields in Table 3. The pattern is thus more or less the same as in the years 1995-1999[1].

STABILITY OF EARNINGS CAPACITY IN THE LEAST AND MOST STABLE SECTORS, 1999-2000 Chart 22



Note: The bars indicate the percentage of companies within the same percentile interval in 2000 as in 1999, corresponding to the yellow diagonal in Table 3.
Source: The Danish Business Information Bureau and own calculations.

[1] See Financial Stability, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2001, p. 57.

10 per cent of the companies had a high return on assets in 1999, but a low return on assets in 2000, while 13 per cent had a low return on assets in 1999 and a high return on assets in 2000, cf. the grey fields in Table 3. A sectoral breakdown shows that especially companies in building and construction moved from a high to a low category, and that the lowest incidence of shifts from a high to a low category is found within trade, hotels and restaurants, as well as manufacturing.

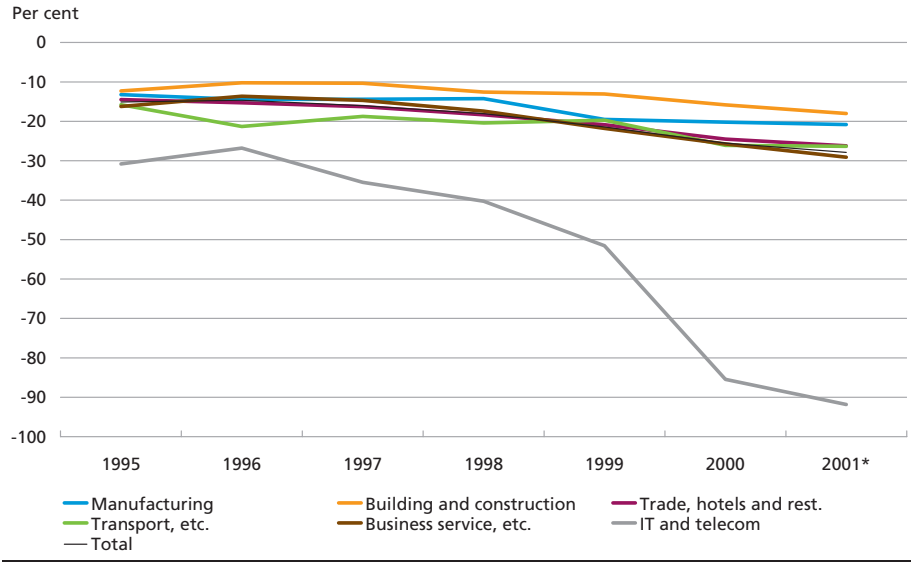
Moreover, the degree of earnings stability differs from sector to sector. Building and construction is the least stable sector, while business service, etc. is the most stable one, cf. Chart 22.

Financial items

The average ability to meet financial net costs has declined slightly in the period since 1997, and the average ability to service debt has declined likewise.

Particularly the situation of the companies with the poorest ability to meet financial net costs has deteriorated, cf. Chart 23. In fact, the weakest companies in all sectors, but especially in the IT and telecom sector, are unable to meet their financial net costs on the basis of their current operations.

ABILITY TO MEET FINANCIAL NET COSTS BY THE 10 PER CENT OF THE COMPANIES LEAST ABLE TO MEET PAYMENTS IN DIFFERENT SECTORS — Chart 23



Note: The ability to meet financial net costs is defined as primary operating result less financial net costs as a ratio of total debt. The Chart shows the 10th percentile. 2001* includes observations from companies which published their accounts between 1 July 2000 and 30 June 2001.

Source: The Danish Business Information Bureau.

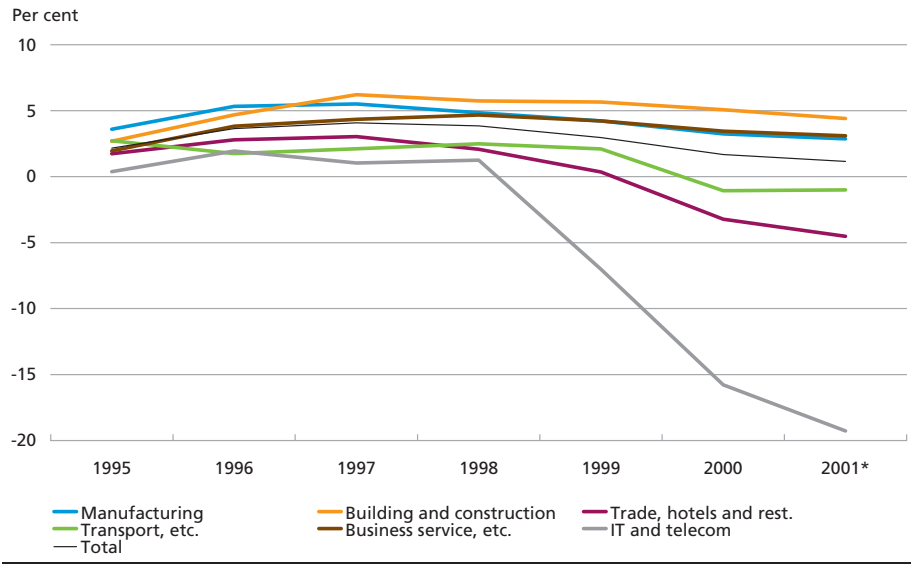
The companies' average solvency has increased since 1995. The variation among the least solvent companies in each sector (10th percentile) increased between 1998 and 2001, cf. Chart 24. Particularly the least solvent companies in the IT and telecom sector, and to a lesser degree in trade, hotels and restaurants, have seen a major decline in solvency. The least solvent companies in the IT and telecom sector, trade, hotels and restaurants, as well as transport, etc., had negative solvency ratios in both 2000 and 2001.

A comparison of the least solvent and least profitable companies shows that the least solvent companies are on average larger (in terms of assets) and have more debt, as a comparison of Charts 20 and 25 will show. The debt ratio for the least solvent 10 per cent of the companies exceeds 10 per cent of the sector's overall debt in two sectors only: building and construction, and business service, etc.

The solvency dispersion between companies has only widened marginally since 1996. The increase is greatest in IT and telecom, transport, etc., and trade, hotels and restaurants. While the dispersion in transport, etc. has been fairly stable since 1996, the dispersion in the IT and telecom sector, as well as trade, hotels and restaurants, has widened.

SOLVENCY OF THE LEAST SOLVENT 10 PER CENT OF THE COMPANIES IN VARIOUS SECTORS

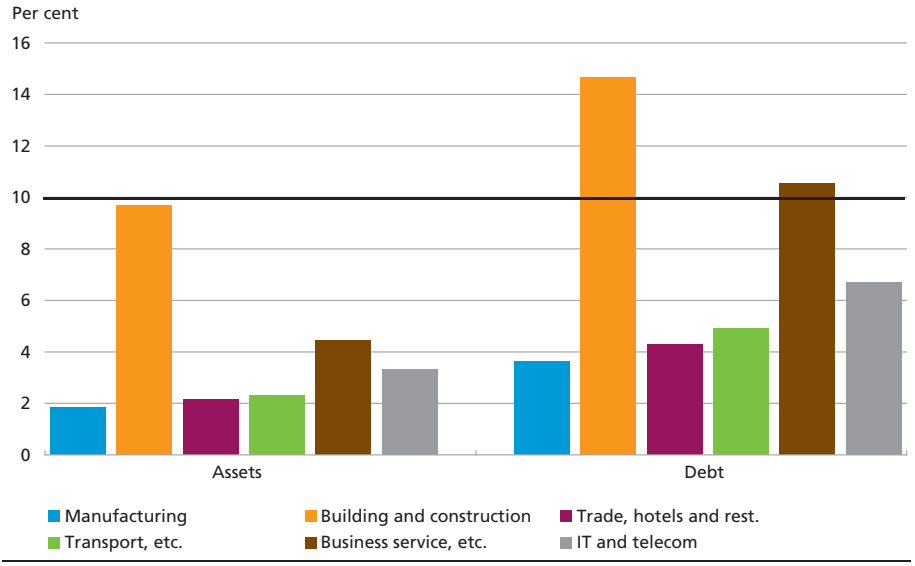
Chart 24



Note: Solvency is defined as equity capital as a ratio of total liabilities. The Chart shows the 10th percentile. 2001* includes observations from the companies which published their annual accounts between 1 July 2000 and 30 June 2001.

Source: The Danish Business Information Bureau.

PROPORTION OF VARIOUS SECTORS' TOTAL ASSETS AND DEBT HELD BY THE LEAST SOLVENT 10 PER CENT OF THE COMPANIES IN THE SECTOR, 2001 Chart 25



Note: For each sector, the bars show the proportions of assets and debt, respectively, in the least solvent companies (10th percentile) as a ratio of total assets and debt in that sector.
Source: The Danish Business Information Bureau.

An intuitive way of distinguishing sound companies from those heading for liquidation is to break them down by return on assets and solvency[1]. The companies are divided into four categories by return on assets and solvency for the years 1995 and 2001. A natural starting point is zero, i.e. whether the companies are making profits/losses and whether the solvency is positive or negative.

For both years, only few companies' total debt is in the critical category where solvency and return on assets are both negative, cf. Table 4. Companies with a positive return on assets and positive solvency account for the major part by far of total debt. However, it should be noted that the proportion of debt in the poorest companies increased from 1995 to 2001.

COMPANIES' DEBT IN TERMS OF SOLVENCY AND RETURN ON ASSETS, PERCENTAGES Table 4

	1995		2001	
	Solvency > 0	Solvency < 0	Solvency > 0	Solvency < 0
Return on assets > 0	77	3	70	2
Return on assets < 0	16	3	25	4

Note: Due to rounding, the percentages may not add up to 100.
Source: The Danish Business Information Bureau and own calculations.

[1] Solvency is a good way of filtering out companies threatened by liquidation, whereas the return on assets is more ambiguous, e.g. because it can reflect the company's risk level.

Agriculture

Lending by banks to the self-employed accounted for approximately 13 per cent of total domestic lending in 2001. Just over a quarter of this was for agriculture, etc. The major part of agricultural credit is granted by mortgage-credit institutes.

In recent years, overall earnings in the agricultural sector have fluctuated. Agricultural earnings increased by 53 per cent from 1999 to 2000 after having declined in both 1998 and 1999. Especially the value of pork production has risen, mainly due to favourable price developments.

According to estimates from the Danish Farmers' Union this positive trend is expected to have continued in 2001, whereas the Union's forecast for 2002 shows declining earnings for the three major types of holdings[1] in Denmark.

The high level of earnings in 2000 meant that the agricultural sector's interest expenditure as a ratio of earnings dropped significantly from more than 80 per cent in 1999 to just under 60 per cent in 2000.

The agricultural sector's total debt increased by just over kr. 8 billion to kr. 171 billion in 2000. However, the debt-to-assets ratio fell to approximately 55 per cent in 2000 as a result of higher prices for farm land, among other factors.

In spite of the positive trend in 2000 and the expected continued growth in 2001, cf. estimates from the Danish Farmers' Union, the number of bankruptcies in the agricultural sector has increased, although from a very modest level, cf. Chart 15. The continued rise in bankruptcies in March 2002 coupled with the Danish Farmers' Union negative expectations for 2002 indicate a squeeze on the most vulnerable farms.

HOUSEHOLDS

The banks' lending to households accounted for approximately 30 per cent of total domestic lending in 2001. The households' incomes and assets reflect their ability to service this debt. Particularly in 2001 households' use of floating-rate housing loans increased. The risks implied by this type of financing will be discussed at the end of the chapter.

Income and assets

The households' real disposable income rose by almost 3 per cent in 2001. Sustaining the current high level of employment is of major importance for the households' ability to meet payments.

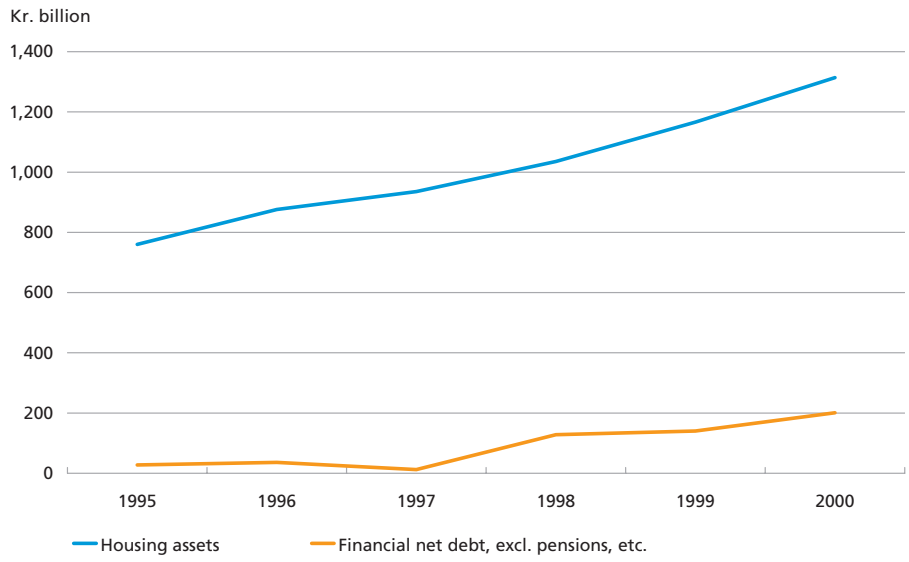
[1] Crops, dairy cattle and pigs (sows and slaughter pigs).

In 2000, the households' financial net assets totalled kr. 636 billion. Part of the assets comprised savings in life-insurance companies and pension funds, which are less liquid than other financial assets. Disregarding such savings, the households' total financial net debt rose from kr. 28 billion in 1995 to around kr. 200 billion in 2000. The higher debt is partly a result of increasing property prices, pushing up the borrowing requirement for home purchases. The growth in the debt should therefore be seen in the light of the increase in housing assets, cf. Chart 26. Higher financial net debt makes greater demands on the households' future earnings.

To some extent the general trend covers an unequal distribution of financial assets and liabilities between the age groups. As regards home-owners, Chart 27 shows that young home-owners account for the largest share of the debt, but the smallest share of the financial assets. This is because young home-owners have recently entered the housing market and have only to a limited degree reduced their debt and accumulated savings. The distribution of debt and financial assets is therefore as can be expected on a life-cycle basis.

The major part of the debt has been incurred by families with high disposable incomes. In 2000, the 20 per cent of the home-owners with the highest disposable incomes held more than 40 per cent of the financial assets and approximately 30 per cent of the debt.

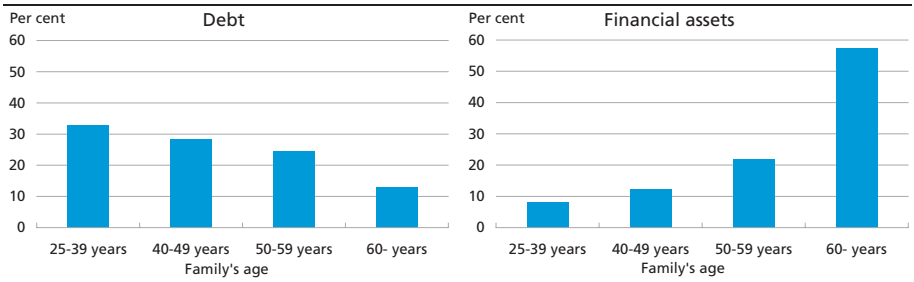
HOUSEHOLDS' HOUSING ASSETS AND NET DEBT — Chart 26



Note: Housing assets are stated as the official property valuations, which are typically lower than the actual property value. The housing assets shown do not include the entire housing stock, but are an estimate of the value of households' housing assets. The data relating to financial net debt are national accounts data concerning financial accounts.

