Danmarks Nationalbank

Financial stability

2006

DANMARKS NATIONAL BANK 2006

FINANCIAL STABILITY 2006

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 on half of unit employed
- • Category not applicable
- na. Numbers not available

Details may not add due to rounding.

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Introduction and Summary

Danmarks Nationalbank is responsible for monetary policy in Denmark, and its objectives include ensuring a stable krone and contributing to efficiency and stability in the payment systems and in the financial markets. This is stated in the Danmarks Nationalbank Act, according to which it is the task of Danmarks Nationalbank to "maintain a safe and secure currency system in this country, and to facilitate and regulate the traffic in money and the extension of credit". Monetary policy and financial stability are closely linked. On the one hand, credible monetary policy and a stable krone are the basis for financial stability. On the other hand, monetary policy is conducted via the financial system, and financial stability is thus crucial to the effective implementation of market-oriented monetary policy. At the same time, the financial system must be sufficiently robust to leave room to conduct the necessary monetary policy.

The annual publication *Financial Stability* assesses financial stability in Denmark, with emphasis on financial institutions, markets and payment systems. The most significant risks to the financial system are identified, including situations that are very unlikely to arise, but which might have major consequences for the economy. It is assessed whether the overall financial system is robust enough for any problems experienced within the sector not to spread and prevent the financial markets from functioning as providers of capital and financial services. It is the task of the Danish Financial Supervisory Authority to ensure that each financial institution is sufficiently robust.

The purpose of the publication is to create awareness of conditions that are of importance to maintaining financial stability in Denmark.

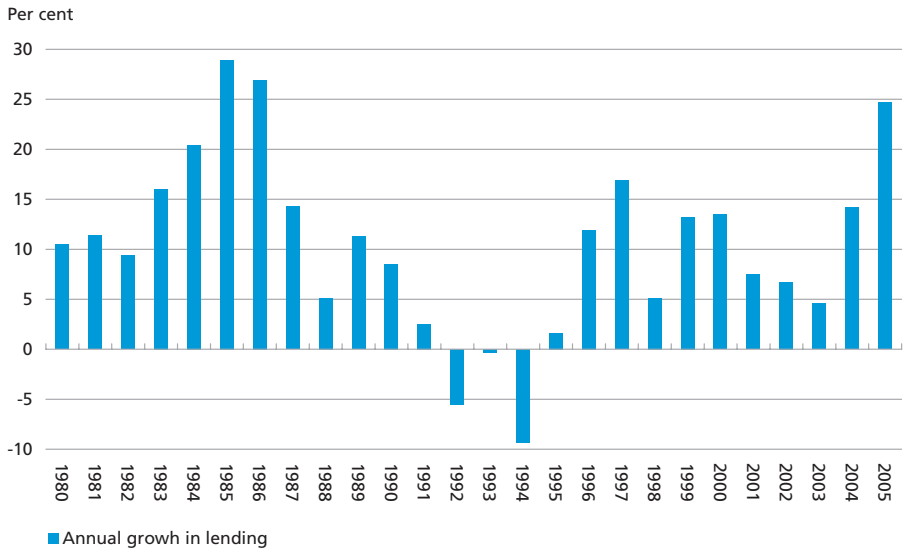
SUMMARY

Denmark is currently enjoying favourable economic conditions. The Danish economy is in an upswing that began almost three years ago. This benefits the financial sector, and again in 2005 the banking institutions posted record-high earnings.

Overall, the financial institutions are still found to be robust, and there seem to be no potential threats to financial stability in Denmark.

The banking institutions achieved high growth in lending in 2005, the highest since the mid-1980s, cf. Chart 1. A few banking institutions even

LENDING GROWTH, ALL BANKING INSTITUTIONS IN DENMARK, 1980-2005 Chart 1



Note: All banking institutions in Denmark comprise the Danish Financial Supervisory Authority's categories 1, 2 and 3. No adjustment has been made for the impact of the new accounting standards, which came into force in 2005. 2005 figures are estimates.
Source: Danish Financial Supervisory Authority.

saw very high lending growth. The growth in lending was driven by such factors as the continued low level of interest rates and rising property prices. A comparison of the banking institutions' credit risk with the growth in lending shows that high lending growth has a certain tendency to coincide with a higher credit risk, even though considerable dispersion is seen. In a situation with very high growth in lending it is important that the banking institutions are more alert to any decrease in credit quality, and that they adjust their capital base and buffers against increasing losses accordingly.

Overall, the banking institutions and the Nordic groups appear to be robust. The strong lending growth and a minor decrease in capital adequacy do mean, however, that the resilience to increasing losses has decreased a little. At the same time, there is no clear positive link between the resilience of the individual banking institution and the probability of the banking institution experiencing a loss. Consequently, it is not necessarily the banking institutions with the highest credit risk on their lending portfolios, i.e. with the highest probability of losses, that are resilient to the greatest losses.

The new Basel II capital adequacy rules provide for calculation of credit institutions' capital requirements by means of internal credit-risk models. This gives the credit institutions various options with regard to

data and methodology that may affect the resulting capital requirement. The special chapter on advanced approaches to calculation of capital requirements under Basel II illustrates the effects of some of these choices.

The rules for banks' liquidity is one of the elements of the EU framework that so far has not been harmonised. The special chapter on the banks' liquidity describes the banks' liquidity management, and various liquidity indicators are presented. The liquidity of Danish banks by far exceeds the statutory requirement, even though the excess liquidity cover has declined somewhat in recent years in step with the stronger increase in lending by, than deposits to, the banking institutions.

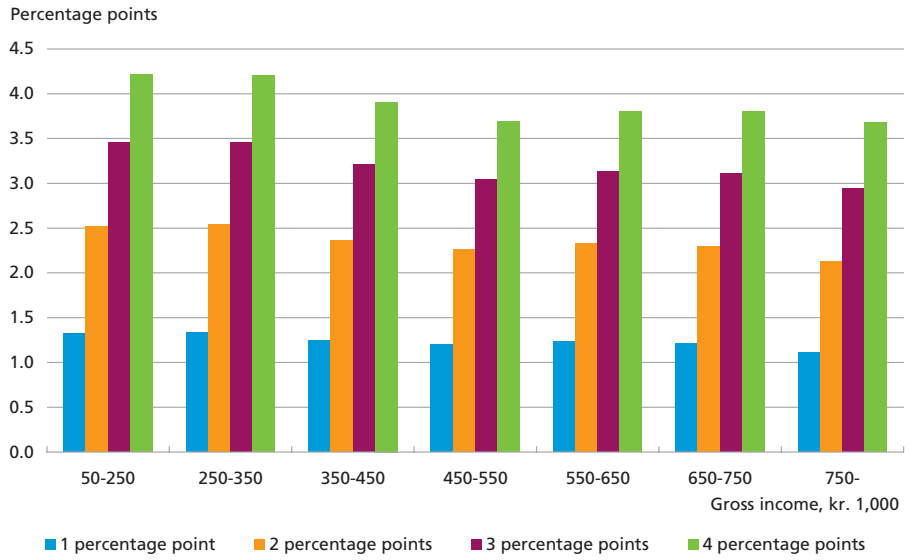
Secure and efficient payment systems are an important prerequisite to financial stability, and the special chapter on protection of settlement in Danish payment systems describes how settlement of retail payments and securities transactions is ensured in relation to financial risks.

Based on Danmarks Nationalbank's failure-rate model, the estimated failure rates of Danish companies are generally found to have decreased in 2005. The situation of the weakest companies has become more difficult, however, since many new companies are established when economic conditions are as favourable as they are now. All other things being equal, the estimated failure rate is relatively higher for newly-established companies than for older companies. The development in estimated failure rates for the various sectors and the distribution of lending by sector give grounds to expect that the banking institutions will continue to record low losses in the immediate future.

The economic conditions of the households have improved. Real incomes have risen, and more households have a sound income concurrently with the fact that unemployment has fallen. The prices of owner-occupied housing have risen significantly in recent years. The increases are higher than previously seen and among the highest in the world. Combined with a low level of interest rates, this has contributed to high growth in private consumption. The favourable economic conditions for the households are reflected in an ever higher rate of indebtedness, and the households' interest burden has grown.

On average, homeowners' mortgage-credit interest expenses will increase by 1.2 per cent of gross income on an increase in the short-term interest rate by 1 percentage point, compared to 1 per cent of gross income last year. Considerable dispersion is seen, however, and some homeowners' interest expenses will rise by more than 3 per cent of their gross income. Homeowners' increasing use of capped adjustable-rate loans dampens the effect on the average increase in the interest burden in the event of substantial interest-rate increases, cf. Chart 2.

AVERAGE CHANGE IN INTEREST BURDEN ON INCREASES IN THE SHORT-TERM INTEREST RATE BY, RESPECTIVELY, 1, 2, 3 AND 4 PERCENTAGE POINTS, FEBRUARY 2006 Chart 2



Note: The short-term interest rate is defined as the rate of interest on an adjustable-rate loan, irrespective of the fixed-rate period. Interest expenses on mortgage debt only. The interest burden is interest expenses as a ratio of gross income.
Source: Nykredit and own calculations.

The increased use of adjustable-rate loans in recent years makes the homeowners more exposed to fluctuations in the short-term interest rate. This exposure is particularly pronounced for households that have also opted for deferred amortisation since they have already made use of the buffer which the deferred-amortisation option provides, unless the deferred amortisation has been used to repay other, more expensive debt.

The households' favourable economic conditions have contributed significantly to the strong economic growth. There are exposed groups of households, but in overall terms the development in the households' interest-rate exposure poses no threat to the functioning of the financial system or to financial stability.

The favourable cyclical conditions can lead to an overoptimistic outlook in which it can be hard to spot the risks. Combined with the continued low level of interest rates this may increase the appetite for higher yields and quick gains, leading to speculation in continuously rising property prices or loan-financed investment in exotic investment products such as bonds linked to the price of commodities or the development in the yield curve. The marketing of loan-financed securities purchases has gained ground in recent years. As such, these loans pose

no threat to financial stability. Usually, the financial intermediaries hold collateral for most of the lending, and charge high commission, which contributes to the favourable earnings. However, the individual investor must be aware that a higher expected return can only be achieved by concurrently taking a higher risk, so that losses can be substantial. At the same time, the various risks may be connected; for example, rising interest rates and falling bond prices concurrently with a drop in property prices. This can exacerbate the losses on the individual investor's total portfolio.

Financial stability analysis

The Financial Sector

Again in 2005 the Danish banking institutions and the Nordic financial groups posted record-high earnings. Growing business volumes with strong lending growth, intense activity in the securities markets, as well as remortgaging activity generated higher fee income. This was also yet another year with historically low write-downs on loans due to continued favourable economic conditions and new accounting rules. Finally, the banking institutions' securities portfolios yielded substantial capital gains.

Overall the banking institutions and the Nordic groups still appear to be robust. The strong lending growth and a minor erosion of capital adequacy mean that the resilience of medium-sized and small banking institutions to increasing losses has decreased a little. At the same time, there is a certain tendency for the credit risk on the lending portfolio to be higher for the banking institutions with strong growth in lending. The resilience of the Nordic groups to losses has also declined a little as a result of high lending growth.

The strong growth in lending makes it important that the banking institutions, in their risk and capital management, allow for both direct and indirect effects of a possible cyclical reversal, as well as the fact that under the new accounting rules write-downs on loans are not based on the prudential accounting principle, and thus cannot serve as a buffer.

THE SIGNIFICANCE OF FINANCIAL INSTITUTIONS TO FINANCIAL STABILITY

The banking institutions play a central role in the financial sector as intermediaries of capital between depositors and borrowers. This chapter focuses on the banking institutions' earnings capacity, risks and resilience.

The mortgage-credit institutes are providers of credit for financing of real estate, which makes them the largest bond issuers in Denmark. The development in the mortgage-credit institutes can affect the banking institutions' earnings directly via ownership and indirectly via competition in the home-financing market.

Similarly, life-insurance companies and pension funds (hereinafter pension companies) can affect the banking institutions directly via ownership and indirectly via competition in the pension market. At the same time, the sector plays an important role in the financial markets via its management of substantial assets.

CATEGORIES APPLIED Box 1

The analyses are based on the annual accounts of 53 selected banking groups and banking institutions, divided into Nordic groups (category A), large Danish banking institutions (category B) and small Danish banking institutions (category C). The banking institutions have been selected and grouped on the basis of their status at end-2005. They are assumed to belong to the same categories prior to end-2005.

OVERVIEW OF CATEGORIES APPLIED

	Danmarks Nationalbank			Danish Financial Supervisory Authority			
Categories	A	B	C	1	2	3	4
Handelsbanken	1						
Swedbank	1						
SEB	1						
DnB NOR	1						
Danske Bank	1			1			
Nordea	1			1			
Jyske Bank		1		1			
Sydbank		1		1			
Banking institutions with working capital in the range kr. 3 billion to kr. 25 billion		17			21		
Banking institutions with working capital in the range kr. 250 million to kr. 3 billion			28			75	
Banking institutions with working capital of less than kr. 250 million							71
Total number of groups/institutions	6	19	28	5	21	75	71
Total assets at end-2005, kr. billion	9,580	571	68	2,496	380	122	na.

Note: In categories B and C, the data are based on accounts for the parent companies, while category A is based on consolidated accounts. Consolidated accounts in foreign currencies are translated at the average rates for the year as far as the profit and loss accounts are concerned and at the year-end rates as far as the balance sheets are concerned. The Danish Financial Supervisory Authority's category 1 includes, apart from the banking institutions mentioned, FIH Erhvervsbank.

Source: Annual accounts, Danmarks Nationalbank and the Danish Financial Supervisory Authority (estimate).

The rationale for including the Nordic groups as an independent category is that the largest Nordic banking groups to a large extent have a pan-Nordic orientation, which is reflected in e.g. their exposures. Moreover, the Nordic banking groups are comparable in terms of business areas and sizes.

If the text or the Charts refer to "Danish banking institutions", the aggregate of categories B and C, as well as Danske Bank A/S and Nordea Bank Danmark A/S, is applied. Analyses on the basis of "Danish banking institutions" are typically made where the information provided in the accounts of the other Nordic groups is insufficient.

Finally, in a few analyses, ad-hoc categories are used, based on available data. This is specified in the notes to the respective Charts and Tables.

NORDIC GROUPS AND DANISH BANKING INSTITUTIONS

Earnings and return on equity

Both the Nordic groups in category A and the Danish banking institutions in categories B and C posted record-high results in 2005. The categories are described in Box 1. The pre-tax profit of the Nordic groups totalled kr. 86.3 billion, i.e. an increase of 23 per cent on 2004, and the return on equity after tax rose to 18.5 per cent[1], cf. Table 1. Categories B and C recorded similar earnings increases, by 35 per cent and 29 per cent, respectively, and the return on equity after tax is 17.4 and 14.5 per cent, respectively.

Net interest and fee income was positively influenced by increasing business volumes, with strong lending growth, increased securities trading and continued high remortgaging activity. Fee income still accounts for an increasing proportion of total net interest and fee income, i.e. just over 30 per cent. Capital gains more than doubled for the Nordic groups and increased by 31 per cent for category B and 12 per cent for category C.

PROFITS BEFORE TAX, 2004 AND 2005 — Table 1

	Nordic groups, category A		Danish banking institutions, category B		Danish banking institutions, category C	
Kr. billion	2005	2004	2005	2004	2005	2004
Income						
Net interest income	98.6	94.7	10.9	10.2	2.4	2.2
Net fee income	48.6	43.2	5.1	4.2	1.0	0.8
Value adjustment of securities, etc.	14.1	6.9	3.1	2.3	0.6	0.5
Value adjustment of capital investments	8.9	6.1	0.9	0.8	0.1	0.1
Other ordinary income	7.7	10.0	0.3	0.3	0.0	0.1
Costs						
Operating expenses, etc.	92.9	89.2	11.1	10.2	2.3	2.1
Write-downs on loans	-1.2	1.4	0.4	1.1	0.1	0.3
Profit before tax	86.3	70.4	8.8	6.5	1.7	1.3
ROE before tax, per cent	24.7	22.2	23.2	19.7	19.2	17.1
ROE after tax, per cent	18.5	16.4	17.4	14.7	14.5	13.1
Market share of Danish lending, per cent	53.1	53.1	28.2	27.9	4.6	4.5

Note: For the purpose of currency translation of financial data for the Nordic groups, an average of the exchange rates for the year is used as far as profit and loss accounts are concerned. For translation of balance sheets, exchange rates at year-end are applied. The market share is measured in terms of lending to domestic residents. For the Nordic groups adjustment is made for mortgage-credit lending. The total market share of categories A, B and C amounts to 85.9 per cent in 2005. The remaining market shares are distributed on banking institutions not included in categories A, B or C, e.g. FIH Erhvervsbank and a number of small institutions.

Source: Annual accounts and Danmarks Nationalbank.

[1] In comparison, the return on equity after tax for banks in the euro area was 10.5 per cent in 2004. For the largest banks in the euro area the return on equity was 13.6 per cent in 2004, and preliminary figures for the first six months of 2005 show a return after tax of 20.8 per cent, cf. *ECB, Financial Stability Review*, December 2005.

The costs of the Nordic groups rose by 4 per cent as a result of expansion into new business areas, among other factors. The cost ratio, however, was reduced from 55.4 per cent in 2004 to 52.2 per cent in 2005. The banking institutions in categories B and C recorded cost increases of 9 and 8 per cent, respectively, but the cost ratio was reduced to just under 55 per cent.

NEW ACCOUNTING RULES Box 2

As from the 2005 financial year the Nordic groups and the Danish banking institutions have presented their annual accounts in accordance with the International Financial Reporting Standards, IFRS, or the new Danish IFRS-compatible accounting rules. Not all comparative figures for 2004 have been adjusted, and there may still be some uncertainty regarding the interpretation of the standards. The calculations take the changes into account to the greatest possible extent, as indicated in the notes to the Charts and Tables in question. The following reservations are made:

- In connection with reporting to the Danish Financial Supervisory Authority of accounting data for 1st quarter 2006, the banking institutions are still free to amend their opening balance sheets for 2005, and it is uncertain whether this will have any significant effects.
- Adjustment of the value of lending, including write-downs on loans, may affect the analyses of return on equity, capital structure, stress tests, etc.
- Return on equity is not completely comparable with previous years.
- Loss and provision ratios for previous years are not directly comparable with the write-down ratio in 2005.

All in all, the changes entailed an increase of 6 per cent in the aggregate equity of the Danish banking institutions in categories B and C, as well as Danske Bank A/S and Nordea Bank Danmark A/S.

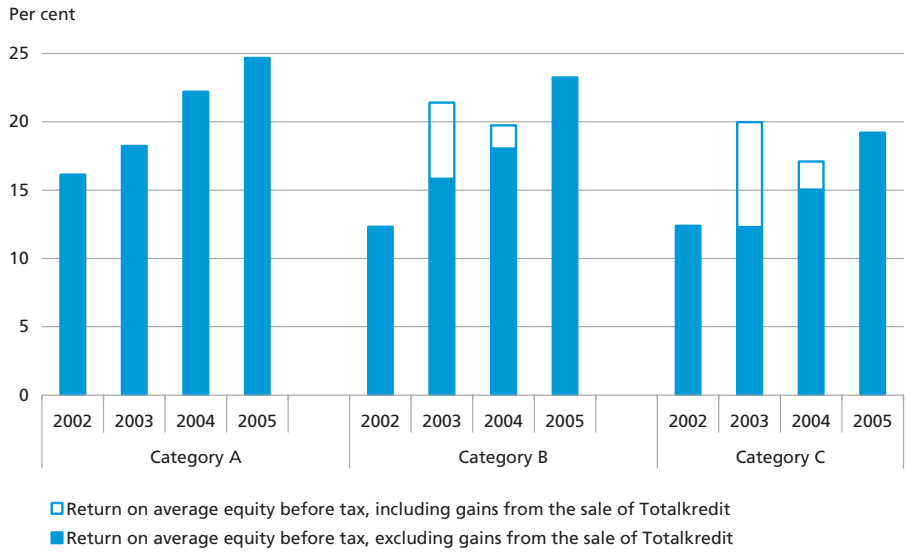
Valuation of lending

Lending was previously valued at nominal value less provisions. Under the new rules, lending is valued at amortised cost less any impairment (write-down) whereby fees and commission on lending are recognised over the term of the loan. Previously, fee and commission income was recognised on receipt from the customer, i.e. often on establishment of the loan.

Write-down on loans

Under the new rules *provisions* on loans will no longer be made on the basis of the probable risk of losses according to the prudential principle of accounting. Instead, a neutrality principle will be applied to *write down* loans in the event of a deterioration in value. Consequently, there must be an objective indication of a deterioration in value before the loan is written down. Thus, write-downs are made at a later stage than was the case for provisions under the previous rules, and often by lower amounts. According to the Danish Financial Supervisory Authority, reversal of provisions in the opening balance sheets on 1 January 2005 amounted to kr. 5.9 billion for banking institutions in categories 1-3.

RETURN ON EQUITY (ROE) BEFORE TAX, 2002-05 Chart 3



Note: ROE is calculated on the basis of an average of equity at the beginning and end of the year. The figures for 2005 are based on equity at the beginning of the year from new opening balance sheets.
Source: Annual accounts.

In 2005 write-downs on loans and guarantees for the year were reduced from an already very low level, and the Nordic groups could report a total amount of kr. 1.2 billion as income in 2005. The new accounting standards, cf. Box 2, are applied to the calculation of write-downs in 2005, which impedes historical comparison.

The return on equity before tax is increasing for all three categories, cf. Chart 3. For a few institutions the return on equity before tax exceeds 30 per cent, and for almost half of the banking institutions in categories B and C the return on equity exceeds 20 per cent. Only two of the banking institutions represented show a return on equity of around 10 per cent. For all the Nordic groups the return on equity before tax exceeds 20 per cent. The return on equity can be broken down into a number of key ratios, cf. Box 3.

For the Nordic groups in category A, the high return on equity is achieved through cost efficiency and high equity gearing, cf. Table 2. The high gearing reflects the groups' focus on their capital structures in order to generate returns for the shareholders and reduce overcapitalisation.

The groups have a relatively low risk level compared to the banking institutions in categories B and C, which is attributable to the high proportion of lending against real property as collateral. In addition, the banking institutions in categories B and C offer mortgage-credit loans in collaboration with mortgage-credit institutes, typically providing a guarantee

BREAKDOWN OF RETURN ON EQUITY — Box 3

Return on equity, ROE, before tax is calculated as:

$$\text{ROE before tax} = \frac{\text{Profit before tax}}{\text{Equity}}$$

A breakdown of the fraction gives the following expression of return on equity:

$$\text{ROE before tax} = \text{Profit ratio} \times \text{Risk-adjusted income} \times \text{Risk level} \times \text{Gearing}$$

since

$$\text{ROE before tax} = \frac{\text{Profit before tax}}{\text{Income}} \times \frac{\text{Income}}{\text{RWA}} \times \frac{\text{RWA}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}}$$

where RWA stands for risk-weighted items.

The profit ratio can also be expressed as:

$$\text{Profit ratio} = \frac{\text{Income} - \text{costs} - \text{write-downs on loans for the year}}{\text{Income}}$$

$$= 1 - \frac{\text{Costs} + \text{write-downs on loans for the year}}{\text{Income}}$$

A breakdown of return on equity into the four key ratios enables an analysis of the basis for the return on equity. Rising earnings are amplified by higher gearing and risk. In terms of financial stability, increased earnings on the basis of higher risk and/or gearing can imply an increase in the vulnerability of the banking institutions.

BREAKDOWN OF RETURN ON EQUITY BEFORE TAX, 2004-05 — Table 2

	Nordic groups, category A		Danish banking institutions, category B		Danish banking institutions, category C	
	2005	2004	2005	2004	2005	2004
Write-downs/income, per cent	-0.7	0.9	1.8	6.5	3.4	8.4
Cost ratio, per cent	52.2	55.4	54.8	58.9	54.6	58.4
Profit ratio, per cent	48.5	43.7	43.4	34.6	42.0	33.2
Risk-adjusted income, per cent.....	4.3	4.3	5.2	5.3	6.1	6.6
Risk level, per cent	47.5	49.3	74.2	71.9	109.4	102.6
Gearing, number of times	25.2	24.2	13.8	13.6	6.9	6.7
Return on equity, per cent	24.7	22.2	23.1	18.0	19.2	15.0

Note: Where key ratios are calculated on the basis of balance-sheet items, an average of the balances at the beginning and end of the period is used. For 2005 balances from new opening balance sheets are used where possible. The profit ratio is profit before tax/income, risk-adjusted income is income/risk-weighted assets, risk level is risk-weighted items/total assets, gearing is total assets/equity. Adjusted for the gain on the sale of Totalkredit.

Source: Annual accounts.

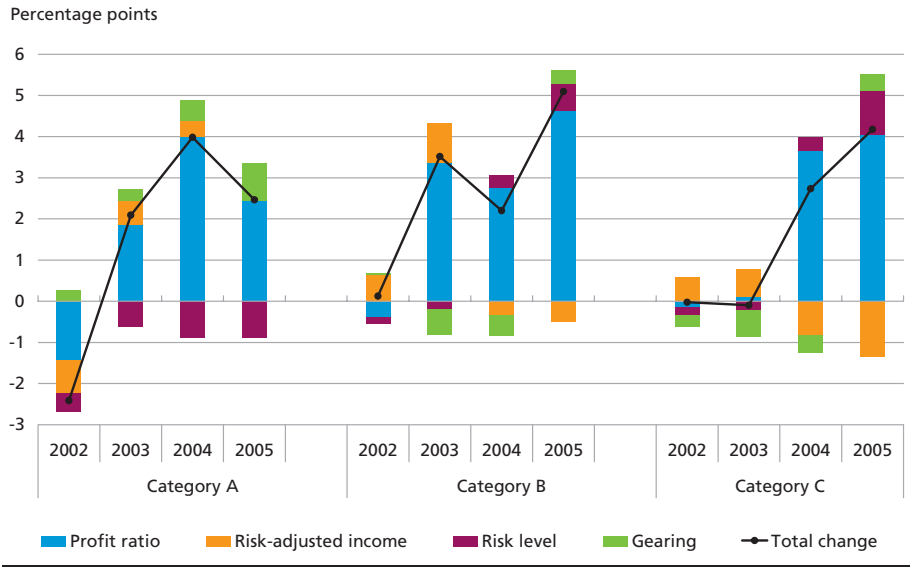
against losses to the mortgage-credit institute. These guarantees are not included in the total assets, but in the risk-weighted items, and the effect of the guarantees is particularly pronounced in category C which has a risk level of 109 per cent in 2005. On the other hand, the gearing is low for institutions in category C compared to category B and the Nordic groups.

The banking institutions in categories B and C are by and large at the same level, but lower than the Nordic groups, in terms of the profit ratio, i.e. operating profit over operating income. Recent years have seen a tendency for many small and medium-sized banking institutions to focus on growth rather than reducing costs.

Chart 4 shows how the increase in return on equity has been achieved over the last four years. For example, the higher gearing contributed 0.9 percentage point of the total increase of 2.5 percentage points in the return on equity for the Nordic groups from 2004 to 2005, and the improved profit ratio contributed 2.4 percentage points, whereas a decrease in the risk level reduced the return on equity by 0.9 percentage point.

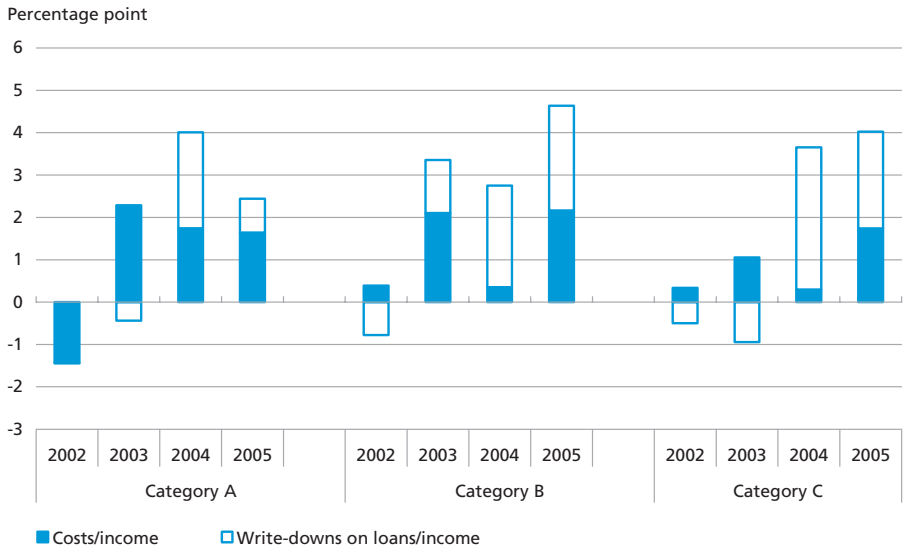
The banking institutions in categories B and C have increased their risk level in recent years, particularly from 2004 to 2005, and at the same time risk-adjusted income has declined. As a result, the banking institu-

CONTRIBUTIONS TO THE CHANGE IN RETURN ON EQUITY BROKEN DOWN BY UNDERLYING KEY RATIOS, 2002-05 Chart 4



Note: Adjustment has been made for the gains from the sale of Totalkredit. Where key ratios are calculated on the basis of balance-sheet items, an average of the balances at the beginning and end of the year is used. The figures for 2005 are based on data from new opening balance sheets where possible.
Source: Annual accounts.

SPECIFICATION OF THE EFFECT OF THE PROFIT RATIO ON RETURN ON EQUITY, 2002-05 Chart 5



Note: Adjusted for the gain on the sale of Totalkredit.
Source: Annual accounts.

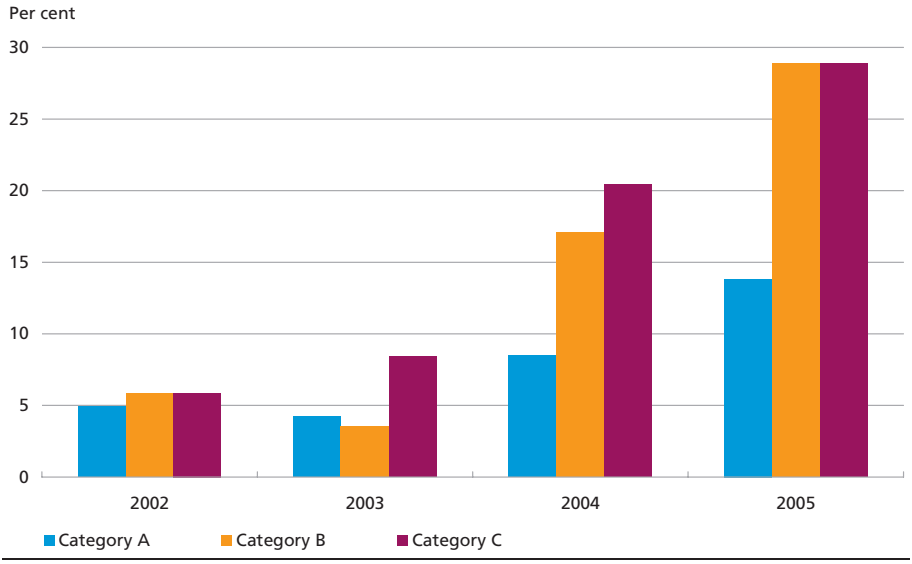
tions' income per "krone of risk" is lower, or, in other words, they charge less for the higher risk.

All three categories have seen strong growth in the profit ratio. The low level of write-downs on loans contributed significantly to the growth in income, cf. Chart 5. This effect is particularly pronounced for the banking institutions in categories B and C, but also among the Nordic groups. The low write-downs are attributable to favourable economic conditions and reversals of previous years' provisions. The latter must be considered a transitional effect in connection with the implementation of new accounting standards. Other income, e.g. remortgaging fees and value adjustments, may also be of a one-off nature. At the same time, an increasing cost level due to e.g. establishment of branches or staff expansions may contribute to dampening profits in future, if the income base is reduced. In addition, expansion of the branch network may intensify competition.

Lending growth

Growth in lending continued to increase in 2005 to 29 per cent for both categories B and C, cf. Chart 6. This is the highest level since the mid-1980s. 10 per cent of the banking institutions are experiencing lending growth in excess of 45 per cent. In comparison, lending by the Nordic groups rose by 14 per cent in 2005.

ANNUAL GROWTH IN LENDING, CATEGORIES A, B AND C, 2002-05 Chart 6

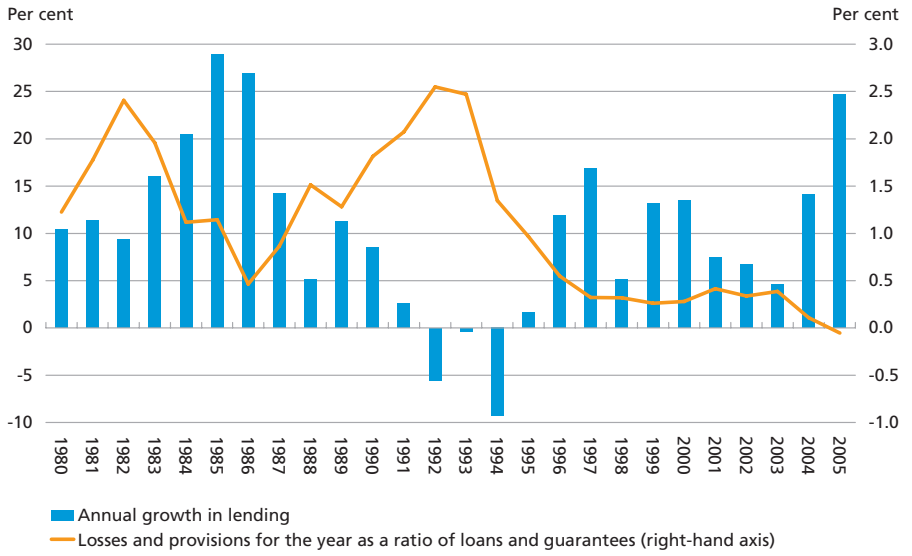


Note: The growth ratio of the Nordic groups is adjusted for exchange-rate fluctuations, Swedbank's sale of FIH Erhvervsbank in 2004, DnB NOR's sale of Elcon in 2004 and Danske Bank's acquisition of two banks in Ireland and Northern Ireland in 2005.
Source: Annual accounts.

The strong growth in lending by the banking institutions in recent years is driven by the sustained low level of interest rates and rising property prices. Growth in lending to households accounts for almost half of total lending growth, and 60 per cent of the household element stems from lending for home-financing purposes. The banking institutions have gained market shares from the mortgage-credit institutes by offering mortgage loans ("prioritetslån", loans collateralised by real estate). Often the excess liquid proceeds for the customer are placed in a deposit account subject to the same interest terms as the loan. Against this background, a proportion of the banking institutions' lending growth is reflected in increased deposits.

In a historical perspective, periods with high lending growth have been followed by gradual deterioration in the credit quality, with increased losses and provisions in subsequent periods. cf. Chart 7. It is by no means certain that history will repeat itself, in view of the increased focus on management of credit risk, e.g. the implementation of the new capital-adequacy rules, Basel II. Under Basel II the capital requirement can, however, be more sensitive to fluctuations in credit quality, and the banking institutions should be aware of this and adjust their capital bases accordingly.

LENDING GROWTH AND LOSSES AND PROVISIONS/WRITE-DOWNS AS A RATIO OF LOANS AND GUARANTEES, ALL BANKING INSTITUTIONS IN DENMARK, 1980-2005 Chart 7



Note: All banking institutions in Denmark comprise the Danish Financial Supervisory Authority's categories 1, 2 and 3. No adjustment has been made for the effect of new accounting standards that entered into force on 1 January 2005. Data for 2005 are estimates.
Source: The Danish Financial Supervisory Authority.

LOANS FOR FINANCIAL INVESTMENTS Box 4

Concurrently with growth in lending, the financial assets of households are also increasing strongly. It is difficult to obtain statistical cover for the volume of loan-financed investments by purpose. The following examples of the banking institutions' marketing illustrate the wide range of products directed at the households.

