Danmarks Nationalbank

Financial stability

2007

DANMARKS NATIONAL BANK 2007

FINANCIAL STABILITY 2007

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).

Financial stability 2007 is available on Danmarks Nationalbank's website:
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This publication is based on information available up to 27 April 2007.

Explanation of symbols:
- \- Magnitude nil
- 0 Less than one half of unit employed
- • Category not applicable
- na. Numbers not available

Details may not add due to rounding.

Datagraf Auning A/S
ISSN 1602-057X
ISSN (Online) 1602-0588

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entail lower buffers in the banking institutions. The actual effects will depend on how the board and management of the individual bank choose to act. The board and management of a banking institution are responsible for ensuring that the banking institution has sufficient capital to meet the risks it faces.

Assessment of Financial Stability

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.

Danmarks Nationalbank defines financial stability as a condition whereby 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.

The risk of financial instability can be approached on the basis of two dimensions. One dimension is risks stemming from the development in society at large, e.g. the general economic development, unemployment, the finances of the banking institutions' customers, trends in the financial markets, etc. The other dimension is the vulnerability of the financial sector, especially the banking institutions, to inappropriate changes in the risk factors. Are earnings and buffers sufficiently resilient to withstand unexpected events, or are there other trends that may entail a risk, e.g. the development in costs, liquidity or other factors?

Overall, Danmarks Nationalbank finds that there are currently no major threats to financial stability in Denmark.

The international trends are described in the IMF's "Global Financial Stability Report", April 2007.[1]

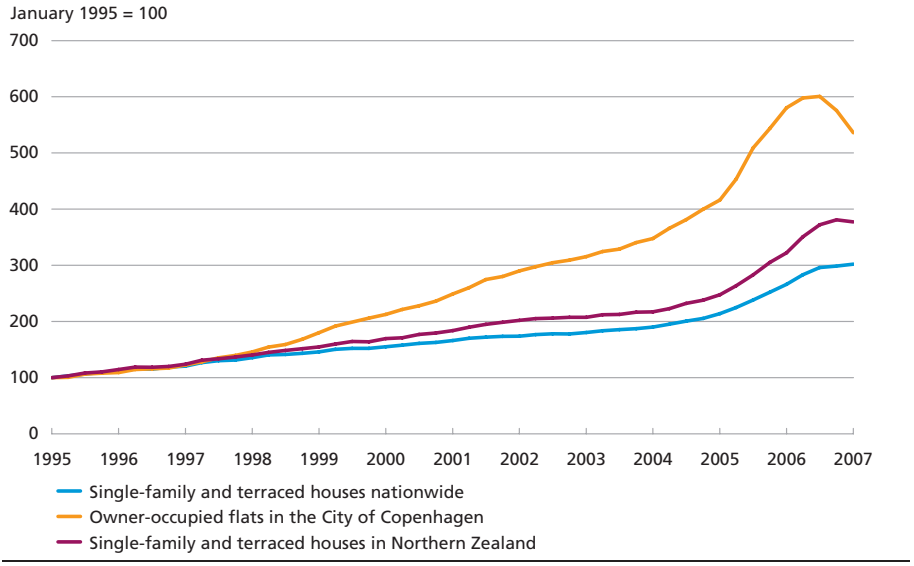
Risk factors

The Danish economy is booming for the fourth consecutive year. Unemployment is the lowest for more than 30 years, inflation is low, interest rates have edged upwards, but are still low, and there is a sound government budget surplus and current-account surplus. So there are no immediate risks to financial stability from the general economic development.

As a result of the sustained upswing, the number of compulsory liquidations of Danish companies is low, while the prospects for the corporate sector are good. The growth in domestic demand is expected to remain high, albeit slightly lower than in the last few years, and forecasts still point to robust growth in the largest Danish export markets.

[1] See www.imf.org/external/pubs/ft/gfsr/2007/01/index.htm.

PRICE PER SQUARE METRE OF HOUSING IN DENMARK, 1995-2007 Chart 1



Note: Northern Zealand comprises the municipalities of: Allerød, Egedal, Fredensborg, Frederikssund, Frederiksværk-Hundested, Furesø, Gribskov, Helsingør, Hillerød, Hørsholm and Rudersdal.
Source: The Association of Danish Mortgage Banks.

Calculations based on Danmarks Nationalbank's failure-rate model, KIM, show generally unchanged failure rates for the corporate sector in 2006 compared to previous years. The most vulnerable companies may, however, experience increasing difficulties 1-2 years ahead compared with prospects in *Financial stability 2006*. One reason is that in an upswing, as in the current situation, many new companies are established, and new companies are more likely to fail than established companies.