Source: Customs & Tax, Statistics Denmark and own calculations.

HOME-OWNERS' DEBT AND FINANCIAL ASSETS BY AGE, 2000 Chart 27

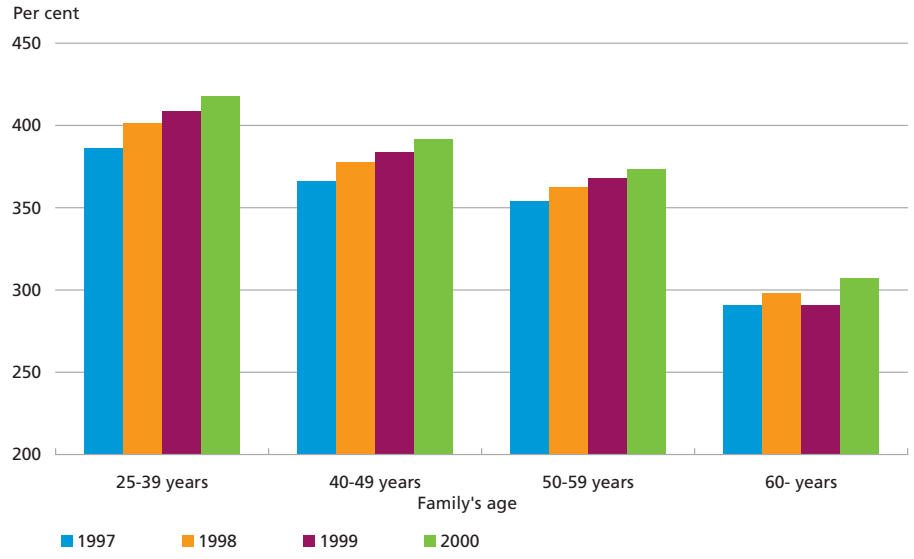


Note: The self-employed and grown-up children living at home are not included in the analysis. The bars do not add up to 100, since families below the age of 25 have been left out. The family's age is defined as the age of its oldest member. Financial assets do not include savings in life-insurance companies and pension funds. If such savings had been included, the distribution of financial assets would have been more uneven across the age groups. The intervals are not the same, but the general picture is, if the Chart is adjusted for the number of families in each age group.
Source: Statistics Denmark.

An expression of home-owners' ability to service their debt is the debt and interest burden[1]. Young home-owners' debt burden is heavier than that of older, more established home-owners. Likewise, interest expenditure as a ratio of disposable income is greater for young home-owners.

Among all age groups, but in particular young home-owners, the debt burden has increased since 1997 for the home-owners with the heaviest debt burden, cf. Chart 28.

DEBT BURDENS OF THE MOST HEAVILY BURDENED 10 PER CENT OF FAMILIES Chart 28

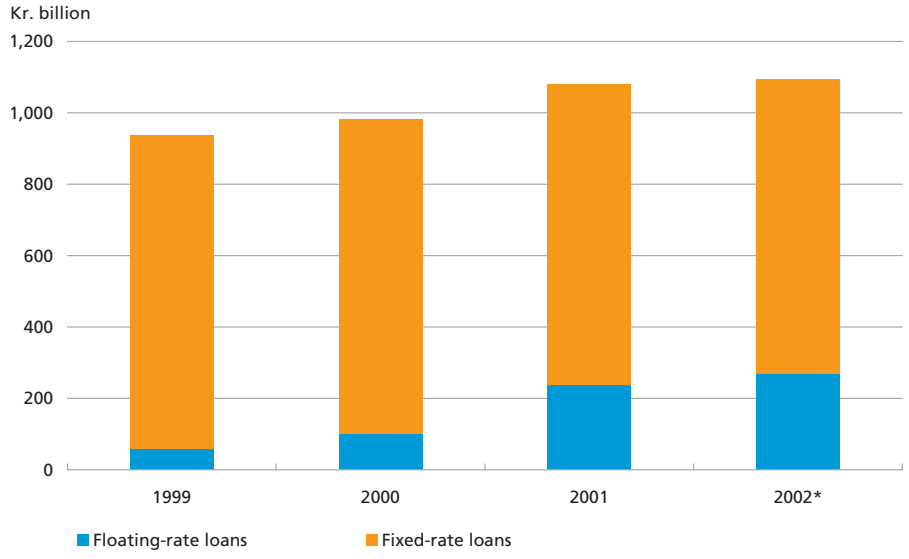


Note: The debt burden is defined as the home-owner's total gross debt as a ratio of disposable income including gross interest expenditure. The Chart shows the 90th percentile. See also the note to Chart 27.
Source: Statistics Denmark.

[1] The debt burden is defined as total gross debt as a ratio of disposable income including gross interest expenditure. The interest burden is calculated as gross interest expenditure as a ratio of disposable income including gross interest expenditure.

MORTGAGE-CREDIT INSTITUTES' DOMESTIC LENDING BY LOAN TYPE, YEAR-END

Chart 29



Note: 2002* figures apply as at end-February 2002.
Source: Danmarks Nationalbank.

The most heavily burdened home-owners have thus become more vulnerable in case of a drop in income as a result of unemployment, etc., in so far as the debt is not offset by assets which can be converted into cash.

Floating-rate loans

As Chart 29 shows, the number of floating-rate loans has risen significantly in recent years.

Generally, floating-rate loans are cheaper than fixed-rate loans, as the first-year payments are often lower. However, the risk profile of a floating-rate loan is significantly different. This will be described in further detail below. A more in-depth analysis of floating-rate loans will be published in Danmarks Nationalbank's Monetary Review for the 2nd Quarter 2002[1].

Assumptions

The interest-rate scenarios in the following show how payments after tax and the equity are affected by rising interest rates, depending on the proportion of floating-rate loans. The calculations are based on simplified assumptions, but the overall conclusions are not affected by changes in

[1] Anders Møller Christensen and Kristian Kjeldsen, Floating-rate Loans, Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2002 (published 29 May 2002).

OWNER-OCCUPIED HOME USED IN THE CALCULATIONS Box 5

The starting point is the purchase of an owner-occupied house, such as a bungalow or a terraced house, of 180 sq.m. in municipal category 4[1]. In 2001 the price per square metre for such a house was approximately kr. 8,500[2]. Consequently, the market value of the house is set at kr. 1.5 million in the calculations. The equity is assumed to be 20 per cent of the market value, i.e. kr. 300,000. The interest rate at the time of purchase is assumed to be 6 per cent for a 30-year fixed-rate bond loan and 4 per cent for a 30-year floating-rate loan with annual adjustments. The monthly net payment (after tax deduction of interest payments) in the first year is kr. 5,255 for 100 per cent fixed-rate financing, and kr. 4,439 for the floating-rate loan[3].

[1] Comprising Odense, Esbjerg, Kolding, Randers, Århus and Aalborg.
[2] See www.realkreditraadet.dk.
[3] The actual payment series are calculated. Net payments increase over the term of the loan as a result of the falling interest expenditure and thus the lower rate of interest deductibility over time. The sensitivity analyses only take into account the changes in the average payments in the first year. The calculations do not take account of other financing costs (e.g. administration fees) than the pure financing costs.

the assumptions described in Box 5. In most cases, the interest rate payable on floating-rate loans is fixed once a year, and in the following analyses the increase in interest rates is assumed to take place at that time. The calculations are for a home-owner with negative net capital income with a rate of interest deductibility of 32.5 per cent[1].

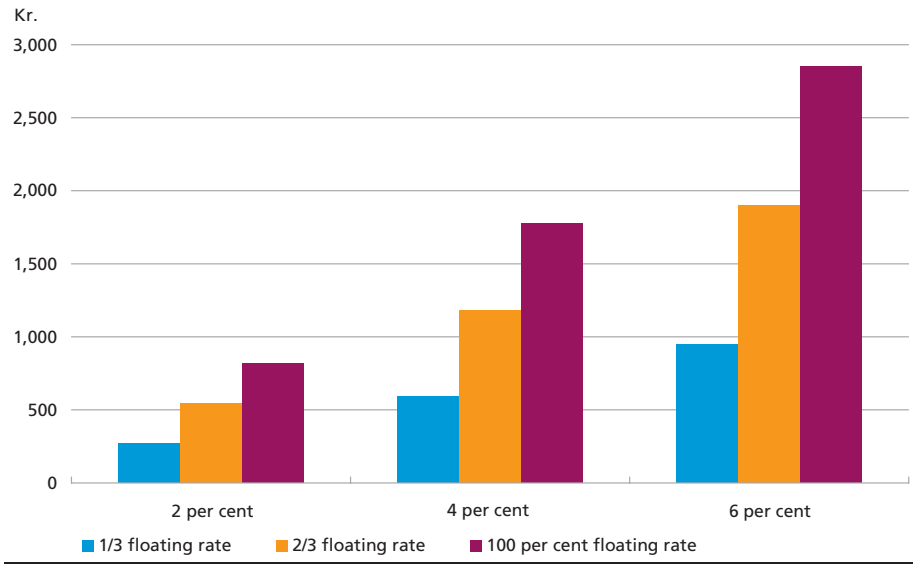
Effect on net payments

By choosing fixed-rate loans the home-owner knows what the financing costs are throughout the maturity of the loan[2]. In other words, a home-owner taking out a 30-year fixed-rate loan knows what the costs will be all 30 years. In contrast, payments on floating-rate loans vary with interest rates. The latter have fluctuated greatly over the past 10 years, but naturally this cannot be seen as an indication that the same will be the case in the years to come.

Currently both short-term and long-term interest rates are low. Generally the 1-year rate is lower than the long-term rate, which is used as an argument for choosing floating-rate rather than fixed-rate loans. However, the borrower should be aware of the risk, which is different for the two loan types. Should (short-term and long-term) interest rates go up, this would not affect payments on fixed-rate loans, whereas payments on floating-rate loans would rise.

[1] See Kristian Kjeldsen and Erik Haller Pedersen, Taxation of Asset Income and the Financial Markets, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2002.
[2] The option to remortgage when interest rates fall is disregarded in this connection. For fixed-rate loans the home-owner is protected from higher financing costs in connection with rising interest rates, but may choose to remortgage if rates fall significantly.

INCREASE IN MONTHLY NET PAYMENTS FOR INTEREST-RATE INCREASES BY 2, 4 AND 6 PERCENTAGE POINTS — Chart 30



Note: As stated, payments on fixed-rate loans are not affected by interest rates and have consequently been omitted.
Source: Own calculations.

Chart 30 shows the changes in net payments (after tax) when interest rates go up by 2, 4 or 6 percentage points[1] for various degrees of floating-rate-loan financing. As stated above, payments on fixed-rate loans are not affected by rising interest rates.

Chart 30 shows that an increase in interest rates by 2 percentage points means net costs of approximately kr. 800 more per month when all of the debt is floating-rate loans. For an increase of 4 percentage points the net costs per month will be about kr. 1,700 higher.

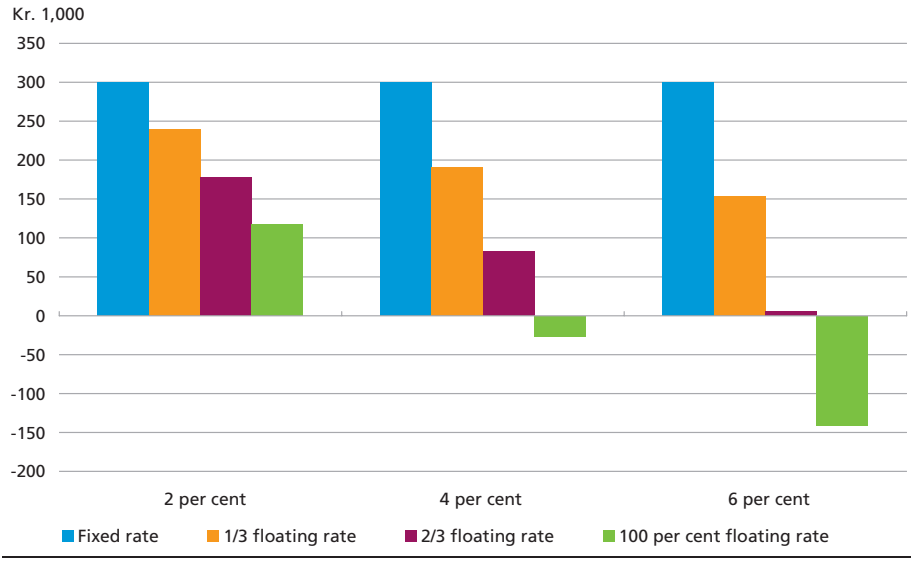
Effect on equity

Higher interest rates may entail a decrease in property prices as a result of increased financing costs for housing. Home-owners with fixed-rate loans have hedged this risk in that the decline in the property price is offset by a fall in the market value of the debt. The equity of the property is thus maintained even when interest rates increase. In terms of risk, this is different from floating-rate loans, where the market value of the debt does not go down when interest rates go up.

[1] The increases selected may seem high, but the resulting interest levels are within the range seen in the 1990s.

EFFECT ON EQUITY OF INTEREST-RATE INCREASES BY 2, 4 AND 6 PERCENTAGE POINTS

Chart 31



Source: Own calculations.

In the sensitivity analyses the direct effect on the equity of an increase in interest rates is calculated for a price drop corresponding to the fall in the present value of the fixed-rate-loan payments. It is therefore assumed that the 1-year rate increases *pari passu* with the long-term rate, i.e. a parallel shift in the yield curves. The present value of the payments will fall as a result of the higher interest rate. The interest rate is tax-adjusted, as it is assumed that the price decrease is determined by the change in the payment after tax on the debt. Chart 31 shows the effect on the equity of interest rates rising by 2, 4 or 6 percentage points for varying degrees of floating-rate-loan financing.

As Chart 31 shows, the equity of an owner-occupied home financed via fixed-rate loans only is maintained when interest rates increase. For an owner-occupied home financed via floating-rate loans only the equity drops from kr. 300,000 to around kr. 100,000 if interest rates rise by 2 percentage points. If the rise is by 4 percentage points, the equity becomes marginally negative.

Chart 31 shows that the equity of homes financed via floating-rate loans is sensitive to rising interest rates. This is due to the gearing of newly-acquired owner-occupied homes, where the equity is typically considerably lower than the debt. When gearing is high, relatively small interest-rate fluctuations will lead to large fluctuations in the equity.

With fixed-rate financing the home-owner is practically protected from such net-asset losses.

Effect on financial stability

When used prudently and taking the risk exposure into account the increased use of floating-rate loans will not affect financial stability significantly, although home-owners should be aware of the increased financial risk associated with such loans.

Financial-Market Trends

The banks seem to be robust to the major shocks which affected the financial markets in 2001, whereas the pension companies were more severely affected. The development in the Danish financial markets is to a great extent driven by trends abroad, including in the USA. As a result, the financial institutions can only to a limited degree reduce their market risks by spreading their investments to other countries. Fluctuations in the stock markets are usually accompanied by fluctuations in the bond markets, although no constant correlations can be established. The uncertain correlations and the periods with strongly fluctuating markets emphasise the need to apply stress tests when assessing the stability of financial institutions.

The number and total amount of share issues on the Copenhagen Stock Exchange was considerably lower in 2001 than in 2000.