Investment credits

The product range includes investment credits and loans for investment against the free mortgageable value of the home as collateral. An investment credit can be an overdraft facility to be invested in securities together with the household's own liquid funds, and the securities are then typically placed in a collateralised custody account. Borrowing for investment against the free mortgageable value requires establishment of a loan with the free mortgageable value as collateral, and the proceeds are invested in e.g. securities. A common feature is that the risk assumed by the banking institution is normally minimal, while the exposures contribute to increasing business volumes in terms of increased lending and securities trading.

The purchaser speculates in the return on investment exceeding the interest payments on the loan, but in order to obtain a positive return on the entire exposure it is necessary to invest in riskier assets. Interest-rate exposure and the correlation between assets and liabilities play a role in this connection.

Continued

CONTINUED Box 4

All other things being equal, households' assets – securities and housing wealth – will, for example, be adversely affected by an interest-rate increase, while the interest burden on a variable-rate loan will grow. This could put the households' liquidity under pressure, while eroding the value of the collateral for the loans. In addition, increased volatility in the securities markets might force sale of assets to minimise losses.

Loans for pension contributions

Borrowing against the free mortgageable value of the home to finance contributions to pension schemes has also been marketed, e.g. based on the assumption that the households in question will not have to pay top-rate tax as pensioners. This increases the balance sheet while at the same time assets in the pension scheme are tied and cannot be immediately realised. This could increase the vulnerability of the households and put their liquidity under pressure.

Index-linked bonds

The households are offered index-linked bonds, the yield on which is determined by an option element linked to e.g. commodity prices or the yield curve. For example, the investor pays a price of 105 per 100 and is guaranteed at least the par rate if the bond is held until maturity, while a positive yield depends on costs and the development in the financial markets or the commodity markets.

It is difficult to get an overview of the risks associated with these products, so it is also difficult to determine whether the price is right. This product requires in-depth knowledge of highly volatile markets.

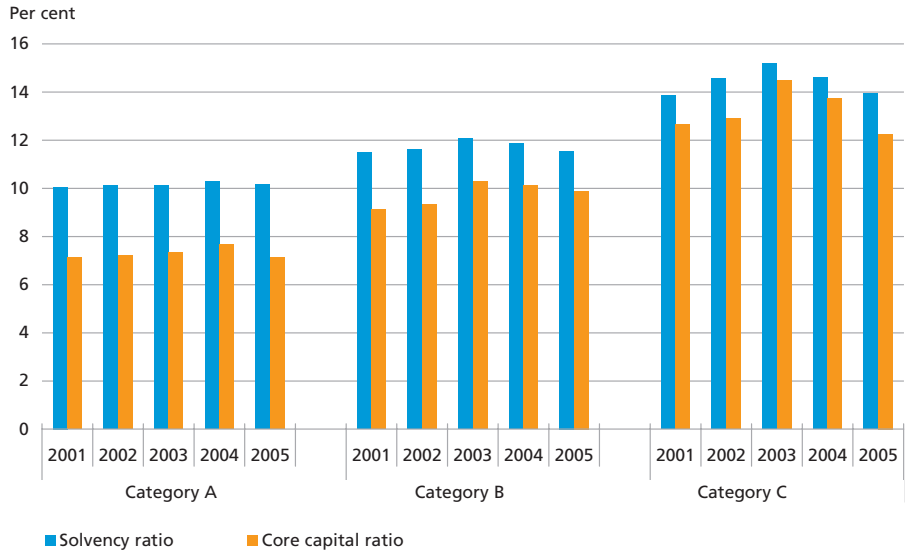
In addition, investment in index-linked bonds may entail a number of complicated legal and operational issues, and the real costs may be far from transparent.

Project financing

A proportion of the increased activity in the market for commercial and residential properties is attributed to private individuals' increased interest in investment properties. Such investments are often projects with an investor group of maximum 10 private individuals. The property is acquired through a limited partnership, limiting the individual investor's liability while offering the opportunity to write off the property for tax. The property is financed by the cash deposits from the investors as well as mortgage-credit or bank loans. The property and the investors' residual liability are furnished as collateral for such loans. The risks for the investors, and ultimately for the sources of financing, depend on e.g. the following factors: Was the property acquired at market price or at an excess price? Are the tenants reliable and are the lease contracts interminable for a long period? Do the purchase price and the financing ensure positive liquidity throughout the investment period? Is the return on the investment based solely on future increases in value? Are the investors subject to adequate credit rating?

During the end of the 1980s and the beginning of the 1990s, partnership shares and limited partnerships were popular types of investment which eventually led to legal proceedings and major losses for investors and banking institutions. Typical reasons for disputes and losses were that the project failed to meet the budget or the descriptions in the prospectus, that the asset was contributed at an excess price, or that the investors failed to honour their residual liabilities.

SOLVENCY AND CORE CAPITAL RATIOS, CATEGORIES A, B AND C, 2001-05 Chart 8



Source: Annual accounts.

Capital structure

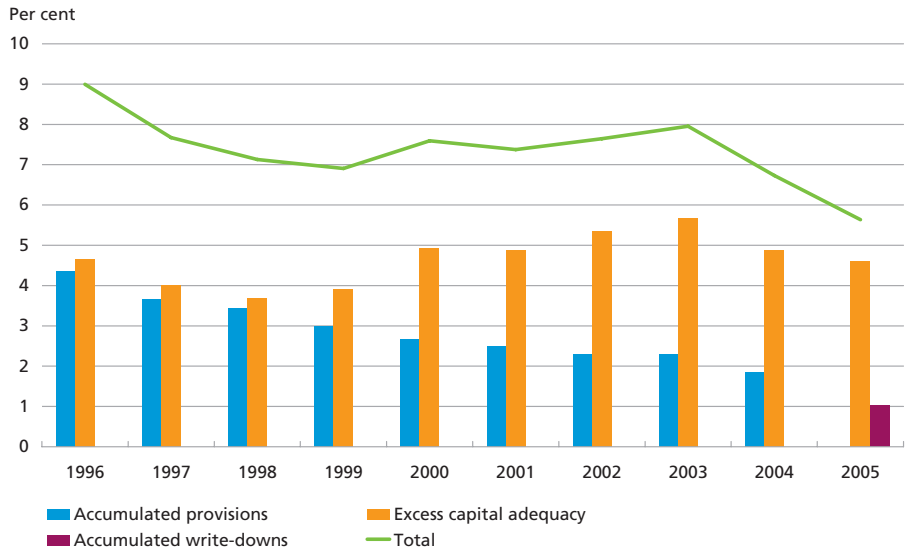
The solvency ratio for banking institutions in categories B and C is still considerably above the statutory 8-per-cent requirement, but the strong growth in lending in the two categories has increased the risk-weighted assets, with an adverse impact on the core capital and solvency ratios. As a countermeasure, the banking institutions in category B have primarily issued hybrid core capital[1] (loan capital that may be included in the core capital according to certain rules), and the banking institutions in category C have primarily raised subordinated debt. As a result, the core capital and solvency ratios in category B are almost unchanged, while especially the core capital ratio for category C has been reduced, albeit from a high level, cf. Chart 8.

The average solvency ratio for the Nordic groups in category A is just over 10 per cent. The groups have primarily raised subordinated debt, but also hybrid core capital, so that the solvency ratio has remained almost unchanged. The capital structure has been actively adjusted by repurchase of own shares, and the core capital ratio has been reduced to just over 7 per cent on average.

An increase in the banking institutions' losses will first and foremost reduce earnings, and any additional losses are to be borne by the buff-

[1] Hybrid core capital is described in more detail in: *Financial stability 2005* and Bundgaard, Birgitte and Suzanne Hyldahl, Structure of the Banks' Capital – New Statutory Requirements and Opportunities, Danmarks Nationalbank, *Monetary Review,* 3rd Quarter 2002.

THE BANKING INSTITUTIONS' EXCESS CAPITAL ADEQUACY, PROVISIONS AND WRITE-DOWNS AS A RATIO OF LOANS AND GUARANTEES, 1996-2005 Chart 9



Note: The Chart comprises all banking institutions in the Danish Financial Supervisory Authority's categories 1-3. As from 2005, new accounting standards apply to write-downs on loans and guarantees, cf. Box 2. Write-downs are not immediately comparable to the previous provisions for losses on loans and guarantees. Figures for 2005 are estimates.
Source: The Danish Financial Supervisory Authority.

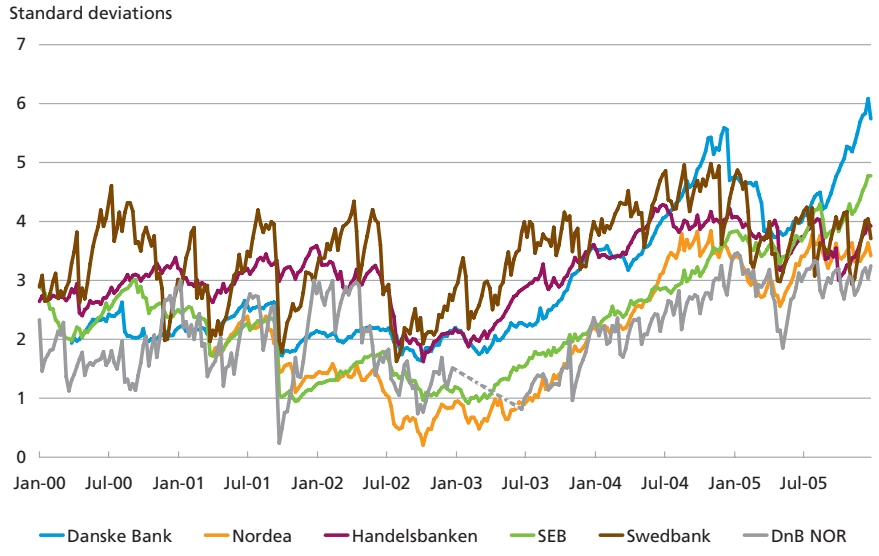
ers, i.e. the proportion of the capital in excess of the statutory 8-per-cent requirement. Excess capital adequacy has been reduced from 4.9 per cent in 2004 to 4.6 per cent at end-2005, cf. Chart 9. Under the previous accounting rules based on the prudential principle the banking institutions' loan loss provisions were not necessarily reflected in subsequent losses whereby the accumulated provisions partly served as a buffer. Under the new IFRS accounting standards as from 1 January 2005, the banking institutions may not write down loans and guarantees unless there is an objective indication of impairment - the principle of neutrality. This means that any write-down will most likely be associated with a loss. Thus, under the new rules, accumulated write-downs will not have the same buffer value as was the case for accumulated provisions. This implies erosion of the banking institutions' total buffers, cf. Chart 9.

Market assessment of the Nordic groups

Prices in the financial markets contain information on investor expectations of the future. On the basis of equity prices and accounting data, it is possible to estimate a market-based risk measure – distance to insolvency[1]. This measures the changes (in number of standard deviations) in

[1] See the description of methodology in the chapter on market-based risk measures in *Financial stability 2004* and the chapter on analysis of bank equity prices in *Financial stability 2005*.

DISTANCE TO INSOLVENCY FOR THE NORDIC BANKING GROUPS, 2000-05 Chart 10



Source: Annual accounts and Bloomberg.

market asset value that can be accommodated within the group's capital buffers, write-downs and earnings. Chart 10 shows the distance to insolvency for the Nordic groups.

For each Nordic group the distance to insolvency is more than three standard deviations. Consequently, the market assessment is that the group's buffers are at least three times greater than the expected changes in market asset value. Distance to insolvency may be seen as a value-at-risk measure, with a distance to insolvency of 3 standard deviations corresponding to a market assessment of a mere 0.13 per cent probability[1] that a banking institution's losses will exceed its buffers. Overall, the distance to insolvency is greater than previously and is at a level indicating a market assessment that the risk of a group's non-compliance with the statutory solvency requirement is very low.

RISK FACTORS FACING DANISH BANKING INSTITUTIONS

Assessment of banking institutions' credit risks

Credit risk is the risk of a banking institution suffering a loss should customers or other counterparties default on their obligations to that banking institution.

Danmarks Nationalbank's failure-rate model can be used to analyse the credit risk on the lending portfolios of Danish banking institutions,

[1] 0.13 per cent corresponds to the probability mass in a normal distribution for incidents of more than 3 standard deviations.

CALCULATION OF BANKING INSTITUTIONS' CREDIT RISK ON THEIR LENDING PORTFOLIOS Box 5

The calculation is based on Danmarks Nationalbank's failure-rate model, which estimates the potential failure rate for Danish public and private limited liability companies, cf. the chapter on the corporate sector and the households. 50 per cent of the companies in the failure-rate model provide information about which bank they use. The analysis includes only banking institutions serving at least 30 companies. As an approximation for the estimated failure rate of the households ($P^{households}$) and the agricultural sector ($P^{agriculture}$), the current year's average loss ratios for each of the two groups are used[1]. Then, an overall credit-risk measure is calculated for the lending portfolio of the individual banking institution. The calculation of the credit risk of banking institution *i* on its lending portfolio is based on the formula:

$$\text{Credit-risk measure}_i = p_i^{corporate} \cdot U_i^{corporate} + p^{agriculture} \cdot U_i^{agriculture} + p^{household} \cdot U_i^{household}$$

$P_i^{corporate}$ is the weighted estimated failure rate of the companies using banking institution *i*. The estimated failure rate of the individual company served by the individual banking institution is weighted by the debt of the company relative to the debt of all companies served by the individual banking institution. U_i is the lending ratio of banking institution *i* to the corporate sector, households and agriculture, respectively.

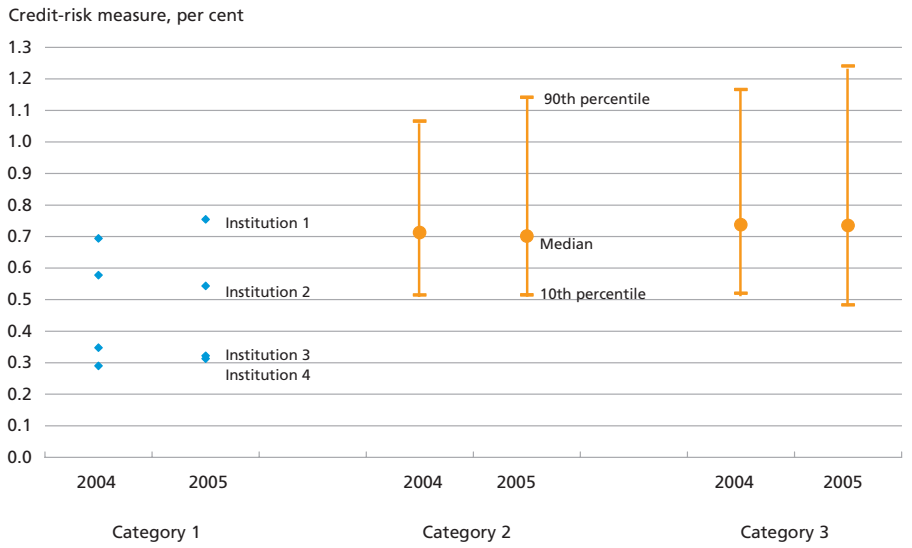
[1] The loss ratio is losses as a ratio of loans and guarantees. The 2005 loss ratio is not yet available and is assumed to be equal to the loss ratio in 2004.

cf. Box 5. For each banking institution a credit-risk measure can be estimated. The measure reflects the proportion of the lending portfolio that the banking institution may expect to lose over 1-2 years. The credit-risk measure is used to rank the banking institutions according to the degree of credit risk on their lending portfolios.

The credit risk is generally lower for the large Danish banking institutions than for other Danish banking institutions, cf. Chart 11. The principal reason is that the estimated failure rate for the companies using the large Danish banking institutions is, on average, less than half the estimated failure rate for the companies using the small and medium-sized banking institutions. This can be attributed to such factors as a higher return on assets, the fact that the companies are larger and older, as well as higher solvency and a lower debt ratio[1]. In contrast, banking institutions in categories 2 and 3 have a higher proportion of lending to private customers, at around 50 per cent compared to 25 per cent for the large banking institutions. Viewed in isolation, this implies a lower credit risk since the probability of losses on households is generally lower than the probability of losses on companies. Overall, for the banking institutions in categories 2 and 3 the credit risk is higher and the dispersion in the credit-risk measure is greater.

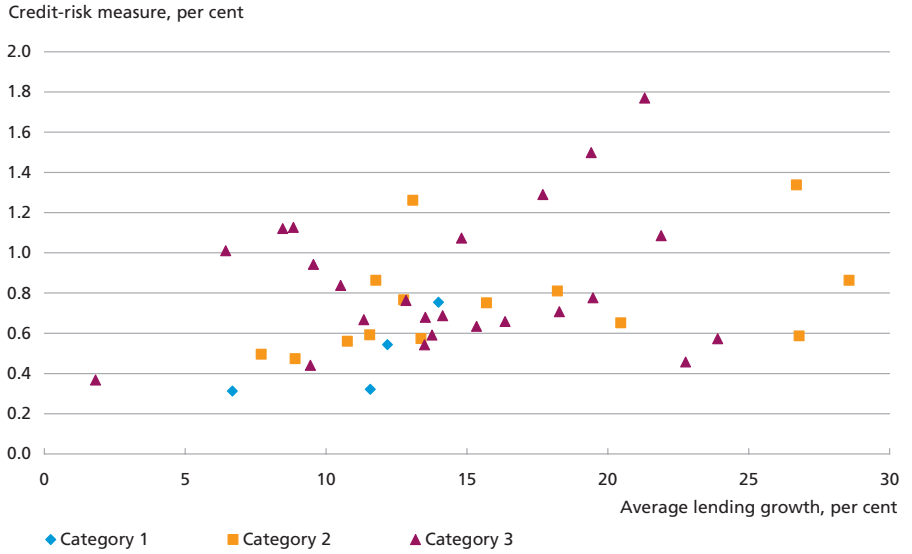
[1] See also the description of the failure-rate model in *Financial stability 2004.*

10TH, 50TH AND 90TH PERCENTILES FOR CREDIT RISK ON THE LENDING PORTFOLIOS IN THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S BANKING INSTITUTION CATEGORIES 1-3, 2004 AND 2005 Chart 11



Note: The Chart comprises the 42 banking institutions for which credit-risk measures have been calculated, cf. Box 5. The institutions are then classified in the Danish Financial Supervisory Authority's categories. Category 1 includes only four institutions, which makes percentiles and median meaningless for this category.
Source: The Danish Financial Supervisory Authority, annual accounts and own calculations.

RELATION BETWEEN CREDIT RISK AND AVERAGE LENDING GROWTH, 2002-05, BANKING INSTITUTIONS IN CATEGORIES 1, 2 AND 3 Chart 12



Note: Lending growth is calculated as a geometrical average of lending growth for the years 2002-05. Lending growth in 2005 is calculated on the basis of new opening balance sheets presented according to the new accounting standards.
Source: Annual accounts and own calculations.

A comparison of the banking institutions' credit risk with the growth in lending shows that high lending growth has a certain tendency to coincide with a higher credit risk, cf. Chart 12. At the same time, the dispersion in the credit-risk measure is relatively high among banking institutions with high lending growth.

Money-market exposure

The Danish money market is the market for krone-denominated exposures among banking institutions and mortgage-credit institutes. This market is used primarily for exchange of krone-denominated liquidity and management of short-term interest-rate positions.

The volume of exposures among Danmarks Nationalbank's monetary-policy counterparties in the uncollateralised day-to-day money market rose by 35 per cent to kr. 10.4 billion on average per day in 2005. The market was thus characterised by ample liquidity and many positions at the short end of the yield curve. The market scale fluctuated considerably from day to day, with total lending in a single day peaking at kr. 26.8 billion and bottoming out at kr. 3.2 billion.

Table 3 shows the average exposure among credit institutions in the uncollateralised day-to-day money market in 2005, calculated on the basis of transactions in Danmarks Nationalbank's payment system, Kronos.

In 2005, the average daily exposure of the Nordic groups in category A amounted to kr. 943 million, corresponding to an increase of 32 per cent on 2004. The groups are by far the largest players in the market, with a market share of 77 per cent in 2005. The market share of foreign credit institutions, excluding Nordic groups, decreased from 12 per cent in 2004 to 8 per cent in 2005. Average lending conceals considerable dispersion over days and between credit institutions. Table 4 shows the

AVERAGE DAILY EXPOSURE PER CREDIT INSTITUTION IN THE UNCOLLATERALISED DAY-TO-DAY KRONE MONEY MARKET, 2005 Table 3

Lending by credit institutions, kr. million	To category A	To category B	To category C	To other Danish credit institutions	To foreign credit institutions, excl. Nordic groups	Total
Category A	609	253	10	7	63	943
Category B	35	43	10	7	3	99
Category C	2	6	2	0	0	10
Other Danish credit institutions	30	31	0	0	11	72
Foreign credit institutions, excl. Nordic groups	66	22	2	1	6	98

Source: Danmarks Nationalbank.

MAXIMUM UNCOLLATERALISED DAY-TO-DAY EXPOSURES PER CREDIT INSTITUTION, 2004 AND 2005 Table 4

Kr. million	Maximum exposure per credit institution, 2005 (average for the category)	Maximum exposure per credit institution, 2004 (average for the category)
Category A	3,756	2,950
Category B	568	627
Category C	64	47
Other Danish credit institutions	396	273
Foreign credit institutions, excl. Nordic groups	966	722

Source: Danmarks Nationalbank.

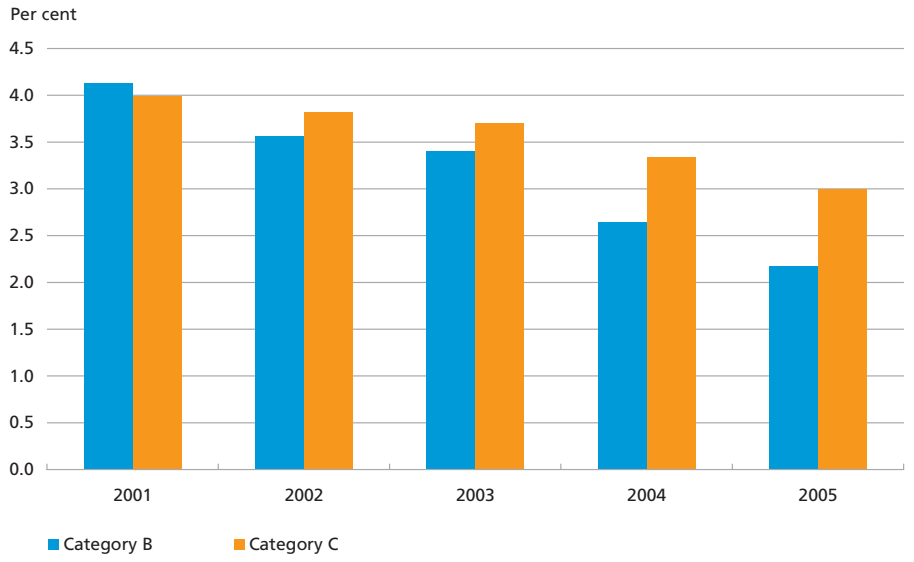
highest average exposure per credit institution in the categories in 2004 and 2005. The highest exposure for the Nordic groups in category A increased from kr. 3.0 billion in 2004 to kr. 3.8 billion in 2005.

Interest-rate risk

The interest-rate risk of the banking institutions is measured in terms of the proportion of the core capital (tier 1 capital) that is lost on an upward parallel shift in the yield curve of 1 percentage point.

The banking institutions in category B have almost halved their interest-rate exposure, from 4.1 per cent in 2001 to 2.2 per cent in 2005, cf. Chart 13. The reduction has taken place in step with the decline in the

INTEREST-RATE RISK: PROPORTION OF CORE CAPITAL LOST ON A 1-PERCENTAGE-POINT RISE IN INTEREST RATES, CATEGORIES B AND C, 2001-05 Chart 13



Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio: interest-rate risk. The key ratio is not available for the Nordic groups.
Source: Annual accounts.

general level of interest rates and may reflect expectations of rising interest rates. The dispersion among the banking institutions is great, however. Among the institutions in categories B and C, 10 per cent recorded an interest-rate risk of more than 4.6 per cent and 6.2 per cent, respectively at end-2005.

Stress testing

The resilience of the banking institutions to a number of hypothetical scenarios can be tested. The consequences of an interest-rate increase, higher losses on loans and guarantees and the failure of the largest counterparty in the uncollateralised day-to-day money market during the year are analysed. The analyses are static and cover a period of one year. They are based on the profit for the year and capital structure at year-end. Thus, no allowance is made for the possibility that the banking institutions could have responded to the changed conditions, so the re-

NUMBER OF BANKING INSTITUTIONS AND GROUPS WITH NEGATIVE RESULTS BEFORE TAX, CATEGORIES A, B AND C, 2004-05 Table 5

Scenarios	Category A		Category B		Category C	
	2005	2004	2005	2004	2005	2004
Basis, ordinary operating result	0	0	0	0	0	0
Credit risk						
1 An increase in losses by 1 percentage point	0	0	0	0	0	0
2 An increase in losses by 2.5 percentage points	6	6	17	17	20	22
3 An increase in losses by 1 percentage point for households and 2.5 percentage points for corporate customers	6	6	8	10	9	7
4 Failure of largest counterparty bank in the Danish uncollateralised day-to- day money market	0	0	10	14	9	11
Interest-rate risk						
5 An increase in interest rates by 1 percentage point	na.	na.	0	0	0	0
6 An increase in interest rates by 3 percentage points	na.	na.	2	5	3	6
Combinations						
7 Scenarios 1 and 5 simultaneously ..	na.	na.	1	4	3	1
8 Scenarios 2 and 6 simultaneously ..	na.	na.	19	18	28	27
9 Scenarios 3 and 4 simultaneously ..	6	6	19	19	19	16
Total number of banking institutions	6	6	19	19	28	28

Note: na. means that there are no available data. Scenario 4, failure of the largest counterparty bank in the uncollateralised day-to-day money market, includes only accounts between banking institutions holding a current account with Danmarks Nationalbank.

Source: Annual accounts and Danmarks Nationalbank.

sults of the stress tests are not suitable for analysing the resilience in the longer term. The scenarios selected in *Financial stability 2005* still apply.

The International Monetary Fund, IMF, is performing a macro stress test of the Danish banking sector in 2006, cf. Box 6.

Slightly fewer banking institutions in categories B and C would show a loss in the event of higher losses on loans and guarantees in 2005 than in 2004, cf. Table 5. Viewed in isolation, increasing lending reduces the resilience to higher losses, but this effect is offset by higher earnings. The results for the scenarios with interest-rate increases also reflect the higher earnings concurrently with a reduced interest-rate risk.

In scenario 4, the banking institutions are assumed to suffer a loss on the failure of the largest counterparty in the uncollateralised day-to-day

MACRO STRESS TEST OF THE DANISH BANKING SECTOR — Box 6

During 2005 and 2006 the International Monetary Fund (IMF) is assessing the Danish financial sector under the Financial Sector Assessment Program (IMF-FSAP)[1]. The standard analyses of the report will comprise a macro stress test of the Danish banking sector. The purpose is to assess the sector's resilience to various hypothetical macroeconomic scenarios based on "bottom-up" and "top-down" analyses. For the "bottom-up" analysis, the largest banking institutions in Denmark were asked by the Danish Financial Supervisory Authority to estimate the effect of the given macroeconomic scenarios against the background of the institutions' own data and models. The Danish Financial Supervisory Authority is collecting data for this part of the analysis. The results will be compared to the "top-down" analysis, prepared by the IMF and Danmarks Nationalbank, which focuses on overall patterns in the banking sector's losses on loans and guarantees on the basis of model calculations. The IMF's final FSAP report is expected to be published in the autumn of 2006.

The IMF has outlined three economic scenarios to be assessed:

- Scenario 1 depicts a slowdown in the Danish economy after a sustained upswing. The scenario implies a 14 per cent drop in domestic housing prices over three years, leading to a decrease in consumer confidence and demand and ultimately to zero growth.
- Scenario 2 depicts an external shock to the effective exchange rate. Investors all over the world are concerned about the US savings deficit and regard the euro area as a safe haven. The result is a considerable appreciation of the euro. The Danish krone mirrors the euro, appreciating correspondingly vis-à-vis the dollar and other currencies. This leads to loss of competitiveness, which again causes Danish exports to weaken, GDP to fall and unemployment to rise.
- Scenario 3 is a deterioration of scenario 1. A slowdown in the domestic economy is exacerbated by a tightening of the ECB's monetary policy. This scenario implies a 30 per cent drop in housing prices in Denmark and a decrease in GDP by 3 per cent.

Continued

[1] For a broader description of IMF-FSAP see Gitte Wallin Petersen, Review of the Financial System in Denmark, *Monetary Review*, 3rd quarter 2005.

money market. This scenario also shows that the banking institutions were more resilient in 2005, despite the general increase in exposures.

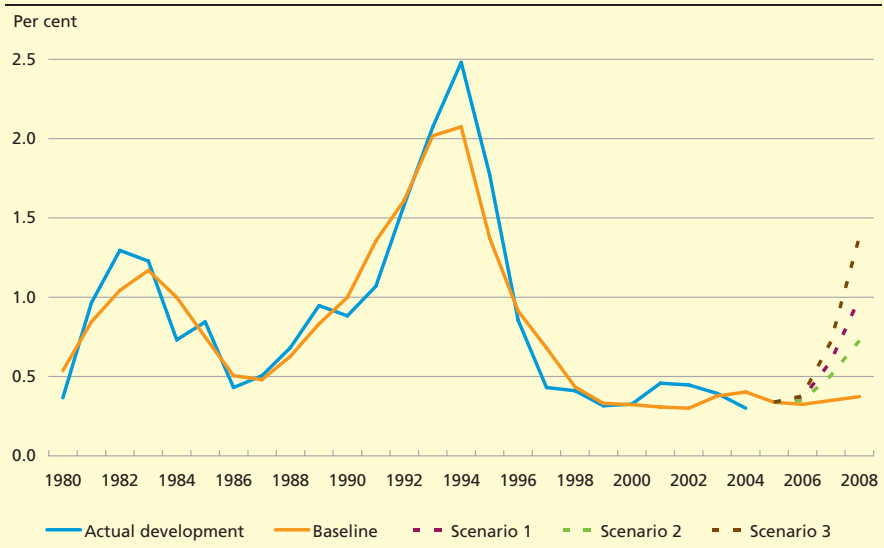
In scenario 8, the loss ratio is increased by 2.5 percentage points and the interest rate is increased by 3 percentage points. In this scenario, all banking institutions in categories B and C would have recorded negative results.

Taking the banking institutions' excess capital adequacy into account, Chart 14 shows how many banking institutions would have a solvency ratio below 8 as the loss ratio on loans and guarantees increases.

Earnings and excess capital adequacy are not lost until losses rise by 4 percentage points so that the solvency ratio of one banking institution

CONTINUED Box 6

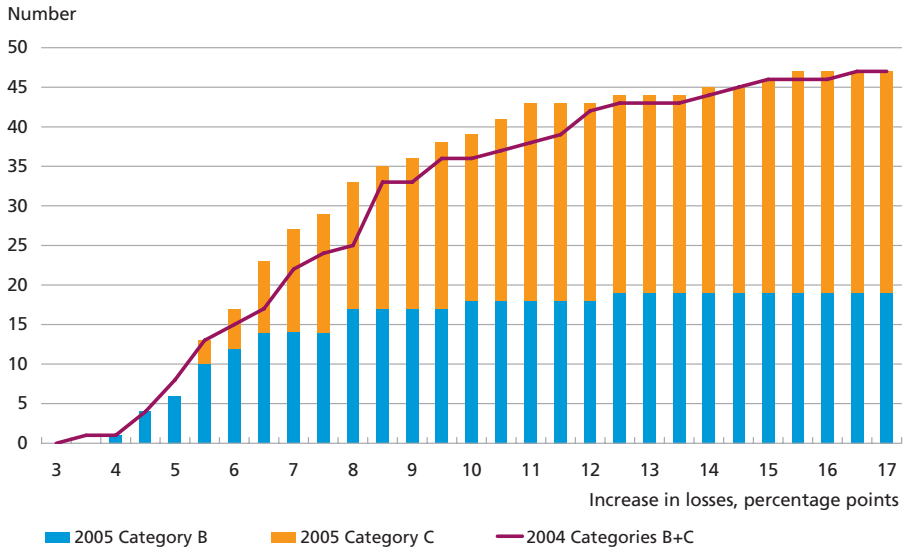
ACTUAL AND ESTIMATED LOSS IN THE DANISH BANKING SECTOR



Source: The Danish Financial Supervisory Authority and own calculations.

In a historical perspective a correlation can be observed between the development in unemployment, domestic lending as a ratio of GDP and the banking sector's losses on loans and guarantees. Danmarks Nationalbank has estimated a simple model which makes use of this correlation in the projection of the banking sector's total losses on loans and guarantees in the given scenarios. Preliminary analyses show that the banking institutions' losses on loans and guarantees will on average rise by approximately 1.5 percentage points in scenario 3, cf. the Chart. The blue line in the Chart indicates the actual course of the banking sector's losses on loans and guarantees. The black line indicates the expected course estimated on the basis of the simple model. The dotted lines indicate the development in losses in the three scenarios on the basis of the simple model.

NUMBER OF BANKING INSTITUTIONS IN CATEGORIES B AND C WITH A SOLVENCY RATIO BELOW 8 ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2004-05 Chart 14



Source: Annual accounts and own calculations.

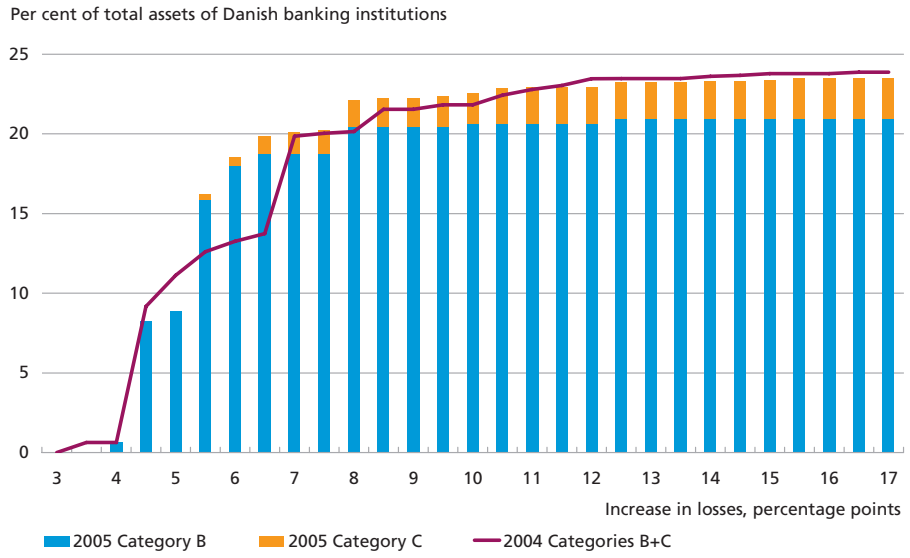
in category B falls below 8 per cent. The strong lending growth and declining solvency imply slightly lower resilience for the banking institutions in categories B and C taken as one, since more banking institutions encounter solvency problems sooner when losses on loans and guarantees are rising (the red curve extends further to the southeast than the bars).

Chart 15 shows the same situation, but the banking institutions are included with their total assets. This gives an idea of the size of the affected banking institutions.

As far as the Nordic groups are concerned, losses must rise by 2.75 percentage points before two groups fall below the solvency requirement. The corresponding figure in 2004 was 3 percentage points. All six groups would encounter solvency problems on an increase in losses by 4.25 percentage points, compared to 4.75 percentage points in 2004.