The finances of the households are still sound. Disposable real incomes have increased considerably because more people are in employment and real wages have risen. The easing of direct and indirect taxation has also contributed. Wealth has increased quickly in step with the recent surge in housing prices. The households' strong financial position is emphasised by a very low level of enforced sales.

The housing market dampened during 2006 and the beginning of 2007, cf. Chart 1. However, there is no reason to expect a general housing price dive for as long as the economy remains strong. However, some downward price adjustment cannot be ruled out in the areas that previously showed the highest price increases.

The vulnerability of the financial sector

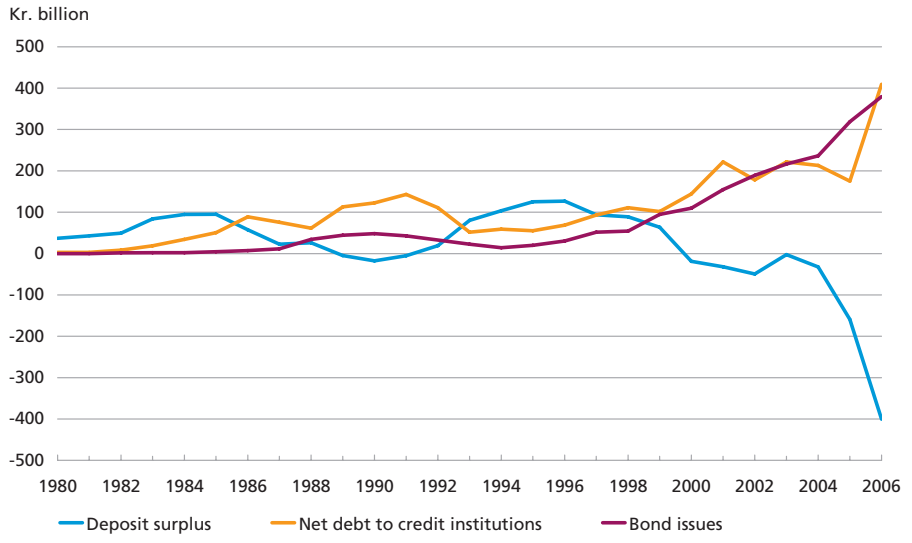
The banking institutions posted record-high earnings again in 2006. The high earnings are the banking institutions' first buffer against increased

losses and can be attributed to such factors as the very high growth in lending, which requires more capital. Overall, the excess capital adequacy of the Danish banking institutions as a ratio of loans and guarantees was slightly higher at end-2006 than in 2005 due to the issue of share capital, supplementary capital and hybrid core capital. Stress tests show that the resilience of banking institutions to higher losses remains sound at the end of 2006 compared to 2005.

One consequence of the high lending growth in recent years has been that the banking institutions have built up a large deposit deficit, cf. Chart 2, which is financed by e.g. issuing bonds and borrowing from other credit institutions. Financing via the money and capital markets is generally more exposed than deposits to changes in the banking institutions' own credit standing. Moreover, changes in the general appetite for risk and risk premiums can rapidly increase the cost of market financing, and the individual banking institution's market may potentially "dry out".

To some extent the deposit deficit reflects the banking institutions' increasing share of the market for housing loans. In future, it will be possible for banking institutions to use these housing loans as collateral for the issuance of covered bonds (SDO). This will provide a new, stable source of funding for the banking institutions.

DEPOSIT SURPLUS, NET DEBT TO OTHER CREDIT INSTITUTIONS AND BOND ISSUES, DANISH BANKING INSTITUTIONS, 1980-2006 Chart 2



Note: Danish banking institutions comprise banking institutions in the Danish Financial Supervisory Authority's groups 1-3.
Source: The Danish Financial Supervisory Authority.

Similarly, the liquidity reserves of the banking institutions have diminished over a number of years. This may affect the banking institutions' ability to react to unexpected developments, and tight liquidity may reduce their freedom of action.

Financial stability analysis

The Financial Sector

The financial sector in Denmark is still robust. Stress tests show that the resilience of banking institutions to higher losses remains sound due to record-high earnings and the increasing capital base.

Particularly among the small and medium-sized banking institutions the growth in lending continued to be high in 2006. The rapidly increasing deposit deficit, which is a result of the high lending growth, makes it necessary to focus on capital and liquidity management. The opportunity to use housing loans as collateral for issuance of covered bonds (SDO) may contribute a new, stable source of financing for the banking institutions.