THE MARKET RISKS OF FINANCIAL INSTITUTIONS

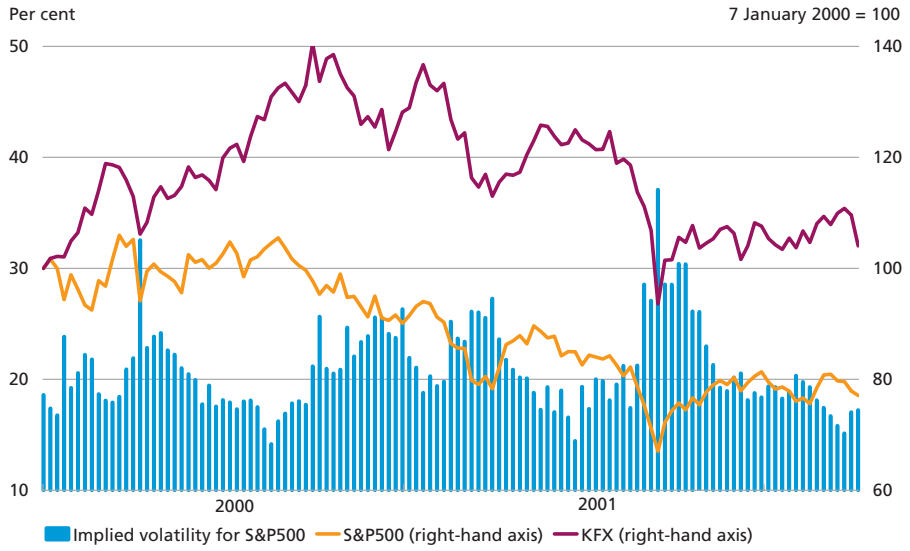
The banks, pension companies and mortgage-credit institutes undertake a number of market risks in the course of their business. The principal market risks are interest-rate risk, the risk of stock-price fluctuations and exchange-rate risk. As shown by the sensitivity analysis in the chapter on trends in the financial sector, Danish banks as a whole are robust to market risks, but some individual banks may be more exposed. Trends in the financial markets affect pension companies in particular, but as described in the chapter on pension companies and financial stability, pension companies are only of indirect significance to financial stability. The mortgage-credit institutes are almost immune to market trends, since the composition of their balance sheets is subject to statutory rules.

In the autumn of 2001, the interest-rate and stock markets saw strong fluctuations, and a number of pension companies found it difficult to meet the solvency requirement. The recovery of the stock markets eased the pressure on the pension companies, but the development in the autumn of 2001 drew attention to the financial institutions' robustness to market risks.

The market situation

The terrorist attacks on the USA on 11 September 2001 caused stock prices to plummet in the industrialised countries in the following weeks,

STOCK INDICES IN THE USA AND DENMARK AND IMPLIED VOLATILITY Chart 32



Note: Implied volatility one month ahead. No implied volatility is calculated for the KFX, since options on the index are not traded on the stock exchange.
Source: Bloomberg and Ecowin.

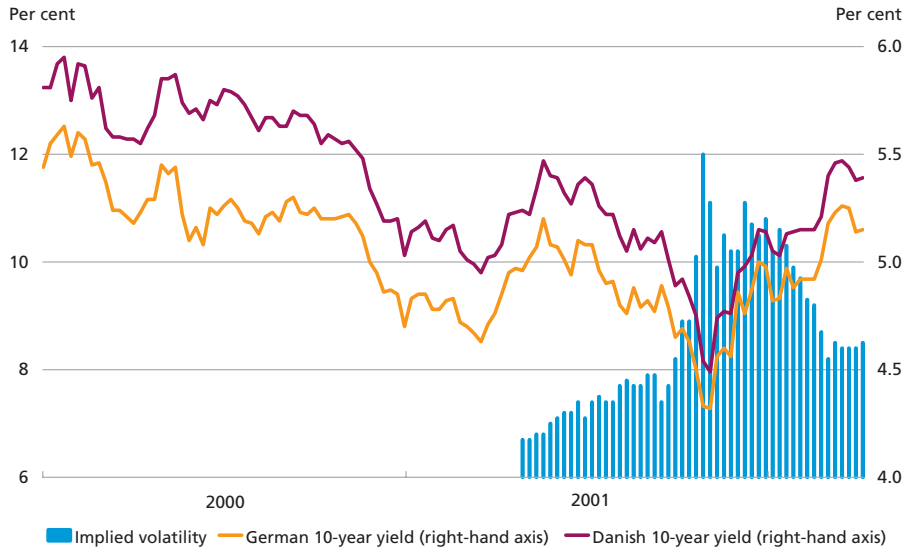
cf. Chart 32. At the same time, market uncertainty concerning the future course of stock prices increased, as appeared from e.g. the high level of implied volatility in the US stock index, S&P500[1]. Stock prices recovered relatively soon after the terrorist attacks and the uncertainty concerning future developments again diminished. However, stock prices have tended to decrease overall in the industrialised countries since the reversal of the course of the US economy in 2000. At the end of April 2002, the benchmark stock indices in the USA, the euro area and Denmark were approximately one third below their peaks in 2000.

In the spring of 2002, the indications of an economic upturn in the USA and the euro area generated only a limited reaction in the stock markets. The moderate reaction is particularly attributable to the very high level of US stock prices compared to the latest corporate earnings. Another possible factor is investors' focus on the fact that corporate accounts may not give a complete view of the companies' commitments, as the liquidation of the US energy company Enron showed.

In the autumn of 2001, long-term interest rates in the USA and Europe briefly fell to a very low level. At the same time, the 10-year yield differential between Denmark and Germany narrowed, and the yield for the 30-year Danish government bond fell below the yield for the corresponding German bond. This trend reflects strong interest in long-term

1 Cf. Box 6.

10-YEAR YIELDS IN DENMARK AND GERMANY AND IMPLIED VOLATILITY Chart 33



Note: Implied volatility of a 20-year euro swaption receiving a 10-year yield.
Source: Bloomberg.

bonds among Danish pension companies, which generally require assets with long duration in view of their pension commitments. When interest rates were low in the autumn, some pension companies also purchased euro-denominated interest-rate options, including swaptions. The pressure to buy contributed to high option premia as reflected in the high implied volatility on swaptions, cf. Chart 33. The use of swaptions is described in Box 6[1].

Identification of market risks

The financial institutions have large holdings of bonds and stocks denominated in Danish kroner and foreign currency, cf. Table 5.

The effects of changes in market conditions on the equity of financial institutions also depend on the financial institutions' liabilities. If assets and liabilities have the same market-risk characteristics, the financial institutions' equity is less exposed to market trends than what is entailed by separate market risks on assets and liabilities. On the other hand, a pronounced mismatch between assets and liabilities may imply that the equity is relatively strongly exposed to market trends. Furthermore, the financial institutions' use of derivatives could expand or diminish the exposure of their equity in relation to the exposure shown by their balance sheets.

1 See also Louise Mogensen, Market Dynamics at Low Interest Rates, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2002.

OPTIONS, SWAPTIONS AND IMPLIED VOLATILITY — Box 6

An option implies a right, but no obligation, to buy or sell an asset at a pre-determined price, called the strike price. The option can thus be used as a hedge against market trends which would generate losses. For example, a pension company can hedge against a low level of interest rates by purchasing a "swaption" at a strike price around the level of the issued interest-rate-guarantees. If the pension company decides to utilise the swaption, it will receive a fixed interest rate corresponding to the strike price against payment of a variable interest rate.

Payment for the option is in the form of a premium or option price. The price depends on such factors as the asset's current price in relation to the strike price and the expected future volatility of the asset price. For a fixed strike price the price of a swaption will increase, all other things being equal, when interest rates decrease and when the expected volatility rises. In practice, options are often priced on the basis of the Black-Scholes model.

The expected volatility cannot be observed, but can be derived from the Black-Scholes model if the option price is known, so it is also called implied volatility. This is the volatility theoretically applied by the market when pricing the option.

As regards the *interest-rate risk*, callable mortgage-credit bonds account for a significant proportion of the bond portfolios of financial institutions. The expected time to maturity of these bonds is very short when the price is close to par due to the increased probability of the borrower exercising the early-redemption right. The interest-rate risk of financial institutions is therefore very sensitive to falling interest rates.

The *exchange-rate risk* of financial institutions is negligible, since most positions in foreign currency are hedged in forward transactions.

The sensitivity of various types of financial institutions to market trends is described in further detail in Box 7. It appears from the Box

ASSETS OF FINANCIAL INSTITUTIONS, KR. BILLION — Table 5

	Banks	Pension companies	Mortgage-credit institutes
Shares, total	37.9	258.7	4.6
Shares in foreign companies	-	160.0	-
Bonds, total	461.7	455.2	232.2
Mortgage-credit bonds	231.3[1]	342.9	202.2[1]
Foreign bonds	97.4[2]	44.4	-1.9[2]
Balance sheet	1,913.0	919.0	1,616.7

Note: The portfolios of the banks and the mortgage-credit institutes are calculated as of end-2001. The portfolios of the pension companies are calculated as of end-2000.

Source: The Danish Financial Supervisory Authority, unless otherwise stated.

[1] The portfolio of debt instruments (excl. money-market papers) issued by monetary financial institutions in Denmark according to Danmarks Nationalbank's MFI statistics.

[2] Portfolios of foreign debt instruments (including bonds) according to Danmarks Nationalbank's MFI statistics. The negative portfolio of the mortgage-credit institutes can be attributed to resale of foreign bonds in connection with repurchase agreements.

THE MARKET RISKS OF FINANCIAL INSTITUTIONS Box 7

For the *banks* taken as one the Danish Financial Supervisory Authority has calculated an *interest-rate risk* of 3.5 at end-2001, compared to 2.6 in 2000. The Financial Supervisory Authority's measure of the interest-rate risk is an approximation of the percentage loss of equity if bond yields increase by 1 percentage point. The banks' equity is thus immediately reduced when bond yields increase, although the effect is modest. As for *life-insurance companies* and *pension companies* the interest-rate guarantee system increases their interest-rate risk exposure when interest rates are low, cf. the chapter on pension companies and financial stability. The composition of *mortgage-credit institutes*' balance sheets is subject to the statutory rules. Against this background the exposure of the mortgage-credit institutes' equity to changes in interest rates is limited. When interest rates are low, however, the volume of re-mortgaging will typically be high, which contributes to growth in the mortgage-credit institutes' earnings.

Shares account for approximately 2 per cent of the *banks*' assets. This implies a limited overall sensitivity to declining stock prices. Nevertheless, decreasing stock prices could reduce the banks' earnings from share trading. Shares account for around 25 per cent of the assets of *life-insurance companies* and *pension companies,* and foreign shares account for just over half of this share. Life-insurance companies and pension companies are thus exposed to stock-market trends in both Denmark and abroad. The share portfolios of the *mortgage-credit institutes* are negligible.

In general the financial institutions are exposed to a limited *exchange-rate risk,* since positions denominated in foreign exchange are normally hedged in the forward market. For the *banks* taken as one, the Danish Financial Supervisory Authority has calculated a Value-at-Risk indicator. The indicator is a measure of the maximum percentage loss – at a probability of 99 per cent – of net capital over a period of 10 banking days. At the end of 2001 the indicator was 0.14, compared to 0.15 in 2000. Since the composition of *mortgage-credit institutes*' balance is subject to statutory rules, they are not exposed to exchange-rate risks.

The Table below summarises the assessment of the market-risk exposure of each type of financial institution.

ESTIMATED MARKET RISK EXPOSURE OF FINANCIAL INSTITUTIONS

Risk factor	Banks	Pension companies	Mortgage-credit institutes
Interest-rate risk	***	*****	**
Stock-price risk	***	****	*
Exchange-rate risk	**	**	*

Note: The asterisks in the Table refer to the estimated size of the risk. ***** = relatively high risk, **** = somewhat high risk, *** = minor risk, ** = low risk, * = no or a very low risk.

that pension companies are particularly exposed. Since the composition of the mortgage-credit institutes' balance sheets is subject to statutory rules, their market-risk exposure is very limited.

Characteristics of the history of the risk factors

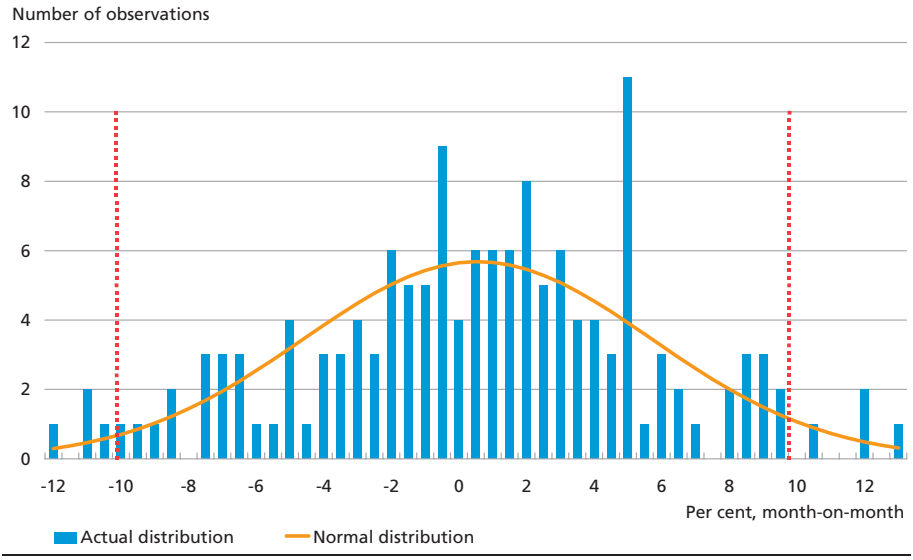
In periods with calm financial markets the fluctuations in stock prices, interest rates and exchange rates are limited, but at other times they may be considerable. This is reflected in the fact that the historical distribution of the changes in these risk factors comprises more extreme observations than what is warranted by a normal distribution.

The Danish KFX index increased from just over 100 to around 260 from the beginning of 1990 to end-April 2002. This period saw strong fluctuations in both directions. On a month-to-month basis the KFX predominantly fluctuated by less than 10 per cent, cf. Chart 34.

In the same period the tendency was for long-term interest rates to decrease. At the end of April 2002 the yield for the 10-year Danish government bond was thus approximately 5.4 per cent, against 10.4 per cent at the beginning of 1990. The monthly fluctuations in the Danish 10-year yield were predominantly below 60 basis points, cf. Chart 35.

At the moment there is a close correlation between fluctuations in the financial markets in Denmark and abroad, cf. the left-hand curves in Chart 36 which show the correlations between Danish and US stock indices and bond yields. In the 12 months until March 2002 the Danish markets have closely followed market trends in the USA (and the rest of Europe).

HISTORICAL FLUCTUATIONS IN THE KFX INDEX — Chart 34



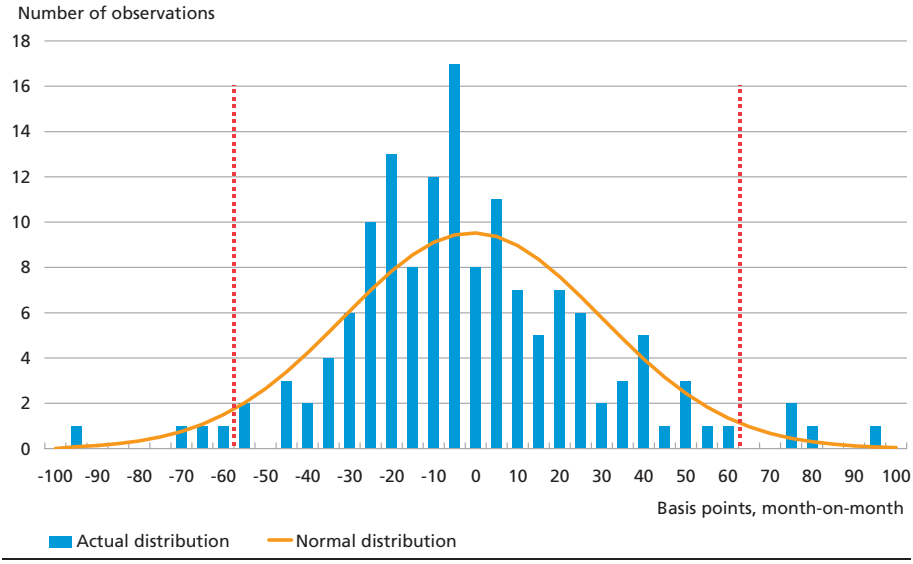
Note: The Chart is based on 147 monthly observations in the period January 1990-March 2002. During this period the average monthly increase in the KFX was 0.8 per cent with a standard deviation of 5.1 per cent. The dotted lines define approximately 95 per cent of the observations in the middle, i.e. the "tails" are outside this area.