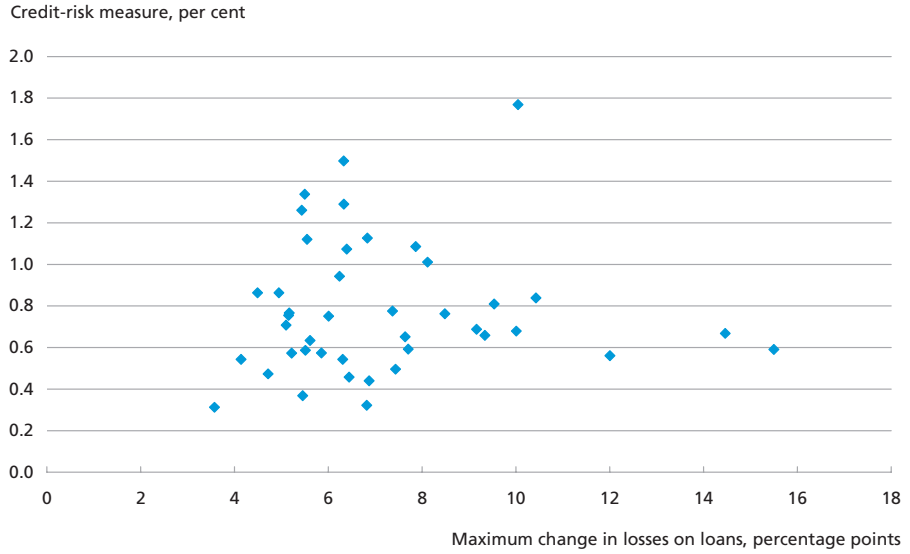
Charts 14 and 15 show only the size of the losses that the banking institutions can sustain, but not the probability of the losses occurring. The probability of losses for the individual banking institution depends on the credit risk on the lending portfolio, among other factors. If the credit risk on a banking institution's lending portfolio is relatively high, stronger resilience to rising losses should be sought. Chart 16 compares the resilience from Chart 14 with the probability of losses expressed by the credit-risk measure. There is no unequivocal positive connection between resilience and risk of losses, so it is not necessarily the banking institutions with the highest credit risk that can sustain the highest losses.

TOTAL ASSETS OF BANKING INSTITUTIONS IN CATEGORIES B AND C WITH A SOLVENCY RATIO BELOW 8 ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2004-05 Chart 15



Note: Total assets for the banking institutions in categories B and C, Danske Bank A/S and Nordea Bank Danmark A/S amounted to kr. 2,727 billion at end-2005, equivalent to 100 per cent on the y axis. Adjustments have been made for an estimate of Danske Bank's activities abroad.
Source: Annual accounts and own calculations.

CREDIT RISK AND RESILIENCE TO LOSSES, DANISH BANKING INSTITUTIONS, 2004-05 Chart 16



Note: Resilience is expressed as the maximum increase in losses on loans and guarantees in percentage points which would have been possible in 2005 within the solvency requirement.
Source: Annual accounts and own calculations.

MORTGAGE-CREDIT INSTITUTES

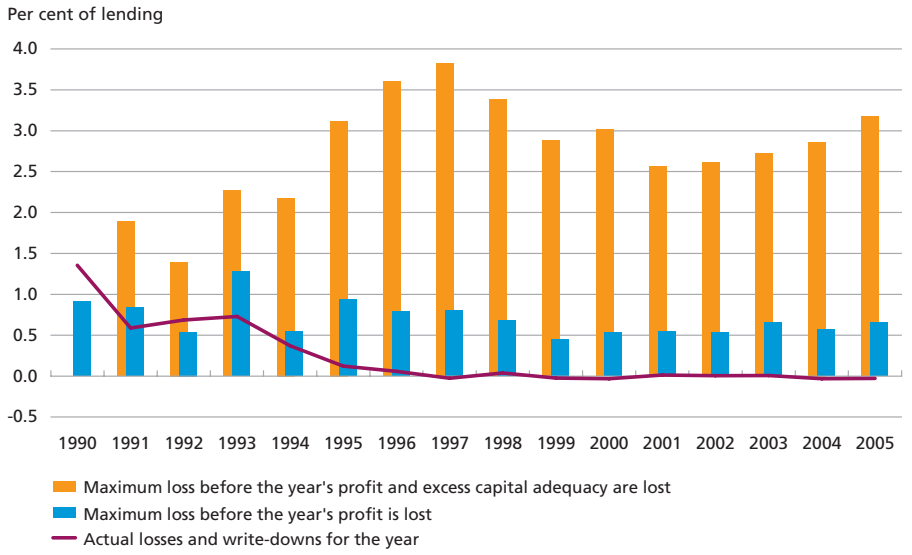
In 2005 the losses and write-downs on loans of the mortgage-credit institutes were influenced by considerable reversal of previous provisions. Together with the very low write-downs in 2005, this enabled the mortgage-credit institutes to report net income of kr. 0.5 billion.

The mortgage-credit market was characterised by competition on products. Gross new lending was record-high at kr. 750 billion in 2005 as a result of the extensive remortgaging to capped loans and deferred-amortisation loan, as well as extensive remortgaging activity. Concurrently, new construction and price increases for owner-occupied homes contributed to 12 per cent growth in mortgage-credit lending. In contrast, the banks' mortgage loans have gained business from the mortgage-credit institutes. The remortgaging activity and the shift towards new products prompted a large number of early redemptions, i.e. just over kr. 540 billion in total. Net lending totalled just over kr. 160 billion.

The income of the mortgage-credit institutes rose by 19 per cent to kr. 15 billion in 2005, with increasing contributions accounting for approximately half. Costs rose by 4 per cent due to the higher activity. Profits before tax increased by 29 per cent in total to kr. 12 billion.

The mortgage-credit institutes' resilience to losses is still high and growing, cf. Chart 17. In 2005 the sector as a whole could bear losses of

MORTGAGE-CREDIT INSTITUTES' BUFFER AGAINST LOSSES, 1990-2005 Chart 17



Note: Maximum losses are compiled including actual losses and write-downs. Capital-base data for 1990 are not available.
Source: Danish Financial Supervisory Authority and annual accounts.

up to 3.2 per cent of the lending portfolio before the profits for the year and the excess capital adequacy would be lost. Actual losses and write-downs for the year accounted for 0 per cent of the lending portfolio.

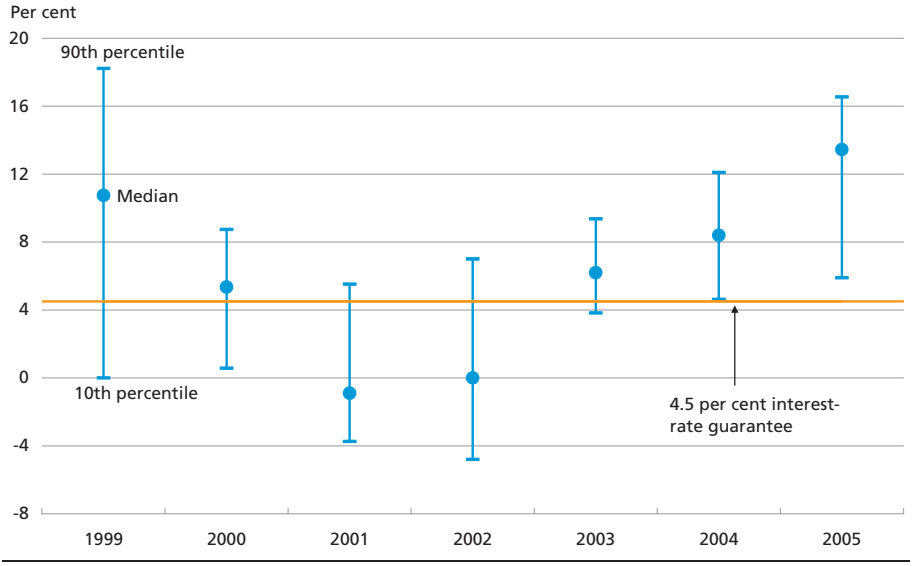
PENSION COMPANIES

The Danish pension companies posted record-high returns on investments in 2005, cf. Chart 18. Rising equity prices combined with falling interest rates enabled the companies to achieve a positive return on both equity and bond portfolios. More than half of the pension companies recorded double-digit returns after tax, which has not been observed since 1999.

In view of the favourable development in returns, today the sector is robust. At end-2005, only few pension companies experienced problems with the yellow-light stress test of the Danish Financial Supervisory Authority, while no pension companies recorded problems with the red-light stress test. The sector's increased use of financial derivatives, which provides for a better match between the interest-rate risk on assets and liabilities, respectively, contributed to this development.

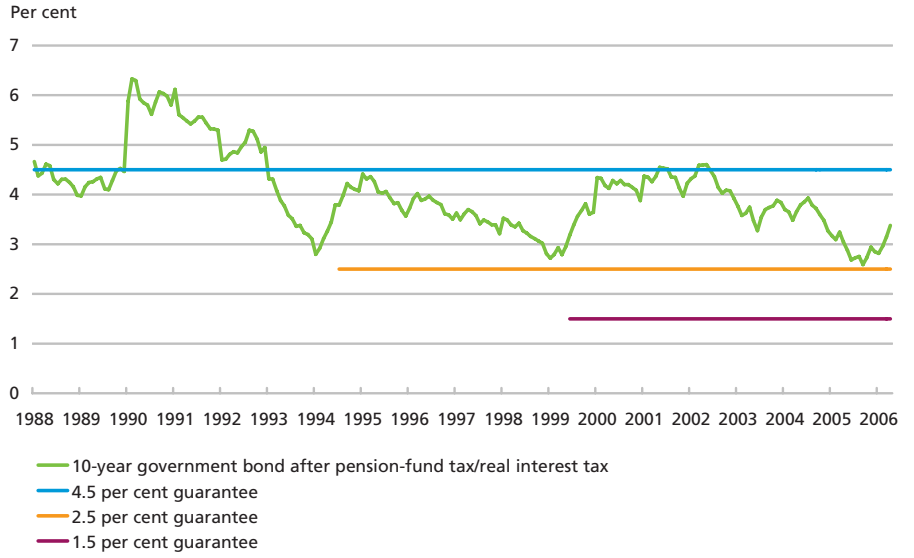
Looking ahead, the low level of interest rates still constitutes a significant replacement risk for the pension companies since old 4.5 per cent

RETURNS AFTER TAX IN THE PENSION COMPANIES, 1999-2005 Chart 18



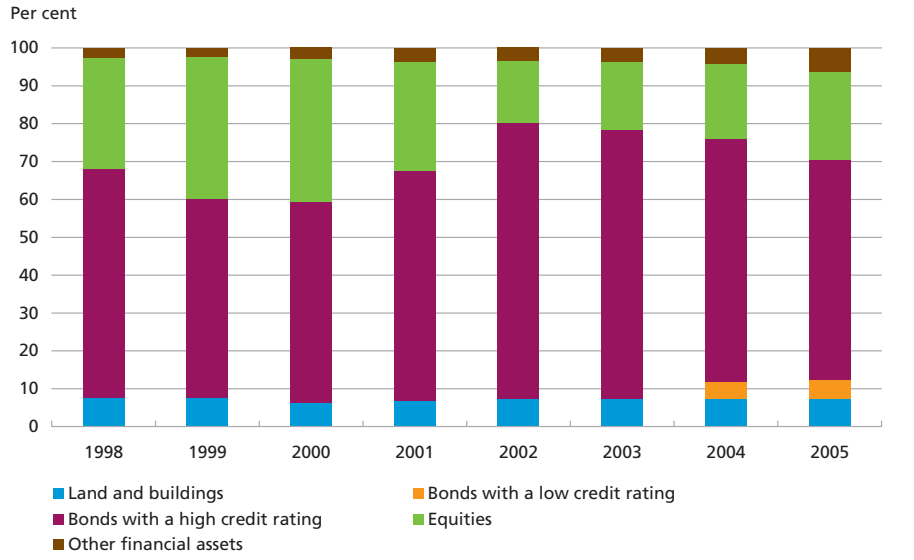
Note: 2005 figures are estimates, based on a number of published annual accounts.
Source: The Danish Financial Supervisory Authority and annual accounts.

MAXIMUM GUARANTEED INTEREST RATES AND YIELD TO MATURITY OF A 10-YEAR GOVERNMENT BOND AFTER PENSION-FUND TAX / REAL INTEREST TAX, 1988-2006 Chart 19



Note: As from 2000, the Pension-Fund Tax Act replaced the Real Interest Tax Act. The maximum guaranteed interest rates are shown after deduction of expense and contingency loading, typically of 0.5 percentage points.
Source: The Danish Financial Supervisory Authority, the Danish Ministry of Taxation and Danmarks Nationalbank.

DEVELOPMENT IN THE PENSION COMPANIES' INVESTMENT ASSETS, 1998-2005 Chart 20



Note: Figures for 2004 and 2005 are based on annual accounts presented before contributions to this report were finanlised. It was not possible to distinguish between bonds with high and low credit ratings before 2004. Other financial assets comprise collateralised loans and financial derivatives.
Source: Annual accounts and the Danish Financial Supervisory Authority.

guarantees continue to weigh heavily on the liabilities of a number of pension companies[1] In view of the current level of interest rates, it can be difficult to pay an annual rate of return after tax of 4.5 per cent, cf. Chart 19.

In 2005, the pension companies reduced the bond element of total investment assets, primarily to increase the equity share, cf. Chart 20. The share of other financial assets is also higher, reflecting e.g. extended use of interest-rate derivatives and other financial derivatives.

[1] As from 1982 until mid-1994 the pension companies were free to guarantee the pension savers a minimum annual return after tax of 4.5 per cent over the life of the pension. In 1994, the Danish Financial Supervisory Authority lowered the rate to 2.5 per cent, followed by a further lowering, to 1.5 per cent, in 1999.

The Corporate Sector and the Households

The prospects for the Danish corporate sector are good. Earnings are high in most sectors, and generally the estimated failure rate is falling, although the gap between the sound and the less sound companies is widening.

The price of owner-occupied housing has risen significantly in recent years. The increases are higher than previously seen and among the highest in the world. At the same time, the households have become more indebted. Danish households make extensive use of the opportunity to finance home purchases via adjustable-rate and deferred-amortisation loans. When opting for these loan types it is important for the households to bear in mind the risk they are incurring. On average the interest expenses of Danish homeowners will increase by 1.2 per cent of gross income if the short-term interest rate goes up by 1 percentage point. There is considerable dispersion, however, and some homeowners will see their interest expenses increase considerably if interest rates rise.

THE SIGNIFICANCE OF THE CORPORATE SECTOR AND THE HOUSEHOLDS TO FINANCIAL STABILITY

Extending credit to the corporate sector and the households is one of the primary functions of the banking institutions. In doing so, the banking institutions incur a credit risk. The finances of the corporate sector and the households and their robustness to adverse developments have an impact on the banking institutions' earnings and balance sheets and thus on financial stability.

CORPORATE SECTOR

The Danish economy is in an upswing that began almost three years ago. In the initial phase, the upswing was driven primarily by private consumption, but has now become more broadly based after accelerating exports and investments during 2005.

The upturn has been most pronounced within building and construction, and the service sector. In step with the increasing growth in exports, which has taken place against the background of high growth in the global economy combined with rising market shares in 2005, manu-

facturing is also picking up. The higher export revenue has increased industrial output, but not sufficiently to reverse the falling trend in manufacturing employment. It should, however, be noted that part of the growth in exports comes from re-export of goods of which the primary elements are manufactured abroad. This applies to products such as mobile telephones and increasingly also to e.g. the clothing industry.

Private-sector employment has risen by around 50,000 in the last two years, and consequently the pressure on capacity has increased considerably. The tendency is most pronounced within building and construction, where the shortage of labour has reached the same high level as in the mid-1980s. In parts of the service sector, e.g. the financial sector, it is difficult to attract the required labour. Consequently, attention has been turned to foreign labour, e.g. from the new EU member states, but the influx of foreign labour is still modest in terms of the growth in employment. Even though unemployment is falling, wage increases have remained low so far.

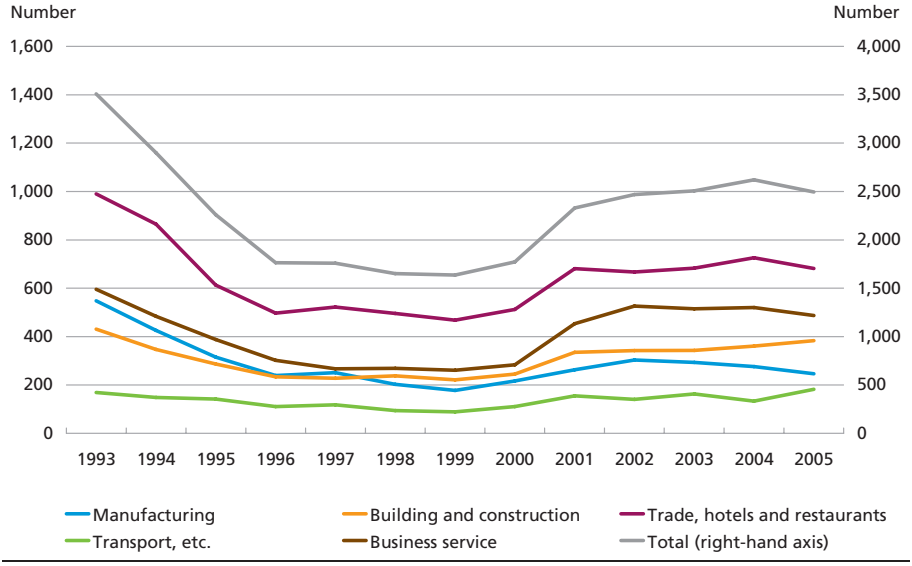
The international economy is strong, and particularly the German economy seems to be picking up after several years' weak growth. Financial conditions have tightened a little against the background of the positive growth prospects – official interest rates have been raised in both the USA and Europe, and long-term interest rates have risen – but the level of interest rates is still low. Export opportunities are therefore good, and domestic demand is expected to continue to show sound growth. In recent years Danish companies have invested substantially in increasing their production capacity, and the ongoing introduction of new technology has led to the efficiency gains that are necessary in view of the increasing international competition. The greatest risk factor is whether the pressure on the labour market will lead to significantly higher wage increases than abroad, to the detriment of Danish competitiveness.

The soundness of Danish companies

The positive cyclical position is a major explanatory factor behind the general decline in the number of failing Danish companies, cf. Chart 21. This trend continued in the first months of 2006. However, the number of failures in the building and construction sector, in which many new companies have been established in recent years, and in the transport sector, is on the rise.

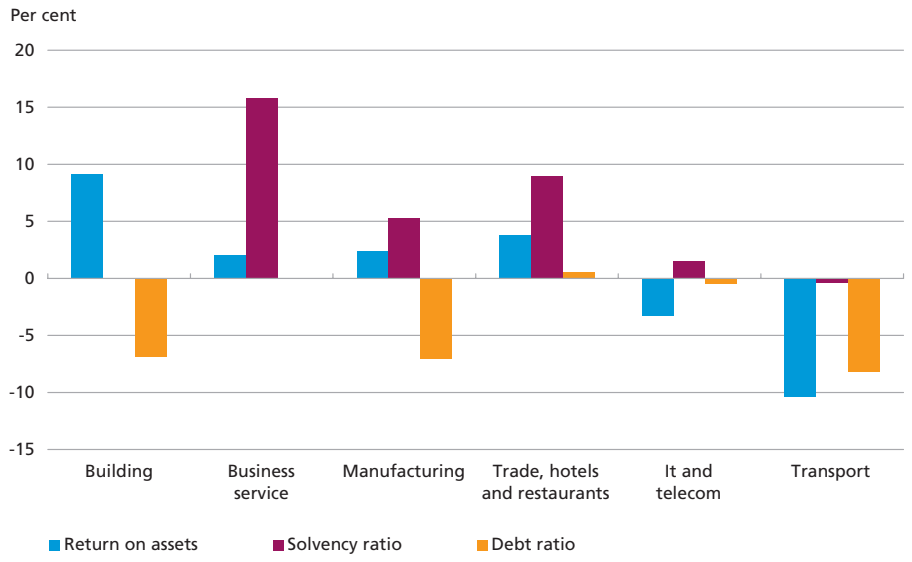
The favourable economy is reflected in the financial statements of Danish companies, cf. Chart 22 which shows the number of companies whose key financial ratios have improved, less the number of companies whose key ratios have deteriorated within the last year. This net result is

NUMBER OF COMPULSORY LIQUIDATIONS, 1993-2005 Chart 21



Source: Statistics Denmark.

PERCENTAGE OF COMPANIES WITH IMPROVED KEY FINANCIAL RATIOS, NET, 2004-05 Chart 22

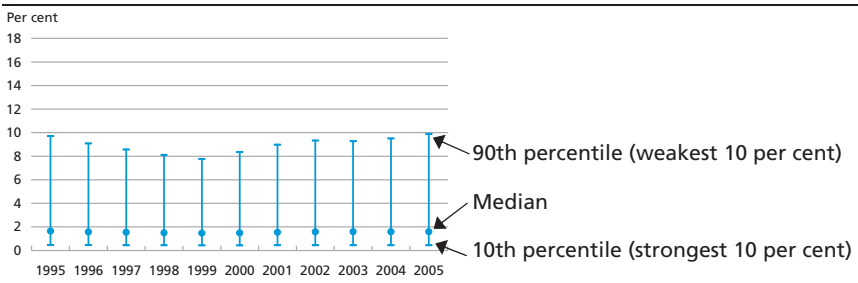


Note: The Chart has been created by comparing financial statements published by companies in both 2004 and 2005. It shows the number of companies whose key ratios have improved in the past year less the number of companies whose key ratios have deteriorated. The net result is calculated as a percentage of all financial statements. A value above 0 indicates that more companies have seen improvement than deterioration in the key ratio in question. A negative debt ratio value indicates that more companies have increased than reduced their debt ratios.

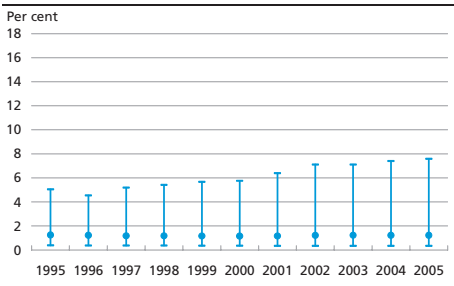
Source: Experian A/S and own calculations.

ESTIMATED FAILURE RATES FOR SELECTED SECTORS AND TOTAL, EXPRESSED AS THE 10TH, 50TH AND 90TH PERCENTILES, 1995-2005 Chart 23

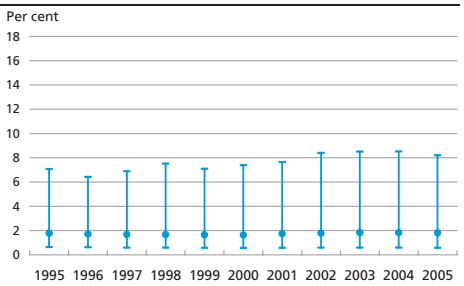
TOTAL



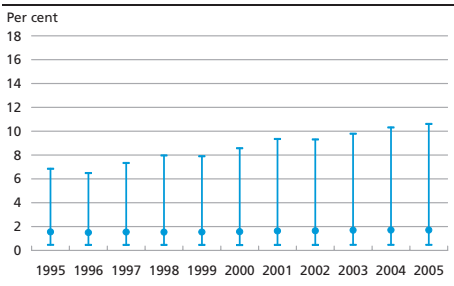
MANUFACTURING



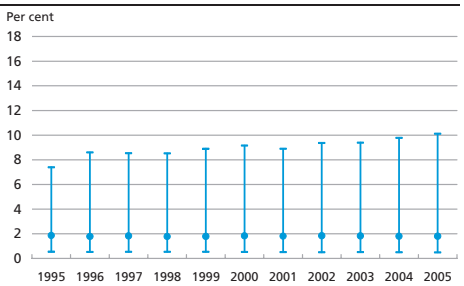
BUILDING



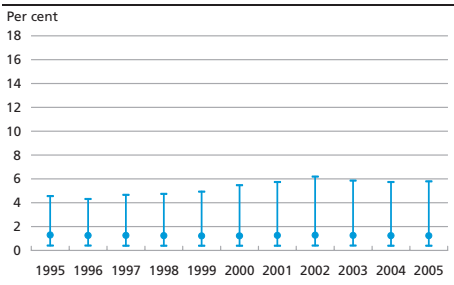
TRADE, HOTELS AND RESTAURANTS



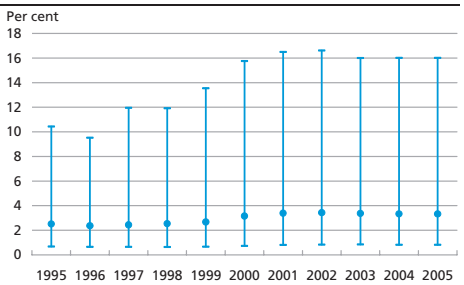
TRANSPORT



BUSINESS SERVICE



IT AND TELECOM



Note: 2005 is a preliminary estimate on the basis of around 40 per cent of the financial statements.
Source: Experian A/S and own calculations.

calculated as a percentage of the total number of companies. Overall, Danish public and private limited liability companies achieved higher returns in 2005 than in 2004, while especially the returns in the transport sector have decreased. The companies' ability to absorb losses, measured as their solvency ratio, improved in most sectors in 2005, but deteriorated slightly in the transport sector. In several sectors, notably transport, the debt ratio (short-term debt) increased in 2005.

On the basis of published financial statements, Danmarks Nationalbank has developed a model to estimate the probability that a company will fail within the next few years, cf. Box 7. Chart 23 shows the distribution of estimated failure rates for Danish companies by sector since 1995.

In general, the median estimated failure rate for all sectors fell slightly in 2005. However, the weakest companies are struggling more. This is reflected in an increase in the 90th percentile in Chart 23 (Total) since

MODEL TO ESTIMATE THE RISK OF COMPANIES FAILING — Box 7

Danmarks Nationalbank's failure-rate model is used to estimate the probability of a company failing within the next few years. The estimated failure rate can be seen as a weighted index of key financial ratios and other elements of the companies' financial statements. The failure-rate model does not include agriculture, etc.

Variables in the model

The model includes ten explanatory variables, i.e. four quantitative variables and six dummy variables. The sign in parenthesis indicates the variable's influence on the estimated failure rate.

- The company's return on assets adjusted for sector (-). The company's return on assets relative to the median return for the sector.
- Solvency (-). Equity capital as a ratio of total assets.
- Debt ratio (+). Short-term debt as a ratio of total assets.
- Reduction of the capital base (+). The dummy variable is set at 1 if the company repeats the deficit for the year, whereby the company's equity capital falls below the capital adequacy required.
- Size (-). Logarithm of total assets.
- Auditors' comment (+). The dummy variable is set at 1 if the auditors' comment in the accounts is critical.
- Form of ownership (+). The dummy variable is set at 1 if the company is a private limited liability company.
- Age (-). Dummy variable for the age of the company.
- Diversification (-). Dummy variables describing the number of sectors and/or subsectors in which the company operates.
- Municipality group (-). Dummy variables ranking the companies by municipality group with Greater Copenhagen as the reference group.

Continued

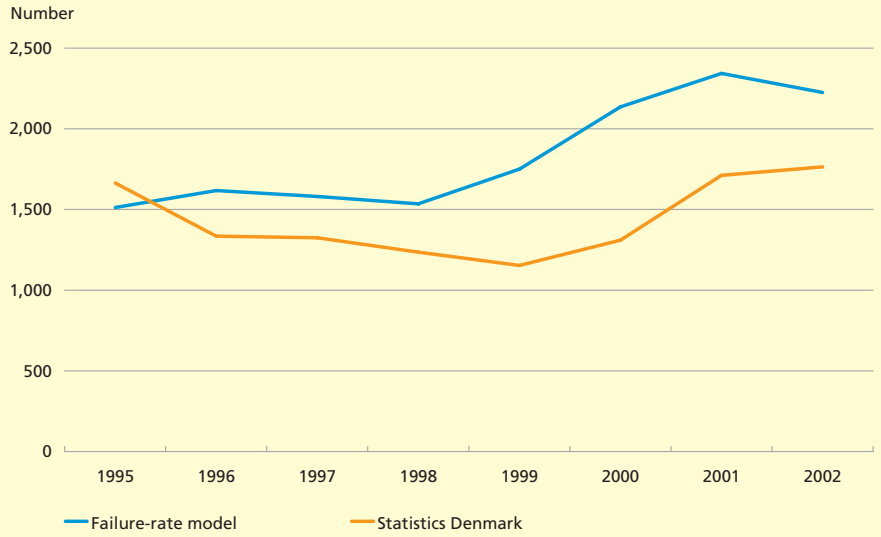
CONTINUED Box 7

Data

The model is estimated on the basis of more than 400,000 financial statements presented in the period 1995-2002 by Danish public and private limited liability companies, of which just under 15,000 relate to failed companies.

The latest accounts presented by an active company before it fails are regarded as coming from a failed company. The average period from the presentation of the last accounts as an active company to the time when the company fails is just under two years. A company is regarded as having failed in the following situations: compulsorily liquidated, subject to compulsory liquidation, dissolved, compulsorily dissolved, subject to compulsory dissolution, compulsory composition confirmed, compulsory composition being negotiated. This broader definition provides a better link to the time when the payment problems arose. The model's definition of company failure thus deviates from the definition applied by Statistics Denmark. In relation to the failure-rate model presented in *Financial stability 2005*, a number of improvements have been made to the model's data basis. This entails that the development in the number of failures in the model is more consistent with the data from Statistics Denmark, cf. the Chart.

NUMBER OF COMPULSORY LIQUIDATIONS IN THE FAILURE-RATE MODEL AND IN THE OFFICIAL STATISTICS, 1995-2002



Source: Statistics Denmark, Experian A/S and own calculations.

2003. This development should be viewed in the light of the establishment of many new companies in current years. All other things being equal, newly-established companies are relatively more likely to fail.

The largest decline in the estimated failure rate is seen for the building and construction sector, where the gap between the strongest and weakest companies has narrowed. The estimated failure rate has fallen

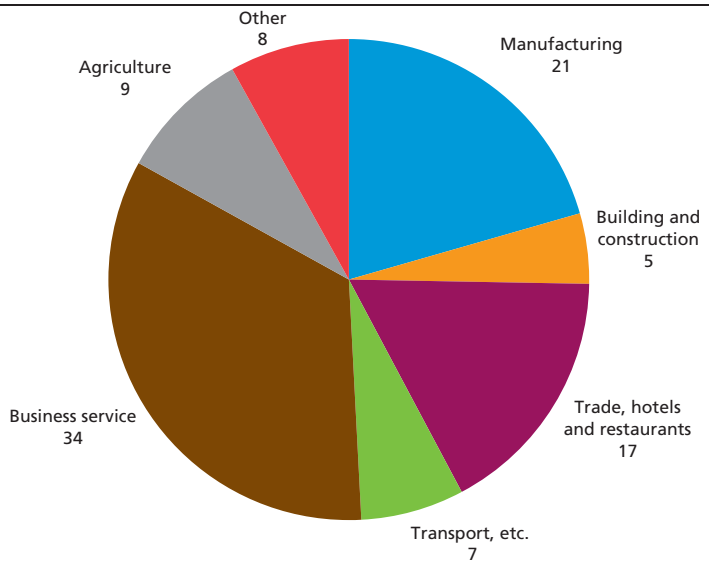
marginally within trade, hotels and restaurants, while the gap between the companies has widened considerably within the last couple of years. The overall estimated failure rate for transport companies has remained unchanged, but again the gap between the top and bottom companies has widened. The estimated failure rate in the IT and telecom sector declined in 2005, but the level is still the highest among the sectors analysed.

One of the weaknesses of the model is that failure rates are estimated on the basis of financial statements that document the companies' past earnings. Consequently, the model only applies historical data to estimate the failure rate. If the model had been more forward-oriented, the estimated failure rates would probably have fallen more in 2005 as a result of the strong economy. This is reflected in e.g. equity prices, which reflect future expectations. Since 2003 the Danish equity-price index has more than doubled, and in 2005 alone it rose by 40 per cent. This has also been the general tendency for the individual sector indices.

Expected losses on corporate exposures

The banking institutions' largest corporate exposures are in business service, cf. Chart 24, and lending for real estate letting and administration constitutes half of the lending to this sector. The ratio of lending to

DANISH BANKING INSTITUTIONS' CORPORATE LENDING BY SECTOR, END-2005, PER CENT — Chart 24



Note: The calculation is based on the institutions reporting in full to the MFI balance-sheet statistics. IT and telecom, which is mainly comprised by the business service sector, cannot be shown as a separate sector. Business service also comprises real estate letting and administration, rental of cars, machinery and other equipment, legal services, consultant engineering services and auditing and other similar consulting and service.
Source: Danmarks Nationalbank.

LOSSES ON CORPORATE LENDING Box 8

Estimated failure rates for Danish companies can, when combined with data on the companies' bank debt, be used to estimate the expected and unexpected losses on corporate lending. This is done by simulating a loss function for corporate lending. The loss function indicates how frequently a given level of losses on corporate lending is realised. The chapter on the use of advanced methods for calculation of capital requirements under Basel II presents the theoretical background to the banking institutions' loss functions in more detail.

The loss function is simulated by setting up 10,000 different scenarios where random companies are assumed to fail. If a company fails, it is furthermore assumed that all short-term bank debt and half of the long-term bank debt is lost for the bank. The total loss in each scenario is calculated, after which the loss distribution can be compiled.

The expected loss is the average loss. The 95th percentile in the loss distribution indicates the bank's maximum loss on corporate lending with a probability of 95 per cent. The difference between the 95th percentile and the average loss can be used as a measure of the uncertainty of the expected loss.

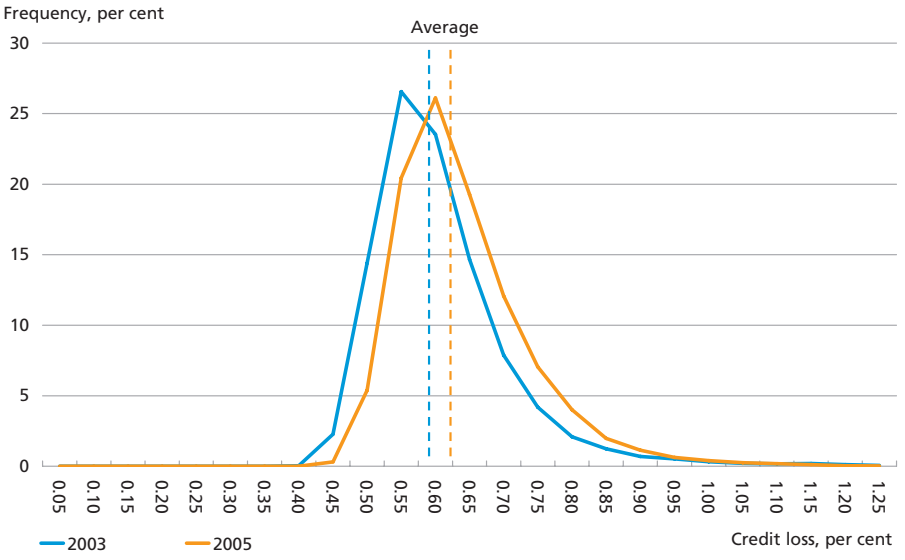
business service rose from 24 per cent in 2000 to 34 per cent in 2005. The ratio of lending by banking institutions to trade, hotels and restaurants declined in the same period. The ratio of lending to other sectors has remained more or less unchanged since 2000.

The banking institutions' losses on lending to various sectors depend on the general soundness of the companies, as well as the distribution of lending on companies with different risk profiles. The banking institutions' expected and unexpected losses on corporate exposures can be simulated on the basis of data from Danmarks Nationalbank's failure-rate model, cf. Box 8.

Chart 25 shows the simulated distribution of the banking sector's loss on corporate exposures. The expected loss, given by the average, increased marginally from 2003 to 2005. Uncertainty concerning the expected loss, measured as the difference between the 95th percentile in the distribution and the average loss, was unchanged in the same period.