The resilience of the mortgage-credit institutes to increasing losses has declined a little, but is still very high. Life insurance companies and pension funds have generally strengthened their reserves, even though investment yields were lower in 2006 than in 2005.

THE SIGNIFICANCE OF FINANCIAL INSTITUTIONS TO FINANCIAL STABILITY

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

In Denmark there are two large, a number of medium-sized, and many small banking institutions. The two large banking institutions differ from the rest of the sector in terms of both size and business areas. Consequently, these two are compared with other large Nordic banking groups. The analyses in this chapter are based on 55 selected banking groups and institutions in three categories. Category A comprises the six largest Nordic banking groups, category B the 12 medium-sized Danish banking institutions, and category C comprises 37 small Danish banking institutions.[1]

The mortgage-credit institutes provide credit to finance real estate, which makes them the largest bond issuers in Denmark. The development in the mortgage-credit institutes can affect the banking institutions' earnings through ownership and collaboration agreements, or via competition in the market for mortgage financing.

[1] For further details, see categories A, B and C in the glossary. Note that the categories have been changed in relation to *Financial stability 2006*.

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

NORDIC GROUPS AND DANISH BANKING INSTITUTIONS

Record-high earnings

The Nordic groups and the Danish banking institutions posted record-high results in 2006.

The Nordic groups in category A achieved a pre-tax profit of kr. 98.5 billion, cf. Table 1, equivalent to an increase of 14 per cent on 2005, and

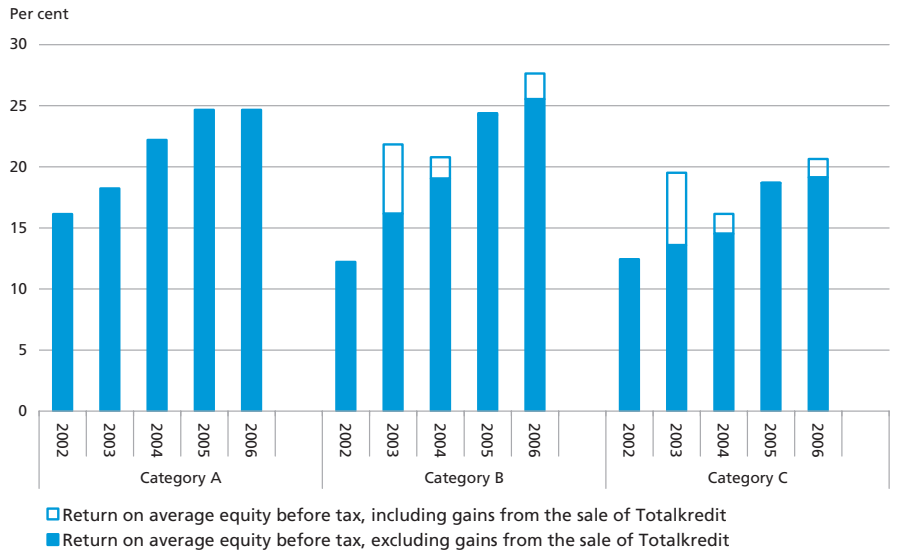
PROFITS BEFORE TAX, 2005 AND 2006 — Table 1

	Nordic groups, category A		Danish banking institutions, category B		Danish banking institutions, category C	
Kr. billion	2006	2005	2006	2005	2006	2005
Income						
Net interest income	99.3	98.6	10.0	9.1	4.8	4.4
Net fee income	52.6	48.4	4.8	4.2	2.1	1.8
Value adjustments	22.7	14.1	4.0	2.7	1.3	1.0
Income from associated and subsidiary undertakings	9.6	8.9	1.0	0.8	0.2	0.2
Other income	8.1	8.0	0.5	0.5	0.2	0.1
Costs						
Operating expenses, etc.	96.1	92.9	10.9	9.6	4.6	4.0
Write-downs on loans	-2.3	-1.2	-0.7	0.3	-0.3	0.2
Profit before tax	98.5	86.3	10.1	7.6	4.4	3.4
Of which gains (sale of Totalkredit)	-	-	0.8	0.0	0.3	0.0
Profit after tax	77.7	64.9	7.7	5.7	3.4	2.5
Equity, year-end	429.3	365.8	39.2	33.8	22.8	19.3
ROE before tax, per cent	24.7	24.7	27.6	24.4	20.6	18.7
ROE before tax excluding gains (Totalkredit), per cent	24.7	24.7	25.5	24.2	19.1	18.7
Market share of Danish lending, per cent	49	51	28	27	10	10

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, except for credit institutions. For the Nordic groups the market share is adjusted for mortgage-credit lending. The total market share of categories A, B and C amounted to 87.5 per cent in 2006. 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. Insurance activities are included under income from associated and subsidiary undertakings.