Source: Ecowin.

Stock-market fluctuations will often coincide with bond-market fluctuations. Higher bond yields may lead to lower stock prices, since the latter reflect expected future corporate cash flows, the present value of which tends to decrease when interest rates go up. Furthermore, an increase in the level of interest rates will entail higher interest-rate costs for the corporate sector and generally dampen economic activity, which may also cause stock prices to decrease. Indeed, the historical correlation between the percentage change in the Danish KFX index and the change in the level of the 10-year yield has been predominantly negative in the period since 1990, cf. the right-hand curves in Chart 36. However, recent years have seen a positive co-variation between changes in stock prices and changes in 10-year yield levels. This also applies in the USA. The positive co-variation between interest-rate and stock-market trends can be attributed to a portfolio effect whereby investors substitute stocks for bonds and vice versa.

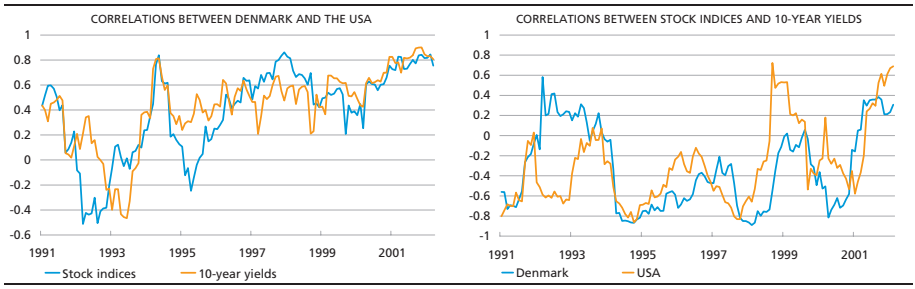
The strong correlations between financial-market trends in Denmark and abroad reflect that market trends in Denmark are very much driven by market trends abroad, including in the USA. Against this background the financial institutions can only to a limited extent diversify by extending their investments to foreign assets. However, the major stock markets abroad are considerably more liquid than the Danish stock market and

HISTORICAL FLUCTUATIONS IN THE DANISH 10-YEAR YIELD — Chart 35



Note: The Chart is based on 147 monthly observations in the period January 1990-March 2002. In this period the average monthly change in the 10-year Danish yield was -3.3 basis points with a standard deviation of 31 basis points. The vertical dotted lines define approximately 95 per cent of the observations in the middle, i.e. the "tails" are outside this area.

CORRELATIONS BETWEEN RISK FACTORS Chart 36



Note: Based on monthly changes in the preceding year. The stock indices are the KFX for Denmark and the S&P500 for the USA.
Source: Ecowin and own calculations.

can therefore absorb larger trading volumes without any considerable price effects. The positive correlation in recent years between changes in the level of interest rates and changes in stock prices has contributed to a reduced market risk on portfolios comprising both shares and bonds. Nevertheless, experience shows that the correlation between shares and bonds is far from constant and that it may move from positive to negative or vice versa, cf. Chart 36. Against this background it is important to assess the market risks assuming various scenarios for the co-variation between the various types of assets and liabilities.

The occurrence of periods with strong market fluctuations, cf. the "fat tails" in the distribution of risk factors in Charts 34 and 35, emphasise the importance of focusing on the solvency of financial institutions under extreme market conditions. The need for this focus is reinforced by the fact that extremely adverse market conditions often lead to increased credit and liquidity risks. The financial institutions may be exposed to counterparties that are relatively hard hit by such effects.

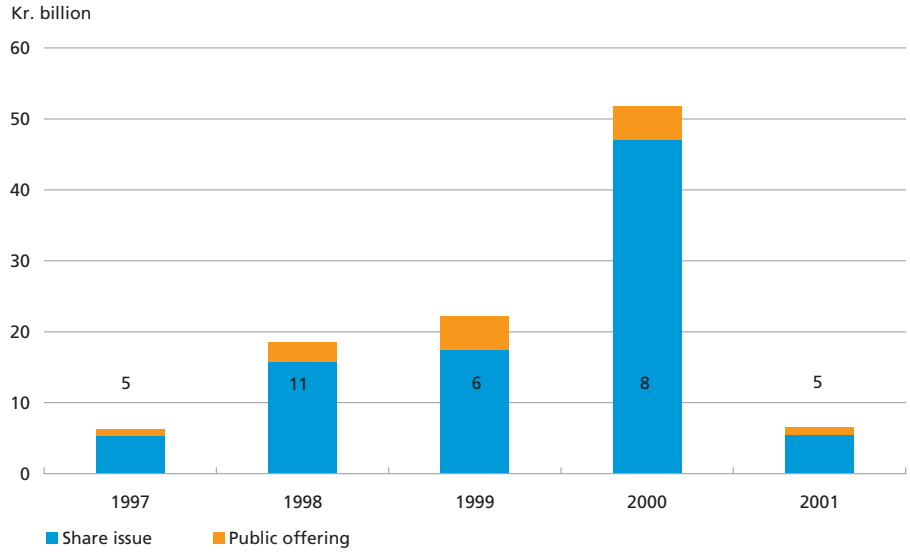
OTHER EFFECTS OF FINANCIAL-MARKET TRENDS

Several sources of revenue for the banks are affected by financial-market trends. In the autumn of 2001, decreasing stock prices entailed a decline in share issues and securities trading activities.

Share issues

The capital contribution from and the number of initial public offerings decreased strongly in 2001 after having shown an increasing trend in recent years, cf. Chart 37. The issuing activity of already listed companies also declined, partly since falling stock prices increased, in relative terms, the costs of this source of financing, partly due to the generally more unfavourable investment climate.

NUMBER OF NEW COMPANIES AND PROCEEDS FROM INITIAL PUBLIC OFFERINGS AND PUBLIC OFFERINGS FROM LISTED COMPANIES ON THE COPENHAGEN STOCK EXCHANGE, 1997-2001 Chart 37



Note: The number of new companies is shown in the bars. A share of kr. 30.1 billion of the proceeds in 2000 can be attributed to Danske Bank's acquisition of RealDanmark.
Source: The Copenhagen Stock Exchange.

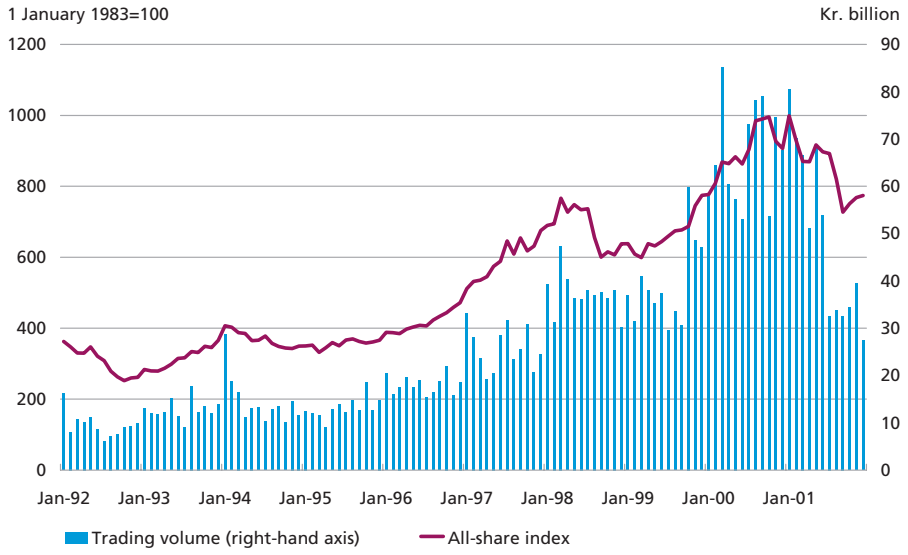
Trading volume of shares and derivatives

The trading volume of shares on the Copenhagen Stock Exchange declined in 2001 compared to 2000, reflecting the tendency for trading volumes to fall in a declining market. The apparently strong decrease in share trading volumes in the 2nd half of 2001, which appears from Chart 38, can be attributed to amended rules for reporting to the Copenhagen Stock Exchange. The new reporting rules have reduced the number of transactions reported twice, which led to a technical decrease in share trading volumes by around 40 per cent. The trading volume of derivatives decreased by a total of 47 per cent in 2001 compared to 2000, while trading volumes of stock options increased considerably.

Market shares

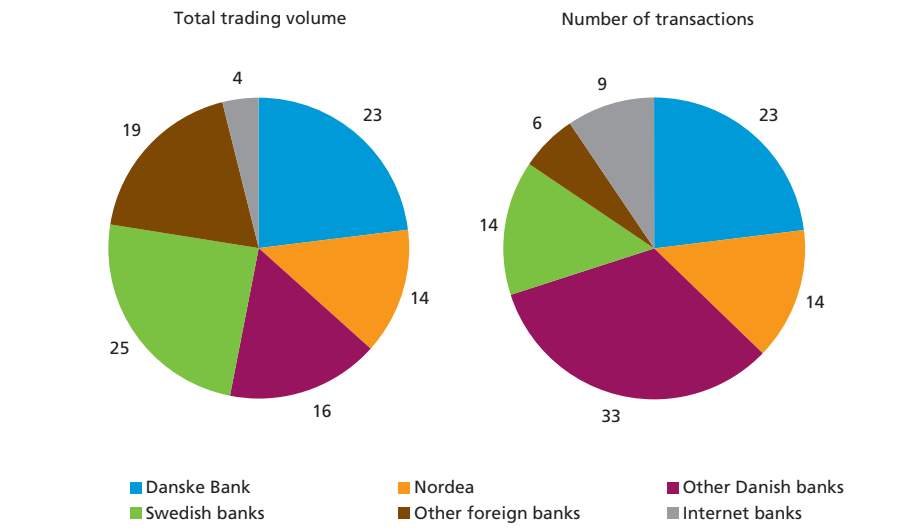
On 1 January 2002 the Copenhagen Stock Exchange began to calculate market shares in terms of its members' trading volume. Chart 39 shows that the Danske Bank Group (Danske Securities AB and Danske Bank A/S) accounted for the largest share, viz. 23 per cent, of the total trading volume in March 2002. The Nordea Group accounted for the second largest share, viz. 14 per cent. Foreign participants account for a significant share of the trading volume, dominated by the Swedish banks.

SHARE TRADING VOLUME AND PRICE DEVELOPMENT ON THE COPENHAGEN STOCK EXCHANGE — Chart 38



Note: The total index includes all listed shares. As from June 2001 a projection of the trend in the KAX (a new all-share index) is used, since the Copenhagen Stock Exchange has restructured the sectors in its index.
Source: The Copenhagen Stock Exchange.

TOTAL TRADING VOLUME AND NUMBER OF TRANSACTIONS ON THE COPENHAGEN STOCK EXCHANGE, MARCH 2002, PERCENTAGE — Chart 39



Source: The Copenhagen Stock Exchange.

However, these data should be interpreted with caution, since they relate to the trading volume in one month only.

A comparison between the total trading volume and the number of transactions shows that the average transaction size is typically somewhat larger for the foreign banks than for the Danish banks. The reason is that private investors primarily trade securities via Danish banks.

Internet banks accounted for 4 per cent of the total trading volume, but 9 per cent of the number of transactions. This confirms the view that it is mostly private customers who trade shares via the Internet.

Issues related to financial stability

Pension Companies and Financial Stability

Pension companies play an important role in the financial sector, by smoothing out risks among pension savers and as managers of long-term savings. In terms of economic development, confidence in pension companies as managers of long-term savings is important. When compared with banks, the effect of pension companies on financial stability is, however, assessed to be more indirect. For instance, financial stability may be influenced via the financial markets, via group ties with banks, or via other types of risk transfer between banks and pension companies.

CENTRAL FUNCTIONS OF BANKS AND PENSION COMPANIES

Banks and pension companies[1] play a central role in the financial sector. Their fundamental functions are different, so they have different impacts on financial stability. However, both contribute to redistributing and minimising various types of risks for customers.

In recent years, the trend has been towards increased integration between banks and pension companies, e.g. in the form of financial conglomerates and via markets for risk transfer. This may entail both strengths and weaknesses in terms of financial stability.

Banks' fundamental tasks are to receive deposits from and grant loans to the public, as well as to be an important link in payment systems. In principle, the borrower and lender could meet directly in the market without an intermediary, but banks have accumulated considerable credit-assessment competencies. Using the bank as a link makes it cheaper for the two parties to meet.

The banks' expertise in credit granting limits the credit costs so that resources in the economy can be put to better use. In addition, banks play an important role in payment systems. In other words banks carry out a number of functions which are important to the economy.

The mismatch on the banks' balance sheets between non-liquid assets (loans not readily negotiable in a market typically constitute a large share of the assets) and liquid liabilities (e.g. deposits, loans from other banks or issue of short-term papers) poses a liquidity risk for the banks, cf. Box 2. Insufficient liquidity-risk management or loss of confidence in

[1] Pension companies is used as a generic term for life-insurance companies and pension funds.

the bank may lead to vulnerability in connection with sudden realisation of claims by depositors or other financial institutions (e.g. in the form of funding problems in the interbank market). Problems in one bank may spread to other banks, e.g. via interbank accounts or payment systems. Extensive problems in the banking system may affect growth and employment as a result of lower loan activity, among other factors.

Pension companies play an important role in the financial sector, by smoothing out risks among pension savers and as managers of long-term savings.

Pension-company products are mostly a combination of savings and insurance. Danish pension benefits are typically subject to a guarantee, cf. Box 8. Savings in pension companies are characterised by a group of policy-holders pooling their funds on a solidarity basis in terms of various risk types. The financial consequences of insurance risks are equalised by the group, and redistribution takes place among the policy-holders. Furthermore, the return on investment is smoothed out over the years so that the value of the pension only to a limited degree depends on the current market situation. As asset managers of their clients' savings the pension companies also have a better opportunity to diversify investments than the individual savers. In other words, a pension company offers the individual client greater diversification and lower transaction costs, e.g. in connection with investment in securities, while evening out the return over time.

Fundamentally, a pension scheme is based on a solidarity principle. That is why pension companies charge a fee (surrender charge) when a client transfers to another company[1]. Pension companies lay down their own rules for such charges, which may consist of several elements, e.g. the costs relating to administration of the surrender transaction (transaction costs for settling the insurance) and still unpaid costs which relate to the policy-holder. Such costs are not charged as one-off fees when the insurance policy is taken out, but distributed over the entire term of the insurance. This part of the surrender charge therefore ensures that the client's costs are paid by the client. The surrender charge may also cover a special fee related to market prices to avoid speculation in transfer of the policy. This fee may be charged where the market value of the assets is lower than the book value and can be justified as a means of protecting remaining clients and the pension company's equity.

[1] For compulsory labour-market schemes, which account for a significant proportion of total pension savings, a member can usually only transfer his account to another pension company in connection with a job change.

VARIOUS TYPES OF PENSION SYSTEMS Box 8

Generally, a distinction is made between two types of pension systems, defined-benefit and defined-contribution systems.