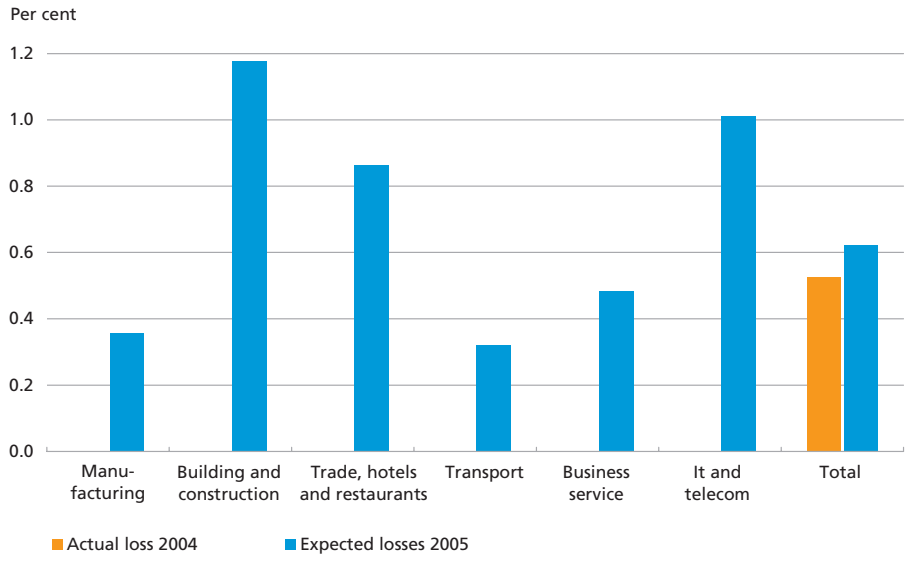
The expected loss on corporate exposures in 2005 has been calculated at around 0.6 per cent of total lending and is at the level of the actual losses sustained by the Danish banking sector in recent years, cf. Chart 26. Although the expected loss ratio for the building and construction sector is relatively high, lending to this sector constitutes a fairly small share of the banking institutions' total lending.

EMPIRICAL DISTRIBUTION OF THE BANKING SECTOR'S LOSSES ON CORPORATE LENDING, 2003 AND 2005 Chart 25



Note: The actual losses are calculated as a ratio of total bank debt. In some scenarios the loss exceeds 1.25 per cent of total bank debt, but this part of the distribution has been omitted for presentation reasons.
Source: Own calculations.

ACTUAL AND EXPECTED LOSSES ON CORPORATE LENDING Chart 26



Note: The expected losses on lending to the individual sectors are calculated as the averages of the simulated loss functions for the sectors in question. The actual loss is calculated as a percentage of lending and guarantees.
Source: Danish Financial Supervisory Authority and own calculations.

DANISH AGRICULTURE Box 9

Since only few farms are operated as public or private limited liability companies, the development in Danish agriculture is not reflected in data from the financial statements database that is used to estimate the failure-rate model. The financial data from the Food and Resource Economics Institute for 2005 will not be available until the autumn of 2006.

In 2004, agriculture's average operating result rose by kr. 59,000 to kr. 105,000 per full-time farm after falling earnings in the preceding two years. The increase is primarily attributable to better operating results for pig farmers. The Food and Resource Economics Institute expects the operating results of the agricultural sector to have been at more or less the same level in 2005, while a fall is expected in 2006.

The average return on assets in Danish agriculture remained virtually unchanged at 3.7 per cent as a result of an increase in agricultural assets. The prices of the largest farm properties rose by 15 per cent in 2004 after having remained more or less unchanged in 2003. In 2005, the prices of farm properties increased further. Besides the level of interest rates and the earnings and production potential in the agricultural sector, the development in land prices is influenced significantly by framework conditions such as environmental requirements and various EU programmes.

The EU's agricultural reform entered into force in 2005. The core element of the reform is a gradual decoupling of direct subsidies so that they are no longer granted for specific products and crops, but rather as premium rights to the farmer, independently of the farm's ongoing production, livestock and land use. The Food and Resource Economics Institute does not expect the overall earnings of the agricultural sector to be significantly affected by the reform even though it will entail substantial redistribution of incomes for certain subsectors.

The number of full-time farm businesses fell to 18,375 in 2004. Structural adjustments within agriculture with a shift to fewer and larger farms – primarily cattle and pig farms – entail a sustained high level of investments in the agricultural sector. In 2004, the development in agricultural debt matched the increase in land prices, and consequently the average solvency ratio in the sector remained unchanged at 39 per cent in 2004.

Agriculture is mainly financed via mortgage-credit institutes. In 2005, mortgage-credit lending to agriculture was unchanged at 29 per cent of total lending to the corporate sector. In 2004, half of the agricultural sector's mortgage-credit debt was at variable interest rates, which makes agriculture extremely vulnerable to changes in interest rates. According to Danish Agriculture, an increase in interest rates by 1 percentage point would add approximately kr. 50,000 to the interest expenses of an average farm, i.e. half of the operating result in 2004.[1]

In the banking sector, the ratio of lending to agriculture is highest among the smaller banking institutions. The ratio of category C banking institutions with large exposures to agriculture, i.e. where lending to agriculture constitutes more than 20 per cent of lending to the corporate sector, was 57 per cent in 2005, while the equivalent ratio for category B banks was 21 per cent.

[1] Danish Agriculture, *Landøkonomisk Oversigt 2005* (Agriculture in Denmark 2005 – in Danish), p. 40.

HOUSEHOLDS

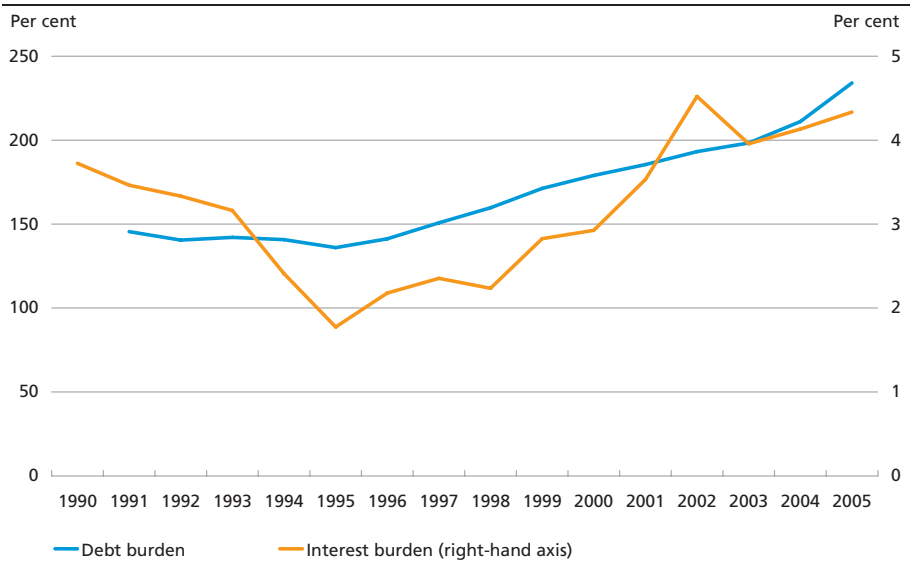
The economic conditions of the Danish households have improved. Real incomes have increased, and more households have a sound income concurrently with the fact that unemployment has fallen. Combined with a low, albeit rising, level of interest rates, and a significant increase in housing wealth, this has contributed to high growth in private consumption since 2003. Consumer confidence is also at a very high level. The favourable economy has improved the households' general ability to meet their payment obligations, and the number of enforced sales is at a historically low level.

The households' positive financial situation is reflected in an ever higher rate of indebtedness, cf. Chart 27. This higher indebtedness has increased the total interest burden on the households. The households' debt and interest exposure is examined further below.

Danish households' debt in an international perspective

In an international perspective, Danish households have a high level of indebtedness in relation to the size of the economy, cf. Chart 28. Households in countries such as the Netherlands and the UK also have high levels of indebtedness.

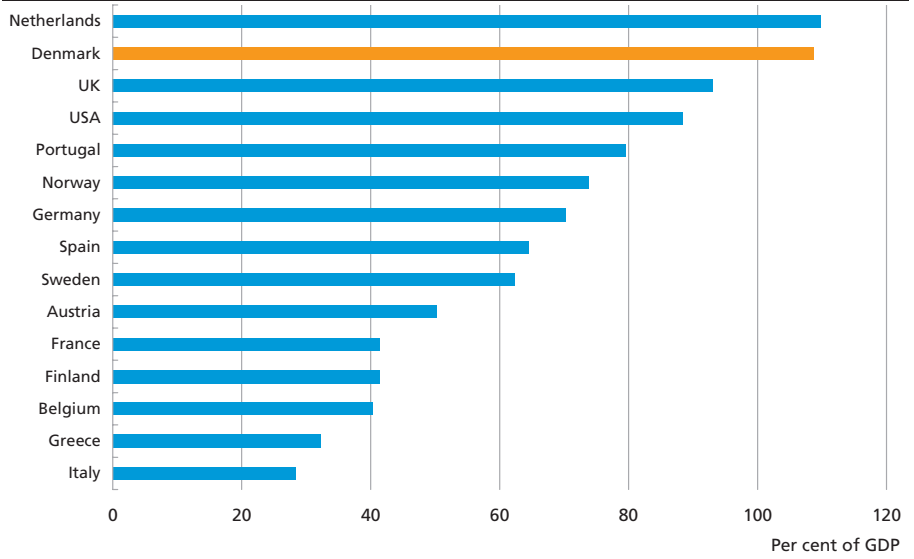
THE HOUSEHOLDS' DEBT AND INTEREST EXPENSES AS RATIOS OF THEIR DISPOSABLE INCOME, 1990-2005 Chart 27



Note: The debt burden is calculated as the households' debt to the MFI sector as a ratio of disposable income. The interest burden is calculated as net interest expenses after tax as a ratio of disposable income. 2005 figures are estimates.

Source: Statistics Denmark and Danmarks Nationalbank.

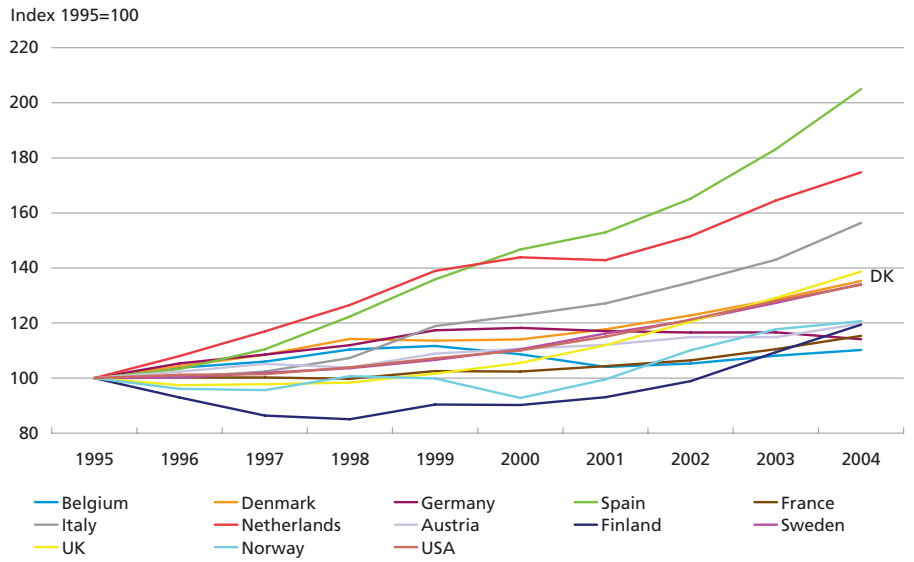
HOUSEHOLD DEBT AS A RATIO OF GDP, 2004 Chart 28



Note: Debt in the household sector is calculated on the basis of the financial sector accounts in the national accounts.
Source: Eurostat and OECD.

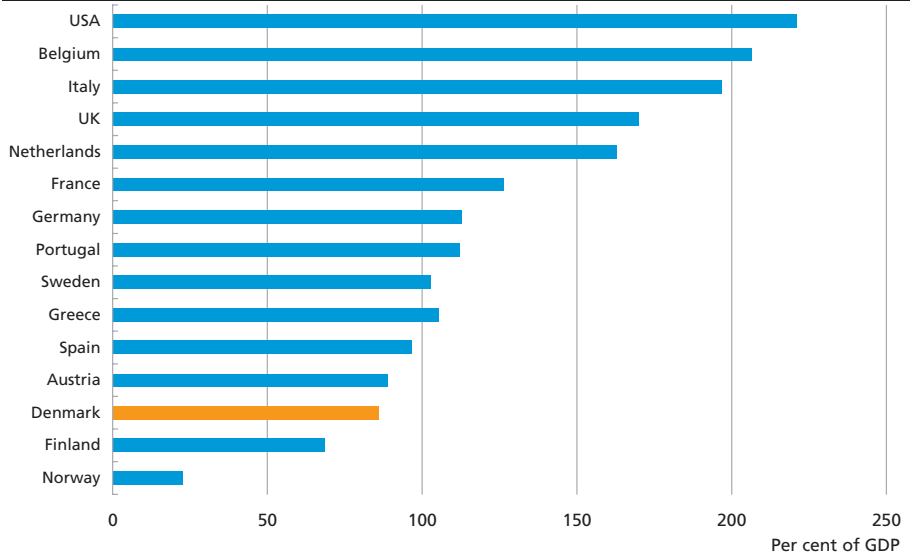
The debt has increased during the last decade, but the development in the debt of Danish households does not differ significantly from other countries, cf. Chart 29. The level of debt is thus high, but the development during the last 10 years is not extraordinary in a European context.

THE HOUSEHOLDS' DEBT, 1995-2004 Chart 29



Note: The households' debt in relation to GDP. Debt in the household sector is calculated on the basis of the financial sector accounts in the national accounts. The development in Portugal and Greece is omitted. Both countries have seen significant growth in debt in relation to the other countries.
Source: Eurostat and OECD.

THE HOUSEHOLDS' FINANCIAL NET WORTH AS A RATIO OF GDP, 2004 Chart 30



Note: Financial net worth in the household sector is calculated on the basis of the financial sector accounts in the national accounts.
Source: Eurostat and OECD.

In international comparisons, the Danish households' financial net worth is in the low range cf. Chart 30.

Financial net worth has increased over the past 10 years, and at a higher rate than in most other EU member states. Accumulation of wealth by households is by and large attributable to capital gains on financial assets. The statistics do not include the households' real assets, including housing. Danish housing wealth increased by kr. 500 billion in 2005 and is estimated to have been kr. 2,700 billion at end-2005, equivalent to approximately 175 per cent of GDP. Even though Danish households have positive net worth, their high gross debt makes them rather vulnerable to rising interest rates and falling income.

It is difficult to make exact cross-border comparisons of household debt and its background. The availability of home financing may e.g. have an impact on the households' rate of indebtedness. In Denmark, even low-income households can obtain mortgage-credit financing. The reason is that the mortgage-credit institutes have relatively fast and easy access to the collateral, i.e. the property. In addition, the interest payable on mortgage-credit loans is not dependent on the borrower's creditworthiness. All borrowers pay the same rate of interest, the market rate, plus a contribution to the mortgage-credit institute.

The access to finance home purchases via different types of loan also affects the level of debt. The development within home financing in

Denmark, e.g. the introduction of deferred-amortisation loans and bank mortgage loans, has made mortgage equity withdrawal easier. In a European context, Denmark has a highly sophisticated mortgage-credit market in terms of the range of products.[1] Empirical studies indicate that a well-developed mortgage-credit market with good opportunities for borrowing against the free mortgageable value of properties increases mortgage debt.[2]

There seems to be a correlation between the completeness of the mortgage-credit markets and the households' debt. Wyman[3] has constructed an index of the completeness of the mortgage-credit markets in a number of countries. The index considers the home-financing options available to the households (supply of loan types), the mortgaging ratio, the types of households that are able to buy homes (size of down payment, young versus elderly people, etc.), and the intended purpose of the loan (second home, rental, summer cottages overseas). Denmark, the Netherlands and the UK achieve high scores in the index. In contrast, several countries in southern Europe have a less complete mortgage-credit market according to this method.

In countries where households can raise housing loans with long maturities the level of debt tends to be higher than in countries where housing loans must be repaid at a faster rate, cf. Table 6. In e.g. the Netherlands, Denmark, the UK and the USA housing loans can be repaid over more than 25 years. In several countries in southern Europe, where the households have relatively lighter debt burdens, the maturity of a typical housing loan is around 15 years.

A high maximum mortgaging ratio makes it possible to raise larger loans, and there is a tendency for the debt to be highest in countries with high maximum mortgaging ratios, cf. Table 6.

If homeowners have the opportunity to raise supplementary mortgage loans, households can be expected to have a higher rate of indebtedness, cf. Table 6. Loans against the free mortgageable value play a significant role in the Netherlands, Denmark, the UK and the USA, where the level of debt is high, while such loans are not available in France and Italy.

The housing market

The economic conditions of homeowners are underpinned by a strong housing market, and housing prices have accelerated, cf. Chart 31. From

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1 Cf. Mercer Oliver Wyman, Study on the Financial Integration of European Mortgage Markets, European Mortgage Federation, 2003.

2 Cf. Pietro Catte, Nathalie Girouard, Robert Price and Christopher André, Housing markets, wealth and the business cycle, OECD Economics Department Working Paper No. 394, 2004.

3 See footnote 1.

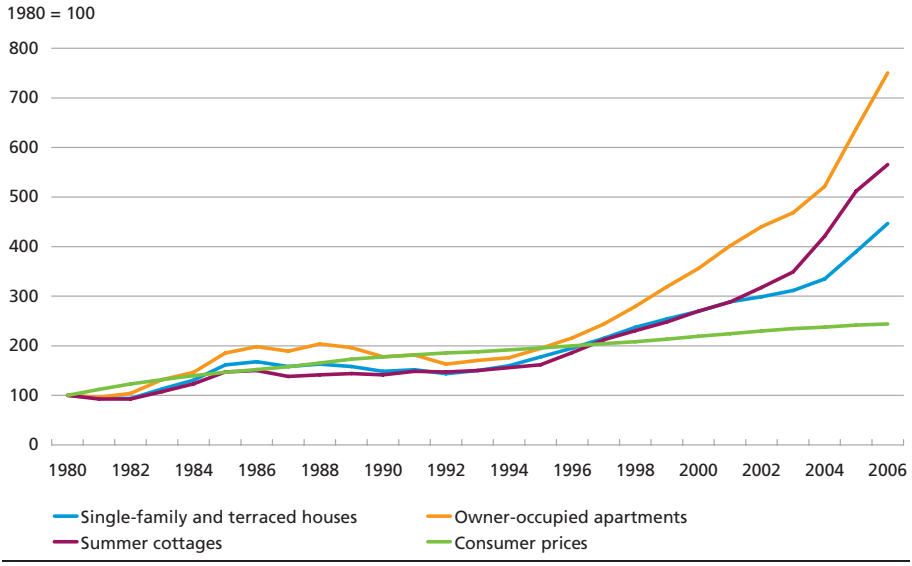
CHARACTERISTICS OF MORTGAGE FINANCING IN SELECTED COUNTRIES Table 6

	Typical maturity of housing loans, years	Typical mortgaging ratio, per cent (maximum in parenthesis)	Option to borrow against free mortgage-able value	House-holds' debt as a percentage of GDP
Netherlands	30	90 (115)	Yes	110
Denmark	30	(80)	Yes	109
UK	25	69 (110)	Yes	93
USA	30	75 (97)	Yes	88
Portugal	15	83 (90)	na.	80
Norway	15-20	(80)	Yes	74
Germany	25-30	67 (80)	No	70
Spain	15	70 (100)	No	65
Sweden	<30	77 (80)	Yes	62
Austria	20-30	60 (80)	na.	50
France	15	67 (100)	No	41
Finland	15-18	75 (80)	Yes	41
Belgium	20	83 (100)	No	40
Greece	15	75 (80)	na.	32
Italy	15	55 (80)	No	28

Source: Jenny Osborne, Housing in the euro area – Twelve markets, one money, Central Bank & Financial Services Authority of Ireland, Quarterly Bulletin 4, 2005. Catte et al., Housing markets, wealth and the business cycle, *Economics Department Working Paper* No. 394, OECD, 2004. Green and Wachter, The American Mortgage in Historical and International Context, *Journal of Economic Perspectives,* vol. 19, no. 4, 2005, pp. 93-114.

the 1st quarter of 2005 to the 1st quarter of 2006, the prices of single-family and terraced houses have increased by 24 per cent, and owner-occupied apartments by even more.

CASH PRICES FOR OWNER-OCCUPIED HOUSING, NATIONAL AVERAGE, 1980-2006 Chart 31



Note: 2006 figures are for the 1st quarter.
Source: Association of Danish Mortgage Banks and Statistics Denmark.

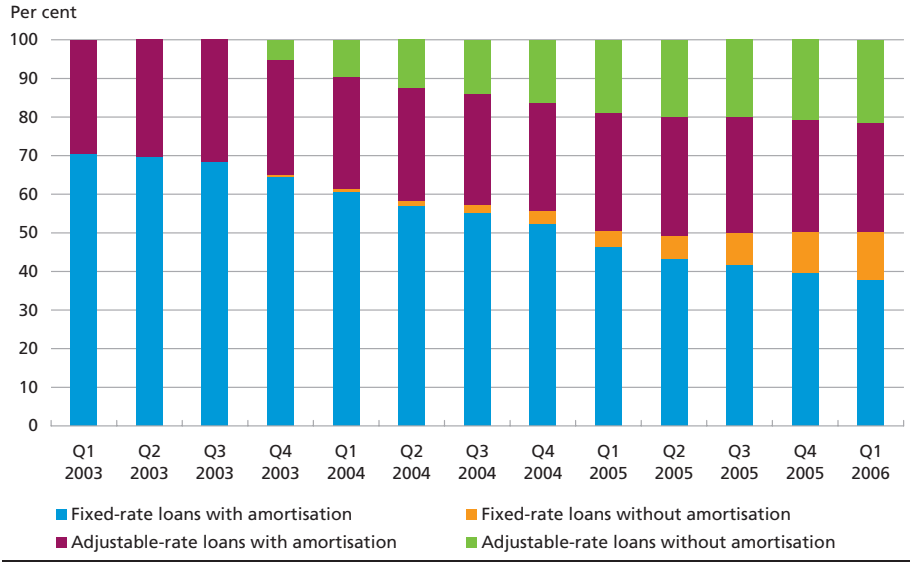
The rising prices especially reflect improvement of the economic fundamentals. The Danish economy is growing strongly, interest rates remain low, unemployment is falling, and the Danes' disposable incomes are increasing. At the same time, the introduction of new loan types, including deferred-amortisation and adjustable-rate loans, has helped to sustain price increases. The freezing of property taxes has also affected prices, particularly in the very attractive areas, where the progressive property tax has or would have an impact. The price increases have been unevenly distributed across the country, with particularly large increases in Greater Copenhagen and the large provincial towns.

In spite of the recent increase, interest rates – nominal and real – remain low. In view of the improved economic outlook for Europe and sustained high energy prices most financial market players expect interest rates to increase further in the near future. This will entail lower housing prices than otherwise, perhaps even a slight decline, but for as long as the economy remains favourable there is no prospect of a significant general fall in housing prices.

Home financing and the households' interest burden

Homeowners increasingly opt for deferred-amortisation loans, which at the end of the 1st quarter of 2006 accounted for around 34 per cent of total lending by mortgage-credit institutes for home financing, cf. Chart 32. 64 per cent of the deferred-amortisation loans are at adjustable in-

THE MORTGAGE-CREDIT INSTITUTES' OUTSTANDING LENDING FOR OWNER-OCCUPIED HOUSING AND SUMMER COTTAGES BY LOAN TYPE, 2003-06 Chart 32



Note: In the Chart, capped adjustable-rate loans are included under adjustable-rate loans.
Source: Danmarks Nationalbank.

DEFERRED-AMORTISATION LOANS AS A PERCENTAGE OF TOTAL LENDING BY AGE GROUP, END-2005 Table 7

Age	Fixed rate	Variable rate	All loans
Under 30	23	53	38
31-40	17	43	31
41-50	14	40	27
51-60	16	42	29
Over 60	27	61	45
Total lending	18	45	32

Note: 28 per cent of the adjustable-rate deferred-amortisation loans are capped.
Source: Association of Danish Mortgage Banks.

terest rates. Particularly in and around the large towns and cities deferred-amortisation loans account for more than 30 per cent of total mortgage-credit loans.

Deferred-amortisation loans are not equally distributed among borrower groups. For homeowners under the age of 30, deferred-amortisation loans account for 38 per cent of the total lending by that age group, while the equivalent figure for those over 60 is 45 per cent, cf. Table 7. For the remaining age groups, the share is close to 30 per cent. Deferred-amortisation loans have made it easier to achieve an intertemporal reallocation of consumption, which might explain why young and elderly homeowners choose deferred amortisation.

The new, more complex loan types have given homeowners more choice when it comes to financing. Products can be mixed to obtain a risk profile that matches the individual household's trade-off between risk and costs.

Financial stability 2005 presented an analysis of the interest-rate exposure of Danish homeowners based on data from early 2005. This analysis has been repeated on the basis of data from early 2006.[1] Table 8 shows the change in the homeowners' interest expenses as a ratio of gross income (interest burden) in various income brackets if the short-term interest rate increases by 1 percentage point. In the analysis, the short-term interest rate is defined as the rate of interest on an adjustable-rate loan, irrespective of the fixed-interest period.

According to the database, since the beginning of 2005 more homeowners have opted for loans at variable interest rates, including many capped loans. The analysis takes into account that the interest on such loans cannot exceed the capped rate. Adjustable-rate loans, including

[1] The analysis is based on a database comprising a range of anonymised data about a group of Danish homeowners – choice of loan type, income, geographical location, etc. The database was made available by Nykredit and does not contain data relating to Totalkredit. The database is described in more detail in The Interest-Rate Exposure of Danish Homeowners, Danmarks Nationalbank, *Financial stability 2005*.

CHANGE IN INTEREST BURDEN ON A 1-PERCENTAGE-POINT INCREASE IN THE SHORT-TERM INTEREST RATE, FEBRUARY 2006, PERCENTAGE POINTS Table 8

Household income, kr. 1,000	Average	Median	60th percentile	70th percentile	80th percentile	90th percentile
50-250	1.3	-	1.5	2.3	2.8	3.6
250-350	1.3	1.2	1.9	2.3	2.7	3.2
350-450	1.2	1.3	1.7	2.0	2.4	2.9
450-550	1.2	1.3	1.7	1.9	2.2	2.6
550-650	1.2	1.4	1.7	2.0	2.2	2.6
650-750	1.2	1.3	1.6	1.9	2.2	2.6
750-	1.1	1.0	1.4	1.8	2.1	2.6

Note: The short-term interest rate is defined as the rate of interest on an adjustable-rate loan, irrespective of the fixed-rate period. Interest expenses on mortgage debt only. The interest burden is interest expenses as a ratio of gross income.
Source: Nykredit and own calculations.

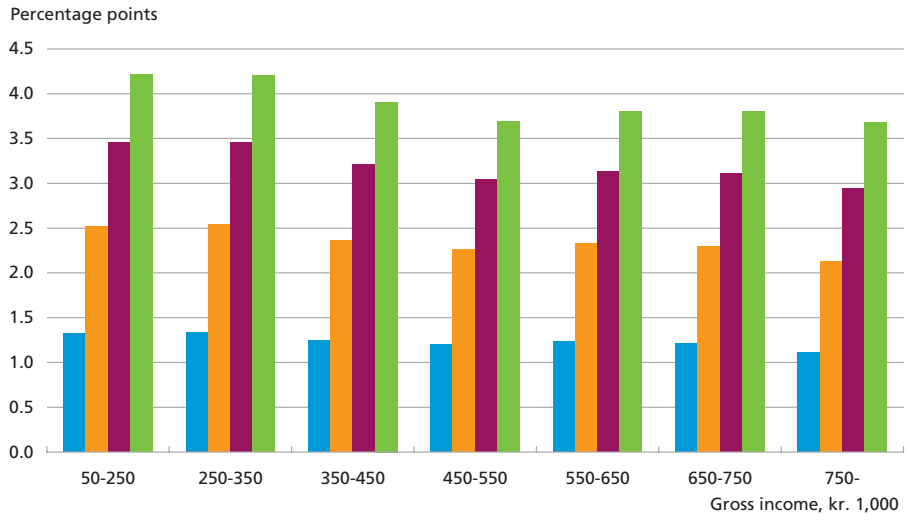
capped loans, initially entail lower interest payments than fixed-rate loans, and from 2005 to 2006 mortgage-credit interest expenses as a ratio of gross income fell for all income brackets except the highest. On the other hand, the higher prevalence of adjustable-rate loans increases homeowners' exposure to rising interest rates.

On average, homeowners' mortgage-credit interest expenses will increase by 1.2 per cent of income before tax on a 1-percentage-point increase in the short-term interest rate, thereby bringing the homeowners' average mortgage-credit interest expenses to 10.5 per cent of gross income, against 9.3 per cent today. For a household with an income of kr. 500,000, the average increase in annual interest expenses would be kr. 6,000 before tax if the short-term interest rate increases by 1 percentage point. There is, however, considerable dispersion between and within income brackets, and the interest burden for some homeowners would increase by more than 3 percentage points, cf. Table 8.

Homeowners' increasing use of capped adjustable-rate loans dampens the effect on the average increase in the interest burden in the event of large interest-rate increases, cf. Chart 33.

The consequence of the increasing use of adjustable-rate loans in recent years is that homeowners have become more exposed to changes in the short-term interest rate. This exposure is particularly pronounced for homeowners who have also opted for deferred amortisation since they have already made use of the buffer which the deferred-amortisation option provides, unless the deferred amortisation has been used to repay other, more expensive debt. It is important that the households are aware of the risks connected with the various home-financing options and understand that no-one can say for certain how interest rates will develop.

AVERAGE CHANGE IN INTEREST BURDEN ON INCREASES IN THE SHORT-TERM INTEREST RATE BY, RESPECTIVELY, 1, 2, 3 AND 4 PERCENTAGE POINTS, FEBRUARY 2006 Chart 33



Note: The short-term interest rate is defined as the rate of interest on an adjustable-rate loan, irrespective of the fixed-rate period. Interest expenses on mortgage debt only. The interest burden is interest expenses as a ratio of gross income.

Source: Nykredit and own calculations.

Financial Markets

Equity prices have been rising since the beginning of 2005, and the market assessment of the uncertainty of future equity prices (the implied volatility) has been stable at a low level. For the Nordic financial groups, category A, equity prices have mirrored the rising prices of European banks.

Unlike the equity market, the European interest-rate market has been characterised by considerable uncertainty as to future interest-rate developments. However, this uncertainty has subsided, and in the short term the market participants expect European interest rates to rise. This has presumably contributed to the widening of the credit spreads for corporate bonds. The interest-rate outlook indicates a considerable risk of further adjustments in the markets for high-risk assets.

THE SIGNIFICANCE OF FINANCIAL MARKETS TO FINANCIAL STABILITY

Banking institutions' earnings and balance sheets are affected by financial market developments. There is a direct impact through various channels – partly in the form of value adjustments of the banking institutions' bond and equity portfolios, and partly via fee and commission income from financial-market-related customer services, such as asset management, investment credits, trading, and advisory services in connection with public offerings. The financial markets also have an impact on the financial situation of the banking institutions' clients and financial counterparties.

In addition, the general development in the financial markets affects the banks' costs of raising capital via bond or equity issues.

THE EQUITY MARKETS

Equity prices have been rising since early 2005, cf. Chart 34, partly as a result of improved growth prospects. The development has been more subdued in the USA than in the euro area because the strong economic development in the USA had to some extent been incorporated into US equity prices at the start of 2005. In addition, monetary policy has been tightened more in the USA than in Europe, and the dollar has strengthened vis-à-vis the euro.

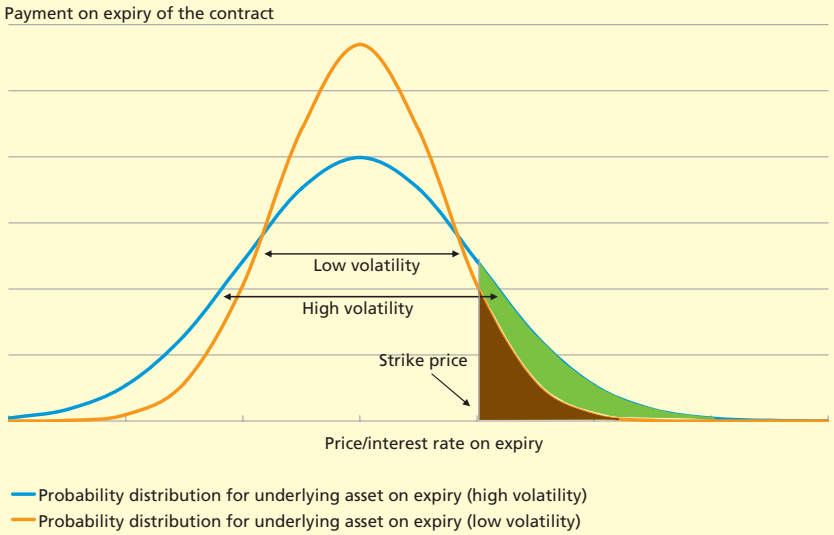
The higher equity prices have generally improved the results of financial companies and also indicate that the market has more confidence in the corporate sector and thus in the banks' customers.

OPTIONS AND IMPLIED VOLATILITY Box 10

An equity option gives the buyer the right, but not the obligation, to purchase an equity at an agreed price (the strike price) at a future point in time.[1] An interest-rate option gives the buyer the right, but not the obligation, to borrow capital at an agreed rate of interest at a future point in time.

The buyer only achieves a gain if the price/interest rate at the expiry of the option is higher than the strike price. The gain is the difference between the strike price and the market price. The expected value of the gain (and thus the price of the option) is the average gain, provided that the price is higher than the strike price.

TODAY'S PRICE FOR AN OPTION DEPENDS ON THE EXPECTED VOLATILITY OF THE EQUITY/INTEREST RATE

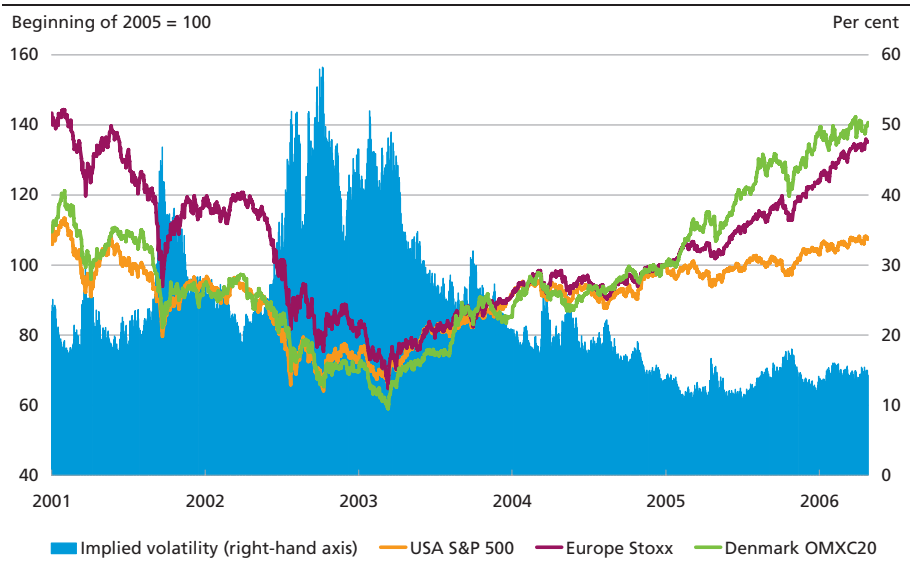


The Chart illustrates two situations where in each case the price is expected to remain unchanged. However, the expected volatility (uncertainty) is greater in the blue scenario – large increases and large falls are deemed to be more probable, while an unchanged price is deemed to be less probable than in the yellow scenario. Consequently, the expected gain from owning the option is greater in the blue scenario (the green and brown areas) than in the yellow scenario (the brown area only). The greater the uncertainty, the more valuable it becomes to hedge.

The implied volatility on which the price is based can be calculated using the strike price and the market price of the option.

[1] These examples are based on call options. Put options, on the other hand, give the buyer the right, but not the obligation, to sell at an agreed price.