Source: Financial statements and Danmarks Nationalbank.

RETURN ON EQUITY (ROE) BEFORE TAX, 2002-06 Chart 3

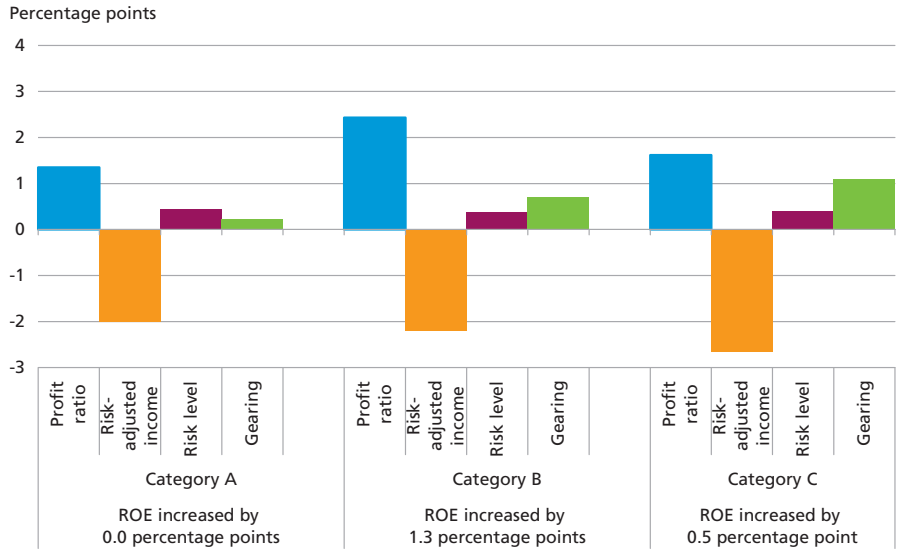


Note: ROE is calculated on the basis of an average of equity at the beginning and end of the year. The figures for 2005, are based on equity at the beginning of the year from new opening balances.
Source: Financial statements.

primarily due to increased net fee income from asset management and securities activities, value adjustments, and reversal of write-downs on loans. Interest margins on loans continued to decline, but the impact on net interest income was set off by the rising volume of lending and increasing interest margins on deposits. Costs rose by 3 per cent and the cost ratio improved from 52.2 per cent to 50.0 per cent.

For the medium-sized banking institutions in category B and the small banking institutions in category C, the pre-tax profit in 2006 improved by 33 per cent and 29 per cent, respectively. Net interest income increased by almost 10 per cent as a result of the sustained high lending growth. Net fee income rose by, respectively, 13 per cent and 15 per cent in categories B and C as a consequence of increased activity within asset management and securities trading. In addition, there was rising commission income from the banking institutions' issuance of guarantees in connection with the intermediation of mortgage-credit loans. Positive value adjustments relate primarily to capital gains on equities and gains from the sale of the remaining shares in Totalkredit. The banking institutions in categories B and C have also reported write-downs on loans as net income. This item must still be assumed to be influenced by adjustments to comply with the new accounting rules that entered into force on 1 January 2005.

CONTRIBUTIONS TO THE CHANGE IN RETURN ON EQUITY BEFORE TAX BROKEN DOWN BY UNDERLYING KEY RATIOS, 2005-06 Chart 4



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. The figures for 2005 are based on data from new opening balance sheets where possible. ROE is the return on equity before tax. Profit ratio is (profit before tax)/income. Risk-adjusted income is income/(risk-weighted items). Risk level is (risk-weighted items)/(total assets). Gearing is (total assets)/equity. Adjusted for the gain on the sale of Totalkredit.

Source: Financial statements.

The small and medium-sized banking institutions show a tendency for staff increases. This contributed to pushing up costs by more than 14 per cent, which will amplify the need to reduce costs again in periods of lower activity.

From 2005 to 2006 the return on equity before tax increased for categories B and C. As Chart 3 shows, this increase is, however, primarily attributable to the banking institutions' gains from the sale of the remaining shares in Totalkredit. Three banking institutions achieved a return on equity excluding Totalkredit gains of less than 10 per cent, while the returns of six banking institutions exceeded 30 per cent.

The Nordic groups all achieved a return on equity before tax of between 22 per cent and 27 per cent. No banking institutions or groups showed negative earnings or returns on equity in 2006.

The development in the return on equity before tax and excluding gains from the sale of shares in Totalkredit from 2005 to 2006 is attributable to the development in four underlying key ratios, cf. Chart 4.