In a defined-benefit system, the pension agreement includes a provision as to the benefit eventually receivable by the pension client. This may e.g. be expressed as a percentage of the salary received by the client immediately prior to retirement, or as a percentage of an average salary throughout the client's term of employment. The benefit is thus directly related to the salary. In Denmark this system has been used e.g. in the former "commitment schemes".

In the defined-contribution system, the pension client is not guaranteed benefits of a certain amount, and the development in the benefit depends on the size of the contributions as well as investment returns, risks and costs. To the client this means that the future benefits are unknown and that basically the client bears the risk related to e.g. unfavourable trends in the financial markets in connection with the management of the pension funds.

In *Denmark* most labour-market pension schemes are defined-contribution schemes. However, the clients' risk in relation to return on investments is reduced in that the pension companies issue interest-rate guarantees[1]. Under the traditional life-insurance and pension-fund system based on average interest rates, yields are evened out, and the annual yield (the deposit rate) is the same for all members of the scheme. The interest rate applied in an individual year is calculated on the basis of the market yield levelled out over time. The collective nature of such pension schemes entails that the individual member is not entitled to specific assets or the yield on these, but is guaranteed a minimum return and a share of any surplus profits (bonus).

When profits are allocated, a number of circumstances must, however, be taken into consideration as the pension-company clients are generally a heterogeneous group. Clients' insurance agreements may be subject to different interest-rate guarantees (the maximum technical rate of interest for insurance policies with bonus is now typically in the range of 1.5-4.5 per cent, depending on when the insurance agreement was entered into), and clients' ages and risk profiles vary. One dilemma could be whether bonus reserves should be used to meet the guarantees made to "old" clients in future, or whether they should be used to support new clients' bonus expectations (at times, pension companies' competition for new customers has pushed up the prevailing deposit interest rate considerably). Under the contribution principle in the Danish Financial Supervisory Authority's regulations it is emphasised that systematic redistribution involving considerable amounts must not take place between different client age groups.

In recent years a number of pension companies have introduced the so-called unit-link schemes. Unit-link schemes comprise the same insurance elements as traditional schemes, but unlike these they are individual savings schemes where clients choose where their funds are placed. The annual yield on a unit-link product therefore directly reflects the trend in the financial markets. This is not the case for traditional schemes where the yield is evened out over several years. Some unit-link schemes are combined with an interest-rate guarantee.

Source: Report from the Danish Pension Market Council 2000/2001.

[1] Pension companies may use several methods for calculating provisions for obligations. Here interest-rate guarantee is used as a generic term of the various calculation methods.

It is still uncertain whether this fee can be justified after the introduction of the market-value principle for valuation of pension-company assets as from 1 January 2002.

Transfer charges impede pension clients' mobility, which reduces the possibility of direct competition on pension schemes in the same way as e.g. banks compete on deposit terms. The "market discipline" options (dissatisfied clients transferring to another company) are not as extensive as in the banking sector. A higher degree of comparability and transparency in terms of pension companies' results and risk sensitivity would enhance market discipline.

The lower degree of market regulation of pension companies is the reason why these companies' profit distribution – between pension clients and owners, and among pension clients themselves – is regulated by the authorities to prevent unintended redistribution.

The authorities regulate the distribution of pension-company profits on the basis of the "contribution principle", i.e. the profits are distributed among the individual pension savers and the owners on the basis of their contribution to generating the profits. The proportion attributable to pension savers (bonus) must be released in a fair manner during the term of the insurance agreement. Under the contribution principle it is emphasised that major, systematic redistribution must not take place between different client age groups.

Pension companies are not as vulnerable to liquidity risks as banks, partly because their liabilities are more long-term, and partly because the part of their investments relating to obligations vis-à-vis clients is typically more liquid than bank assets and are moreover subject to special investment rules. In addition, pension companies have collective reserves, which are part of previous years' profits which have not yet been distribution to clients.

While collective reserves are positive, the vulnerability of the pension company, viewed in isolation, will not increase if a client leaves the company. In connection with the transfer the pro-rata share of the collective reserves cannot be claimed, i.e. the collective reserves remain unchanged in connection with a client's transfer, whereas the company's obligations and corresponding assets are reduced. As stated above, the companies have found it necessary in some cases to introduce a special market price related fee. Finally, pension companies do not involve a systemic risk to financial stability. This may be the case when a bank has a liquidity crisis, since there are often counterparty risks between banks, e.g. in connection with money-market transactions.

Overall, pension companies are not deemed to have the same direct influence on financial stability as banks. The main risk relates to the size

of the clients' future pensions. In case of problems within a pension company, the losses suffered by savers will be limited by the market value of the securities portfolio supporting the commitments to clients. In terms of economic growth it is, however, important that pension companies are trusted as savings managers, so that pension savers have confidence in this type of savings.

PENSION COMPANIES' INDIRECT EFFECT ON FINANCIAL STABILITY

In comparison with banks, pension companies are deemed to have a more indirect effect on financial stability. Problems in pension companies may affect financial stability via the financial markets, via group ties with banks or via other types of risk transfer between banks and pension companies.

Financial-market effects

As significant savings managers, pension companies may have a major influence on the financial markets. In recent years, Danish pension companies have increased their holdings of – primarily foreign – shares, e.g. as a result of the liberalisation of the investment rules[1]. Up to 2001 growth in the holdings of foreign shares was to the detriment of bonds, since the bond ratio fell from just over 80 per cent in the early 1990s to just under 60 per cent in 2000, cf. Charts 40 and 41. Presumably the increased focus on shares has been based on a policy of diversification and higher returns. Preliminary figures indicate that the bond ratio increased in 2001, which should be interpreted in the light of market trends in the autumn of 2001 and subsequent portfolio adjustments.

When interest rates and/or share prices decrease, pension schemes with extensive guarantees will increasingly limit the pension companies' choice of investment policy. This was the case in the autumn of 2001, when the plummeting share prices after 11 September accentuated the problems in the pensions sector[2]. The companies mainly sold foreign shares, cf. Chart 41. Liquidity in foreign shares is deeper than in the Danish share market, so large amounts can relatively quickly be traded without significant price effects. A similar reduction in the holdings of Danish shares would presumably have to be effected over a far longer period in order to avoid a squeeze on the market.

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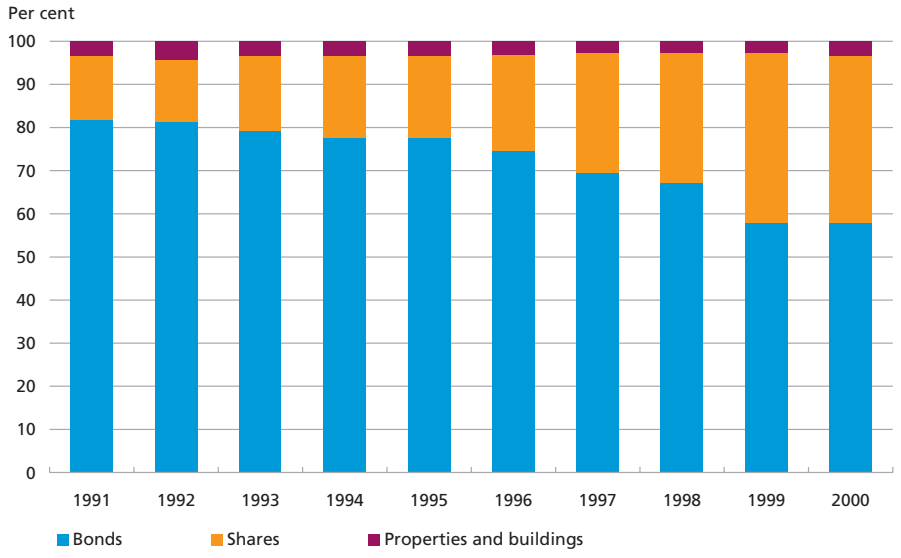
1 The share ceiling has been raised several times, most recently in 2001, from 50 per cent to an upper limit of 70 per cent for well-consolidated companies. How close each company may go to the upper limit is determined by an assessment of the company's actual capital strength in relation to risks associated with investments and obligations.

2 The return on investments was adversely affected by the decrease in share prices, while the decline in interest rates contributed to increasing insurance provisions – and thus the solvency requirement of pension companies.

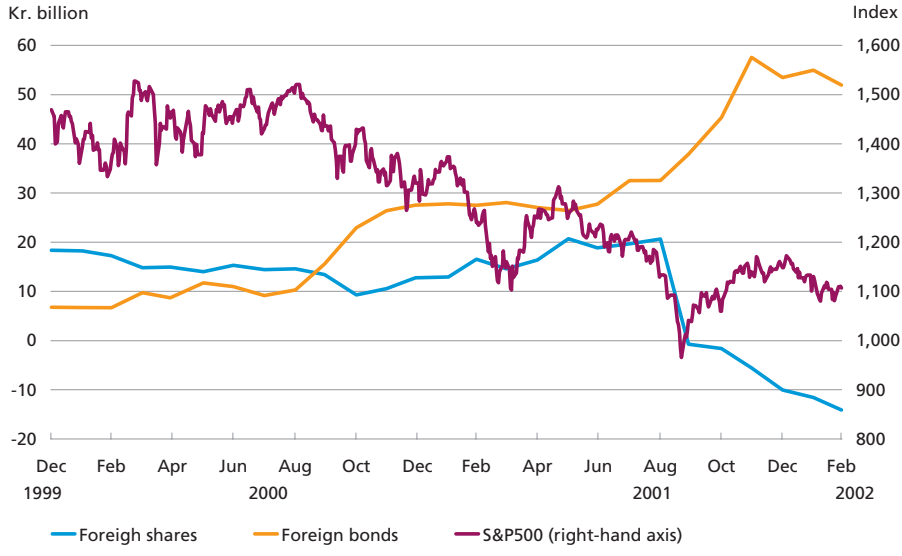
ASSET COMPOSITION IN PENSION COMPANIES Chart 40



Source: The Danish Financial Supervisory Authority.

In 2001 a number of Danish pension companies used financial instruments to hedge further loss-generating drops in bond yields and thus avoid inexpedient restructuring, cf. the chapter on trends in the financial markets.

DANISH PENSION COMPANIES' NET PURCHASES OF FOREIGN SHARES AND BONDS, 12-MONTH SUM Chart 41



Source: Bloomberg and Danmarks Nationalbank.

Effects via financial conglomerates

The links between banks and pension companies are becoming closer and closer. This is e.g. reflected in the establishment of financial conglomerates comprising both banking and life-insurance business. In addition to ordinary, business-specific risks, financial enterprises forming part of a financial conglomerate are exposed to special risks as a result of the conglomerate structure. For instance, the formation of a conglomerate may pose a risk to a bank which finds it necessary, for reputational reasons, to support an ailing company within the group. Problems within one company in the conglomerate may thus have an effect on the bank, even though the bank basically does not have any problems[1]. This can also impact financial stability.

Risk transfer between banks and insurance companies

Apart from the formation of conglomerates, the links between banks and pension companies have been strengthened in a number of other areas. The international financial markets have seen a boom in new products and markets for risk transfer, including credit, market and insurance risk, via derivatives and securitisation. The typical picture for risk transfer between banks and pension companies is that banks transfer their credit risks to pension companies, while the latter have increasingly begun to use the financial markets to hedge market risks (for instance, Danish pension companies have used the options markets to hedge interest-rate guarantees granted to pension clients). Transfer of insurance risks to non-insurance companies is very limited[2].

In relation to financial stability this type of risk transfer offers advantages, e.g. by rendering the financial institutions less vulnerable to regional, sectoral or market shocks, etc. Spreading the risk on several participants may also be an advantage. Diversification gains can thus be achieved through risk transfer. This can help to give clients lower product costs, which again benefits the economy as a whole.

On the other hand, risk transfer can also involve a number of drawbacks. Increased interdependence among the different financial institutions makes it more difficult for the authorities to monitor total risk in the financial sector and the risk distribution among the various institutions. If financial stability is purely assessed on the basis of the banks' situation, a spread in credit risk has a stabilising effect. It should be emphasised that the use of credit derivatives does not entail complete

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1 See also Financial Stability, Structural Trends in the Financial Sector, p. 79-88, *Monetary Review,* 2nd Quarter 2001, Danmarks Nationalbank.

2 See also Financial Stability Review, "Risk transfer between banks, insurance companies and capital markets: an overview", Bank of England, December 2001.

transfer of credit risk, since it is replaced by a counterparty risk. This means that in periods of recession or financial unrest, where the counterparty may also become financially vulnerable, there is a risk that the counterparty cannot meet its obligations. In principle the credit risk might thus revert to the bank [1].

Pension companies may play a more central role in connection with greater spread of credit risk away from banks. In relation to financial stability it would be important for other financial institutions also to have the necessary knowledge and capacity to assess the consequences of this risk[2]. Finally, it should be underlined that such credit-risk transfer is mainly an international trend.

PROBLEMS IN RELATION TO THE INTEREST-RATE GUARANTEE SYSTEM

Pension companies' risk profile differs from that of banks. On the assets side, pension companies have investment risks in the form of market risks and risks of fluctuations in real-property prices. Pension companies' liabilities are associated with insurance risks and an interest-rate risk[3]. Calculation of the relationship between the premiums paid and the benefits offered to the insured under the insurance policy is based on a maximum technical rate of interest. A large part of the Danish insurance agreements are based on an interest rate of 4.5 per cent, which was the maximum technical rate of interest from 1982 to 1994. This rate seemed low at the time of introduction and was presumably seen as a calculation assumption, but it has subsequently caused problems due to the low interest-rate level in recent years. Pension companies therefore face a considerable risk in that clients have been guaranteed a minimum nominal interest rate, which must be met for many years ahead.

Most Danish pension schemes are defined-contribution schemes, cf. Box 8, but in relation to pure defined-contribution schemes the risk on return to the client is limited, in that the pension company has typically issued an interest-rate guarantee. In other words, pension companies are bound in several ways. On the one hand they have guaranteed a certain interest rate, on the other hand they cannot claim higher contributions from the savers.

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1 For instance, the liquidation of Enron has sparked a series of lawsuits as to whether e.g. credit derivatives related to Enron's debt can be enforced.

2 In that connection Howard Davies, Chairman, Financial Services Authority, has emphasised that the rapid growth of credit-risk transfers of various forms between banks and pension companies in the UK are causing concern (press release, 29 January 2002, see www.fsa.gov.uk) .

3 See Charlotte Møller, "Tilsynet med risikostyring i livsforsikringsselskaber og pensionskasser", Finans/Invest 8/01.

The long-term nominal interest-rate guarantees and the minimum solvency requirements[1] for pension companies are the two determining factors behind Danish pension companies' investment policy. Interest-rate guarantees may thus involve a kind of cost in the form of less freedom to compose the asset portfolio and can thus lower the yield potential for investment assets.

The drop in share prices and long-term interest rates in the autumn of 2001 exacerbated the guarantee problems experienced by a number of pension companies which found it difficult to meet the statutory capital requirements. Some companies have hedged against decreases in interest rates via the options market. Some pension companies are also considering splitting up policy blocks, by the size of the guarantees, in various sub-blocks with related investment assets. For each sub-block an investment policy may then be pursued which best matches the individual guarantees. The higher the maximum technical rate of interest, the more cautious the investment policy. Thus customers with extensive guarantees basically finance these guarantees themselves.

Up till now, many insurance companies have fixed the deposit rate for clients one year ahead, and this rate has been an important competitive parameter among pension companies. On the basis of the problems experienced by the sector in the autumn of 2001, many companies have now adopted a new approach in respect of deposit rates. Generally, the 2002 level is lower than the 2001 level, and in addition some companies have introduced a variable rate over the year, depending on the development in the return on investments. Flexible deposit rates can make it easier for companies to meet their obligations. On the other hand, different methods for fixing deposit rates reduce transparency for clients[2].