EQUITY INDICES IN DENMARK, THE EURO AREA AND THE USA, AND IMPLIED VOLATILITY IN GERMANY, 2001-06 Chart 34



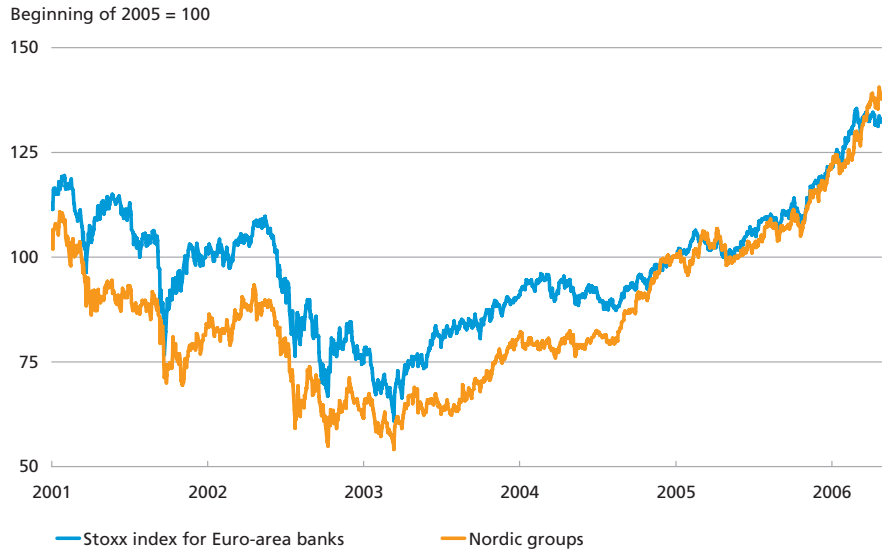
Note: Implied volatility is calculated on the basis of option prices on the German DAX index in per cent p.a.
Source: Bloomberg.

The market assessment of the uncertainty concerning future equity prices can be expressed as the implied volatility[1], which can be calculated on the basis of equity option prices, cf. Box 10. Compared with the level in recent years, the implied volatility of the German stock index (DAX) been stable at a low level has since the beginning of 2005, cf. Chart 34. This increases the risk of a pronounced upward movement. Higher uncertainty makes equities a more risky investment, and in such a scenario equities therefore tend to fall.

The development in equity prices for the Nordic financial groups (category A) is illustrated in Chart 35. The significant increases in equity prices for the Nordic groups in the 2nd half of 2004 continued in 2005 and early 2006. The market participants thus assess the value of the banks to be higher, and this reduces the banks' financing costs. The correlation between the price development for Nordic financial groups' equities and bank equities in the euro area points to integration of the financial markets in Europe, and consequently bank equities could to some extent be subject to fluctuations that are not driven by expectations of growth in their own earnings.

[1] Changes in the implied volatility may reflect changes in expectations of realised volatility, as well as compensation for uncertainty concerning future volatility.

EQUITY INDICES FOR NORDIC GROUPS AND EURO-AREA BANKS, 2001-06 Chart 35



Note: The equity index for Nordic groups is calculated as a market-weighted price for the individual institutions.
Source: Bloomberg and own calculations.

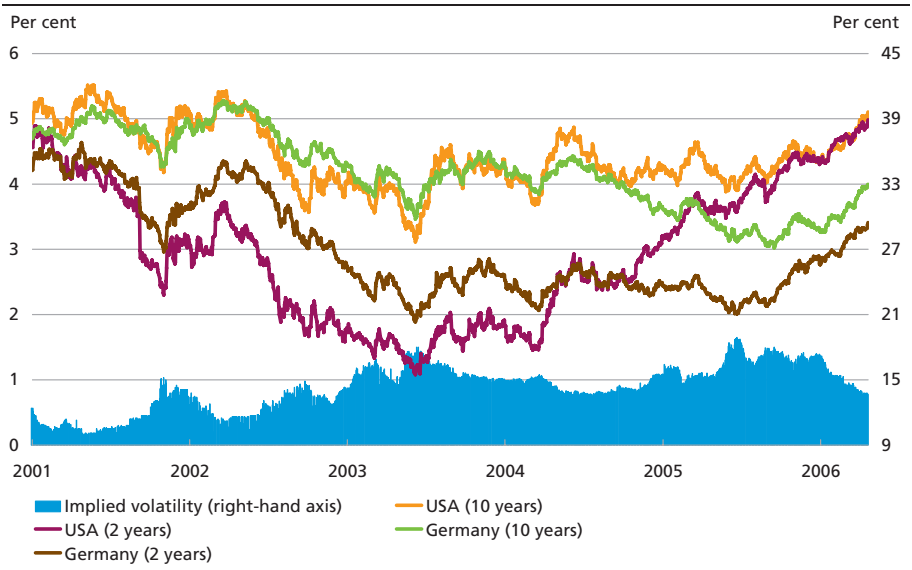
GOVERNMENT-BOND MARKETS

Since mid-2005, yields on government bonds have risen in the USA and Europe, cf. Chart 36. Danish yields have matched those of the euro area. In both regions short-term yields have risen particularly. The development reflects monetary-policy tightening in response to increased economic activity.

Fundamentally, the subdued development in long-term yields should be taken as an indication that in the long term inflation is expected to remain stable at a low level. In addition, institutionally determined demand for long-term bonds from pension companies and Asian central banks may have contributed to keeping long-term yields down. The commitments of pension companies resemble long-term bonds in that they are of long duration. A number of countries are introducing accounting rules that are similar to the Danish rules, i.e. commitments must be book-entered at market value, and the pension companies therefore invest in long-term bonds in order to reduce the risk of insolvency. The Asian central banks' demand for US bonds is especially attributable to current-account surpluses in Asian countries and a wish to maintain stable exchange rates vis-à-vis the dollar.[1]

[1] See Andersen, Hydeskov and Sand, Why are Long-Term US Yields Low?, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2005.

2-YEAR AND 10-YEAR INTEREST RATES IN GERMANY AND THE USA, AND IMPLIED VOLATILITY IN THE EURO AREA, 2001-06 Chart 36



Note: Implied volatility is calculated on the basis of prices for euro-denominated swaptions that after 1 year entitle the owner to receive a fixed 10-year interest rate and pay a variable interest rate for 10 years.
Source: Bloomberg.

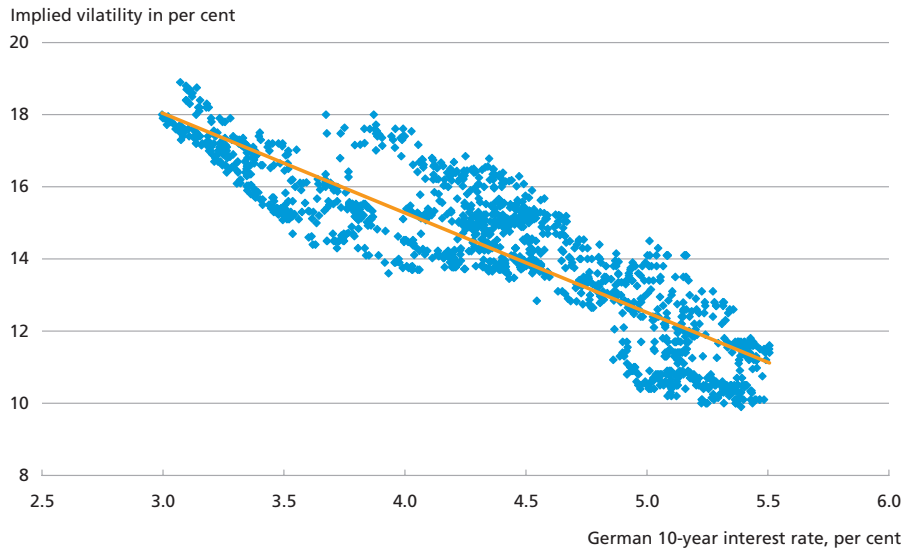
The market's assessment of the uncertainty regarding future interest rates can be measured as the implied (interest-rate) volatility, which can be determined via the prices of interest-rate options[1], cf. Box 10. In 2005 the implied volatility of 10-year interest rates in Europe rose substantially due to increased uncertainty concerning the future level of interest rates[2], cf. Chart 36. The reason may be that the economic situation led to uncertainty as to the future official interest rates in Europe. In step with the improved prospects for the European economy and rising inflation, the ECB has raised its official interest rate and reduced uncertainty in the market, cf. below.

Another explanation could be that there is typically a negative correlation between the level of interest rates and implied volatility, cf. Chart 37. This correlation reflects, among other things, that e.g. pension companies operate with interest-rate guarantees and therefore purchase interest-rate options that ensure a certain minimum return on assets. The demand for such options increases when interest rates fall, which entails higher implied volatility. In other words, the development in the implied volatility is attributable to other factors than uncertainty concerning interest rates.

1 Derived from options for interest-rate swaps.
2 Changes in the implied volatility may reflect changes in expectations of realised volatility, as well as compensation for uncertainty concerning future volatility.

CORRELATION BETWEEN IMPLIED VOLATILITY AND 10-YEAR GERMAN INTEREST RATE

Chart 37



Note: Implied volatility is calculated on the basis of prices for euro-denominated swaptions that after 1 year entitle the owner to receive a fixed 10-year interest rate and pay a variable interest rate for 10 years.
Source: Bloomberg.

CREDIT SPREADS IN EUROPE AND THE USA

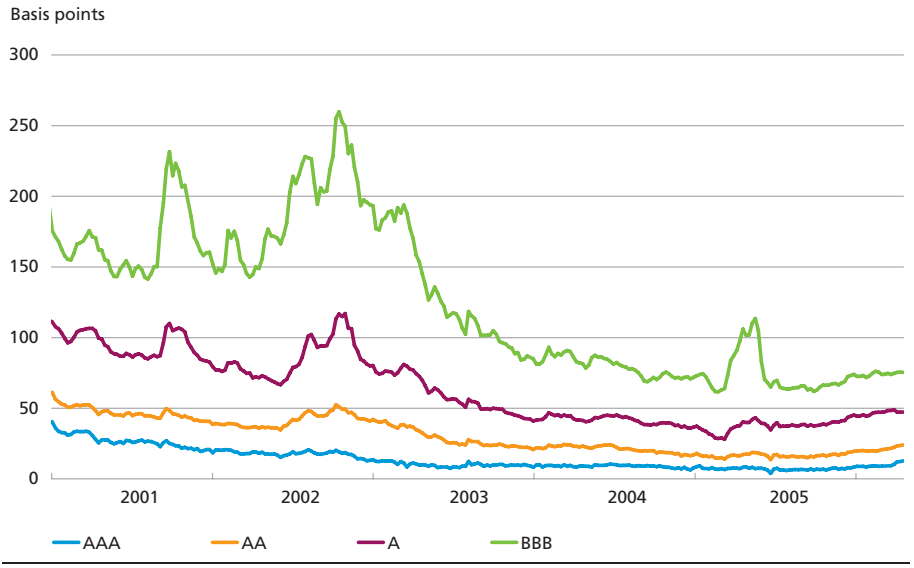
After having narrowed for several years, credit spreads[1] in Europe have widened slightly since the beginning of 2005, cf. Chart 38. This may reflect the rising level of interest rates. In recent years, investors have used the low interest-rate levels to finance purchases of high-risk assets, including credit bonds, which has exerted upward pressure on prices (and narrowed the yield spread). This tendency may be reversing now.

Credit spreads have widened more in the USA, and consequently the difference between the credit spreads for e.g. A-rated bonds in the USA and Europe has increased. However, the US and European credit spreads have generally been closely correlated so that wide spreads in the USA coincide with wide spreads in Europe. One of the consequences of the close correlation is that European corporate bonds are exposed to changes in the US credit spread. This partly explains why the downgrading of General Motors and Ford in May 2005 led to a widening of the European low-rated credit spreads, cf. Chart 38.[2]

The substantial widening of the credit spread in May 2005 shows how volatile credit spreads in low risk classes are. This volatility does not nec-

[1] The spreads between the yields on corporate and mortgage-credit bonds and a basket of euro area government bonds.
[2] General Motors and Ford are among the largest issuers of corporate bonds in the USA.

CREDIT SPREADS FOR EURO-AREA BONDS, 2001-06 Chart 38



Note: Aggregate index of liquid euro-denominated bonds. The credit spread indicates the spread between the yields on corporate and mortgage-credit bonds and a basket of euro-area government bonds.
Source: EcoWin.

essarily reflect an increased risk of insolvency, but rather that the price of risk (risk premium) is volatile. The credit spreads fluctuate too much over time to merely reflect the probability of insolvency. The implication is that it is difficult to derive the credit risk from the credit spreads.[1] Furthermore, the fluctuations in the indices are for a given rating, and since a bond's rating changes if the credit standing changes, the fluctuations will underestimate the investment risk.

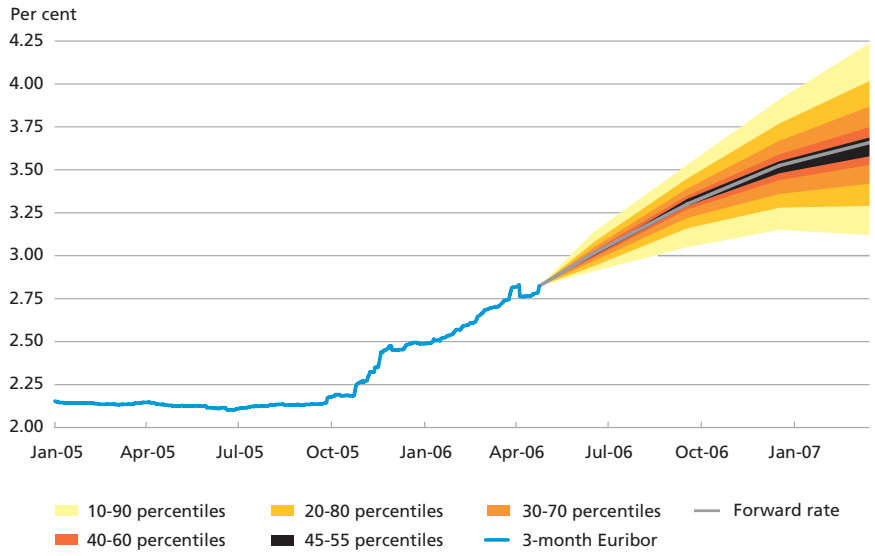
The wider credit spreads have entailed capital losses for investors and have increased financing costs for the corporate sector, including the banks. So far the impact has, however, been small.

INTEREST-RATE EXPECTATIONS DERIVED FROM OPTION PRICES

The prices of financial assets contain information on the market participants' expectations of future market developments. Forward interest rates can be calculated on the basis of yields on bonds with different maturities and can be seen as break-even interest rates. The forward interest rate between e.g. year 1 and year 2 shows the 1-year interest rate one year ahead if an investor is to achieve the same yield by purchasing either a 2-year bond – of which the yield is known today – or a

[1] For further details, see Jens Thomsen, Yield and Risk, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2005.

3-MONTH EURIBOR AND DISTRIBUTIONS DERIVED FROM OPTION PRICES Chart 39



Note: The risk-neutral probabilities are estimated using a mixture of log-normal distributions. This method is described in more detail in Bhupinder Bahra, Implied Risk-Neutral Probability Density Functions from Option Prices: Theory and Application, Bank of England *Working Paper*, 66, 1997. The Chart has been estimated on the basis of prices as at 26 April 2006.
Source: Bloomberg and own calculations.

1-year bond – of which the yield is known today – followed by another 1-year bond at the forward interest rate.

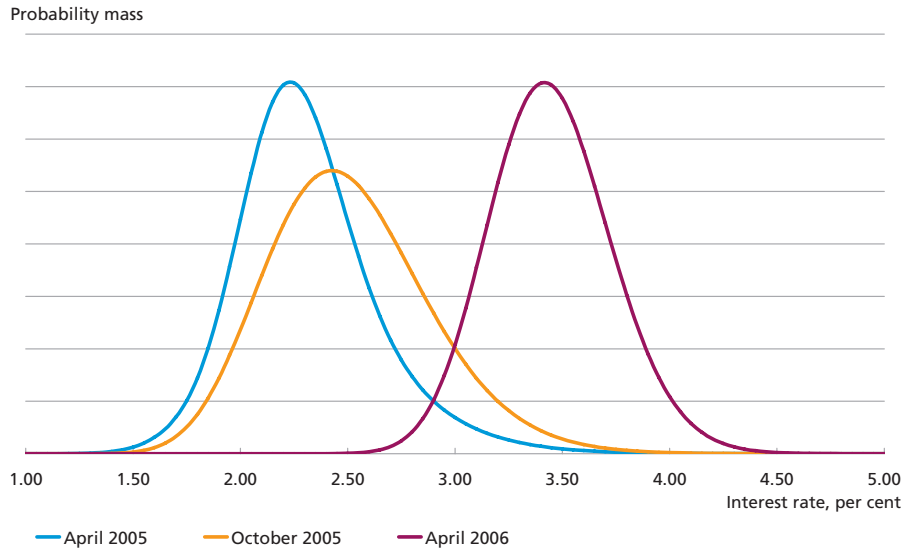
The full break-even probability distribution for the future interest rate can be derived on the basis of the prices of interest-rate options. In this distribution, the forward interest rate is the mean value. Chart 39 shows this calculation for the 3-month Euribor (Euro InterBank Offered Rate) using prices for traded options written on the Euribor future.

It is seen from the *forward interest rate* that the market participants expect short-term interest rates to rise. The observations can thus be interpreted to indicate that the (option) market expects further monetary-policy tightening in Europe. A 3-month interest rate of approximately 3.75 per cent is expected in March 2007. The *distribution* shows that the uncertainty about the level of interest rates increases as we move further into the future. The market thus operates with a very small probability that the interest rate only increases to 3 per cent in March 2007.

The interest-rate expectations in the spring of 2006 can be compared to the expectations at various times in 2005, cf. Chart 40. It is seen that the expectation of the interest rate eight months ahead has risen, particularly from October 2005 to April 2006.

There has also been a shift in uncertainty, which was comparatively low in April 2005, when unchanged or marginally increasing interest rates were seen as relatively likely. In October 2005, market participants

PROBABILITY DISTRIBUTIONS FOR EURIBOR DERIVED FROM OPTION PRICES Chart 40



Note: See the note to Chart 39. The calculations are based on a constant horizon/maturity of eight months.
Source: Bloomberg and own calculations.

were more uncertain about the imminent development, which is seen from the broader distribution with a lower peak. Since then uncertainty has diminished again, possibly because the ECB has begun to tighten its monetary policy.

If interest rates increase, capital losses on bonds will continue, and at the same time credit spreads may widen, which will amplify the increase in corporate financing costs. Many households with adjustable-rate loans will also see an increase in their payments. If the development also affects long-term interest rates, however, the pension companies' commitments will decrease. The debt of households with fixed-rate loans will also decrease.

Many analysts link the rising prices for high-risk assets in recent years to the lower level of official interest rates since investors have utilised the opportunity to raise inexpensive loans for investment in e.g. corporate bonds, commodities and property. This trend may therefore reverse if interest rates rise, as predicted by the market participants, cf. Box 11. The risk is supported by a tendency for many market participants to display uniform investment behaviour, partly because they are benchmarked against each other and apply similar market-based risk-management tools, and consequently an adjustment may be self-reinforcing.

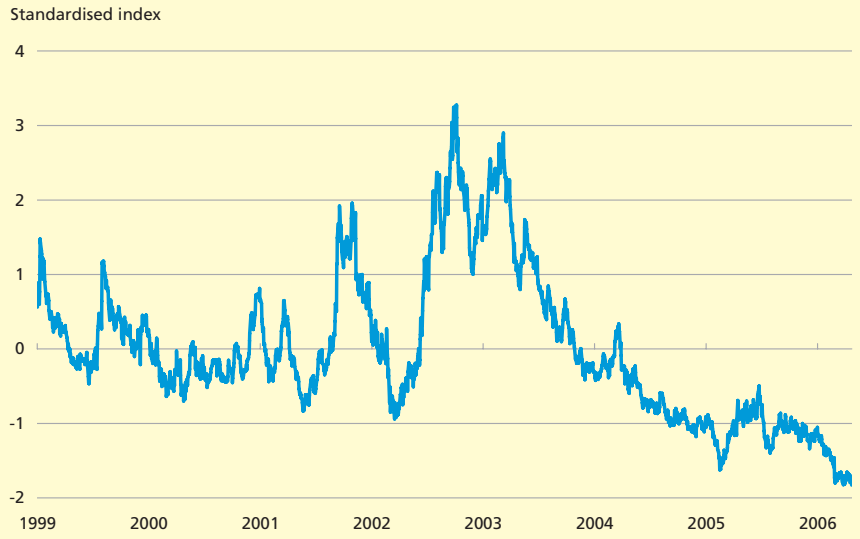
A number of products have been introduced that allow households to invest in e.g. commodities and government debt in emerging markets.

A RISK INDEX FOR EURO-DENOMINATED ASSETS Box 11

The development in the financial markets can be used to calculate a risk index for assets denominated in euro[1]. The index is calculated on the basis of a number of credit spreads and implied volatilities, among other things. An increase in the index indicates that in the assessment of the market participants the level of risk in the markets has increased, and/or that the market participants are less willing to incur a given risk (whereby the price of the risk increases).

It is seen that since 1999 the development in a number of factors has been linked to fluctuations in the risk index – an increase in the risk index is related to e.g. lower economic activity, higher macroeconomic uncertainty and higher official interest rates, as well as individual events such as the US accounting scandals in 2002.

A RISK INDEX FOR EURO-DENOMINATED ASSETS, 1999-2006



Note: For the calculation, see the footnote to the Box.
Source: Bloomberg, J.P. Morgan and own calculations.

In recent years the risk index has fallen to a low level, cf. the Chart. This provides scope for substantial upward adjustment, in which case investors with higher-risk assets would incur losses compared with investors with lower-risk assets. Such adjustment might be initiated by official interest rates developing as the market participants expect since a positive correlation has previously been observed between the official interest rates and the risk index.

[1] This Box is based on Jakob Lage Hansen, A risk index for euro-denominated assets, Danmarks Nationalbank, *Working Paper*, 36, 2006.

Such investments have previously yielded high returns. However, there are no sure gains in the financial markets – high expected gains entail high risk[1].

[1] For further details, see Jens Thomsen, Yield and Risk, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2005.

Framework Conditions for the Financial System

Changes in the framework conditions for the financial system in Denmark have primarily been driven by the development towards further harmonisation of regulation within the EU. Internationalisation and realisation of the EU's single financial market have paved the way for more efficient financial markets. This process makes great demands of all parties involved in terms of handling considerable structural adjustments. It is important to the stability of the financial system that both the financial sector and the authorities responsible deploy the necessary resources. Particularly the introduction of new capital-adequacy rules and new rules in the securities area will continue to require substantial resources. This chapter describes the changes in the framework conditions for the financial system that are assessed to have a significant impact on financial stability in Denmark.

FINANCIAL STABILITY AND THE FRAMEWORK FOR THE FINANCIAL SYSTEM

The framework for the financial system is of importance to financial stability. Regulatory amendments may affect the financial sector and the incentive to maintain stable development in the short and long term. The framework for the financial sector is typically adjusted on the basis of initiatives from the authorities or the financial sector.

Interaction between the sector and the authorities

The regulatory development in the financial sector can be seen as an iterative process, the driving forces being new requirements within the sector, as well as other considerations taken by the authorities, e.g. in order to avoid crises, realise visions or safeguard consumer interests.

In an ideal world, regulatory adjustments would take place steadily over time, in step with changing preconditions. In the actual world, the process tends to be far less gradual, since in many cases regulatory initiatives are not being implemented until a need has already materialised, and because it may take some time to reach agreement, particularly on far-reaching international rule sets. Consequently, regulation can be outdated in some periods, and a great many changes may be seen in the

sector within a short interval, when new regulation is introduced. In both cases, there may be consequences for financial stability.

The introduction of the Lamfalussy procedure in 2001 exemplifies the issue. The procedure was aimed at speeding up decision-making in the EU since the authorities had realised that the EU was no longer able to implement the necessary common regulation sufficiently rapidly to keep up with developments in the financial sector.

The EU's regulation of the securities markets reflects a wish to influence development via regulation in order to create a well-functioning single securities market to the benefit of both borrowers and investors.

Amendment of the capital-adequacy rules has been driven by market developments over a prolonged period of time. When the current rules, Basel I, were introduced in 1988, they could be seen as the authorities' reaction to the banking crisis in the 1980s, when a large number of banks were struggling, as well as the burgeoning internationalisation. The new capital-adequacy rules, Basel II, reflect the sector's subsequent development in terms of methods to manage credit risk. At the same time, consolidation within the financial sector has led to the formation of considerably larger financial entities, many of which operate across national borders. Consequently, there has been a call for regulation that is to a greater extent based on the differences between the credit institutions, and for the supervisory focus to be adjusted to system supervision, dialogue with credit institutions and international supervisory co-operation, rather than more traditional reviews of the credit institutions' exposures.

With the realisation of the single financial market within the EU, Danish market participants and supervisory authorities must, individually and jointly, operate at the EU level in order to influence the framework conditions for the financial sector. This involves e.g. the European supervisory committees: the Committee of European Banking Supervisors, CEBS (banking institutions); the Committee of European Securities Regulators, CESR (securities markets); and the Committee of European Insurance and Occupational Pensions Supervisors, CEIOPS (insurance). [1]

THE SINGLE FINANCIAL MARKET

In May 2005, the European Commission (hereinafter the Commission) published a report on the follow-up of the EU's Financial Services Action Plan, FSAP. A main conclusion of the report is that there is only a limited

[1] For further information on the three committees and their work, see their respective websites: www.c-ebs.org, www.cesr-eu.org and www.ceiops.org.

need for new EU regulation in the financial area, and that attention should rather be turned to effective implementation and application of the initiatives introduced under FSAP. Looking ahead, the report calls for better regulation in preference to more regulation. Another main conclusion is that while FSAP was primarily aimed at the wholesale markets, future initiatives should predominantly be aimed at the retail market, where there are substantial challenges in terms of realising the single financial market in the EU. Initially the Commission has given priority to initiatives relating to investment associations and mortgage credit. In each of these areas, a report was prepared in 2005.

CREDIT INSTITUTIONS

The EU directives to implement Basel II

Towards the end of 2005, the Council and the European Parliament reached agreement on the final wording of the directives on new capital-adequacy rules, the implementation of Basel II. This was an important step towards a more up-to-date rule set whereby the capital requirements better reflect the risks incurred by each individual credit institution, and the credit institutions are encouraged to optimise risk management.[1] On 29 March 2006, the Danish government presented a bill to transpose the new directives into Danish legislation. The new act will enter into force on 1 January 2007. Much of the implementation in Denmark will be effected via executive orders.

For credit institutions that prefer internal approaches to calculating credit risk or operational risk, the directive operates with a 3-year transitional period during which limits for easing the capital requirements are defined. However, the large majority of Danish credit institutions will opt for the standardised approach, in which case the directive does not envisage a similar transitional arrangement.[2]

The following comment on the issue is included in the consultation memorandum from the Minister for Economic and Business Affairs to the Trade and Industry Committee of the Folketing (Parliament):

"*The Danish Financial Supervisory Authority has estimated the impact of the new rules for companies applying the standardised approach for credit risk and the basic indicator approach for operational risk. The expectation is that the new solvency rules will, by and large, be neutral in relation to the existing rules for most of the companies that apply the*

[1] The chapter on the use of advanced methods for calculation of capital requirements under Basel II illustrates some of the options available under the provisions of the new directives for credit institutions to calculate their own capital requirements.

[2] See Lisbeth Borup and Dorte Kurek, Proposal for a Directive on New Capital-Adequacy Rules (Basel II), Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2005.

simplest approaches. It is expected that the reduced requirements in relation to credit risk will be set off by the new requirements in respect of operational risk. However, it cannot be ruled out that a few companies will achieve substantial reductions.

No transitional arrangements are thus proposed for companies applying the standardised approach; a general transitional arrangement in Denmark would constitute an administrative burden for the majority of companies, since for a period they would have to report solvency calculations on the basis of two sets of rules. The general supervision of financial enterprises takes account of situations where a company achieves substantial reduction of its solvency requirement. In such situations it will be possible to impose higher individual solvency requirements on the company in question pursuant to section 124(5) of the Act, if the risk profile of the company no longer matches its capital base. "

The EU is currently detailing the procedures for approval of applications from cross-border groups to apply the more advanced approaches to calculation of capital requirements. Approval will be granted on the basis of close cooperation between the supervisory authority in the parent company's home country and the supervisory authorities in member states where it has subsidiaries. Ultimately, the decision will lie with the supervisory authority in the parent company's home country.

Covered bonds

The new capital-adequacy rules include provisions for covered bonds, i.e. specially collateralised bonds issued by credit institutions. For investors subject to the EU's capital-adequacy rules, investment in covered bonds will carry a smaller capital requirement than investment in ordinary bond issues from credit institutions. On the other hand, the capital-adequacy rules impose special collateral requirements that the banking institutions as issuers of covered bonds will find it relatively easier to meet, while this will be considerably more difficult for mortgage-credit institutes, unless they reduce their loan limits. This may shift the competitive balance between the banking institutions and the mortgage-credit institutes.

The best basis for competition is achieved by giving both banking institutions and mortgage-credit institutes a legislative framework for issuing covered bonds, so that there are many providers of home financing – including large providers. In this context it is important that the future statutory basis creates a framework for secure and transparent home financing on capital-market terms for the individual homeowner.

IFRS

On 1 January 2005, the EU's Regulation on International Accounting Standards entered into force, under which all listed undertakings, including listed credit institutions, must present their consolidated financial statements in accordance with the International Financial Reporting Standards, IFRS, issued by the International Accounting Standards Board (IASB). Other credit institutions may present their financial statements either in accordance with IFRS or in accordance with the national accounting standards, which are compatible with IFRS, but which do not provide the same options.

In connection with the EU's procedure to approve the International Financial Reporting Standards, it was not possible to reach agreement on the accounting standard IAS 39, concerning recognition and measurement of financial instruments. Consequently, a reduced version of IAS 39 was initially adopted, which did not permit the application of the fair-value option to financial commitments. Subsequently, IAS 39 was revised by IASB, and in 2005 it was approved by the Commission. The revised IAS 39 resolves the special issues faced by the Danish mortgage-credit sector and provides the required opportunity to assess both mortgage-credit lending and issued mortgage-credit bonds at fair value.

IASB revises its international accounting standards and issues new standards on an ongoing basis. International efforts are directed at harmonising IFRS and US GAAP (US Generally Accepted Accounting Principles) with the aim of making the two standards fully compatible as soon as this is feasible. New or revised IFRS standards must be approved by the Commission before they apply in the EU.

New rules for current profits and core capital

As a new element, banking institutions and mortgage-credit institutes, among others, will in future be able to include the current profit for the year less expected dividend and reserves in their core capital when calculating their solvency ratio.

In this respect, the Danish rules are transposed into the EU's minimum rules. In future the profit for the year can be included in the core capital before the company in general meeting has approved the annual report and the distribution of profits.

The background to this amendment is that the new International Financial Reporting Standards, IFRS, allow for several value adjustments via own funds, and the amendment entails that the calculation of core capital in an annual report includes the profit for the year excluding dividend and reserves for all reporting years. Under the Danish Financial Business Act, the current loss for the year must be deducted from the

core capital. The amendment thus achieves more symmetrical treatment of current losses and profits.

SECURITIES MARKETS

MiFID

The MiFID directive[1] is the key directive for further development of the single European securities market. The very extensive work relating to the technical implementation measures that is still ongoing in the EU has led to postponement of the deadline for the directive's coming into force. The directive is expected to have been finally transposed into Danish legislation by the end of 2006, and the work in this respect is conducted in parallel with the design of the technical implementation measures. This impedes the task of national implementation.

A core issue in relation to price formation and the efficiency of securities trading is market transparency. Different types of securities require different market structures, including various types of market transparency, in order to be traded efficiently. The point of departure of the MiFID directive is that the new transparency rules should only be applied to trading in equities. However, the member states may apply the rules to other securities. When assessing whether there is a need to apply the new rules on pre-trade and post-trade information (transparency rules) to other securities, it is relevant to consider whether the market itself is able to bring about sufficient transparency. If that is the case, there is in principle no need for special national legislation. Not later than two years after the directive has entered into force, the Commission must prepare a report on the need for rules on pre-trade and post-trade information for other securities than equities.

Supervisory initiatives in the Nordic securities market

The acquisition of the Copenhagen Stock Exchange A/S by OMX AB in 2005 resulted in the new Swedish company OMX Group, which e.g. owns the stock exchanges in Copenhagen, Stockholm, Helsinki, Tallinn, Riga and Vilnius. The Copenhagen Stock Exchange is still domiciled in Denmark and subject to Danish regulation and supervision. Likewise, the Stockholm Stock Exchange is Swedish and subject to Swedish supervision, and the Helsinki Stock Exchange is Finnish and subject to Finnish supervision. In 2005, the supervisory authorities in Denmark, Sweden and Finland concluded a Memorandum of Understanding (MoU) on su-

[1] Directive on Markets in Financial Instruments, adopted in 2004 by the Council and the European Parliament.

pervision of the OMX Group. The objective of the MoU is to lay down the framework for supervisory cooperation. Well-functioning international supervisory cooperation is a prerequisite for maintaining stability in the securities markets in connection with cross-border consolidation of trading places, including avoidance of regulatory and supervisory arbitrage.

PAYMENT AND SETTLEMENT SYSTEMS

Danmarks Nationalbank's oversight of payment systems

Danmarks Nationalbank oversees systemically important payment system and securities settlement infrastructures in Denmark. Until now, oversight has been based solely on the Danmarks Nationalbank Act, under which Danmarks Nationalbank has an obligation to maintain a safe and secure currency system, and to facilitate and regulate the traffic in money. For Danmarks Nationalbank this entails oversight with a view to contributing to secure and efficient payment and securities settlement systems, thereby minimising the risk that systemic problems jeopardise financial stability.

In order to distinguish more clearly between the tasks of Danmarks Nationalbank and the Danish Financial Supervisory Authority in relation to systemically important payment systems, as of 1 March 2006 Danmarks Nationalbank's responsibility for oversight was incorporated in the Danish Securities Trading Act.

In connection with this amendment, Danmarks Nationalbank has also taken over responsibility for registering systemically important payment systems under section 57a of the Act. Such registration entails that the system is comprised by the pan-European protection of settlement via such systems, as stipulated in the Settlement Finality Directive.[1]

ESCB-CESR standards

International standards for payment and securities settlement systems are subject to ongoing development in various international fora.[2] Danmarks Nationalbank applies these standards in its oversight of Kronos, the Sumclearing and VP settlement.

In September 2004, ESCB-CESR[3] published new European standards for securities settlement systems, Standards for Securities Clearing and Settlement in the European Union. The new standards will tighten the ex-

1 See Danmarks Nationalbank, *Payment Systems in Denmark*, 2005.

2 For a description of international standards for payment and securities settlement systems, reference is made to Danmarks Nationalbank, *Payment Systems in Denmark*, 2005.

3 ESCB is the European System of Central Banks. CESR (Committee of European Securities Regulators) is the EU member states' committee for supervision of securities markets.

isting requirements concerning e.g. contingency planning. In order to ensure uniform implementation, ESCB-CESR has subsequently been preparing assessment guidelines for the standards. In October 2005 this work was suspended, however, pending the Commission's expected initiative in this area. Consequently, the ESCB has decided to update the existing user standards from 1998 for central securities depositories handling collateralisation in connection with the extension of credit by the Eurosystem. The Danish central securities depository, VP Securities Services, must comply with these user standards since collateral for euro-denominated credit from Danmarks Nationalbank is registered with VP.

EU directive on payment services

On 1 December 2005, the Commission tabled a proposal for an EU directive on payment services (New Legal Framework). The objective is to create a legal framework for a single market for customer-to-customer payments (retail payments) by harmonising the existing, very diverse national rules. In addition, the directive is to support the European banking sector's current work to establish the infrastructure for a single retail payment area in euro (Single Euro Payments Area).

The Commission proposes introducing a new type of financial institution in EU legislation, viz. payment institutions, which would obtain European passports. Payment institutions would have access to providing all types of payment services that are not related to receiving deposits and issuing e-money. Under the Commission's proposal, these new institutions would have to obtain the approval of a national supervisory authority, but would not be subject to capital requirements, as is the case for credit and e-money institutions. The Council and the European Parliament are expected to finalise the Commission's proposed directive during 2006.

Issues related to financial stability

Advanced Approaches to Calculation of Capital Requirements under Basel II

The new capital accord, Basel II, will influence the credit institutions' risk management and capital requirements and will thus have a direct impact on financial stability.

As a new element, Basel II allows credit institutions to apply internal models to calculation of the capital requirement for credit risk. This will contribute to greater consistency between the credit institutions' capital requirements and risk. In Denmark, the relatively few large credit institutions that will apply the new internal models will account for a large market share.