The blue column illustrates the development in the *profit ratio*, i.e. operating profit before tax over operating income. This key ratio has improved in all three categories. Excluding net reversals of write-downs on loans, only the profit ratios of the Nordic groups have improved. For

the banking institutions in categories B and C, costs have risen relatively more than income.

All three categories have seen lower *risk-adjusted income*, calculated as income as a ratio of risk-weighted items[1]. Neither interest income nor fee income has increased at the same rate as the risk-weighted items, and particularly the modest development in interest income has a negative impact on the return on equity.

In this chapter, *gearing* is calculated as assets as a ratio of equity capital. Higher gearing can have a positive impact on the return on equity, but viewed in isolation may be negative in terms of financial stability. The greatest effect of increased gearing was seen for the banking institutions in category C, which was also the category with the highest growth in lending in 2006.

Sustained high growth in lending

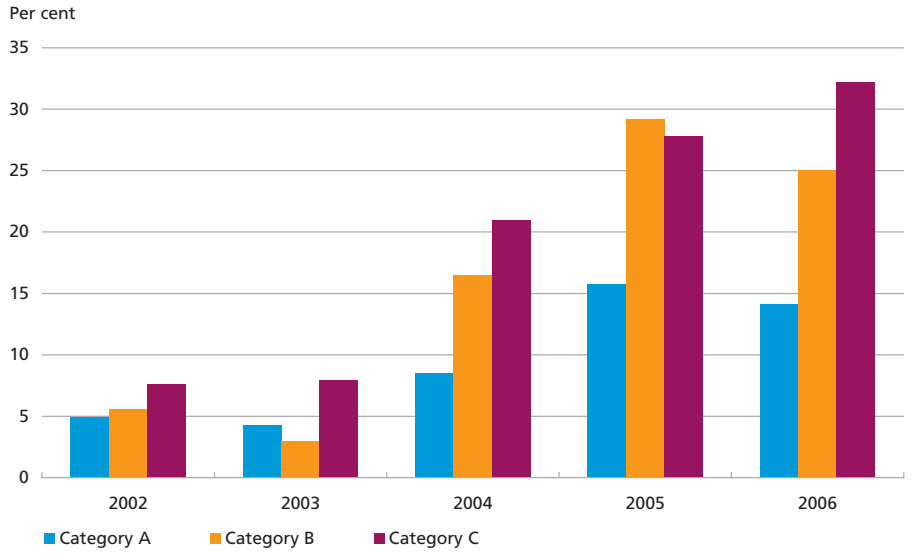
Lending growth remained very high in 2006, cf. Chart 5, especially in the category B and C banking institutions, which averaged 25 and 32 per cent, respectively. In category C, more than every fourth banking institution achieved lending growth in excess of 40 per cent. For comparison, lending growth in the Nordic groups in category A was 14 per cent on a portfolio far more diversified in terms of e.g. geographical areas.

In 2004 and 2005, when lending growth escalated, substantial increases were primarily seen in lending to households. The high growth coincided with the banking institutions' introduction of mortgage loans against real property as collateral. In 2006, the rate of growth in corporate lending exceeded the growth rate for total lending to households.

In their financial statements, several banking institutions mention how the high growth in lending to households comprised, inter alia, investment credits, whereby the customer typically has a sum of money that is used as a margin. The banking institution lends the customer an amount that is x times the margin. This money is invested in securities, which are pledged as collateral for the credit together with the margin held by the banking institution. The banking institution thus only incurs a risk if the customer's loss on the investment exceeds the margin. The customer speculates on the return on the investment exceeding the interest payable on the loan, but in order to achieve a positive expected return on the entire exposure, the investment must be placed in more

[1] In the financial statements for 2006, risk-weighted items are regulated by the capital-adequacy rules applying hitherto, i.e. Basel I.

GROWTH IN LENDING, CATEGORIES A, B AND C, 2002-06 Chart 5



Note: The growth ratios of the Nordic groups are adjusted for exchange-rate fluctuations, as well as 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 Northern Ireland and Ireland in 2005. Weighted averages are used.
Source: Financial statements.

risky assets. Investment credits do not constitute a direct threat to the banking institutions, provided that the investment is monitored closely and divested in time should the market value of the securities fall. However, derived effects may have an indirect impact on the banking institutions. If customers suffer massive losses on the investments, and the activities are discontinued, the banking institutions will see a rapid reduction of exposures, resulting in a diminishing business volume and lower earnings. Moreover, the losses may have a negative impact on the customers' finances and ability to meet payments.