In general, the scope for changing the terms of guarantees already given is presumably limited. For new contracts, however, there is room for development. Considering that most pension schemes are established with very long-time horizons, it would be expedient for the pension system to be adjustable and better geared to tackle changes in the economic assumptions.

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1 Unlike the procedure for banks, where the solvency requirement is based on assets, the capital-base requirement for pension companies (the solvency margin requirement) is based on liabilities.

2 It should be noted that some companies already applied flexible deposit rates before 2001, and pension funds typically determine and add the deposit rate for each year when the year is over.

The Banks' Capital Adequacy and Earnings

Excess capital reserves and a good earnings capacity both help to safeguard banks and thus contribute to financial stability. Several large Danish banks have implemented capital allocation models to optimise the relationship between earnings capacity, capital base and risk profile. Such models can be good strategic tools which can enhance the banks' risk management when combined with traditional credit rating.

THE BANKS' CAPITAL ADEQUACY

In recent years the focus on corporate governance has increased. The desire for good governance stems from the fact that ownership and management are segregated[1]. The management might in such case choose to pursue objectives which are not – or are only partly – shared by the owners.

Banks are mostly operated as limited companies on a par with other companies in the corporate sector. This means that owners demand the same return on invested capital as from other companies with a similar risk profile.

However, the financial sector has a special position in a macroeconomic context, and special rules and regulations apply to its companies. The most important requirement as regards banks is the capital-adequacy requirement. The current capital-adequacy requirements are based on the Basle Accord of 1988, which has been incorporated into EC directives and thus implemented in Danish law. The capital requirement sets a lower limit for the banks' ratio of capital to the sum of risk-weighted assets. The capital-adequacy rules and a number of other statutory requirements for banks have been set out to meet society's need for a stable financial sector, including the wish to protect depositors trusting commercial banks with their funds. This makes banking business unique in relation to other business. The stakeholders safeguarding the interests of society and its citizens are referred to as authorities in the following.

There may be a conflict of interests between authorities and owners, which can pose a dilemma for a bank when optimising the capital structure and risk profile.

The authorities determine the capital requirements which the bank must meet as minimum. In addition, the authorities define limits for the risks the bank may assume.

[1] See Jens Verner Andersen, Corporate Governance in the Danish Financial Sector, Danmarks Nationalbank, Monetary Review, 4th Quarter 1999.

The owners set targets for the return on the invested capital and thus encourage the bank to take risks which can ensure a satisfactory return.

Capital adequacy and profitability

The increased focus on corporate governance has accentuated the owners' interests, i.e. shareholder value. One result of this has been that a number of banks have reduced their core capital via increased dividend payments or share buy-backs. Reduction of the core capital increases the return for the owners, since it is assumed that they can obtain a better return by investing their excess capital elsewhere. By buying back shares the bank also signals to the market its adherence to the principle of shareholder value, which is expected to boost the price of its shares and thus increase its value. However, a number of Danish banks also have limits on voting rights and ownership, which does not support the target of maximising the return on capital.

It is in the interest of owners that banks are operated as efficiently as possible in order to maximise the earnings capacity. An improved earnings capacity will have a positive effect on profitability. Profitability can be a measure of the extent to which the bank is capable of generating earnings on the basis of the use of capital and the risks assumed. A good earnings capacity can act as a buffer against unexpected losses.

Since the bank's authorisation to carry out credit-institution activities may be revoked if the capital adequacy falls below the authorities' capital-adequacy requirement of 8 per cent, it is in fact the capital reserves exceeding 8 per cent which enables the bank to withstand unexpected losses.

Good earnings capacity and excess capital reserves therefore both help to safeguard the banks and thus contribute to financial stability. These are not independent sources, since the excess capital reserves may have been generated via good earnings in previous years. An improved earnings capacity may, all other things being equal, reduce the need for excess capital reserves.

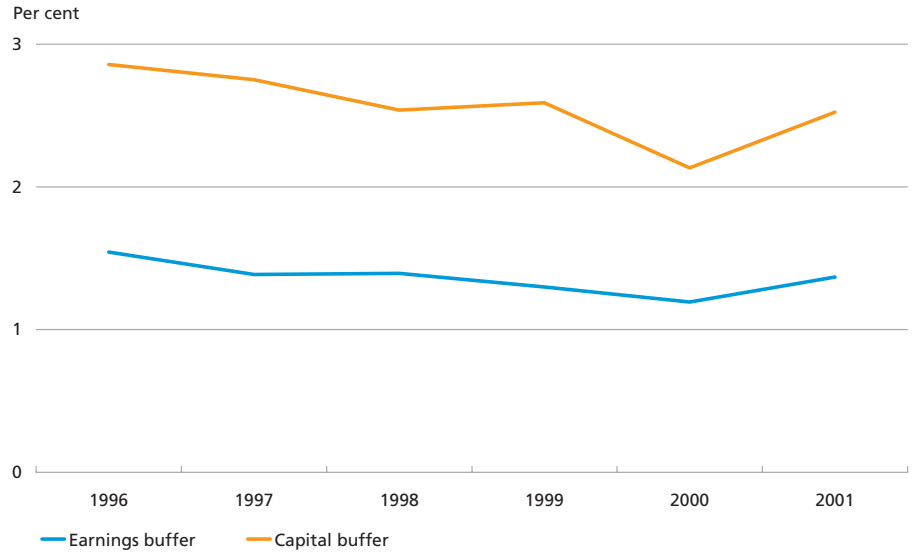
On the other hand, it requires considerable resources to keep the excess capital level as close as possible to the statutory requirement. This may be one reason why small banks in particular often opt for greater excess capital reserves.

Based on 50 banks'[1] financial statements, Chart 42 defines a measure for the banks' average earnings and capital buffers[2] in the period 1996-2001. The earnings and capital buffers can be seen as simple indicators

[1] See the footnote on p. 18 in the chapter on trends in the financial sector.

[2] Here the earnings buffer is calculated as the profit before tax as a ratio of total risk-weighted assets. The capital buffer is calculated as excess capital reserves, i.e. the ratio of capital to risk-weighted assets exceeding the 8 per cent capital-adequacy requirement.

BANKS' EARNINGS AND CAPITAL BUFFERS AS PERCENTAGES OF TOTAL RISK-WEIGHTED ASSETS, 1996-2001 Chart 42



Note: The averages have been calculated for the 50 banks included in the analyses of trends in the financial sector. Where the bank is part of a group, consolidated figures are used. The 1996 data are not complete. The 2000 level is influenced by the merger between Danske Bank and RealDanmark.
Source: Annual accounts and BankScope.

of earnings capacity and excess capital reserves. Considered over the whole period the Danish banks' earnings and capital buffers declined marginally. In 2001 they increased compared to 2000.

CAPITAL ALLOCATION

The major Nordic financial groups and the largest Danish banks have implemented capital-allocation models to optimise capital utilisation in the various business areas by focusing on earnings capacity and risks.

The return in relation to the risk and thus the allocated capital can basically be improved via three parameters. Firstly, revenue can be increased, depending on the competition environment among other things. Secondly, costs can be reduced, but only to the extent that the earnings capacity is maintained. Thirdly, the risk can be adjusted, with focus on whether the risk-to-earnings ratio is appropriate. When attempting to optimise all three parameters, the bank must still take into account the statutory capital-adequacy requirement.

RAROC models[1] constitute one type of capital-allocation model. In the following RAROC is used as a generic term for capital-allocation models

[1] Risk-Adjusted Return On Capital.

where the risk-adjusted return is seen as a ratio of economic capital. Risk-adjustment of the net income can be based on several principles, and likewise there are several methods for calculating capital. The risk-adjusted return differs from the accounting return as it reflects the annual loss the bank expects to suffer on average over a longer period, e.g. a complete business cycle. The term economic capital covers the estimated capital required to cover the anticipated maximum loss within a period with a certain probability. The calculation takes into account unexpected losses in relation to various risk types, e.g. market risks, credit risks[1] and operational risks. Economic capital is thus the bank's own assessment of the necessary capital base.

RAROC models enable calculations and comparison of the risk-adjusted return on economic capital within the individual business areas. For each business area the risk-adjusted return on economic capital must at least match the requirements set. If this is not the case for a business area, the activity may be subject to strategic review. RAROC models may help to ensure an appropriate relationship between earnings capacity, capital and risk profile within the individual business areas. In addition, RAROC models can be used for pricing products and services.

Some Nordic financial groups and Danish banks apply capital allocation models which are less sophisticated than the RAROC models, e.g. models which allocate the statutory capital.

The Basle Committee is reviewing the capital requirements for banks, and published a new consultative document to this effect in January 2001[2]. The philosophy behind the proposed new capital-adequacy requirements is that the banks' knowledge and overview of their own risk profiles should be exploited further to improve the coherence between statutory capital reserves and economic capital. The proposed capital-adequacy requirements take greater account of the financial innovation within risk assessment and management. According to the Basle Committee's present time schedule the proposal should be finalised by the end of 2002 with implementation by 2005. It is uncertain whether this can be achieved, since a number of key elements in the proposed set of rules still need to be negotiated and settled. Judging from the present proposal, there will be many similarities between the RAROC models and the principles for determining future capital requirements.

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1 Credit models are described in Jens Verner Andersen, Kristian Sparre Andersen, Leif Lybecker and Suzanne Hyldahl, Models for Management of Banks' Credit Risk, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2001.

2 In February 2001 this document was followed by a new consultative document from the European Commission. The proposal for new capital-adequacy rules is explained in further detail in Suzanne Hyldahl, *New* Capital-Adequacy Rules for Banks, Danmarks Nationalbank, Monetary Review, 1st Quarter 2001.

The existing capital allocation models were implemented at a time when the economy had seen sustained high growth for some years, which may have affected the parameters used and thus yielded a too optimistic risk picture. However, the models are good strategic tools which can enhance the banks' risk management when combined with traditional credit rating.

Payment System Risks

Payment systems are potential sources of contagion which can transmit credit or liquidity problems directly and quickly from one system participant to the rest. Such domino effects are called systemic risks. Simulations of various failure scenarios in Kronos and the Sumclearing, the two central payment systems in Denmark, have been conducted. The simulations were carried out to quantify the extent to which the largest individual participant's problems can be transmitted to the other system participants. The simulations show a limited transmission to the other participants, but they also show that ample liquidity in the systems is a decisive factor.

PAYMENT SYSTEM RISKS

A payment system's exposure to systemic risks depends on its design and functioning. In principle, there is no spreading of credit risk in Kronos and only limited spreading of credit risk in the Sumclearing, but there is a risk of spreading liquidity risk[1]. However, both systems are generally regarded as secure and stable. In an analysis of the systems' stability attempts have been made to quantify the extent to which liquidity risks can spread from one participant to the other participants in the Sumclearing and Kronos respectively. The method applied was simulations of various failure scenarios for the two systems[2].

The Sumclearing and Kronos are the backbone of the settlement of retail and interbank payments respectively in Denmark. In 2001, the total transaction value in absolute terms in the Sumclearing was thus three times higher than the Gross Domestic Product (GDP) and in Kronos almost 30 times higher than GDP.

The simulations concern two different failure scenarios, both based on the largest system participant having problems[3]. In the *financial failure*

1 Payment system risks are described in Financial Stability, Danmarks Nationalbank, *Monetary Review,* 2nd Quarter 2001, p. 73f.

2 The survey is an element of Danmarks Nationalbank's oversight of systemically important payment systems. Central banks' oversight of these systems is described in further detail in Tobias Thygesen, International Standards for Payment Systems, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2001. The Nationalbank's oversight is described in Danmarks Nationalbank, *Monetary Review*, 2nd Quarter 2001, p. 89f.

3 A survey of the implications of problems for the largest individual system participant is a frequently applied method. Principle no. 5 of "Core Principles for Systemically Important Payment Systems" prepared by the central banks of the G10 countries in 2000 requires timely completion of daily settlements in a netting system in the event of an inability to settle by the participant with the largest single settlement obligation.

scenario the largest payment system participant is assumed to be subject to compulsory liquidation. Its removal from the system then results in inability to settle the participant's payments on own behalf and on behalf of others. In the *operational failure scenario* the largest participant is assumed to be unable to connect to the system for technical reasons for a given period.

These simulations confirm that Kronos and the Sumclearing are secure and stable payment systems. The removal of the largest participant has little effect on the rest. However, a prerequisite in the simulations is ample available liquidity such as the current level. It can thus be useful to monitor the liquidity in the payment systems.

When interpreting the simulation results it is important to bear in mind that the data reflect the participants' payment behaviour given the amount of liquidity actually available in the period under review. This behaviour would thus most likely be different in a failure scenario. It must also be emphasised that the simulations are isolated analyses which do not take into account the interaction between settlement of payments in Kronos, the Sumclearing and the VP settlement system.

Simulations of systemic risk in the Sumclearing

The Sumclearing is the Danish retail payment system for settlement of Dankort (debit card) payments, cheques, account-to-account payments and BetalingsService (direct debit) payments. The Sumclearing is a netting system. At fixed times of the day the 67 participants' multilateral net positions[1] are calculated and subsequently settled via the participants' accounts with Danmarks Nationalbank[2]. The payments of a participant with insufficient liquidity are removed from the settlement process.

The Sumclearing is subject to a potential systemic risk, since the removal of a participant could mean that other participants expecting to receive liquidity from the removed participant become unable to fulfil their own obligations. In the following this systemic risk is clarified by simulation of a financial and an operational failure scenario based on actual data for 22 settlement days in the period 21 December 2001-25 January 2002[3]. A measure of systemic risk can be the number of participants unable to fulfil their settlement obligations as a consequence of compulsory liquidation of or operational problems for the largest par-

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1 Multilateral net positions: a figure for each participant stating how much the participant must pay or receive in overall or net terms in the settlement in question.

2 The settlement concept and account structure of Danmarks Nationalbank are described in further detail in "Financial Institutions' Accounts at and Pledging of Collateral to Danmarks Nationalbank", Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2001.

3 The simulations have been conducted in cooperation with the Danish Bankers Association and PBS, respectively the owner and operator of the Sumclearing. The methodology and results will be described in further detail in a subsequent working paper to be published by Danmarks Nationalbank.

ticipant. The analysis does not consider whether the participants are able to provide more liquidity in the settlement than they actually did on the days in question.

In the financial failure scenario the participant with the largest multilateral net position is assumed to be subject to compulsory liquidation. However, in the cases where Danmarks Nationalbank has the largest position the participant with the second-largest multilateral net position is assumed to be subject to compulsory liquidation. This is the case on 17 of the 22 days in the analysis. Danmarks Nationalbank's often very large positions in the Sumclearing reflect its role as banker for central-government payments. In the operational failure scenario outgoing central-government payments are assumed to be subject to operational problems[1].

Financial failure scenario in the Sumclearing

The simulations of the financial failure scenario show that in general, compulsory liquidation of the largest participant does not lead to systemic effects in the Sumclearing. On only one of the 22 days in the analysis did problems spread from the liquidated participant to the other participants, and in this case the multilateral net position of only one participant exceeded the maximum drawing access. The analysis does not consider whether the participant in question could have provided extra liquidity for settlement.

The absence of systemic effects in the Sumclearing in the period under review indicates that there is ample liquidity in the Danish financial sector and that the participants provide considerably more liquidity for settlement in the Sumclearing than is strictly necessary. Chart 43 shows the excess liquidity in the actual settlement on the days in question.

The inherent risk in netting systems, which is also present in the Sumclearing, can be illustrated by a number of simulations in which the participants' liquidity is equal to their drawing requirements before compulsory liquidation of a participant[2]. This shows how compulsory liquidation of the largest participant affects the liquidity of the other system participants.