The framework for determining the capital requirement under the advanced approaches has been designed to accommodate the credit institutions' own systems and methods for risk management and assessment. Consequently, the capital requirements for a given credit portfolio may vary substantially. In order to perform an accurate assessment of a credit institution's robustness it is therefore necessary to have access to detailed information about the structure of the credit institution's systems for risk management and assessment.

This chapter illustrates a few of the methods and calculations for determining capital requirements under the advanced approaches, as well as the impacts of various choices. The analyses are partial and limited by the data available to Danmarks Nationalbank, e.g. on the estimated failure rates of companies. The chapter does not provide an overview of all options.

INTRODUCTION OF NEW CAPITAL-ADEQUACY RULES IN DENMARK

On 1 January 2007, the new capital-adequacy rules, Basel II,[1] will be introduced in Danish legislation. The existing, uniform capital-adequacy rules will be replaced by rules that ensure greater consistency between the credit institutions' capital requirements and the individual risks to which they are exposed.

[1] For a description of the overall framework for the new capital-adequacy rules, reference is made to Lisbeth Borup and Dorte Kurek, Proposal for a Directive on New Capital-Adequacy Rules (Basel II), Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2005.

Under the new rules, credit institutions have a choice of three different approaches to calculation of the capital requirement for credit risk. The approaches, which vary in complexity, are a standardised approach, whereby the credit institutions' various assets are allocated fixed, standardised risk weights, and two internal ratings-based approaches (IRB), under which the credit institutions' own knowledge of their credit risks is used to estimate risk weights.

The vast majority of small and medium-sized Danish banking institutions will opt for the standardised approach, which is the most simple and is based on the current compilation method, but divides exposures into additional risk classes with fixed weights. 5-10 large Danish credit institutions are expected to apply the IRB approaches. These credit institutions account for a substantial market share in Denmark.[1]

The framework for determining the capital requirement under the IRB approaches is relatively flexible, in order to accommodate e.g. the credit institutions' own systems and methods for risk management and assessment, but also because the use of credit models is a new area without a well-established best practice. Credit institutions applying the IRB approaches must therefore make a number of choices in relation to estimation of credit risks. These choices may have a considerable impact on the capital requirements that are calculated.

For Danish credit institutions, the new rules are expected to entail an overall reduction of the capital requirement. One reason is that Danish credit institutions have a relatively large number of loan exposures with households and small and medium sized enterprises, for which the capital requirements are lower under the new rules.[2] The differences between the present and future capital requirements will not be discussed further in this chapter.

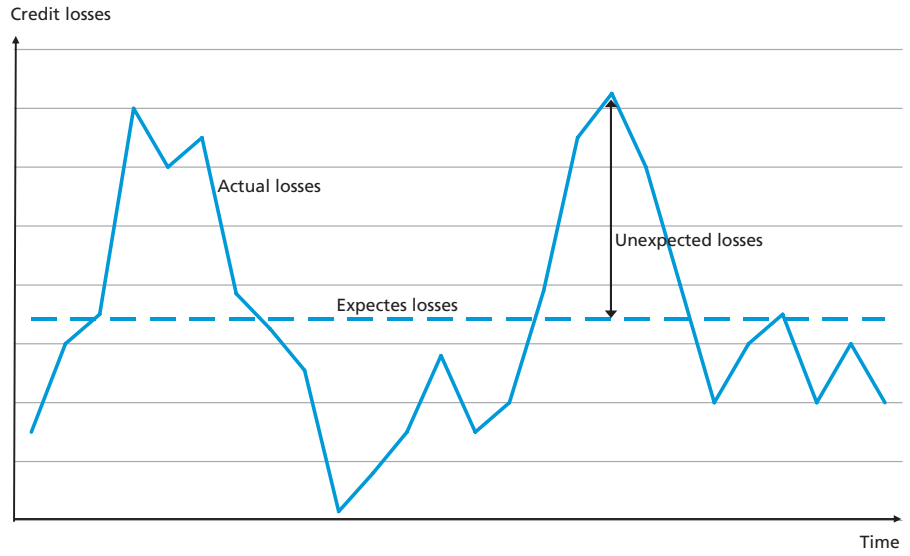
THEORETICAL BACKGROUND TO THE CREDIT INSTITUTIONS' CAPITAL REQUIREMENTS

A credit institution will frequently have borrowers that do not meet their payment obligations. To be able to operate, a banking institution must have the special skills required for assessing, managing and pricing such credit risks.

[1] According to the financial statements for 2005, Danske Bank, Nordea, Jyske Bank, Sydbank, Alm. Brand Bank, FIH Erhvervsbank, Nykredit, BRFkredit and DLR, among others, intend to apply the IRB approaches.

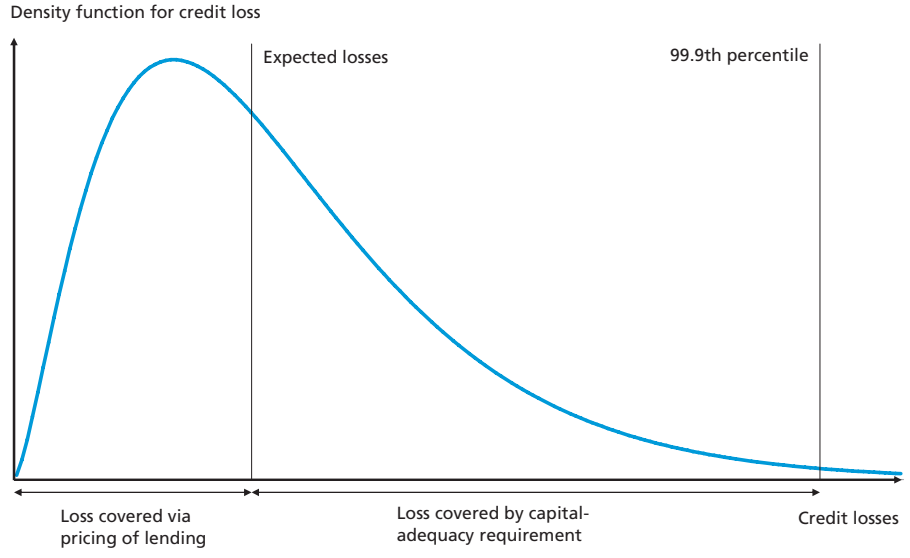
[2] For an assessment of the expected changes in the capital requirements as a result of the new rules, reference is made to the report *Study on the financial and macroeconomic consequences of the draft proposed new capital requirements for banks and investment firms in the EU*, PriceWaterhouseCoopers, 8 April 2004. The report can be downloaded from the European Commission's website, http://europa.eu.int/comm/internal_market/bank/regcapital/impact_en.htm#consequences.

A CREDIT INSTITUTION'S CREDIT LOSSES OVER TIME Chart 41



Credit losses typically vary over time, as illustrated in Chart 41. A credit institution can never know for certain which losses will be realised in a given year, but the expected loss can be estimated, cf. the dashed line in Chart 41. The expected loss on a lending portfolio can be taken into account via loan pricing, e.g. by charging a sufficiently high rate of interest. However, in some cases the actual loss will exceed the expected loss.

DENSITY FUNCTION FOR A CREDIT INSTITUTION'S CREDIT LOSS Chart 42



The actual loss less the expected loss is known as the unexpected loss. To some extent, credit institutions hedge this loss via their capital reserves.

Under the new capital-adequacy rules, the formula for calculating the capital requirement entails that the capital covers the difference between the expected loss and the maximum loss to the credit institution within a confidence interval of 99.9 per cent.[1] Chart 42 illustrates the distribution function for a credit institution's credit losses. The distribution of the credit loss is right-skewed with a long tail since the probability of small losses is substantially greater than the probability of large losses. Consequently, the average (the expected loss) does not correspond to the maximum of the distribution function. In Chart 42, the unexpected loss is shown as the area below the curve from the expected loss to the 99.9th percentile. In the chapter on the corporate sector and the households, the development in the Danish banking sector's credit losses on corporate lending is illustrated using an equivalent distribution function.

CALCULATION OF THE CAPITAL REQUIREMENT USING IRB APPROACHES

Credit institutions must apply to the supervisory authorities for permission to use either the foundation or the advanced IRB approach. The latter gives greater scope for applying the credit institution's own estimates.

When calculating the capital requirement for a loan according to the IRB approaches, four parameters are used:

- the probability of default on a loan within the coming year (PD)
- the loss given default (LGD)[2]
- the expected exposure at the time of default (EAD)
- the maturity of the loan (M).[3]

Credit institutions applying the advanced IRB approach must estimate all parameters themselves, while those opting for the foundation IRB approach must only estimate PD.[4] The risk weights for the individual loans are calculated by inserting PD, LGD and if required M into fixed formulae and multiplying by the exposure, EAD, cf. Chart 43. The capital requirement can then be calculated as 8 per cent of the risk-weighted lending (0.08 x risk weight x EAD).

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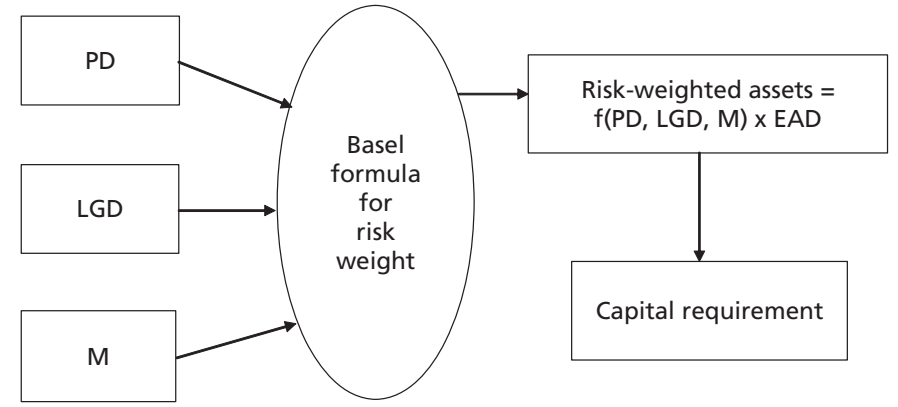
1 This means that in 1,000 different simulated instances, the loss within the following year will exceed the capital requirement in one case.

2 For credit institutions applying the advanced IRB approach, the LGD and EAD estimates must as a minimum reflect the conditions in an economic downturn.

3 M must be calculated for lending to governments, credit institutions and corporates.

4 For retail lending, only the advanced approach can be applied.

SIMPLE ILLUSTRATION OF CAPITAL REQUIREMENT FOR CREDIT RISK FOR CORPORATE LENDING UNDER THE IRB APPROACHES Chart 43



The Basel Committee's formulae for calculation of capital requirements are described in Box 12.

There is considerable flexibility with regard to the estimation methods the credit institutions can use to determine the value of the parameters. The analysis below focuses primarily on the methods for estimating PD, supplemented with a simple sensitivity analysis of LGD. The other parameters, EAD and M, are not included.

Estimation of risk parameters under the IRB approaches

In order to obtain the Danish Financial Supervisory Authority's approval to use the IRB approaches, a credit institution must, among other things, establish one or more rating systems for meaningful classification of borrowers on the basis of their credit quality. The system(s) may be developed by the credit institution itself or purchased from a third party. A rating system is typically based on a credit-score system whereby the credit institutions rank their customers on the basis of both quantitative data (e.g. financial accounts) and qualitative data (e.g. knowledge of the customer).

For lending to the corporate sector, governments and other credit institutions, the credit institutions' rating systems must include at least seven classes for non-defaulted loans and a separate class for defaulted loans. The credit institutions must also establish rating systems for their retail portfolios[1]. Lending to small and medium-sized enterprises (SME)

[1] For the retail lending portfolio, the credit institutions shall base the PD estimation on a rating system based on either obligor grades or pools, which – in addition to counterparty risk – also includes facility-specific risk, i.e. whether the loan is a guarantee, an overdraft facility, etc.

IRB FORMULA Box 12

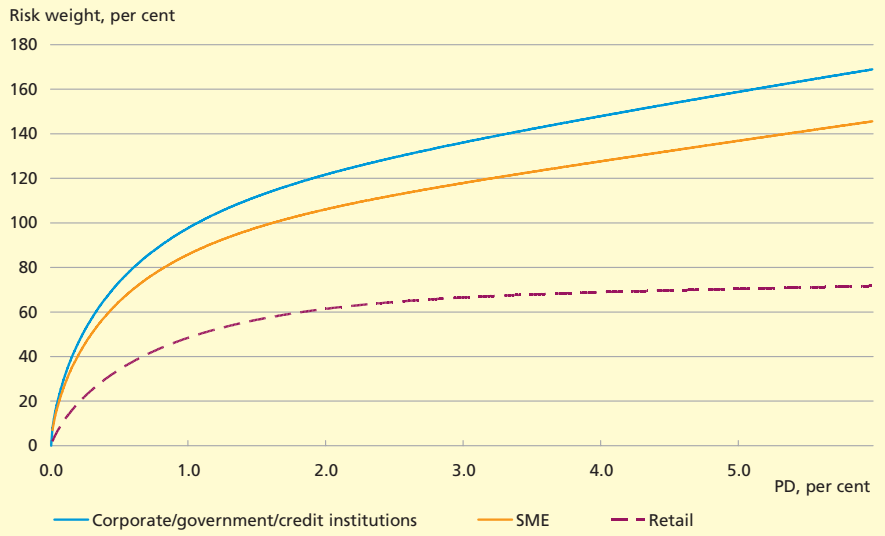
This Box describes the formula for calculation of the capital requirement for corporate lending, including lending to small and medium-sized enterprises (SME).

The capital requirement (C) is calculated as 8 per cent of the risk weight (RW) multiplied by the exposure at default (EAD):

$$C = 0.08 \times RW \times EAD$$

As the Chart shows, the risk weight (RW) for a corporate loan is to a large extent determined by whether the loan is considered to be part of the corporate portfolio, including the SME subcategory, or transferred to the retail portfolio. The risk weight for lending to SMEs is thus considerably lower than for corporate lending, and the gap widens as PD increases. Furthermore, the risk weight can be approximately halved if the loan meets the requirements for inclusion in the retail portfolio. This requires that the loan to the individual enterprise does not exceed 1 million euro. In addition, the credit institution must have a significant number of SME loans that are handled in a similar manner.

RISK WEIGHTS FOR LENDING TO THE CORPORATE SECTOR, SMEs AND RETAIL CUSTOMERS, IRB APPROACH



Note: The SME curve is calculated for a company with an annual turnover of 25 million euro. An LGD value of 45 per cent and an M value of 2.5 years are applied.
Source: Danmarks Nationalbank.

For non-defaulted exposures[1], the IRB formula for calculation of the risk weight (RW) is:

$$RW = \left[LGD \times N\left(\frac{N^{-1}(PD) + \sqrt{R} \times N^{-1}(0.999)}{\sqrt{1-R}} \right) - (LGD \times PD) \right] \times \frac{(1+(M-2.5)\times b)}{1-1.5\times b} \times 12.5 \times 1.06$$

Continued

CONTINUED Box 12

PD (Probability of Default) is the probability that a borrower defaults within the next year, LGD (Loss Given Default) is the expected loss ratio in the event of default, and R expresses the correlation between the value of the credit institutions' loans. N(x) is the cumulative distribution function for a standardised, normal-distribution stochastic variable. The confidence level, $N^{-1}(0.999)$, has been set at 99.9 per cent. M is the maturity of the loan in years. If the maturity, M, is set at 2.5 years, the expression in the last fraction of the formula can be reduced to a function of the maturity factor b, which is determined by:

$$b = (0.11852 - 0.05478 \times \ln(PD))^2$$

The correlation (R) is determined by:

$$R = 0.12 \times \frac{1 - e^{-50 \times PD}}{1 - e^{-50}} + 0.24 \times \left[1 - \frac{1 - e^{-50 \times PD}}{1 - e^{-50}}\right] - \omega^{SME}$$

R is inversely dependent on the borrowers' credit quality (PD). For corporate lending of the highest credit quality (i.e. with a low PD) the correlation approaches 24 per cent, while for corporate lending of the lowest credit quality (i.e. with a high PD) it approaches 12 per cent, cf. the R formula.[2] The R formula also includes a correction factor ω^{SME} for SMEs with turnover not exceeding 50 million euro. The correction factor is expressed by:

$$\omega^{SME} = 0.04 \times \left(1 - \frac{S - 5}{45}\right)$$

where S is the total annual turnover in million euro for enterprises with turnover in the range of 5 to 50 million euro. For enterprises with annual turnover of less than 5 million euro, S will be set at 5 million euro. For enterprises with turnover of 50 million euro or more, ω^{SME} is zero, so that the correlation band remains unchanged at 12-24 per cent. For enterprises with turnover not exceeding 5 million euro, ω^{SME} is 0.04, whereby the correlation band is reduced to 8-20 per cent.

The Basel Committee has determined that PD for corporate lending, etc. must be at least 0.03 per cent.

Under the foundation IRB approach, LGD for uncollateralised lending must be set at 45 per cent if the loan is not subordinate to other creditors. If, however, the uncollateralised loan is subordinate, LGD must be set at 75 per cent. For loans for which recognised collateral has been pledged, LGD can be reduced in accordance with special rules for credit risk mitigation. LGD can thus be reduced to less than 45 per cent for credit institutions applying the foundation IRB approach. For credit institutions opting for the advanced IRB approach, which must estimate all parameters themselves, the starting point for LGD, i.e. not taking pledged collateral into account, may be higher than 45 per cent, since LGD must as a minimum, among other things, reflect the conditions in an economic downturn. On the other hand, more types of collateral are recognised according to the rules for credit risk mitigation, and consequently LGD may be reduced further. However, the Basel Committee has set a provisional lower limit of 10 per cent for loans secured by real estate.

Under the foundation IRB approach, M has been set at 2.5 years.

[1] For defaulted loans, PD=1 and RW thus 0.

[2] For retail lending, the correlation range has been set at 3-16 per cent with the exception that the correlation for housing loans has been set at 15 per cent and for overdraft facilities at 4 per cent.

is in principle included in the corporate portfolio, but may under certain conditions be treated as part of the retail portfolio, cf. Box 12.

The rules give the credit institutions two options when it comes to estimating PD values:

- Estimation on the basis of the rating system: a representative PD is estimated for all companies within the same rating class.
- Direct estimation: the credit institution's internal statistical credit-risk models are applied, after which an individual PD is estimated for each loan.

Credit institutions applying the advanced IRB approach must also estimate LGD and EAD and calculate M. As a minimum, the LGD and EAD estimates must reflect conditions in an economic downturn, unlike the 1-year term of the PD estimate.

The rules enable estimation of LGD either directly or on the basis of a rating system corresponding to the rules for PD estimation. Pledged collateral may be included in the LGD estimate, in which case provision must be made for the fact that it is very difficult for the credit institutions to gain control of their collateral and liquidate it at market value within a short timeframe.

When estimating EAD, the credit institutions must take account of the uncertainty related to the size of the exposure at the time of default. For instance, an overdraft facility may not have been fully utilised.

When the risk parameters for the individual loans have been estimated, they are entered into the Basel Committee's formula for calculation of the capital requirement, cf. Box 12. The capital requirements for the individual loans are added to give the credit institution's total capital requirement for credit risk. Consequently, the estimations of the risk parameters, including the use and structure of rating systems, influence the capital requirement.

Further requirements of rating systems

The credit institutions must test the accuracy and robustness of their rating systems, e.g. by back-testing and stress-testing against a mild recession scenario.

The rating systems must be established on a sound and meaningful basis, which requires that the credit institutions have access to extensive data on the individual assets, including whether or not the borrowers have previously defaulted on their payment obligations. Consequently, it may be necessary for a credit institution to supplement its own data with external data, i.e. data pooling, with a view to obtaining a sufficient number of observations to distinguish between risks in the various

rating classes. If a credit institution needs to pool data, it must be able to demonstrate that the overall data set is representative of its own loan portfolio, including that a uniform definition is applied to determining when a loan is classified as defaulted.

Besides forming the basis for calculation of the capital requirement, the system must e.g. be used in day-to-day credit management. This also applies if a credit institution uses direct PD estimation. Credit institutions applying the IRB approaches thus have a very direct incentive to develop and maintain systems and methods that provide the best possible overview of the assets' risk characteristics.

Developing, maintaining, testing and documenting the systems and methods required in order to apply the IRB approaches is a considerable task. These approaches are therefore only relevant for large credit institutions.

QUANTIFICATION

This section quantifies differences in the capital requirements for a portfolio of lending to Danish non-financial enterprises. The point of departure is the failure rates for Danish companies estimated using Danmarks Nationalbank's failure-rate model, cf. Box 13. The estimated failure rate for each company in the model is used to express PD.

Danmarks Nationalbank's data basis cannot be used to derive parameter estimates of LGD and EAD, but like PD estimates they will be subject to uncertainty, and the size of the parameters will have a significant impact on the capital requirements calculated.[1] This is illustrated by a simple sensitivity analysis of various parameter values for LGD.

The analysis is not a systematic account of the sensitivity of the capital requirement, but an illustration on the basis of available data.

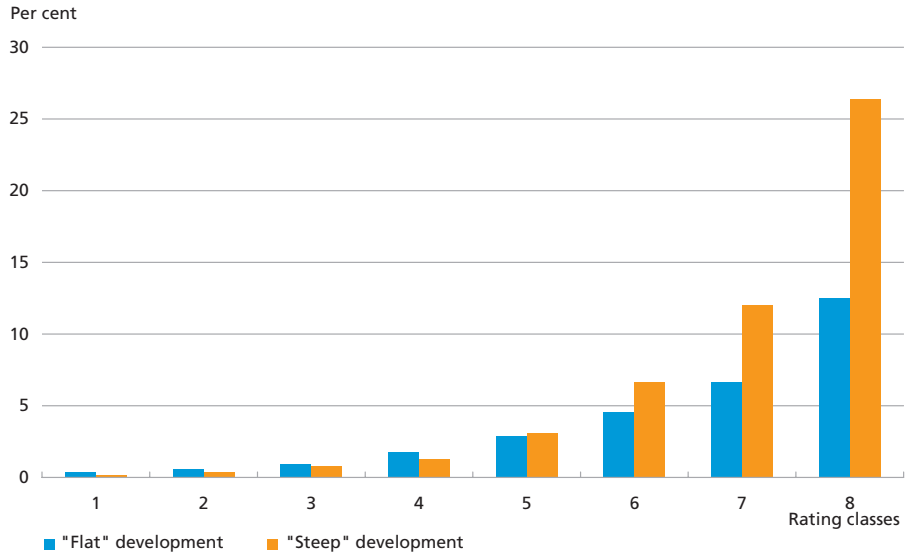
Both the number of rating classes and the distribution of companies within the rating classes may affect the capital requirement.

Chart 44 shows two different rating systems with eight rating classes each. The difference between the two is that the rating system with the "steep" slope has a higher ratio of failed companies in the low rating classes (classes 6-8) than the "flat" rating system, and a lower ratio of failed companies in the high rating classes. Chart 45 presents two rating systems with, respectively, 8 and 14 rating classes.

[1] In principle, determining the impact on the capital requirement of various parameter values for e.g. LGD and EAD requires access to confidential data on e.g. collateral pledged for the individual loans, customers' utilisation of overdraft facilities, etc.

ACTUAL FAILURE RATES IN TWO RATING SYSTEMS WITH 8 RATING CLASSES – "FLAT" AND "STEEP" DEVELOPMENT

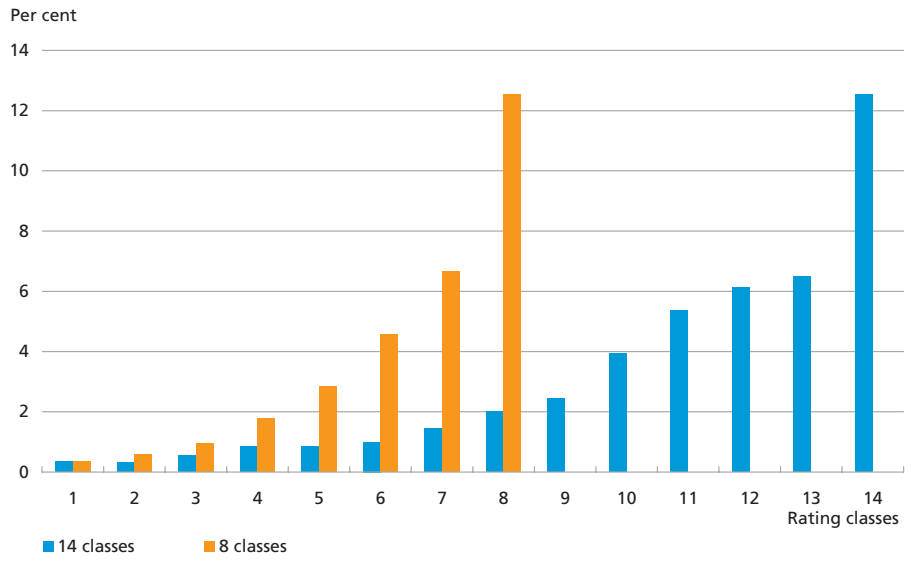
Chart 44



Source: Own calculations.

ACTUAL FAILURE RATES IN TWO RATING SYSTEMS WITH 8 AND 14 RATING CLASSES

Chart 45



Source: Own calculations.

Danmarks Nationalbank's failure-rate model primarily applies historical accounting data for Danish companies to estimate the failure rate for each company. The same basic model is used to analyse the credit risk of the Danish banking sector in this publication's chapters on, respectively, the financial sector and the corporate sector and the households.

In order to calculate banks' capital requirements under the Basel II Accord, it is necessary to have an expression of the probability of default on a loan (PD). The estimated failure rate for each company in Danmarks Nationalbank's failure-rate model is used to express PD.

Establishment of a rating system for calculation of PD

A rating system can be structured in many ways. First, the companies must be rated by credit quality. In this analysis, primarily accounting data has been applied, and the companies are ranked by the value of the estimated PD. Then, the number of rating classes must be determined. This analysis operates with rating systems with, respectively, 8 and 14 rating classes. Under the capital-adequacy rules, a rating system must have at least 8 rating classes. 14 rating classes have been selected for the simple reason that this is the highest number stated by a Danish banking institution.

The individual rating classes are determined by an upper and a lower band for the companies' estimated failure rates. Companies with high estimated failure rates are in the low rating classes, while companies with low estimated failure rates are in the high rating classes. Both active and failed companies are allocated to rating classes. When all companies have been placed in a rating class, it is possible to calculate the number of companies in each rating class that have actually failed. Typically, rating classes are designed so that the actual failure rate across rating classes approximates to an exponential function, cf. the Chart. The same approach is used to establish the various rating systems in this analysis. The PD of the individual rating class is calculated as the simple average of estimated failure rates for companies in that rating class.

Direct PD estimation

In direct PD estimation, the estimated failure rate for each company is used as an expression of PD.

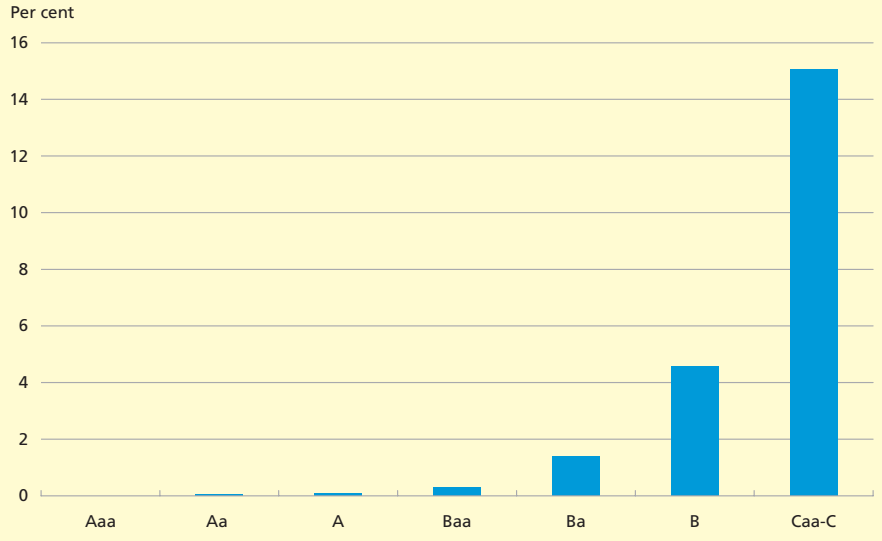
EAD, exposure at default

In order to calculate the capital requirement for each individual company, it is necessary to know the bank's exposure with the company in question (EAD). For this purpose, the bank debt stated in the company's annual accounts is used. The data basis for the failure-rate model does not include data on bank debt for all companies; where no data is available, the company is included in the calculations with a capital requirement of zero.

Continued

CONTINUED Box 13

EXAMPLE OF FAILURE RATES IN A RATING SYSTEM



Note: The Chart shows Moody's historical 1-year failure rates for various rating classes.
Source: Default and Recovery Rates of Corporate Bond Issuers, 1920-2004, Hamilton et al., 2005.

Basic scenario

For comparing results, a basic scenario has been defined, which has been set at 100. In this basic scenario, the rating system is based on all companies in the failure-rate model and has 8 rating classes. The development in the actual failure rates is relatively flat across rating classes. On calculation of the capital requirement, LGD has been set at 45 per cent and M at 2.5 years.

The capital requirements calculated on the basis of the various rating systems and via direct PD estimation are shown in Table 9. For the rating system giving the highest capital requirement in the analysed portfolio of Danish companies, the capital requirement has been set at 100. For the lending portfolio applied, the capital requirement depends on the "steepness" of the rating system.

CAPITAL REQUIREMENTS UNDER DIFFERENT RATING SYSTEMS AND USING DIRECT PD Table 9

8 rating classes and "flat" development set at 100	"Flat"	"Steep"	Direct PD
8 rating classes	100.0	96.6	
14 rating classes	98.1	96.1	
Direct PD			95.3

Note: It is assumed that LGD = 45 per cent and M = 2.5 years, cf. the basic scenario in Box 13.
Source: Own calculations.

CAPITAL REQUIREMENTS AT DIFFERENT LGD VALUES — Table 10

Capital requirement for LGD = 45 per cent set at 100	
LGD = 75 per cent	167
LGD = 60 per cent	133
LGD = 45 per cent	100
LGD = 30 per cent	67
LGD = 20 per cent	44
LGD = 10 per cent	22

Note: The capital requirement is calculated by applying the basic scenario, cf. Box 13.
Source: Own calculations.

The "steep" system entails lower capital requirements than the "flat" system. At the same time, the analyses show that in this case the capital requirement is reduced when the number of rating classes in the rating system is increased, the highest effect being achieved for the "flat" system.

The lowest capital requirement is obtained using direct PD estimation, whereby the number of rating classes in principle matches the number of companies. In general, the distribution of lending within each rating class will determine whether direct PD estimation results in higher or lower capital requirements. Especially the distribution of loans has an impact on rating systems based on a relatively small lending portfolio, since some rating classes may include only few loans.

The capital requirement for credit risk is also affected by the estimation of LGD. The higher LGD, the higher the capital requirement. This is evident from the Basel Committee's formula for calculation of capital requirements, cf. Box 12. If it is assumed that all loans in the portfolio have the same LGD, the capital requirement changes by the same factor as LGD. This sensitivity is illustrated in Table 10, which is based on the range of parameter values for LGD that the rules provide for[1].

The new capital-adequacy rules allow credit institutions to treat part of their lending to SMEs as retail lending. Since capital requirements are generally lower for retail lending, the overall capital requirement decreases as more SME lending is transferred to the retail portfolio, cf. the Chart in Box 12. SMEs may be included in the retail portfolio under certain conditions, e.g. that lending to the individual SME does not exceed 1 million euro, and that the credit institution has a significant number of SME loans that are handled in a similar manner. In a Danish context, the 1-million-euro exposure limit is relatively high, i.e. many loans could potentially be comprised.

[1] See Box 12.

CAPITAL REQUIREMENTS WHEN SMALL ENTERPRISES ARE GRADUALLY TRANSFERRED TO THE RETAIL PORTFOLIO — Table 11

Rating system based on all companies, set at 100	100.0
- based on companies with balance sheets exceeding kr. 500,000	99.0
- based on companies with balance sheets exceeding kr. 1 million	96.7
- based on companies with balance sheets exceeding kr. 3 million	86.5
- based on companies with balance sheets exceeding kr. 10 million	64.7

Note: The result is calculated on the basis of rating systems with eight rating classes and "flat" development in the failure rate over rating classes. The failure-rate model does not include data on turnover and bank lending for all companies, and consequently the balance-sheet totals are applied instead.
Source: Own calculations.

To illustrate the impact, rating systems are established and the capital requirement for credit risk is calculated for different lending portfolios from which small enterprises are increasingly eliminated. Small enterprises typically have a high PD, i.e. there are relatively many small enterprises in the lowest rating classes. When the small enterprises are transferred from the corporate portfolio to the retail portfolio, the greatest impact is therefore seen in the lowest rating classes, where the average PD declines. The result is a lower capital requirement, cf. Table 11.

Banks' Liquidity

Liquidity risk is an integral part of banks' activities. A bank's complex liquidity profile can be summarised as liquidity indicators for use in the bank's internal risk management and in the supervision of liquidity.

Based on available data, the liquidity of Danish banks is judged to be more than adequate. The stock of liquidity is comparable to that in other EU member states with comparatively sophisticated financial systems and by far exceeds the statutory requirement, even though the excess liquidity cover has declined somewhat in recent years. Denmark's statutory liquidity requirement is more quantitative and stock-based than equivalent requirements in other EU member states, but it has functioned as an efficient check. The Danish Financial Supervisory Authority supervises individual banks and ensures that they have adequate liquidity and contingency liquidity plans.

INTRODUCTION

Liquidity has various meanings in different contexts, e.g. market liquidity of financial instruments, liquidity in payment, clearing and settlement systems, monetary-policy liquidity and the financial liquidity of individual entities. This chapter focuses on the liquidity risks in banks as these risks have attracted growing interest from central banks and supervisory authorities in recent years. Firstly, liquidity problems in banks have played a significant role in financial crises in many countries. This is one reason why explicit regulation and supervision of the banks' liquidity form part of most countries' supervisory regimes.

Secondly, supplying the banking system with sufficient liquidity is primarily seen as a central-bank responsibility. This is the case for the general implementation of monetary policy and for the design of robust payment systems, as well as for the provision of liquidity support in the event of a financial crisis.

Thirdly, liquidity supervision and regulation is one element of the framework for the EU banking sector that so far has not been harmonised. One argument in favour of national liquidity regulations is that banks' liquidity needs depend not only on each bank's business profile, but also on the national financial system, and particularly on the scope for selling or borrowing against various assets (e.g. securities) in different countries.

THE LIQUIDITY REQUIREMENT IN THE DANISH FINANCIAL BUSINESS ACT, SECTION 152 — Box 14

(1) A bank shall have appropriate liquidity, cf. subsection (2). Such liquidity shall amount to no less than

- 15 per cent of the debt exposures that, irrespective of possible payment reservations, shall be payable by the banking institution on demand or are redeemable at less than one month's notice, or
- 10 per cent of the total debt and guarantee exposures of the banking institution, less subordinated debt that may be included in the calculation of the base capital.

(2) The following may be included in calculations of liquidity:

- cash in hand
- fully secured and liquid demand deposits with credit institutions and insurance companies
- holdings of secure, easily realisable securities and credit funds not used as collateral for a loan.

(3) If the requirements of subsection (1) are not met, and if such a situation is not remedied within 8 days after the banking institution failed to meet the requirements, the banking institution shall notify such a situation to the Danish Financial Supervisory Authority immediately. The Financial Supervisory Authority shall lay down a time limit within which the requirements shall be met.