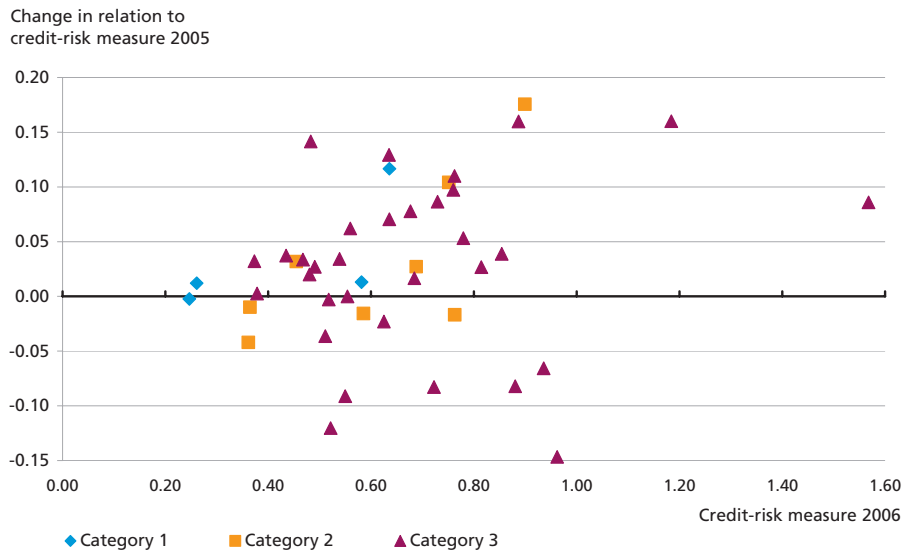
The credit risk is increasing marginally

Danmarks Nationalbank uses its failure-rate model, cf. the chapter on this model (KIM), to calculate a credit-risk measure[1] that expresses the individual banking institution's expected loss ratio on its lending portfolio. As Chart 6 shows, the credit risk of most Danish banking institutions rose slightly in 2006 compared with 2005, since most dots are above the horizontal line.

The concentration of exposures also affects the credit risk. For example, a lending portfolio can be concentrated on one single sector or geographical area that is dependent on a specific source of income. If

[1] For further specification of the credit-risk measure, see the glossary.

CREDIT RISK 2006 AND COMPARISON WITH CREDIT RISK 2005, BANKING INSTITUTIONS IN THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S CATEGORIES 1-3 Chart 6



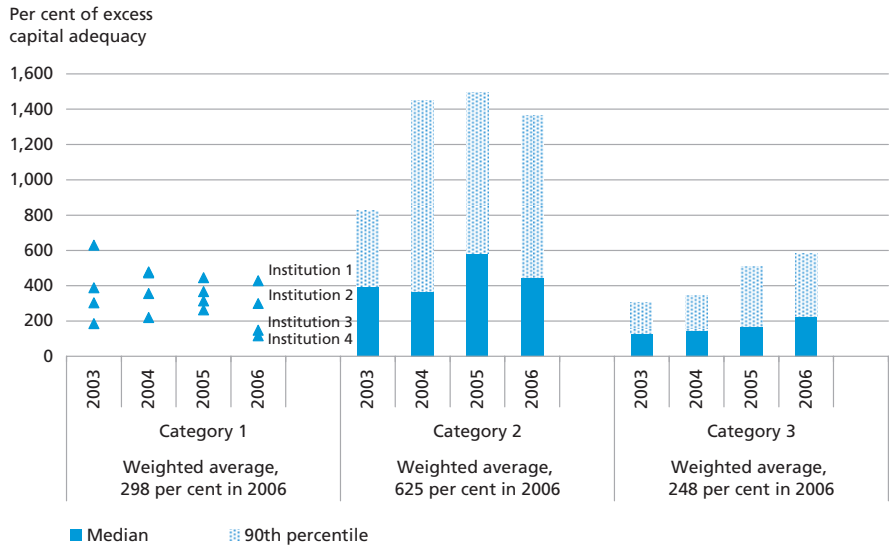
Note: The Chart comprises the 44 banking institutions for which credit-risk measures have been calculated. Only banking institutions to which at least 30 companies can be linked are included. The categories of the Danish Financial Supervisory Authority are then applied.
Source: Danish Financial Supervisory Authority, financial statements and own calculations.

the concentration is high, there is an increased risk of substantial losses if precisely this source of income dries up. In this connection it is important that the correlation between the individual concentrations is taken into account, i.e. whether different concentrations of lending are dependent on the same economic conditions, or are mutually dependent, so that losses in one segment will coincide with losses in another segment. The smaller the correlation between risk factors, the lower the risk of substantial losses.