The simulations with hypothetical and very limited maximum drawing access show that on average just over one third of the participants drop

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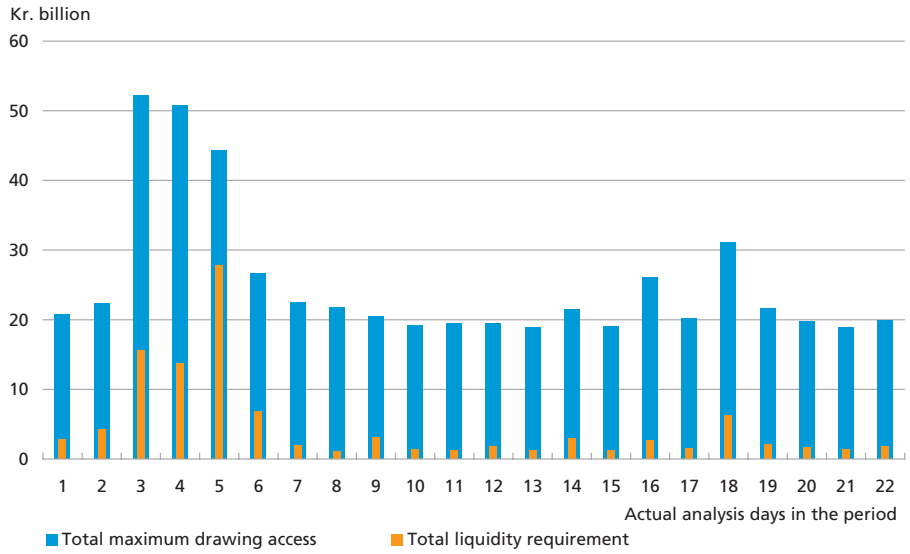
1 Settlement of central-government payments is undertaken by a private bank. However, central-government payments are kept separate from the bank's own payments, since central-government payments are processed in the Sumclearing together with Danmarks Nationalbank's payments. Central-government payments will thus be unaffected, should the handling bank be subject to compulsory liquidation, but it cannot be ruled out that operational problems can lead to inability to effect central-government payments. Operational problems in connection with settlement of central-government payments are simulated by removing Danmarks Nationalbank from the settlement process. Danmarks Nationalbank's own payments in the Sumclearing are negligible compared to central-government payments.

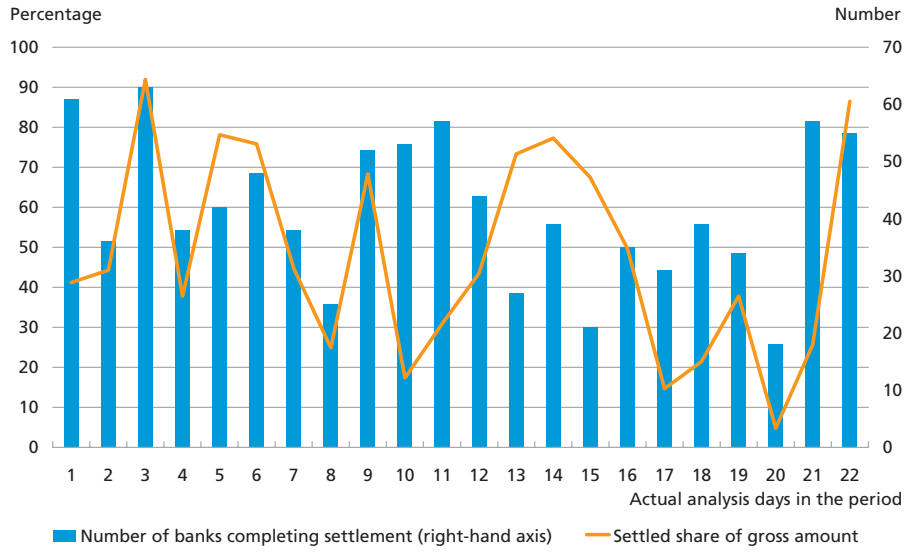
2 This is not a realistic scenario, since the participants in a netting system should always have a certain amount of buffer liquidity.

EXCESS LIQUIDITY IN THE SUMCLEARING — Chart 43



out of the settlement in the event of compulsory liquidation of the largest participant. Chart 44 shows how many of the 67 participants go through with the settlement and how large a share of the gross amounts is settled on the individual days, subject to the given assumptions.

SYSTEMIC EFFECTS AT NO EXCESS LIQUIDITY — Chart 44



FINANCIAL FAILURE SCENARIO – LIQUIDITY AND SYSTEMIC RISKS Table 6

Excess liquidity	100 per cent	75 per cent	50 per cent	25 per cent	0 per cent
Number of days with systemic effects	1	1	1	3	22
Number of participants affected (average) ...	1	1	1	1	23

With a view to assessment of the sensitivity of the results to changes in liquidity, simulations have been conducted with reduction of the excess liquidity in the system to 75, 50 and 25 per cent respectively of actual excess liquidity. The systemic risk in the Sumclearing turns out to be negligible even on reduction of excess liquidity to 25 per cent of the original level. On only 3 of the 22 days did one other participant encounter liquidity problems, and on average almost the entire part of the original gross amount which does not concern the participant subject to compulsory liquidation is settled. The correlation between liquidity and systemic risk is shown in Table 6.

The conclusion of the analysis of the financial failure scenario is that in the present liquidity situation the Sumclearing is robust to compulsory liquidation of the largest participant. This also applies in the event of reduction of liquidity from the present level. However, in the absence of excess liquidity systemic effects occur on all 22 days.

Operational failure scenario in the Sumclearing

The operational failure scenario assumes operational problems in the settlement of central-government payments, excluding these payments from the Sumclearing. In this scenario, systemic effects occur on 2 out of the 22 days. On the one day the non-settlement of central-government payments means that two other participants have insufficient liquidity for settlement and on the other day 10 participants encounter problems. A reduction of the excess liquidity in the system entails an increase in the systemic risk so that problems will still only occur on a few days, but more participants will encounter liquidity problems. Table 7 shows the correlation between system liquidity and systemic risk.

OPERATIONAL FAILURE SCENARIO – LIQUIDITY AND SYSTEMIC RISKS Table 7

Excess liquidity	100 per cent	75 per cent	50 per cent	25 per cent	0 per cent
Number of days with systemic effects	2	2	2	2	22
Number of participants affected (average) ...	6	8	10	16	57

In the hypothetical situation where the maximum drawing access is equal to the participants' drawing requirements (without operational problems) systemic effects occur on all 22 days, as in the financial failure scenario. On 5 of the days in the analysis the settlement system collapses and no participants can complete their settlements. On average 57 participants will drop out of the settlement. The very considerable systemic effects in this scenario show that central-government payments are a central element of liquidity in the Sumclearing, since most of the participants typically receive payments from the central government.

The analysis of the operational failure scenario shows that the systemic effects in the Sumclearing generated by the inability to settle central-government payments are more pronounced than the systemic effects in the financial failure scenario.

Simulations of systemic risk in Kronos

Kronos is the Nationalbank's real-time gross settlement system (RTGS system) for payments in kroner and euro. RTGS systems allow account holders to transfer online payments from their own accounts to the accounts of other account holders. The individual payments are typically large and often time-critical and are settled immediately and finally via the accounts. An RTGS system in principle eliminates the credit risk for the recipient participant, but does not eliminate the liquidity risk. Payments entered to an RTGS system might therefore not be settled immediately, but take their place in a queue[1].

A number of simulations have been carried out to assess the extent to which a financial and an operational failure for the largest participant generate queuing, which would contribute to delaying settlement of payments. The extent of delays can be regarded as a measure of the systemic risk in Kronos.

The participants are assumed to have access to the exact amount of liquidity required for settlement of all payments without delay under normal circumstances. The simulations are based on the participants' actual book entries over a continuous period of 64 banking days[2].

In the *financial failure scenario* the largest participant in terms of value of payments is assumed to be subject to compulsory liquidation at the beginning of the day and is therefore unable to send or receive payments during the day. In the *operational failure scenario* it is assumed that the largest participant cannot connect to the system until 1

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

[2] The simulations are described in further detail in E-money and Payment System Review, Central Banking Publications, 2002.

hour before the system closes. It is also assumed that the other participants are unaware of the problem and continue transmitting payments to the participant in question. An important difference between the two scenarios is that in the operational scenario some time elapses, depending on the reason for the technical problem, before the other participants become fully aware of the problem and act accordingly. On the other hand, the other participants are fully aware of a case of compulsory liquidation.

The effect of a failure on settlement delays

Table 8 shows how a financial and an operational failure for the largest individual participant affect settlement delays. The financial failure scenario showed very moderate delays on average, but significant delays on certain days. The delays are also relatively limited in the operational failure scenario, but somewhat longer than in the financial failure scenario. The reason is that a considerable proportion of liquidity is locked on the relevant participant's settlement account until 1 hour before the system closes.

The system participants can themselves reduce the delays in the settlement of payments by countermeasures to deal with another participant's operational problems. The model therefore moderates the assumption that all the other participants are unaware of the relevant participant's problems by giving payments to this participant a low priority. However, the simulations indicate that the effect of such measures is very limited, since the indicator of average and maximum delay is 0.11 and 0.30, respectively.

In the financial failure scenario it was not possible to settle all payments during the day given the amount of liquidity available to the participants. This is due to the fact that the total liquidity requirement of the remaining participants at the end of the day was greater after the removal of the largest individual participant. On average, approximately 4.5 per cent of the total payment value was not settled, but on the worst day in the period under review, the share of unsettled payments was 27 per cent. The operational failure scenario showed only one case of unsettled payments at the end of a day[1].

The simulations in Kronos were subject to relatively restrictive assumptions regarding the amount of available liquidity. The simulations showed that operational and financial failure have an effect on the extent of delays and unsettled payments, but that this effect is limited.

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[1] All these payments could be settled by applying a gridlock resolution mechanism in the operational failure scenario. In the financial failure scenario the gridlock resolution mechanism contributed less to reducing the number of unsettled payments. Gridlocks and gridlock resolution are described in further detail in Morten Linnemann Bech and Kimmo Soramäki, Gridlock Resolution in Payment Systems, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2001.

THE EFFECT OF FAILURE ON SETTLEMENT DELAYS — Table 8

Indicator of delay, ρ	Financial failure	Operational failure
Average delay	0.04	0.12
Maximum delay	0.26	0.31

Note.: The delays in the settlement of payments are measured by the indicator, ρ. The indicator is zero if all payments are settled immediately and 1 if all payments are settled at the end of the day.

PAYMENT SYSTEM EFFICIENCY

The simulations of failure scenarios in the Sumclearing and Kronos focus on the systems' stability and security. These aspects of payment systems have traditionally been a focus area for central banks. However, in recent years, focus has also been on system efficiency, which is reflected e.g. in the latest international recommendations concerning payment and securities settlement systems[1]. The recommendations include e.g. that settlement in payment systems should be practical for the participants and efficient for the economy.

The background to central banks' increased focus on both stability and efficiency is that a payment system can be so "secure" that the very high costs of using it will induce the participants to settle payments in less secure systems. The completely secure payment system is thus not a realistic option, and a balance must be struck between security/stability and efficiency.

Examples of balancing stability and efficiency

In the autumn of 2001 Danmarks Nationalbank entered into cooperation with the financial sector and the Danish Securities Centre (VP) to improve the flexibility of the provision of collateral for settlement in the VP settlement system, the Sumclearing and the future currency settlement system, CLS[2]. Flexibility is enhanced by extending the scope of the automatic collateralisation agreement which is a particularly flexible type of provision of collateral. Currently, the automatic collateralisation agreement is used only in connection with securities settlement, but under the new system it will also be used in the other settlement systems. This enhances the efficiency of the systems as a whole. However, this solution could also reduce the stability, since it creates interdependence between the settlement systems. Delays in one settlement system could e.g. be transmitted to other settle-

[1] See "Core Principles for Systemically Important Payment Systems" published by the G-10 countries' central banks in 2000 and "Recommendations for Securities Settlement Systems" published by the G-10 countries' central banks in cooperation with IOSCO (International Organisation of Securities Commissions) in 2001. Both reports are available at www.bis.org.

[2] CLS is described in further detail in Danmarks Nationalbank, *Report and Accounts 2001*, p. 73.

ments in so far as collateral is tied in one system until settlement in this system has been completed. However, the recommended model for extending the automatic collateralisation agreement achieves a balance between efficient provision of collateral and the security of payment systems. The decision to extend the automatic collateralisation agreement is thus an example of actively balancing efficiency and stability.

Another example shows that different participants strike different balances between stability and efficiency. There are two types of participants in the Sumclearing and in the VP settlement system: direct and indirect participants. The indirect participant settles payments/trades via the direct participant. This provides for easier settlement at lower cost for the indirect participant. On the other hand, the indirect participant could be exposed to a higher risk, since this procedure is for the indirect participant associated with a credit risk as well as a liquidity risk on the direct participant. Finally, the indirect participant could also be exposed to an operational risk, since the indirect participant risks losing access to settlement if the direct participant drops out.

Analysis of Banks in Relation to Financial Stability

This chapter describes the analysis of the banks in relation to financial stability. The banks evolve all the time, so the methods and analyses described here cannot be applied mechanically. Instead, they should be adjusted and improved on an ongoing basis. The analyses described provide partial views of aspects of the banking sector. Subject to a certain amount of caution, these partial views can be pieced together to form an overall view of the banking sector's robustness and thus the conditions for financial stability.

The most important data sources for the analyses of the banks in relation to financial stability are the banks' own annual financial statements, data releases from the Danish Financial Supervisory Authority and the central bank's own statistics on financial institutions. Consolidated figures comprise all elements of the groups, which means that several major Danish groups are included for business areas, i.e. banking, mortgage credit and insurance. Consolidated figures are most relevant e.g. in an analysis of capital adequacy, while individual bank figures are most relevant e.g. in an analysis of the banks' lending.

The analysis can be conducted at several levels ranging from the overall banking sector to the individual bank. In an analysis of the banks as a whole, the overall average approach is supplemented with distribution measures to achieve a more varied presentation of the sector. The Danish banks vary considerably, which emphasises the need for distribution measures. The figures can be broken down using various methods, depending on the type of data and the areas to be analysed. One method is to break down key indicators for the individual banks into percentiles. This makes it possible to e.g. identify the 10 per cent of the banks showing the strongest deviation from the median. Another method is to determine a cut-off value for a given key indicator and simply count the number of banks below the cut-off value. A third method is attributing weights to the key indicators. Weighting can be in terms of e.g. total balance-sheet value or equity.

THE BANKS' FINANCIAL STATEMENTS

The general principles for the banks' presentation of financial statements are laid down in the Commercial Banks and Savings Banks, etc. Consolidated Act, while more detailed accounting requirements are set out in the Danish Financial Supervisory Authority's Executive Order on the Presentation of Accounts, etc., by credit institutions, specialised credit institutions and certain savings and lending institutions. The Financial Business Act adopted in the spring of 2001 provides for several amendments of the accounting regulations for banks among others. However, the chapter on annual financial statements and audit will not enter into force until a committee established by the Financial Supervisory Authority has examined the consequences of introducing new rules. The committee will assess such issues as how valuation is affected by the introduction of the fair-value principle as a new valuation principle[1].

The banks' annual financial statements are subject to specific requirements and must consist of a balance sheet, a profit and loss account, notes and an annual report. These components must be combined into a whole which provides a true and fair view of the banks' assets and liabilities, financial position and result.

The banks' valuation is subject to the prudent accounting principle, whereby gains must not be included before they are realised, while losses must be included as soon as they are likely. Furthermore, the banks interpret the prudent accounting principle in the sense that within the framework of the Act the banks deliberately adopt a prudent approach to the valuation of assets and liabilities. Besides the prudent accounting principle the valuation rules are influenced by the fact that individual balance-sheet items are subject to varying valuation principles. The valuation principles are overall applied to valuation of fixed assets, current assets, debtors and items in foreign currency and financial instruments.