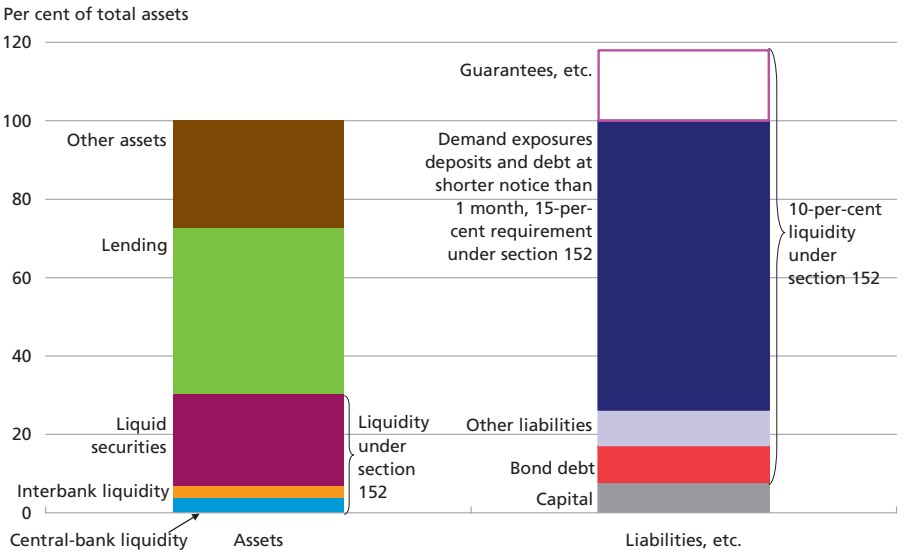
With increased international banking, the lack of harmonisation of national liquidity requirements can potentially distort competition and encourage regulatory arbitrage. It may also impede international banks' liquidity management, e.g. by tying up liquidity in certain countries, business units or currencies. The growing international interest could in due course lead to harmonisation of liquidity supervision.

Banks' liquidity risk

Liquidity risk can be roughly defined as the risk of not being able to raise cash to make payments as they fall due. For ordinary individuals this e.g. means the risk of unexpected expenses or loss of income, which may be hedged and managed to varying degrees, e.g. via insurance, extra cash in the bank, an overdraft facility, credit cards or other financial products. Bank customers regard their demand deposits and overdraft facilities as liquidity that can be converted into cash at ATMs in their home country or abroad, or used as ready means of payment (i.e. money) via payment cards or bank transfers.

Banks supply liquidity to individuals and companies, and take on liquidity risks as an integral part of their lending and deposit-taking activities. Banks take deposits, typically demand deposits that can be with-

THE BALANCE-SHEET STRUCTURE AND LIQUIDITY OF DANISH BANKS, END-2004 Chart 46



Source: The Danish Financial Supervisory Authority and own calculations.

drawn again immediately, and relend the funds, e.g. as a 7-year car loan. This creates a mismatch between the payment profiles for deposits and lending.

For the Danish banking sector as a whole, liabilities payable on demand or at less than one month's notice make up more than two thirds of total liabilities, while cash in hand accounts for less than 1 per cent of total assets, and liquid assets – as defined in section 152 of the Danish Financial Business Act, cf. Box 14 – constitute approximately 30 per cent of the total assets, cf. Chart 46.

This balance-sheet structure, plus the potential liquidity drain from guarantees and other off-balance-sheet items, may at first sight appear to entail a high level of potential liquidity risk. However, banks monitor their liquidity closely, subject to the supervision of the Danish Financial Supervisory Authority.

Section 152 of the Danish Financial Business Act, cf. Box 14, requires banks to have "appropriate liquidity" (broadly defined in subsection (2)) to cover 15 per cent of short-term liabilities and 10 per cent of total debt liabilities (excluding capital), cf. Chart 46. There are several reasons that liquid assets covering only 15 per cent of a bank's short-term liabilities, can be considered to be "appropriate liquidity":

- Portfolio effects: the bank pools the liquidity risks associated with the individual customers – the uncertainty as to when the individual customers will need or want to spend the money in their accounts or on

their overdraft facilities – as a diversified portfolio of deposits from and loans to a wide range of customers. This provides for a more stable and predictable payment profile for the overall portfolio than for each individual account.

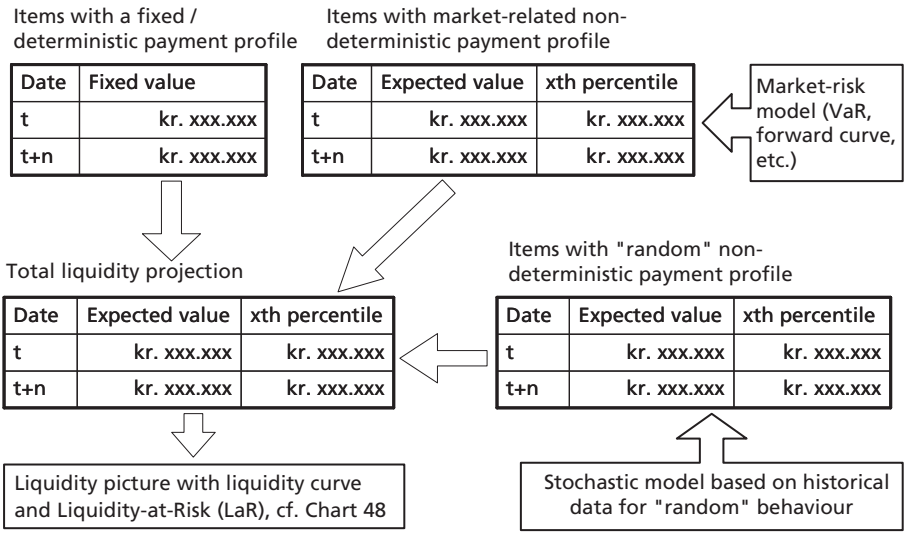
- IT systems and historical data make it easier for banks to get an overview of their liquidity profile and risks.
- Confidence in the banking sector, strengthened by deposit insurance, reduces the risk of sudden panic among the depositors.
- The relatively advanced financial system in Denmark, including extensive use of electronic payment systems, Danmarks Nationalbank's certificates of deposit and liquidity facilities via the extended automatic collateralisation arrangement at VP Securities Services, etc., allows banks to obtain liquidity immediately at a reasonable price on the basis of a wider range of assets.
- Banks smooth their individual liquidity effects via interbank deposits and lending, and banks with easy and secure access to market liquidity sell liquidity insurance (via backup lines[1]) to other banks. In normal times, these instruments contribute to redistributing liquidity in the sector. In the event of bank-specific liquidity problems, where the bank's solvency is not a concern, such instruments can form an important part of the contingency liquidity plans of the individual bank. In the event of a systemic banking crisis, however, where all banks seek to draw on their interbank liquidity, these instruments – that normally have a stabilising effect – can become potential channels of contagion, especially in the absence of timely central-bank liquidity support.

BANKS' LIQUIDITY RISK MANAGEMENT

Liquidity problems can threaten the very existence of a bank. The risk of liquidity problems can be minimised by maintaining substantial holdings of cash and fully liquid assets. A careful strategy like this will be inefficient, however, entailing considerable opportunity costs in the form of lower interest income. A milder form of liquidity risk is that inefficient liquidity management can increase the cost and earnings risks. On days with a liquidity shortfall, there is a need to borrow in the market at perhaps higher-than-normal interest costs, and on days with a surplus this liquidity will need to be deposited or invested, perhaps at a lower interest rate or a higher credit risk. Thus, efficient liquidity management can minimise these liquidity-related cost and earnings risks.

[1] Back-up lines reportedly play a very small part in the liquidity management of Danish banks.

BANK LIQUIDITY RISK MANAGEMENT MODEL, STYLISED STRUCTURE Chart 47

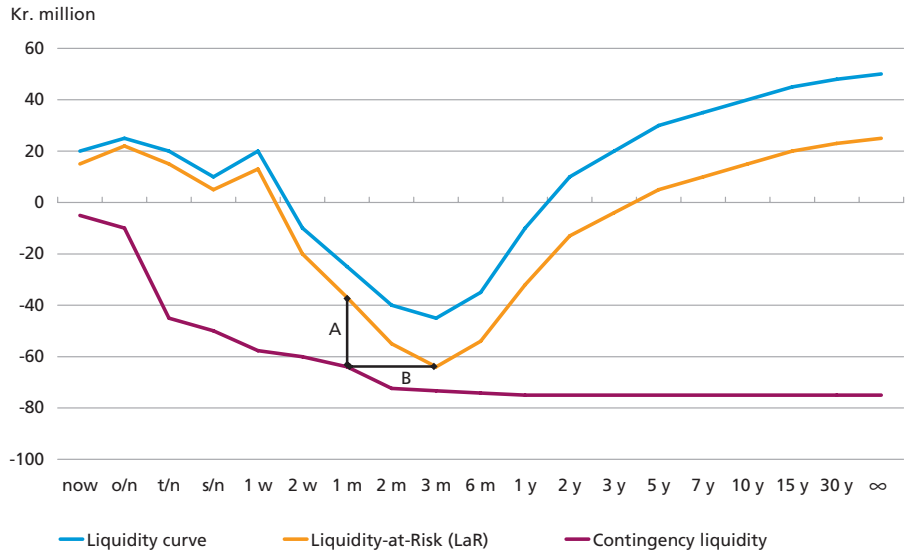


Efficient liquidity management requires a comprehensive overview of the bank's total actual and potential payment obligations, as well as a good contingency liquidity plan with a view to adapting the liquidity position to the actual development. The overview of the bank's liquidity position is complicated by two aspects: (i) the time dimension, i.e. the payments in the next few hours[1], days, weeks, months and years; and (ii) the uncertainty regarding the liquidity effect of many items with a non-deterministic (i.e. not precisely defined) payment profile. This applies to liabilities (e.g. demand deposits), assets (e.g. overdraft facilities) and off-balance-sheet items (e.g. guarantees and derivative contracts).

A bank must be able continuously to calculate, project and monitor the liquidity need for its entire portfolio. In the calculation and projection of the liquidity need, liquidity risk management systems will typically disaggregate the portfolio into items with a deterministic (i.e. precisely defined) payment profile and items with a non-deterministic (not precisely defined) payment profile, cf. Chart 47. Items with a non-deterministic payment profile can be broken down further into items with payments related directly to specific market rates, e.g. currency swaps or variable-rate loans, and items with payments related to apparently random human behaviour, e.g. demand deposits. Market-related payment profiles can be integrated into the bank's market-risk models, while random payments can be projected (with confidence intervals for the risk in the liquidity development) on data for historical behaviour.

[1] Real-time liquidity can be important for the banks' participation in payment, clearing and settlement systems, particularly for international banks operating in various currencies in different time zones.

LIQUIDITY PICTURE FOR A FICTIVE BANK, STYLISED EXAMPLE Chart 48



Note: The contingency liquidity is shown with sign negative for easier comparison with the probable liquidity effects in the liquidity curve and the potential liquidity effects in the LaR curve.

Chart 48 shows the liquidity profile given by such a liquidity management model for a fictive bank.

The liquidity curve shows the expected development in the bank's liquidity position over the time horizon, i.e. the most probable development in liquidity if the banking institution stays on its charted course without raising additional liquidity. For each point on the time horizon, the liquidity curve shows the sum of the deterministic payments plus the expected value of market-related and random payments.

The Liquidity-at-Risk (LaR) curve illustrates the highest risk (with an x per cent confidence interval) in the projected development in the bank's liquidity position, i.e. the worst case for the liquidity development, assuming that the banking institution stays on its charted course without raising additional liquidity[1].

The red curve illustrates the bank's contingency liquidity, i.e. how much money (for meeting payment obligations) can be raised, and how soon, from sale of, borrowing against or repos on liquid assets, or from reliable funding sources. The contingency liquidity does not include the possibility of new bond issues or other sources of funding that would

[1] In relation to Chart 47 the LaR curve shows, for each point on the time horizon, the sum of the deterministic outflow tables plus e.g. the 95th percentile value from the market-risk models and the statistical models for market-related and random liquidity effects, respectively.

require continued unhindered access to the financial markets. The contingency liquidity reflects only the bank's resilience to liquidity shocks, or how fast the bank can restore liquidity if it decides to change course.

The liquidity profile in Chart 48 is complicated by both the time dimension and the uncertainty, as mentioned above. The liquidity profile is a snapshot of the liquidity situation and outlook at a given time on a given day. It may change relatively quickly, depending on the bank's business profile, since the liquidity profile is continuously updated with new transactions and changes in the payment profiles of existing items. The liquidity profile does not imply proceeding along the liquidity curve, but is a management tool used by the bank to determine how much liquidity should be raised or placed over the time horizon.

Liquidity indicators

An overview of a bank's liquidity position can be gleaned from liquidity indicators that give a simple summary of the information in the complex liquidity profile from various angles. Liquidity indicators can be shown as time series and can help the bank's senior management and supervisors to monitor the development in the bank's liquidity in relation to supervisory requirements or internal limits.

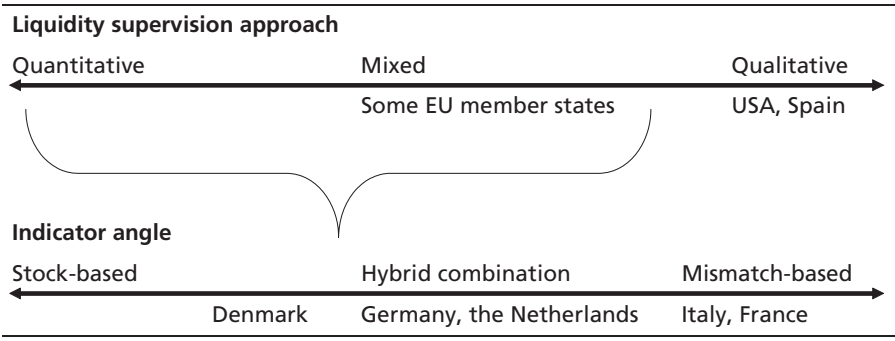
Mismatch-based liquidity indicators focus on the liquidity amounts, or the mismatch between ingoing and outgoing payments over a given time horizon. The relevant time horizon depends on the bank's business profile. Many liquidity indicators focus on the 1-month horizon, e.g. A in Chart 48. Other mismatch-based liquidity indicators focus on the time horizon associated with the greatest negative liquidity risk. The liquidity indicator can be specified in various ways, e.g. to measure the liquidity capacity in relation to the liquidity curve or LaR.

The simplest stock-based liquidity indicators ignore the time dimension and measure e.g. liquid assets as a ratio of total assets. Other types of liquidity indicators concentrate solely on the time dimension, e.g. on how far the bank is from having to draw on its contingency liquidity. In Chart 48, B, for example, shows a "day-count to default" of 2 months between the lowest point on the LaR curve (3 months) and the corresponding point on the liquidity-capacity curve (1 month).

LIQUIDITY SUPERVISION

In contrast to the internationally harmonised capital-adequacy requirements and accounting standards, the regimes for supervision of banks' liquidity still vary considerably across countries. Liquidity regimes can be roughly classified according to two main dimensions: by type of ap-

EXAMPLES OF LIQUIDITY SUPERVISION REGIMES Chart 49



Source: BIS Financial Stability Institute, liquidity management seminar.

proach (quantitative/qualitative) and by type of indicator (stock/mismatch), cf. Chart 49.

Quantitative liquidity regimes focus on compliance with liquidity indicators in relation to statutory thresholds, while qualitative liquidity regimes are based on dialogue concerning the banks' individual procedures and liquidity management systems. Many EU member states employ a hybrid approach that to varying degrees emphasises both compliance with quantitative indicators and a qualitative supervisory dialogue about the banks' own liquidity management.

THE RECOMMENDATIONS OF THE BASEL COMMITTEE FOR THE BANKS' LIQUIDITY MANAGEMENT Box 15

In February 2000, the Basel Committee issued updated recommendations for the banks' liquidity management.[1] The recommendations include the following:

- Liquidity management should be structured, involve the bank's top management, be supported by adequate information systems, with clear framework and processes for the assumption and management of liquidity risks.
- The bank's liquidity need should be calculated and monitored on an ongoing basis with stress testing of the liquidity forecasts (for both bank-specific and wider crisis scenarios) and back testing of model reliability.
- The bank's access to the funding market should be ensured by good relations with counterparties and diversified sources of funding.
- The bank should have a contingency plan for liquidity crises.
- The bank should manage its liquidity risks at a consolidated level and for individual currencies.
- The bank should have an independent internal audit of its liquidity management.
- The bank should publish sufficient information to enable the public to assess the bank's situation (market discipline).
- The supervisory authorities shall supervise the banks' liquidity management.

[1] The Basel Committee, *Sound practices for managing liquidity risk in banking organisations*, February 2000.

Liquidity regimes applying a quantitative or a hybrid approach use very different liquidity indicators. These indicators can be classified on a spectrum from stock-based to mismatch-based liquidity indicators.

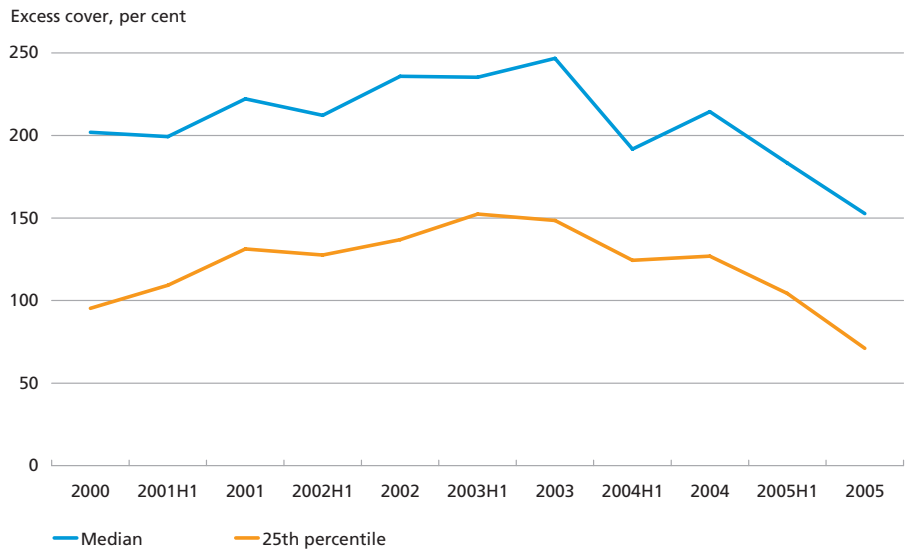
Quantitative liquidity supervision regimes with stock-based liquidity indicators were more widespread a few years ago. Several countries have in recent years switched to mismatch-based or hybrid indicators, or towards a more qualitative approach, particularly since the Basel Committee's revised recommendations were issued, cf. Box 15.

DATA FOR BANKS' LIQUIDITY

The Danish Financial Supervisory Authority publishes indicators for the banks' excess liquidity cover relative to the statutory liquidity requirement, cf. Chart 50.

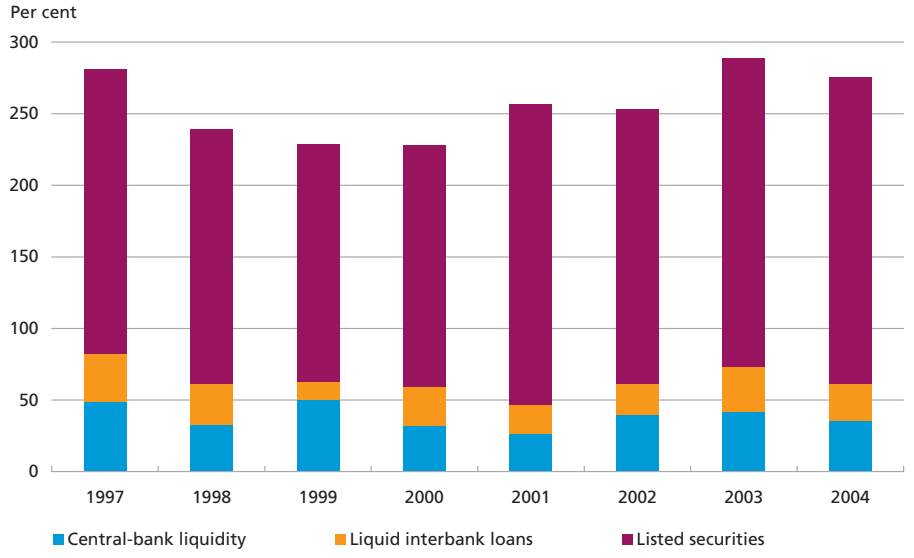
The median and the 25th percentile in Chart 50 show that most banks have far more liquidity than required by section 152 of the Danish Financial Business Act. The excess liquidity cover has diminished somewhat in the last few years, but most banks still have ample excess cover. The stock-based specification of liquidity requirement in section 152 – including the requirement to promptly report and remedy any breach of the liquidity requirement – seems to function as a check which the banks seek to stay clear of.

BANKS' EXCESS LIQUIDITY COVER WITH RESPECT TO SECTION 152 REQUIREMENT — Chart 50



Note: Key ratios for the excess liquidity cover at unconsolidated level. Figures for 2005 are estimates based on the banks' accounts.
Source: The Danish Financial Supervisory Authority and Danmarks Nationalbank.

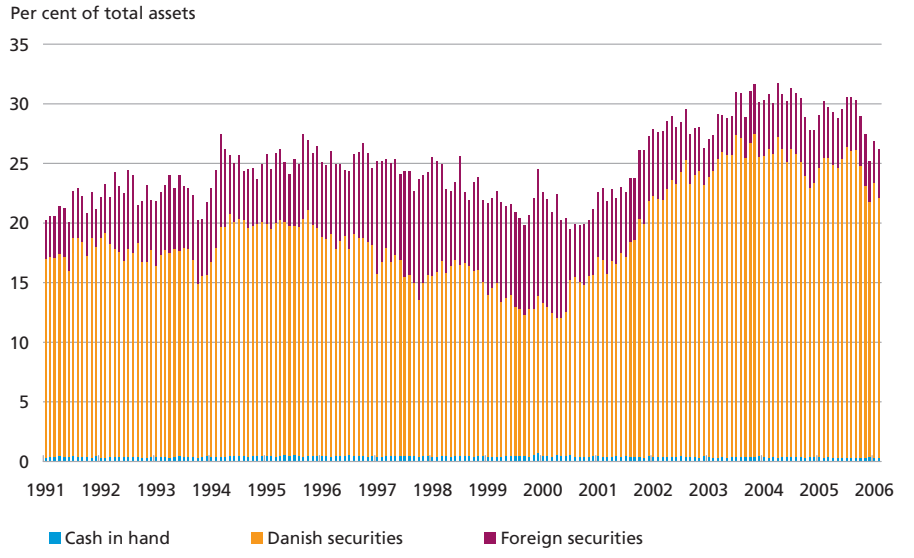
BANKS' LIQUIDITY AS PERCENTAGE OF SECTION 152 REQUIREMENT Chart 51



Source: The Danish Financial Supervisory Authority.

The Danish Financial Supervisory Authority's data for the sector also shows which types of liquid assets are included in the banks' liquidity, cf. Chart 51. Liquid interbank loans account for only a modest proportion

BANKS' CASH IN HAND AND BONDS, ETC., 1991-2006 Chart 52



Source: Danmarks Nationalbank.

of the banks' liquidity. It can be argued that interbank claims are internal to the banking sector and should therefore be excluded from the measure of the overall liquidity in the banking sector, since they would not provide much resilience against a systemic liquidity crisis. The low proportion of interbank loans in total liquidity, though somewhat higher for small banks, can therefore from a systemic stability perspective be regarded as reassuring.

Listed and eligible securities account for a large share of banks' liquidity, particularly for large banks. These securities are highly liquid in the Danish financial system since they can be used easily and quickly to raise means of payment, particularly after the extension of the automatic collateralisation arrangement in 2002. The banking sector's stock of securities is shown in the monthly MFI data, cf. Chart 52.

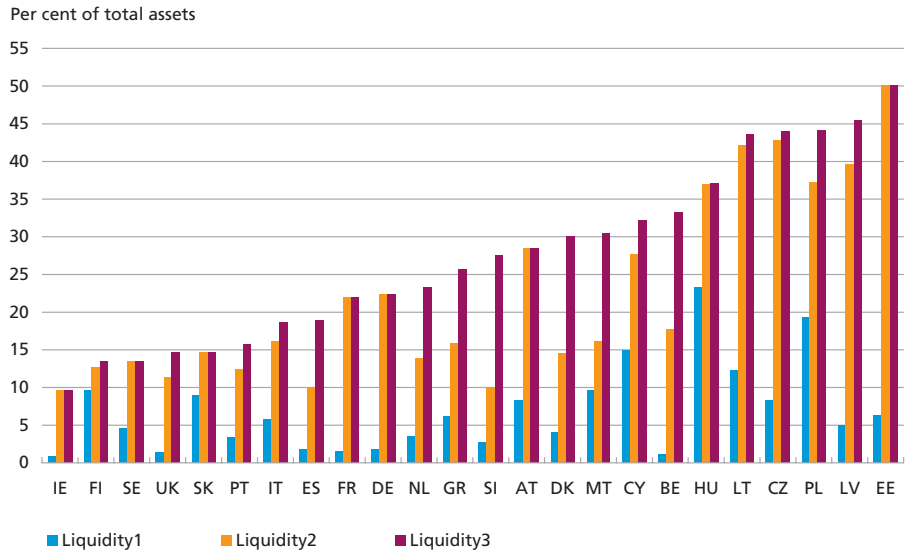
The banks' stock of securities has accounted for around 20-30 per cent of total assets and has grown since 2000.

International comparison of liquidity cover

The Banking Supervision Committee of the ECB has for some years collected consolidated banking data from member states for the calculation of stability indicators for the banking sectors of the EU and the euro area. Indicators for the banking sectors of individual member states were published in the annual EU Banking Sector Stability Report 2005. These indicators include three different definitions of liquid assets as a ratio of total assets. The broadest definition, Liquidity3, has a high degree of overlap with the definition of liquidity in section 152. Thus, the liquidity cover of Danish banks can – subject to national data differences – be roughly compared with corresponding figures for other EU member states, cf. Chart 53. The data for the Danish banking sector is provided by the Danish Financial Supervisory Authority and covers banks only, whereas the data from the ECB report for other countries covers all credit institutions. Danish mortgage-credit institutes are excluded from this comparison because they manage their liquidity risks tightly according to the balance principle, which minimises liquidity risks and the need for liquid assets.

The Danish banking sector's liquidity is comparable to that of other EU member states. The typically higher levels of liquidity in new member states – particularly as regards Liquidity1, i.e. cash in hand and other ultra-liquid funds – may reflect their less developed financial systems with a higher degree of uncertainty concerning the liquidity profile and fewer liquidity management instruments, making more substantial liquidity holdings necessary.

THE EU BANKING SECTORS' LIQUIDITY AS PERCENT OF TOTAL ASSETS, 2004 Chart 53



Note: Liquidity1 = cash in hand, deposits with central banks and short-term government securities; Liquidity2 = Liquidity1 + short-term interbank claims; Liquidity3 = Liquidity2 + public sector bonds. The figures for the Danish banking sector have been adjusted in relation to ECB data to exclude mortgage-credit institutes and solely include commercial banks, and to include certificates of deposit issued by Danmarks Nationalbank in Liquidity1.

Source: The Danish Financial Supervisory Authority, the ECB *EU banking sector stability 2005* and own calculations.

The banks' structural funding and liquidity risks

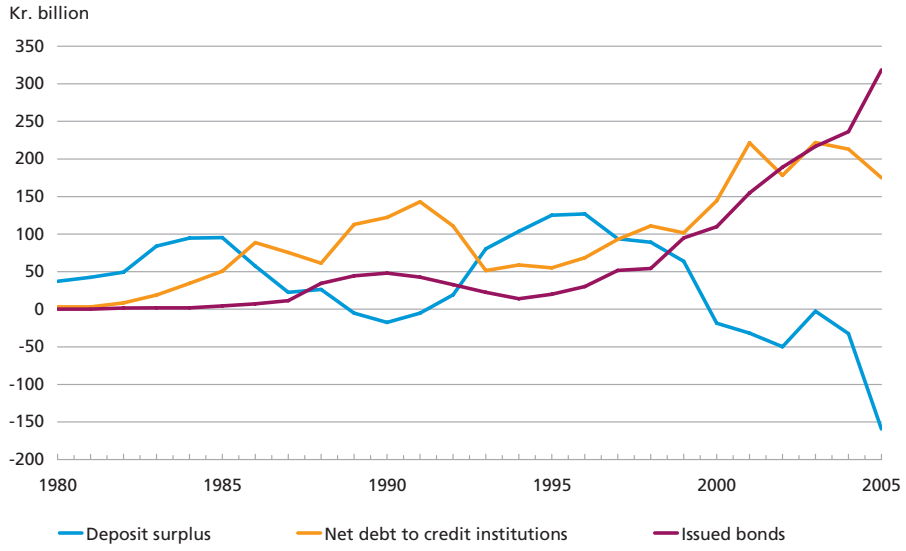
The banks' balance sheets have grown in recent years, with a stronger increase in lending to than deposits from the non-financial sector. This has eroded the deposit surplus, obliging the banks to resort to other sources of funding to make up the difference, e.g. by issuing bonds and borrowing from other credit institutions, cf. Chart 54.

The Danish deposit guarantee scheme covers deposits up to kr. 300,000 so that ordinary depositors need not fear for a bank's solvency. This makes the banks less vulnerable to panic among retail depositors. Retail deposits are therefore – despite the short formal maturity, often on a demand basis – regarded as one of the banks' most stable and reliable sources of funding.

Bond issues constitute an important funding instrument with long maturities and fixed payment profiles. The maturity is not infinite, however, and bond debt requires refinancing on maturity.

Net debt from credit institutions includes liquidity transfers from foreign banks to branches and subsidiaries in Denmark, which can be regarded as a stable source of funding (unless the parent bank gets into problems). However, it also includes some borrowing from foreign banks, which could turn out to be a less stable source of funding and liquidity, especially in the event of a financial crisis.

DEPOSIT SURPLUS, NET DEBT TO OTHER CREDIT INSTITUTIONS AND BOND ISSUES, ALL BANKS, 1980-2005 Chart 54



Note: All banking institutions comprise the Danish Financial Supervisory Authority's categories 1, 2 and 3.
Source: The Danish Financial Supervisory Authority.

A common feature of bond debt and net debt to credit institutions is that the bank must be able to maintain market access and that these sources of funding can make the bank vulnerable to changes in its own credit spreads. A case in point is that of the Icelandic banks in the spring of 2006 when a pronounced shift in market sentiment concerning the Icelandic currency and banking sector widened the credit spreads for Icelandic banks in the international markets.

Protection of Settlement in Danish Payment Systems

In the two Danish payment and settlement systems, the VP Settlement (securities transactions) and the Sumclearing (retail payments), the principal elements protecting settlement are the flexible access to liquidity, combined with the banking institutions' large holdings of securities that can be pledged as collateral for loans from Danmarks Nationalbank. Analyses based on data for 2005 show that the Danish banking institutions' holdings of eligible assets are large enough for settlement to take place even if a large participant becomes unable to settle its payments. Against this background, Danmarks Nationalbank finds that the present situation does not warrant special measures to ensure settlement in the Danish systems.

INTRODUCTION

The Danish payment and settlement systems are currently being assessed as part of the IMF's Financial Sector Assessment Program, cf. Box 6. The IMF review is based on internationally agreed standards for systemically important systems. The standards e.g. specify that such systems should have appropriate and clearly defined procedures for management of liquidity and credit risks. Furthermore, they stipulate that multilateral net settlement systems, cf. Box 16, should be capable of settlement even in the event that the participant with the largest payment obligation is unable to settle.[1]

Settlement via multilateral net settlement systems is associated with both credit and liquidity risks. Credit risk is the risk that a participant with a negative net position becomes insolvent before settlement without sufficient liquidity reserves to cover the payment obligation. The participant in question will then be excluded from the settlement and the net positions of the remaining participants will be recalculated. The liquidity risk is the risk that other participants have insufficient cover for their new net positions, so that they also have to be excluded from the settlement.

[1] See BIS, *Core Principles for Systemically Important Payment Systems,* 2001, principles 3 and 5. BIS/IOSCO, *Recommendations for Securities Settlement Systems,* 2001, contains similar principles for securities settlement systems.

MULTILATERAL NET SETTLEMENT SYSTEMS Box 16

In net settlement systems the transactions of the participants are gathered in cycles to be netted one or more times during the settlement day. Netting of the participants' transactions reduces the need for liquidity for the settlement. There are two main types of netting, i.e. multilateral netting that entails calculation of a participant's net positions vis-à-vis the other participants taken as one, and bilateral netting that entails calculation of net positions vis-à-vis each of the other participants.

In net settlement systems the participants may not always know their exact net positions before they reserve liquidity for the settlement. A participant with insufficient cover for its net position is normally excluded completely or partly from the settlement, and then the net positions of the other participants are recalculated. This may entail that other participants have insufficient cover for their new net positions so that they also have to be excluded from the settlement. This process continues until all the remaining participants have sufficient cover for their net positions.

Source: Danmarks Nationalbank, *Payment Systems in Denmark*, 2005.

In Denmark, both the VP Settlement for settlement of securities transactions and the Sumclearing for settlement of retail payments are multilateral net settlement systems. Settlement in the two systems mainly takes place in overnight settlement cycles. The participants reserve money (liquidity) before the settlement, which is executed by transfer between the participants' accounts at Danmarks Nationalbank. The participants in the settlement have access to intra-day credit at Danmarks Nationalbank against securities as collateral.[1]

This chapter reviews the measures that ensure settlement in Danish payment and settlement systems. Although it focuses on the Sumclearing, the same principles apply to the VP Settlement. Firstly, a number of general measures to protect settlement in retail payment systems with multilateral net settlement are described. This is followed by an account of specific elements in the Sumclearing to ensure settlement execution. Finally, an analysis based on data for 2005 is presented of the Danish banking institutions' contingency measures to counter the liquidity risk in the VP Settlement and the Sumclearing.

The analysis shows that even if a large participant is unable to settle its payments the settlement of securities transactions and retail payments in Denmark is generally well-protected. This is mainly due to the participants' flexible access to liquidity, combined with their substantial holdings of securities that can be pledged as collateral for loans from Dan-

[1] The VP Settlement and the Sumclearing are described in more detail in Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapters 5 and 6.

marks Nationalbank. As a consequence, the current situation is not deemed to warrant any further measures to ensure settlement. Danmarks Nationalbank assesses the need for such measures on an ongoing basis, including the implications of any structural changes, such as cross-border consolidation, in the Danish financial sector.

PROTECTING SETTLEMENT IN MULTILATERAL NETTING SYSTEMS

Protection against credit risk

The factors which in general determine the extent of a credit risk are the counterparty's credit standing, the size and maturity of the exposure and the use of collateral. Multilateral net settlement systems may comprise measures which deal with each of these factors.

Participation in most retail payment systems is subject to access criteria, such as requirements of the participants' credit standing. Furthermore, participation is often restricted to banks that are subject to supervision. This reduces the risk of a participant becoming insolvent, which limits the credit risk in the system.

The size of the exposures in the system can be subject to limits to the participants' negative net positions in a settlement cycle.[1] Such limits can be stipulated vis-à-vis all other participants in total, or against each individual participant. The participants can also decide to set a ceiling for individual payments in the system, which in practice also limits the participants' net positions.[2]

In multilateral net settlement systems, the maturity of the exposures can be reduced by increasing the frequency of settlement cycles (i.e. introducing more settlement cycles during the day). This reduces the probability of a participant becoming insolvent in the period from a payment being effected until final settlement. A higher settlement-cycle frequency may also contribute to limiting the participants' net positions.

Finally, the credit risk in multilateral net settlement systems can be countered by requiring collateral for the participants' net positions. This can e.g. be achieved via a scheme based on a collateral pool. The latter normally consists of highly liquid assets, e.g. cash or securities, which can be used at short notice if a participant defaults on its payment obligation.

A collateral pool differs from the other measures in that it normally also protects settlement of the payments of an insolvent participant. Thus, a collateral pool helps to ensure confidence in the payment settle-

[1] I.e. limits to amounts payable by one participant to other participants in the settlement cycle.
[2] Payments above this limit are normally settled in a real-time gross settlement (RTGS) system. Danmarks Nationalbank's payment system, Kronos, is an example of an RTGS system.

COLLATERAL POOLS Box 17

A collateral pool protects against credit risk in a multilateral net settlement system. It is different from other measures in that it also ensures settlement of the payments of an insolvent participant. Thus, a collateral pool contributes to confidence in the payment system since both payer and payee can be certain that an executed payment will always be settled.