Pursuant to the Danish Financial Business Act, large exposures are defined as exposures that each make up 10-25 per cent of the banking institution's capital base. The sum of these exposures may not exceed an amount equivalent to 800 per cent of the capital base. The calculation of the size of an exposure deviates from the accounting definition in that exposures e.g. include unused credits and loan commitments and are calculated before deduction of write-downs on loans and provisions for guarantees. Groups of interdependent clients are regarded jointly as one exposure.[1]

[1] The definition of an exposure can be found in the Executive Order on Large Exposures.

LARGE EXPOSURES AS A RATIO OF EXCESS CAPITAL ADEQUACY, BANKING INSTITUTIONS IN THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S CATEGORIES 1-3, 2003-06 Chart 7



Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio "total amount of large exposures". This key ratio is not available for the Nordic groups. The Chart comprises the 51 banking institutions included in Danmarks Nationalbank's categories B and C, as well as Danske Bank A/S and Nordea Bank Danmark A/S.
Source: Financial statements.

To gain an impression of the size of large exposures in relation to the banking institutions' reserves, in Chart 7 the key ratio is stated as a percentage of the excess capital adequacy, i.e. the part of the capital that exceeds 8 per cent.

The ratio of large exposures varies considerably. Among the category 1 banking institutions, the total amount of large exposures as a ratio of the excess capital adequacy has been declining in recent years.

Category 2 stands out with a significantly higher level and far greater spread. Among the category 2 banking institutions, the median for large exposures as a ratio of the excess capital adequacy is almost 450 per cent. Half of the banking institutions in category 2 have reduced their total large exposures as a ratio of the excess capital adequacy, some of them considerably. For two banking institutions, the total large exposures exceed 1,000 per cent of the excess capital adequacy. Among the category 3 banking institutions, the ratio of large exposures to excess capital adequacy has been rising over the last few years, but from a lower level than in categories 1 and 2.

The key ratio does not say anything about the correlation between the individual exposures, but for banking institutions with high concen-

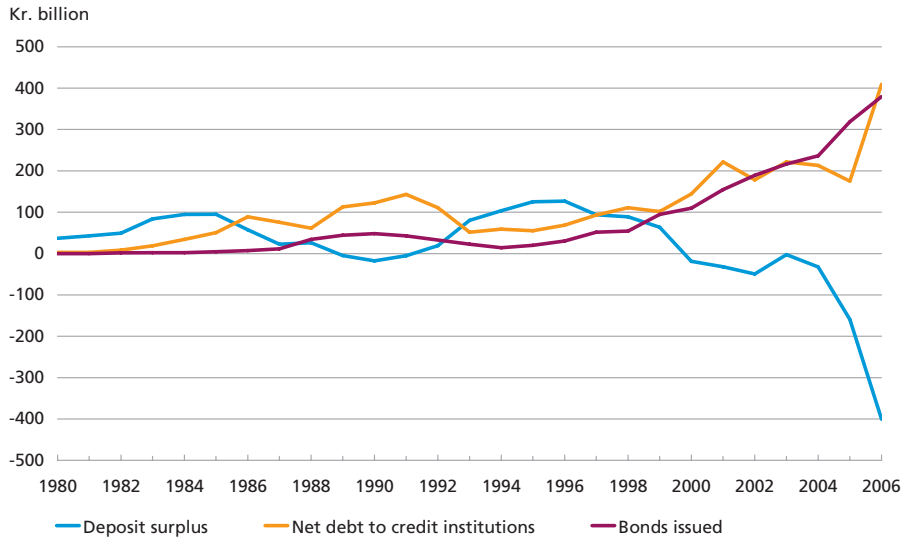
trations this requires special focus. If most of the large exposures of a banking institution can be influenced by the same economic conditions, e.g. the development in real estate prices, a sudden unexpected dive in real estate prices can have major consequences. Likewise, factors such as geographical location may be important to the banking institutions' assessment of risk.

Increasing deposit deficit

In recent years there has been a structural shift whereby the sector's traditionally large deposit surplus has been replaced by a deposit deficit, cf. Chart 8. The reason is that the growth in deposits has not matched the high growth in lending.