A bank's balance sheet is a snapshot of the composition of assets and liabilities as at the balance-sheet date. It does not show – possibly significant – fluctuations during the accounting period. The balance sheet is not an exact statement of the value of the bank's assets and liabilities, including equity capital, since valuation of e.g. loans and guarantees is based on estimated expected losses which may be influenced by the banks' own assessments. Off-balance-sheet items such as guarantees are also presented in connection with the balance sheet. The balance-sheet items fluctuate on an ongoing basis in accordance with the banks' focus

[1] For more details, see Jens Verner Andersen and Per Plougmand Bærtelsen, Application of the Fair Value Principle to the Banks' Financial Statements, Danmarks Nationalbank, *Monetary Review,* 3rd Quarter 2001.

BALANCE-SHEET AND OFF-BALANCE-SHEET ITEMS, END-2000, KR. BILLION Table 9

ASSETS		LIABILITIES	
Cash balances and demand deposits with central banks	15.8	Debt to credit institutions and central banks	475.9
Treasury bills, etc. for refinancing at central banks	0	Deposits	760.0
Claims on credit institutions and deposits with central banks	331.7	Issued bonds	109.8
Loans and advances	778.8	Other liabilities	237.8
Bonds	355.6	Accruals and deferred income	0
Shares, etc.	44.8	Provisions for obligations	3.8
Holdings in associated undertakings, etc.	3.4	Subordinate debt	40.6
Holdings in subsidiary undertakings	57.5	Shareholders equity	116.8
Intangible assets	0	Total liabilities	1,745.4
Tangible assets	13.4	*Off-balance-sheet items*	
Own shares	1.4	Guarantees, etc.	317.0
Other shares	141.6	Other commitments	125.7
Prepayments	1.3		
Total assets	1,745.4		

Source: The Danish Financial Supervisory Authority.

and strategies in various areas. The balance sheet is also affected by changes in market conditions or business cycles. Table 9 shows the balance sheet for all banks in categories 1-3 in 2000.

The profit and loss account shows the operating result for a given period. The result is closely associated with the development in the balance-sheet items and with general economic trends as well as the banks' operations. Table 10 shows the profit and loss account for banks in categories 1-3 for 2000.

The financial statements must also include a number of notes with further specification of the items in the profit and loss account and balance sheet, as well as off-balance-sheet items. This information provides more details on the content of the items and contributes to clarifying the relationship between items in the profit and loss account and balance-sheet and off-balance-sheet items. The notes also include key indicators, primarily capital adequacy, profitability and market, liquidity and credit risks. Stock-exchange-listed banks must provide key indicators related to the stock market.

The annual report gives an account of the development in the banks' financial activities and aspects. If the annual accounts are influenced by significant extraordinary circumstances or subject to significant uncertainty, this must also be stated and quantified, if possible. The annual report also contains information on any important events after the closing of the accounts, as well as the bank's expected main development activities. The report's more qualitative orientation often supplements

PROFIT AND LOSS ACCOUNT FOR 2000, KR. BILLION	Table 10
Profit and loss account	
Interest income	93.4
Interest expense	62.2
Net interest income	31.2
Dividend from shares, etc.	0.9
Fee and commission income	15.7
Fees and commissions paid	2.5
Net interest and fee income	45.2
Value adjustments of securities and foreign exchange income	4.6
Other operating income	1.6
Personnel and administration expenses	30.8
Amortisation and depreciation	1.8
Other operating expenses	2.6
Provisions for bad and doubtful debts	3.1
Value adjustments of capital investments	4.6
Profit on ordinary operations before tax	17.8
Extraordinary income	0
Extraordinary expenses	0
Tax	3.4
Profit for the year	14.4

Source: The Danish Financial Supervisory Authority.

the quantitative data in the accounts. In addition, the report must describe the expected main development activities. This part of the report is thus more forward-looking than the accounts data.

AREAS OF ANALYSIS OF RELEVANCE TO FINANCIAL STABILITY

The analysis in relation to financial stability covers three main areas: capital adequacy, earnings capacity and profitability, and risks. At an overall level, the most interesting analysis would be of banks that are systemically important to the financial system. A number of the described key indicators are used in the chapter on trends in the financial sector.

Capital adequacy

The Commercial Banks and Savings Banks, etc. Consolidated Act imposes a minimum solvency requirement on the banks[1] whereby liable capital plus any short-term supplementary capital must at any time constitute at least 8 per cent of the bank's risk-weighted assets, etc., including items associated with market risk. In case of non-compliance with the capital-

[1] Liable capital consists of core capital after deductions (paid-up share or guarantee capital as well as the premium on issue and reserves less the portfolio of own shares, intangible assets, tax assets and the current deficit for the year), as well as supplementary capital after deduction of capital investments and subordinate capital in certain types of financial enterprises. Supplementary capital must not exceed 100 per cent of the core capital after deductions.

adequacy requirement the Financial Supervisory Authority may stipulate a time frame for compliance or revoke the authorisation to carry out credit-institution activities. In view of the latter condition, it is the capital in excess of 8 per cent that constitutes the bank's buffer against unexpected losses.

An analysis of capital adequacy provides an indication of the financial institutions' robustness to unexpected losses which cannot be absorbed by earnings.

The solvency and core capital ratios are the two most frequently used key indicators. The two indicators have the same denominator, i.e. total risk-weighted assets, but different numerators, i.e. liable capital and core capital after deductions, respectively. The denominator, which consists of risk-weighted items, covers both credit and market risks. The current rules apply very coarse risk weights, so that the actual economic risk may deviate from the risk calculated according to the statutory risk weights. However, the forthcoming[1] new capital-adequacy rules will take greater account of the actual risks assumed by financial institutions.

A falling trend in the key indicators for capital adequacy can be attributed to increased risk and/or a declining capital base. If the capital base alone is viewed in terms of financial stability, a high capital-adequacy level would enable the bank to withstand losses at least in the short term.

Earnings capacity and profitability

The earnings capacity is closely associated with the banks' strategy and balance-sheet composition. The analysis of earnings capacity covers income as well as the expenses defrayed to generate that income. The purpose is to achieve an indication of the robustness of the banks' earnings. Profitability is assessed in terms of the result as a ratio of the resources applied, such as total assets.

At first, the composition of the banks' business activities is considered. Lending and deposits are still the most important business activities for most Danish banks. The income from these activities is primarily reflected in net interest income. The area of securities trading and management has become more and more important to Danish banks in recent years due to such factors as re-mortgaging of an increasing number of mortgage-credit loans and growing securities trading. These activities mainly generate fee and commission income. Some business activities, such as deposits and lending, appear directly in the banks' balance sheet, while other activities, such as securities trading on behalf of customers, do not

[1] See Suzanne Hyldahl, New Capital-Adequacy Rules for Banks, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2001.

appear in the balance sheet. These off-balance-sheet activities are in many cases described in the notes to the financial statements or in the banks' reports on their business activities.

Net interest income and fee and commission income are normally the banks' most important income items. Net interest income can be examined in terms of e.g. the interest margin. The interest margin is interest income as a ratio of interest-bearing assets less interest expenses as a ratio of interest-bearing liabilities. The interest margin tends to vary between the individual banks due to e.g. different strategies and balance-sheet compositions.

Fee and commission income is closely associated with the banks' price policy and with customer behaviour. The development in the share of net fee and commission income of total net interest income and fee and commission income can provide an indication of how dependent the banks' earnings are on various business areas.

Earnings from value adjustments fluctuate according to trends in the markets where the assets are placed. The item is influenced by value adjustments of financial derivatives, foreign-exchange items and the banks' pool schemes, all of which complicate an analysis.

Personnel and administration expenses constitute by far the largest expense item for the banks and can be assessed in relation to the development in the overall balance sheet. This gives an indication of the correlation between growth in costs and growth in business volume. The indication of business volume based on the development in the balance sheet does not consider trends in off-balance-sheet income items, such as fee income from securities trading.

Another significant item in the profit and loss account is provisions for bad and doubtful debts, which can be assessed in terms of the ratio of losses and provisions for the year (losses and provisions for the year as a ratio of loans, guarantees and provisions). In relation to the profit and loss account the development in this item can give an indication of any historical correlation between the risk premium so far (earnings) and the losses occurred.

The banks' earnings capacity can be analysed by considering the development in operating income over operating expenses which shows the relationship between all income and expense items except extraordinary items and tax. A declining trend can be attributed to earnings problems, which could adversely affect the banks' robustness in the longer term. However, a declining trend can also be attributed to investments which are expected to boost earnings in the longer term. Chart 5 shows the development in operating income over operating expenses. The Chart shows a time series for the 10th and 90th percentiles, the median and the aver-

age. The percentiles delineate the 10 per cent of the banks with respectively the lowest and the highest operating income over operating expenses ratio. The Chart shows that it is often insufficient to consider the average alone, and that it is also necessary to look at distribution measures. Since the average is above the median, the Chart can be interpreted to show that the major banks had higher operating income over operating expenses than the smaller banks in the period analysed. In addition, the Chart indicates a narrowing of the spread between the most efficient and the least efficient banks viewed over the entire period.

Profitability can be considered in terms of profit post tax as a ratio of the overall balance sheet. This gives a simple measure of the result as a ratio of the business volume. As mentioned, the size of the balance sheet should be interpreted with caution when assessing the volume of activity. Return on equity based on profit pre and post tax gives a similar simple measure of overall profitability. This ratio is often used by shareholders, since it gives an impression of the return as a ratio of the invested capital. Extraordinarily high returns can be attributed to a high degree of efficiency or substantial risks.

Sensitivity analyses and stress tests are used more and more frequently in analysis work. The purpose of these analyses is to determine the robustness of the banks' result or capital adequacy to various risk scenarios. Sensitivity analyses and stress tests can be of varying design, e.g. with relations to economic development or with dynamic relations between various items in the balance sheet and the profit and loss account. Sensitivity analyses and stress tests are more forward-looking than analyses of accounts data and key indicators.

Risks

The banks' most important risks, e.g. credit, market and liquidity risks, are closely associated with the balances and items stated in the balance sheet and as off-balance-sheet items. There are other types of risk which are not related to the balance sheet, such as operational risks and strategic risks. The risk analysis provides partial views of various risk areas which can be combined to form an overall picture of the banks' risks.

The rest of this article describes some of the indicators applied in the analysis of the banks' risks.

Credit risk

Credit risk is the risk of losses should the counterparty or borrower default on the loan. The credit risk is especially associated with loans and guarantees. Previous banking crises were typically related to loan losses.

As a result, this type of risk has become a focus area. Extraordinarily high growth in lending could indicate that the banks require a lower credit quality, which could subsequently lead to higher losses and provisions. Another reason for high growth in lending could be that the bank requires lower risk premia than other banks for strategic or other reasons. All other things being equal, a lower risk premium will reduce the bank's robustness to losses.

Losses and provisions can be assessed on the basis of losses and provisions as a ratio of credits and guarantees for the year. The development in the account for bad and doubtful debts (correction account) may also be considered in terms of the provision ratio. It is calculated as total provisions on loans and guarantees as a ratio of total loans, guarantees and provisions. The analysis can also include the share of non-performing credits, i.e. the share of total loans, guarantees and provisions for which the banks have reduced the rate of interest due to the borrower's reduced ability to service the obligation. For such exposures earnings do not match the bank's expectations at the time of accepting the exposure. The rate of interest for non-performing exposures will often be 0 per cent. The three key indicators together can provide an indication of the banks' approach to credit risk.

Concentration of the banks' lending on a few sectors or a limited geographical area makes the banks more vulnerable to a slowdown in activity in these sectors or geographical areas. The distribution analysis can include such measures as the distribution between households and business sectors and the key indicator "Sum of large exposures"[1]. This key indicator shows the banks' exposure to relatively large- exposures.

The analysis of key indicators related to credit risk should be interpreted with caution, since valuation of the loan portfolio, including the need for provisions, will to a certain degree be estimated.

Market risk

Market risk is the risk that fluctuations in market prices (interest rates, exchange rates or stock prices) impose losses on the banks. There are various methods to calculate the market risk such as Value-at-Risk (VaR) models. They indicate the maximum loss which within a fixed time horizon will arise at a given probability, based on historical experience. These complex analyses cannot be performed by external analysts, who lack the necessary knowledge of the exact composition of the banks' portfolios. Likewise, the analysts are unable to track the constant portfolio adjustments. However,

[1] The sum of large exposures as a ratio of tier 2 capital. Large exposures are defined as the sum of assets and off-balance-sheet items that, after a reduction for secured exposures, exceeds 10 per cent of the combined tier 2 and tier 3 capital. Tier 2 capital in this calculation include consolidation for the years.

the banks submit a number of calculated key indicators related to the their risks which can be used in the analysis.

Bond and share portfolios as a ratio of the overall balance sheet can give a general impression of the banks' balance-sheet preferences. The higher the proportion of the bond and/or share portfolio, the more exposed the bank is to fluctuations in bond and/or stock prices. However, the banks may have hedged risks associated with interest-rate and stock-price fluctuations. The portfolios also include the banks' pool schemes, so that the indicator should be interpreted with caution. The banks' interest-rate risks indicate the amount of tier 1 capital after deductions lost if interest rates increase by 1 percentage point. This is a good key indicator of the banks' willingness to assume risks related to changes in the interest-rate markets.

Foreign-exchange-exposure indicator 2 in the notes indicates the exchange-rate risk and implies that unless the bank adjusts its foreign-exchange positions in the following 10 days, there is a probability of 1 per cent of the bank suffering losses exceeding the value of the indicator. The exchange-rate risk states foreign-exchange-exposure indicator 2 as a ratio of tier 1 capital. This key indicator is more complicated than the interest-rate risk indicator, but the rationale behind it is similar to that for the interest-rate risk indicator.

Liquidity risk

Liquidity risk is the risk that the bank will be unable to meet its obligations due to insufficient liquidity. Insufficient liquidity reflects the fact that the banks are unable to realise their assets as fast as the depositors[1] require redemption. Liquidity is partly related to costs of realisation or redemption. Liquidity problems in one financial institution may spread quickly to the rest of the banking sector, either via payment systems or due to declining confidence in the entire sector. Payment-system risks are described in the preceding chapter. In February 2000 the Basle Committee under the auspices of the BIS issued an updated an extended set of guidelines and recommendations concerning principles for good liquidity management.

Excess liquidity in relation to the statutory requirement of 10 per cent is a measure of liquidity. Liquidity must account for at least 10 per cent of the banks' total debt and guarantee commitments. The key indicator shows excess liquidity after compliance with the statutory requirement as a ratio of the statutory minimum requirement. In this key indicator liquidity includes cash in hand, fully secure and liquid claims at call on

[1] Depositors in the general sense.

Danish and foreign credit institutions, and the portfolio of secure, easily marketable, unpledged securities and credit instruments. The higher the excess liquidity, the lower the risk of insufficient liquidity. See also Box 2.

In addition, the difference between the volumes of deposits and lending can be used as an indicator of the banks' ability to attract deposits to finance growth in lending. The difference between debt to other credit institutions and claims on other credit institutions can also indicate whether the banks in net terms need other credit institutions as a source of financing. Other credit institutions are expected to react strongly[1] to irregularities concerning one or more banks. Liquidity analyses should be interpreted with caution, since the banks' balance-sheet composition is by no means constant.

[1] See Cato Baldvinsson, Flemming Brokhattingen, Kim Busck-Nielsen and Flemming Nytoft Rasmussen, Danish Banking, 4th revised edition, Forlaget FSR, 2000.

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