It must be possible to use a collateral pool as soon as a participant is found to be insolvent and unable to settle. In practice this means that a collateral pool must consist of highly liquid assets, e.g. deposits at the central bank or securities which can be pledged as collateral for credit from the central bank. The participants should not be able to dispose of the deposits or securities.

A collateral pool can be financed in different ways. One method is for each participant to contribute a separate pool of liquid assets corresponding to the limit for its negative net position. The individual participant thus only pledges collateral for its own participation in the system. Alternatively, the collateral pool can be a joint scheme to which each participant contributes a pool of liquid assets that normally will be below the limit for their negative net positions. In this situation, the other participants will be jointly liable for the insolvent participant that is unable to settle.

A joint collateral pool has the advantage that it normally binds far fewer liquid assets than a scheme based on separate pools. A collateral pool based on joint liability has the drawback of possible unwanted behavioural implications for the participants. Furthermore, it may be difficult to determine each participant's contribution to the scheme to the satisfaction of e.g. large participants with a high credit rating.

A collateral pool can be combined with a loss sharing agreement among the participants to cover any losses as a result of a participant becoming insolvent and unable to settle. The loss sharing agreement enters into force if the collateral pool is insufficient to cover the negative net position of the insolvent participant.

In practice, there are only few examples of retail payment systems with multilateral netting in which settlement is ensured by a collateral pool. On the other hand, this type of measure is used in securities settlement systems in a number of countries, especially in countries where securities are settled via a central counterparties.[1]

[1] A central counterparty is a securities trading intermediary, i.e. it acts as seller for all buyers and buyer for all sellers, cf. Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Box 3.4.

ment system among both payers and payees. Box 17 outlines the functioning of a collateral pool, as well as the pros and cons of such a scheme.

Protection against liquidity risk

In many retail payment systems with multilateral netting, the most important measure to counter liquidity risk is proper central-bank credit facilities. If the participants also have ample holdings of securities that can be pledged as collateral for loans from the central bank, they can relatively easily reserve liquidity for settlement. Another important measure is the possibility of extra settlement cycles within the same settlement day, for which the participants can reserve further liquidity.

PROTECTING SETTLEMENT IN THE SUMCLEARING

The Danish retail payment system, the Sumclearing, is normally defined to comprise only the compilation of banking institutions' total net positions with the system operator, PBS (Payment Business Services), and the actual exchange of amounts on accounts at Danmarks Nationalbank. Thus, the two preceding subclearings, the electronic clearing and truncation and the PBS clearing, which provide the data for the Sumclearing, are not formally part of the system.[1]

Like the VP Settlement, the Sumclearing has been notified to the European Commission as being subject to the Settlement Finality Directive[2]. This directive stipulates that transfer orders and their netting are legally enforceable and binding in relation to third parties, even in the event of a participant's insolvency, if the transfer orders have entered the system before insolvency proceedings are opened. According to the directive, the system's own rules determine when a transfer order has entered the system.

In the Sumclearing, a payment has entered the system if it is included in the banking institutions' mutual net positions, i.e. the sum data, on expiry of the time limits for delivery of these net positions to the PBS Sumclearing system. If a banking institution is declared insolvent before that time, it is excluded from the Sumclearing. This means that the payments of that banking institution will not be settled, cf. below.[3]

In the following, "the Sumclearing" denotes the total clearing and settlement cycle for Danish retail payments, including the electronic clearing and truncation and the PBS clearing.

Protection against credit risk in the Sumclearing

A number of measures to counter credit risk have been introduced in the Sumclearing. Firstly, only banking institutions have access to participate in the Sumclearing. Banking institutions are supervised by the Danish Financial Supervisory Authority and must meet a number of requirements of their solvency, liquidity, etc. This reduces the risk of a participant in the Sumclearing becoming insolvent.

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1 The electronic clearing and truncation handles credit transfers, giro and cheque payments, as well as Dankort (debit card) payments using transaction vouchers. The PBS clearing processes payments related to PBS's own products, e.g. Betalingsservice (direct debit) and Dankort payments via payment terminals.

2 Directive 98/26/EC on settlement finality in payment and securities settlement systems, cf. Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapter 9.

3 The handling of an insolvent participant in the Sumclearing is described in detail in Niels C. Andersen, Clearing and Settlement in a Legal Perspective, Danmarks Nationalbank, *Working Papers* no. 20, 2004.

PROS AND CONS OF SETTLING AN INSOLVENT BANKING INSTITUTION'S RETAIL PAYMENTS — Box 18

The principal advantage of ensuring the settlement of an insolvent banking institution's retail payments is that it contributes to confidence in payment settlement. For example, a payer can be certain that the payment will always be completed even if the payer's banking institution becomes insolvent. The payer thereby avoids holding claims on an insolvent estate and having an unsettled payment. Furthermore, the payee (e.g. a merchant) does not have to be concerned about the payer's banking institution's credit rating.

One drawback of protecting the settlement of a payee can be that the latter holds a claim on an insolvent estate if the payee's banking institution becomes insolvent. The reason is that funds contributed to an insolvent estate cannot be paid out before the insolvent liquidation proceedings have been finalised. Furthermore, ensuring the settlement of an insolvent banking institution's retail payments will entail deviation from Danish insolvency legislation according to which insolvency takes legal effect when the insolvency order is handed down.

In addition, the banking institutions participating in the Sumclearing have set individual limits to the amount that can be drawn on them in a single payment in the electronic clearing and truncation.[1] The PBS clearing also applies limits to the size of individual payments, i.e. kr. 1 million for any single Dankort payment.

Furthermore, most of the retail payments in Denmark are settled in the Sumclearing during the night following the execution of the payment (e.g. a card payment at a merchant). Consequently, the exposures on the individual payments are of short duration.[2]

In the Sumclearing there is no collateral pool, and no other collateral is required for the banking institutions' net positions in the system. As mentioned above, this means that there are no measures to ensure the settlement of an insolvent banking institution's retail payments transacted prior to the insolvency order. Box 18 outlines some pros and cons of completing settlement of an insolvent banking institution's retail payments.

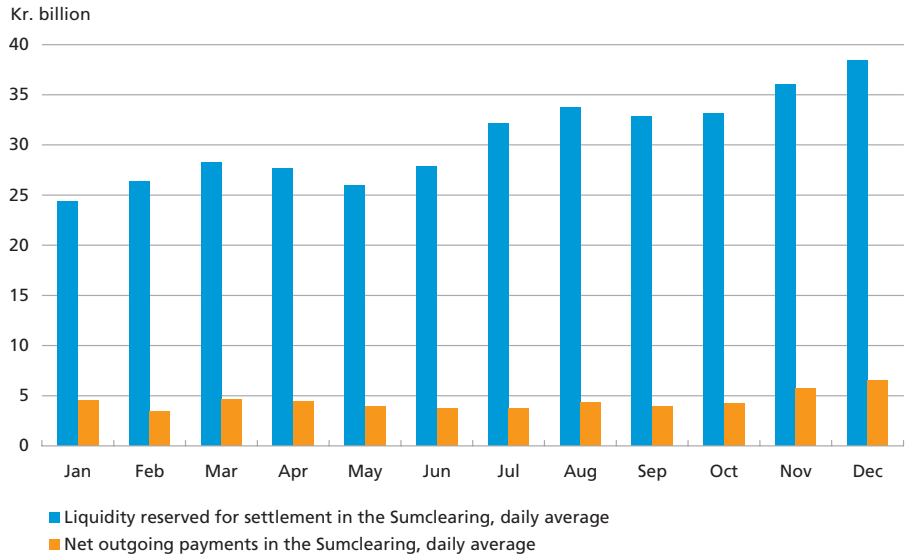
Protection against liquidity risk in the Sumclearing

The settlement of payments in the Sumclearing also includes measures to reduce the banking institutions' liquidity risk. The principal element is the banking institutions' easy access to intraday credit at Danmarks Nationalbank against collateral. The banking institutions can provide col-

1 In electronic clearing and truncation, no single payment may exceed kr. 100 million, but most banking institutions have set their own considerably lower limits.

2 Some retail payment systems provide for settlement of payments already on the day they are effected, i.e. intraday settlement, implying even shorter exposure durations.

EXCESS LIQUIDITY COVER IN THE SUMCLEARING, 2005 Chart 55



Source: Danmarks Nationalbank, own calculations.

lateral via traditional pledging of securities or via the automatic collateralisation arrangement. The latter is a highly flexible credit scheme, particularly for settlement of securities, cf. below.[1]

Eligible securities acceptable to Danmarks Nationalbank include Danish government bonds and mortgage-credit bonds as well as, for intraday credit, certificates of deposit issued by Danmarks Nationalbank. Overall, the banking institutions have ample holdings of securities that are eligible as collateral for credit from Danmarks Nationalbank. This can be attributed to the very large mortgage-credit market in Denmark, even by international standards. This ample supply of eligible securities is illustrated in the following section.

The combination of the banking institutions' flexible access to credit from Danmarks Nationalbank and their ample holdings of eligible securities entails very low costs for reserving liquidity for settlement in the Sumclearing. This is reflected in the fact that the banking institutions typically seek to have substantial excess liquidity cover in the Sumclearing, cf. Chart 55. Consequently, a banking institution's failure to meet its payment obligations very rarely causes other banking institutions' net positions to exceed their liquidity cover.[2]

[1] See also the detailed description of the automatic collateralisation arrangement in Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapter 5.

[2] Danmarks Nationalbank, *Financial stability 2002*, contains a chapter on payment system risks, including an analysis of the consequences of having to exclude a banking institution from the Sumclearing settlement. The analysis shows that this in only very few cases entails that other banking institutions have inadequate cover for their recalculated net positions.

In the event that a banking institution's cover for its net position is inadequate so that it has to be excluded from the settlement, the Sumclearing allows for extra settlement cycles during the day. This ensures that the banking institution's payments can still be settled on the required settlement date. At that time, Danmarks Nationalbank's RTGS system, Kronos, is open, so that participants can provide further liquidity for the extra settlement cycle. In addition, extraordinary settlement cycles (i.e. settlement cycles in addition to the predetermined extra settlement cycles) during the day can be agreed until 3.00 p.m.[1]

THE BANKING INSTITUTIONS' LIQUIDITY RESERVES

This section assesses the extent of the Danish banking institutions' contingency measures to counter liquidity risk in the VP Settlement and the Sumclearing.[2] In accordance with the usual hypothesis in international standards for payment and settlement systems, a large banking institution is assumed to be unable to meet its payment obligations and, thus, has to be excluded from the settlement. It is then analysed whether the other banking institutions have sufficient liquidity reserves to cover their recalculated net positions.

A banking institution's liquidity reserves for a given settlement day can be calculated as the sum of the following two items:

- The balance of the banking institution's current account at Danmarks Nationalbank at the close of the preceding monetary-policy day, i.e. at 3.30 p.m.[3]
- Its holdings of eligible securities that have not already been pledged as collateral for a loan from Danmarks Nationalbank.

This measure expresses how much liquidity a banking institution can reserve for the settlement without borrowing from other parties besides Danmarks Nationalbank. It must be emphasised, however, that this by no means gives the complete picture of the banking institutions' access to provide liquidity for the settlement, since they may also borrow against simultaneously acquired securities as collateral via the automatic collateralisation arrangement.

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1 Furthermore, these measures increase the robustness of settlement in the Sumclearing to operational events (e.g. computer system failure) that may have significant liquidity consequences for the participants.

2 The analysis also includes banking institutions' payments in the CLS foreign-exchange settlement system. The settlement of payments in CLS is described in more detail in Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapter 5.

3 The monetary-policy day in kroner runs from 4.00 p.m. to 3.30 p.m. the next banking day and is the period during which the banking institutions have access to intraday credit at Danmarks Nationalbank.

METHOD FOR ASSESSMENT OF BANKING INSTITUTIONS' CONTINGENCY LIQUIDITY MEASURES Box 19

The Danish banking institutions' contingency measures to counter liquidity risk in the VP Settlement and the Sumclearing have been analysed on the basis of data for 2005. The latter consists of daily data for the banking institutions' total net outgoing payments in the two systems (and CLS), as well as current-account deposits at the end of the monetary-policy day (3.30 p.m.). Information on holdings of securities eligible as collateral for loans from Danmarks Nationalbank stems from the banking institutions' monthly balance-sheet statistics.

The compilation of the banking institutions' holdings of eligible securities takes into account that some of these securities have already been pledged to Danmarks Nationalbank as collateral for monetary-policy loans. Furthermore, 5 per cent of the securities' market value has been deducted as an estimate of the actual securities-specific haircuts used for calculation of the collateral value of the securities.

It is assumed that the banking institutions' holdings of securities remain unchanged during the month. Furthermore, the calculation does not take into account that a proportion of the banking institutions' holdings of securities can already be pledged as collateral for loans from other banking institutions, so that they cannot be used as collateral for loans from Danmarks Nationalbank.

The banking institutions in the analysis do not include the smallest banking institutions participating in the VP Settlement and/or the Sumclearing, branches and subsidiaries of foreign banks, banking institutions in Greenland and the Faroe Islands and a few specialist banks. The analysis comprises a total of 56 banking institutions. For banking institutions that are part of the same group as a mortgage-credit institute, the calculation of the banking institution's liquidity reserves includes the mortgage-credit institute's holdings of eligible assets and any current-account deposits.

For each day during the year it is assumed that the banking institution with the largest net outgoing payment is unable to meet its payment obligation and has to be excluded from the settlement. Knowledge of the banking institutions' bilateral net positions is required in order to calculate how this exclusion affects the net positions of the other banking institutions. As this information is not available, an effect on the participants' net positions has been estimated on the basis of the banking institutions' original net positions.

On certain days this method is deemed to overestimate the calculated consequences for the net outgoing payments of the small banking institutions. This applies particularly on days when a single banking institution has a very large payment obligation. For this reason data for 20 December 2005 has been disregarded since on this date one banking institution made an extraordinarily large net outgoing payment to the central government's account at Danmarks Nationalbank due to settlement of pension-yield tax.

The methodology of the calculations is described in more detail in Box 19. The analysis is based on all banking days in 2005[1] and covers the Danish banking institutions participating in the VP Settlement and/or the Sumclearing. For each day in the course of the year it is assumed that

[1] Data for 20 December 2005 is disregarded, however, cf. Box 19.

NUMBER OF DAYS IN 2005 WHEN DANISH BANKING INSTITUTIONS' NET OUTGOING PAYMENTS EXCEED THEIR LIQUIDITY RESERVES Table 12

	Number of banking institutions with net outgoing payment that exceed their liquidity reserves				
Number of days	1	2	3	4	Total days
No banking institutions excluded (actual event)	4	0	0	0	4
The banking institution with the largest payment obligation is excluded	12	2	2	1	17

Note: See Box 19 for a description of the analysis.
Source: Danmarks Nationalbank, own calculations.

the banking institution with the largest net outgoing payment is unable to meet its payment obligation and has to be excluded from the settlement. The other participants' net positions are recalculated on the basis of their estimated bilateral net positions vis-à-vis the excluded participant, and the net positions are then compared with the banking institutions' liquidity reserves.

Table 12 summarises the results of the analysis for all banking institutions. The Table shows the number of days in 2005 when one or more banking institutions had a larger net outgoing payment in the VP Settlement or the Sumclearing than the liquidity reserves. The Table compares the actual pattern in 2005 with the situation where on each day the banking institution with the largest net outgoing payment has been excluded from the settlement.

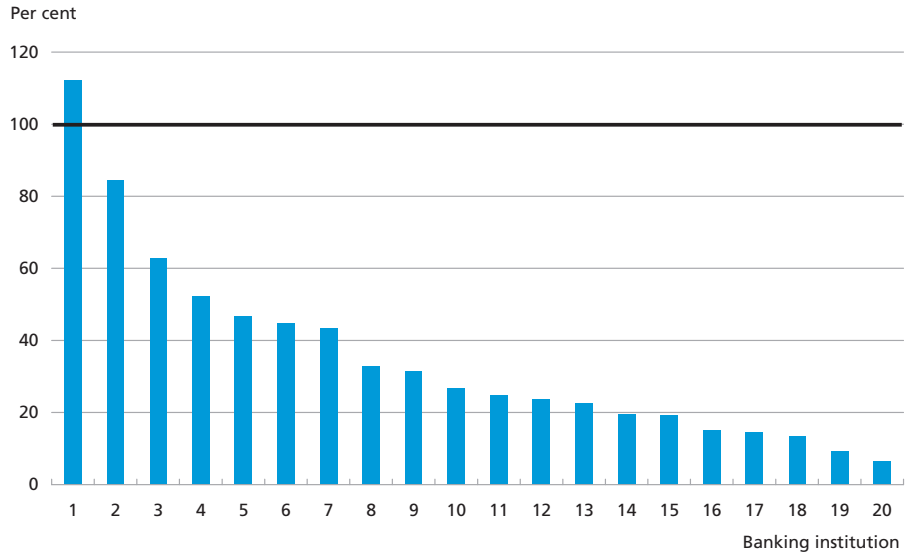
On four days in 2005, one banking institution's total net outgoing payment exceeded its liquidity reserves.[1] There were no days when this was the case for several banking institutions. If the banking institution with the largest payment obligation had to be excluded from the settlement on each day, there would be 17 days when the total net outgoing payment of one or more banking institutions exceeded their liquidity reserves. On a few days several banking institutions would be affected, but on most days only one.

In Table 12 especially the small banking institutions have a net outgoing payment that exceeds their liquidity reserves, which to some extent can be attributed to the methodology, cf. Box 19.

Chart 56 shows the 20 largest banking institutions' maximum net outgoing payments as a ratio of their liquidity reserves during 2005, where on each day the banking institution with the largest payment obligation

[1] Usually, a banking institution is still able to settle its payments even if it has a net outgoing payment that exceeds its liquidity reserve. This is due to the automatic collateralisation arrangement, which allows the participants to pledge securities not yet part of their liquidity reserves as collateral, cf. below.

THE LARGEST DANISH BANKING INSTITUTIONS' MAXIMUM NET OUTGOING PAYMENTS AS A RATIO OF THEIR LIQUIDITY RESERVES IN 2005 Chart 56



Note: See Box 19 for a description of the analysis. The day in 2005 on which an individual banking institution had the largest net outgoing payment as a ratio of its contingency liquidity typically varies among the banking institutions.
Source: Own calculations.

is excluded from the settlement. It appears that only one banking institution, on one day, has a net outgoing payment that exceeds its liquidity reserves. On all days in 2005, the liquidity reserves of most of the other banking institutions considerably exceed their total net outgoing payments in the VP Settlement and the Sumclearing.

As mentioned above, the analysis to some extent underestimates the banking institutions' contingency measures to counter liquidity risk in the VP Settlement and the Sumclearing. Thus, in the VP Settlement the banking institutions may, in addition to the calculated liquidity reserves, pledge acquired securities as collateral for intraday credit already in the settlement cycle in which the securities are received. As a result, the banking institutions' real contingency liquidity is considerably higher than the calculated liquidity reserves. Furthermore, the banking institutions will rarely lack liquidity in the VP Settlement even if no payments are received from a large banking institution.[1]

The analysis confirms that in overall terms the Danish banking institutions have ample contingency liquidity to counter the liquidity risk in VP Settlement and the Sumclearing. This applies especially to the largest banking institutions whose total net outgoing payments only rarely ex-

[1] See Danmarks Nationalbank, *Financial stability 2005*, Assessment of Settlement Risks in VP Securities Services, for an analysis of the liquidity risk in VP Settlement.

ceed their liquidity reserves, even when the banking institution with the largest payment obligation has to be excluded from the settlement. In addition, in the VP Settlement the banking institutions can pledge simultaneously acquired securities as collateral for intraday credit via the automatic collateralisation agreement, which in practice significantly increases their real contingency liquidity.

Glossary of Financial Terms

Additional capital. Subordinate loan capital in credit institutions, offered as part of the *base capital*, that meets certain requirements (no default sanctions for the creditor, an option to defer interest payments and to write down the principal), as well as revaluation reserves.

Adjustable-rate loan. See *variable interest rate*.

Amortised cost. A principle for valuation of lending by banking institutions. On determination of the value of the loan, the original cost price is calculated less redemptions and any *write-downs* and with the addition/deduction of the accrued transaction costs, fees and commission to be received during the term of the loan. See also *fair value*.

Base capital. Financial companies' capital required for compliance with the statutory *capital requirement*. The base capital comprises *core capital* and *additional capital*, and the latter may not exceed half of the base capital. The base capital is adjusted for e.g. capital investments in other financial companies.

Basel II. Description of the *Basel Committee*'s standards for new capital-adequacy rules, entering into force on 1 January 2007.

Basel Committee on Banking Supervision, whose secretariat is at *BIS*, was set up in 1975 with the purpose of promoting cooperation between national banking supervision authorities and strengthening the stability of the international financial system.

BIS. The Bank for International Settlements serves as banker to the central banks.

Callable bond. A bond which can be prematurely redeemed by the debtor on terms agreed in advance. Danish mortgage-credit bonds are callable bonds.

Capital adequacy. See *solvency ratio*.

Capital need. A credit institution must assess its capital need, i.e. capital adequacy in relation to its risks. See also *solvency requirement*.

Capital requirement. See *solvency requirement*.

Category 1, 2, 3 or 4 banking institution. The Danish Financial Supervisory Authority's categorisation of Danish banking institutions based on their volume of *working capital*. Banking institutions in category 1 have working capital of kr. 25 billion and above; category 2 from kr. 3 billion to kr. 25 billion; category 3 from kr. 250 million to kr. 3 billion; and category 4 less than kr. 250 million.

Category A, B or C. Danmarks Nationalbank's categorisation of Nordic financial groups and Danish banking institutions. Category A comprises 6 Nordic financial groups including Danske Bank and Nordea. Category B comprises 19 selected major Danish banking institutions, i.e. selected banking institutions in the Danish Financial Supervisory Authority's categories 1 and 2 that are not included in category A. Category C comprises 28 selected small Danish banking institutions and is part of the Danish Financial Supervisory Authority's category 3.

CEBS. The Committee of European Banking Supervisors. CEBS is a level-3 committee for the banking sector, comprising both central banks and supervisory authorities. See the *Lamfalussy procedure*.

CEIOPS. The Committee of European Insurance and Occupational Pension Supervisors. CEIOPS is a level-3 committee for the insurance sector, comprising supervisory authorities. See the *Lamfalussy procedure*.

CESR. The Committee of European Securities Regulators. CESR is a level-3 committee for the securities sector, comprising supervisory authorities. See the *Lamfalussy procedure*.

CIBOR. The Copenhagen Inter-Bank Offered Rate is a reference interest rate for liquidity offered on an uncollateralised basis in the *interbank market* to banking institutions with a high *credit standing*.

Clearing. Compilation of each participant's purchases and sales of securities, resulting in the net position of each participant. See also *settlement* and *VP*.

CLS. Continuous Linked Settlement is an international currency-settlement system.

Conglomerate (financial). A group comprising both an insurance company and a credit institution or investment company, and in which the financial activities account for a significant share of the balance sheet.

Core capital. In credit institutions, this comprises paid-up share, cooperative or guarantee capital, premium on *issue* and reserves, adjusted for e.g. own shares and deficit for the year. Furthermore, *hybrid core capital* may be included.

Cost ratio. A banking institution's costs, excluding losses and provisions, as a ratio of revenue

Credit derivative. A term used for a number of *financial derivatives* that can be used for trading in credit risk.

Credit risk. The risk of suffering a loss should the counterparty default on its payment obligations.

Credit spread. The difference between the yield on a lower rated bond and a higher rated bond.

Credit standing. Assessment of a debtor's willingness and ability to honour its commitments. See also rating.

Depositor Guarantee Fund. The Guarantee Fund for Depositors and Investors is a private, independent institution established by act of parliament. It grants compensation to depositors and investors in Danish banking institutions, mortgage-credit institutes and investment companies for losses in connection with suspension of payments or compulsory liquidation. Under certain conditions, branches of foreign credit institutions and investment companies may also be included in the Danish depositor guarantee scheme.

Derivative. See *Financial derivative.*

Distance to default. The risk measure "distance to default" illustrates the probability that the estimated market value of a company's assets falls below the value of its debt (i.e. *insolvency*). The distance is measured by the number of *standard deviations* for the estimated market value of the company's assets. See also *distance to insolvency*.

Distance to insolvency. The risk measure distance to insolvency shows the fluctuations in asset market value that can be accommodated within a banking institution's buffers of capital, write-downs and earnings. Distance to insolvency shows the probability that a banking institution keeps within the statutory solvency requirement, i.e. that a decrease in the assets' estimated market value does not cause the banking institution to fall below the statutory *solvency requirement*. The distance is measured by the number of *standard deviations* for the estimated market value of the assets. See also *distance to default* and *Value-at-Risk*.

Economic capital. The credit institution's assessment of the adequate capital base for the risk profile chosen. The calculation takes account of unexpected losses in relation to various risk types, e.g. *market risk*, *credit risk* and *operational risk*. See also *solvency requirement*.

Equity capital. The owners' share of the company's capital, including share capital, accumulated profits, etc.

ESCB. The European System of Central Banks consists of the European Central Bank (ECB) and the central banks of all EU member states.

Estimated failure rate is in this publication for companies estimated in a failure-rate model based on key accounting ratios, etc. The estimated failure rate indicates the probability that a company involuntarily suspends its activity within the next few years.

European passport. The option to operate across borders within the EU on the basis of approval in one member state.

Exchange-rate risk. The risk of losses due to exchange-rate fluctuations. See also *market risk*.

Fair value. An estimate of the proceeds from transfer of an asset to a buyer on market terms. The fair value of a liability is an estimate of the set-off value of the liability on market terms. See also *amortised cost*.

Financial derivative. An instrument whose value is derived from the price of an underlying asset such as a security, a product or a currency. *Options* and *swaps* are examples of financial derivatives.

Financial Sector Assessment Program (IMF-FSAP) is a joint initiative by the International Monetary Fund (IMF) and the World Bank. The initiative aims to conduct an in-depth assessment of a country's financial sector and appurtenant risks. Participation in IMF-FSAP is voluntary.

Forward rate. An implied short-term interest rate at a future point in time. It is derived on the basis of bonds with different, long maturities. The forward rate reflects expectations of the future rate of interest, including, *inter alia*, a risk premium to take account of the uncertainty of the future interest rate.

FSAP. The EU's Financial Services Action Plan. FSAP was initiated in 2000 to put into effect the EU's single market for financial services.

Gearing (financial). Debt (loan capital) as a ratio of equity.

Going concern. A description of a company that is expected to continue its activities. Used e.g. as a basis for valuation of assets and liabilities.

Guaranteed interest rate, also called technical interest rate. The lowest return on the savings guaranteed to the policyholders in a pension company. The guaranteed interest rate is used to calculate the relationship between paid-in premiums and the *guaranteed benefits* to policyholders in a pension company under the insurance contract. The interest rate is based on a number of assumptions regarding risk of disability, mortality, and interest rates and costs.

Hedge association. The Danish equivalent of a hedge fund. Unlike e.g. investment associations, hedge associations will not be subject to limitations to their *gearing* and *short-selling* options.

Hybrid core capital. Capital that may, under certain conditions, be included in the banking institutions' *core capital*. Hybrid core capital is loan capital subject to stricter requirements, including that the maturity must not be fixed, and that interest on debt lapses if the banking institution has no free reserves. Hybrid core capital must not exceed 15 per cent of the *core capital*.

IAS. se *IFRS*.

IFRS. The international accounting standards prepared by the independent International Accounting Standards Board (IASB) to make accounts comparable across countries.

Implied volatility. The theoretically derived volatility in the Black and Scholes option-price model for an underlying financial asset, calculated on the basis of the observed option prices.

Insolvency. A company's situation if the value of its equity is negative.

Insurance provisions. The total provisions made by a pension company for settlement of commitments relating to the insurance policies issued by the company. Insurance provisions are divided into various categories, of which the most important in pension companies is life-insurance provisions.

Inter-bank market. In Denmark, the market for krone-denominated loan agreements and interest-rate derivatives with a maturity of up to a year transacted between banking institutions and mortgage-credit institutes. Often referred to as the money market.

Interest margin. The difference between the rate of interest for lending and deposits.

Interest-rate guarantee. See *guaranteed interest rate*.

Interest-rate risk. The risk that interest-rate fluctuations generate losses. The Danish Financial Supervisory Authority's key ratio "interest-rate risk" is an expression of the part of the *core capital* after deductions that is lost on a parallel shift of the *yield curve* by 1 percentage point.

Internal interest rate. See *yield to maturity*.

IOSCO. The International Organization of Securities COmmissions, established in 1983, is an international forum for securities supervisors.

Issue. The issue of e.g. securities on a stock exchange.

KFX. See *OMXC20.*

Kronos is Danmarks Nationalbank's real-time gross settlement (RTGS) system for Danish kroner and euro and is thus a core element of Danish payment systems. The system is used

primarily for time-critical large-value payments between account holders at Danmarks Nationalbank, as customer or interbank payments.

Lamfalussy procedure. A procedure determining the framework conditions for a new, faster legislative process within the EU, respecting the competences of the various EU institutions. The Lamfalussy procedure consists of four levels: at level 1, the European Parliament and the Council jointly adopt the framework regulation. More technical provisions are laid down in legal acts issued by the European Commission following consultation of a special committee of member-state representatives, i.e. level 2. Level 3 comprises close cooperation between the member states' supervisory authorities, etc., while level 4 is enforcement of the provisions by the European Commission.

Liable capital. A term previously used for *base capital in credit institutions*.

Liquidity. A measure of negotiability. See also *liquidity premium*.

Liquidity premium. The premium which the buyer is willing to pay for a more *liquid* asset.

Liquidity risk. The risk that the required financing is not available at a given price (interest rate) as the commitments fall due (e.g. if refinancing of securities or a loan is required).

Market risk. The risk that fluctuations in market prices (interest or exchange rates or equity prices) will result in losses. See also *Value-at-Risk*.

OMX AB. A Swedish company that owns, *inter alia*, the stock exchanges in Stockholm, Helsinki, Tallinn, Riga and Vilnius.

OMXC20. Equity index consisting of the 20 most traded and liquid Danish shares listed on the Copenhagen Stock Exchange. The composition of the index is revised twice a year. The index was formerly known as *KFX*.

Operational risk. The risk of losses due to IT system failure, legal risk, human errors, fraud, etc.

Option. A *financial derivative* granting the owner (buyer) the right, but not the obligation, to buy or sell an underlying asset (e.g. a product, a security, a currency or another derivative) at an agreed price (the strike price) at/before an agreed future point in time. The seller of an option is obliged to fulfil the owner's right. An option can also be an inherent element of securities in the form of the right of premature redemption.

Percentile. The numerical value representing the proportion of the observations below that value. For example, the 10th percentile for the *estimated failure rate* illustrates that the estimated failure rate for 10 per cent of the companies (observations) is below this value.

Portfolio. A holding of assets.

Prime broker. An investment bank that services hedge funds in connection with their activities in the financial markets. Prime brokers offer the following services, among others: trading transactions, *clearing* and *settlement*, securities lending, help to set up hedge funds. See *hedge associations*.

Profit ratio. Calculated as operating profit over operating income.

Profitability. See *return on equity*.

Provisions for loans. See *write-downs*.

Rating. An assessment of *credit standing* given by rating agencies such as Fitch, Moody's and Standard & Poor's. Rating is used e.g. in connection with the issue of securities and takes the probability of default and the size of the loss into account.

Real-time gross settlement (RTGS) system. Payment system characterised by individual settlement of payments in real time. RTGS systems are typically used for settlement of large-value, time-critical payments. Danmarks Nationalbank's payment system, *Kronos*, is an RTGS system.

Red light. See *traffic lights for pension companies, red and yellow lights*.

Return on assets. Describes a non-financial company's ability to achieve a return on invested capital. It is calculated as the company's profit before interest (primary operating result) as a ratio of its assets.

Return on equity. A measure of a company's ability to achieve a return on the owners' investment. Calculated as the company's profit as a ratio of its equity capital.

Risk-weighted items. The risk-weighted assets and off-balance-sheet items, i.e. items subject to *credit risk* and *market risk*. When *Basel II* is introduced, the banking instiutions will also have to take the operational risk into account. See also *solvency requirement*.

S&P 500. US abbreviation of Standard & Poor's 500 equity index. It consists of the 500 most traded US equities and is e.g. used as an underlying index for equity futures and equity *options*.

Settlement. Completion of trade by final settlement of agreed commitments. See also *clearing* and *VP*.

Short-selling. Sale of securities or currency not yet possessed in the expectation that the position can subsequently be hedged by purchasing at a lower price. See also *hedge association*.

Solvency. Indicator for a company's ability to sustain losses. More specifically the part of its assets that can be lost before the losses affect its loan capital. Calculated as the ratio of equity capital to assets.

Solvency ratio. A key indicator for credit institutions, defined as *base capital* as a ratio of *risk-weighted items*. See also *solvency requirement*.

Solvency requirement. The statutory solvency requirement imposed on financial companies. In a credit institution, the *base capital* must constitute at least 8 per cent of its *risk-weighted items*. In a pension company, the solvency requirement is calculated on the basis of life-insurance provisions with a number of minor additions. See also *solvency ratio*.

Standard deviation. The average distance from the observations to the average in the data material.

Subordinate loan capital. Debt that is subordinate to other liabilities in the event of the borrower's compulsory liquidation. Subordinate loan capital meeting certain requirements can be included in the credit institutions' *additional capital*. See also *base capital*.

Swap. A *financial derivative* that is an agreement between two parties to exchange payments over a fixed period. Currency swaps are used to restructure payment flows between various currencies. Interest-rate swaps are typically used to restructure payment flows between fixed and variable interest rates. Credit default swaps are used to exchange credit risk between two borrowers. The overall value of a swap is usually zero when the agreement is made, but may subsequently become positive or negative, depending on market developments in interest and exchange rates.

Swaption. An option on a *swap*. The buyer of a swaption has the right, but not the obligation, to conclude a swap on agreed conditions.

Systemic (financial) risk. The risk that an event may trigger financial losses and/or lack of confidence in a significant part of the financial system and thus potentially threaten financial stability. Events leading to systemic risk may occur suddenly and unexpectedly, or the risk builds over time in case of insufficient regulation, etc.

Technical interest rate. See *guaranteed interest rate*.

Term structure of interest rates. The relationship between securities' yields and maturities. A rising term structure, i.e. where yields on short-term securities are lower than yields on long-term securities, is considered normal. A falling term structure is described as inverse.

Traffic lights for pension companies, red and yellow lights. The Danish Financial Supervisory Authority's risk scenarios for pension companies aimed to illustrate whether the company's chosen relationship between investment risk, capital base and commitments is appropriate. Each risk scenario is used to test the pension companies' ability to sustain losses due to changes in interest rates, falling equity and real estate prices, etc.

Value-at-Risk (VaR). A model for measuring *market risk* based on *volatility* and correlations in historical market developments. For a given *portfolio* and within a fixed time horizon, the model calculates the maximum loss that may arise with a given probability (often 95 per cent).

VaR. See *Value-at-Risk*.

Variable interest rate. An interest rate that varies during the maturity of the loan, e.g. because it is agreed that it tracks another interest rate.

Volatility. A parameter indicating the size of fluctuations in an asset's price, e.g. the fluctuations in a share price. See also *implied volatility*.

VP. An abbreviation of Værdipapircentralen A/S (VP Securities Services). VP and the Copenhagen Stock Exchange are the two key market institutions in the Danish securities market. VP's most important tasks are electronic issue of securities, registration of ownership and rights concerning electronic securities, and *clearing* and *settlement* of securities transactions. All stock-exchange-listed securities and a number of unlisted securities are held electronically at VP.

Working capital. Comprises deposits, issued bonds, *subordinate loan capital* and *equity capital*. See also *category 1, 2, 3 or 4 banking institution*.

Write-down on loans. Under the new accounting rules, banking institutions' provisions are in future to be referred to as write-downs. For loans on which a loss is expected (i.e. there is an objective indication of a deterioration in value), the banking institutions must write down the loan to the present value of the expected future payments, including realisation of collateral.

Yellow light. See *traffic lights for pension companies, red and yellow lights.*

Yield curve. See *term structure of interest rates*.

Yield to maturity or internal interest rate. The fixed discount rate at which the present value of a cash flow equals the investment.