The banking institutions' lending is primarily funded by deposits, which are, on average, an inexpensive and stable source of funding. If deposits are not sufficient to cover lending activities, the banking institutions procure liquidity in the money and capital markets, e.g. via short-term money-market loans and issuance of bonds. This has been the case as the deposit deficit has increased, and in recent years the supply of capital has been ample and inexpensive. However, the large and small banking institutions do not have equal access to the money and capital markets in that the large banking institutions have easier access to the

DEPOSIT SURPLUS, NET DEBT TO OTHER CREDIT INSTITUTIONS AND BONDS ISSUED, DANISH BANKING INSTITUTIONS, 1980-2006 Chart 8



Note: Danish banking institutions comprise institutions in the Danish Financial Supervisory Authority's categories 1-3.
Source: Danish Financial Supervisory Authority.

capital markets and can make large issues at lower prices. The small banking institutions are more dependent on access to funding via the money market, but to some extent also issue through larger credit institutions.

Funding through the money and capital markets is generally more sensitive than deposits to changes in the banking institutions' own credit standing. Moreover, changes in the general appetite for risk and risk premiums can rapidly increase the cost of market funding, and the individual banking institution's market funding may potentially "dry out".

To some extent the deposit deficit reflects the banking institutions' increasing lending against real property as collateral. In the future it will be possible for banking institutions to use these housing loans as collateral for the issuance of covered bonds (SDO). This will provide a new, stable source of funding.

Reduced liquidity reserve

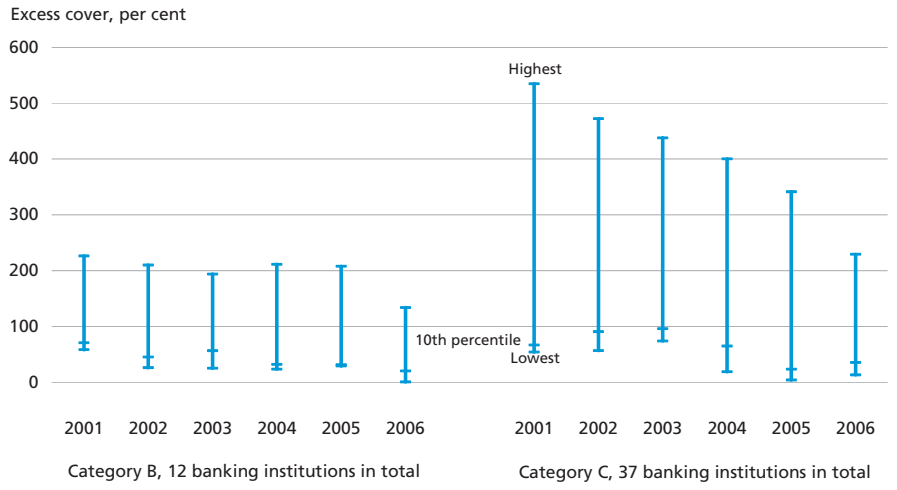
The banking institutions' liquidity reserve can be measured using the Danish Financial Supervisory Authority's liquidity indicators. Among other things, liquid assets must constitute at least 10 per cent of the total debt and guarantee commitments, less the part of the subordinated capital that can be included in the capital base.

Historically, this key ratio has been high for Danish banking institutions, but in recent years the liquidity reserve has been reduced considerably in step with the high lending growth. A number of banking institutions had only very modest liquidity reserves at the end of 2006, cf. Chart 9. Comparison with the situation at end-2001 shows that the number of banking institutions in category B with a liquidity reserve of less than 100 per cent has increased from 5 to 10 of the 12 banking institutions.

Likewise, the number in category C has increased from 12 to 25 of the 37 banking institutions. The average liquidity reserve has almost halved since 2001, to 57 per cent for category B and 87 per cent for category C at end-2006.

The lowest liquidity reserve in one category B banking institution at end-2006 was a mere 0.6 per cent, which is only just above the statutory minimum. The banking institution in question has subsequently obtained liquidity by raising loans and issuing bonds. Of the category C banking institutions, two have liquidity reserves of less than 20 per cent. The low liquidity reserves are remarkable and affect the banking institutions' ability to react to unexpected developments. Tight liquidity may reduce their freedom of action.

HIGHEST AND LOWEST LIQUIDITY RESERVES AND 10TH PERCENTILE FOR EXCESS COVER IN BANKING INSTITUTIONS IN CATEGORIES B AND C, 2001-06 Chart 9



Note: The Chart is based on the Danish Financial Supervisory Authority's key ratio "Cover relative to statutory liquidity requirement", which shows excess liquidity after compliance with the 10-per-cent requirement, cf. section 152 of the Financial Business Act. Liquidity must amount to at least 10 per cent of the total debt and guarantee commitments less subordinated capital investments, which can be included in the calculation of the capital base. Nordic groups are not included in the calculations since this key ratio is only calculated for Danish banking institutions.

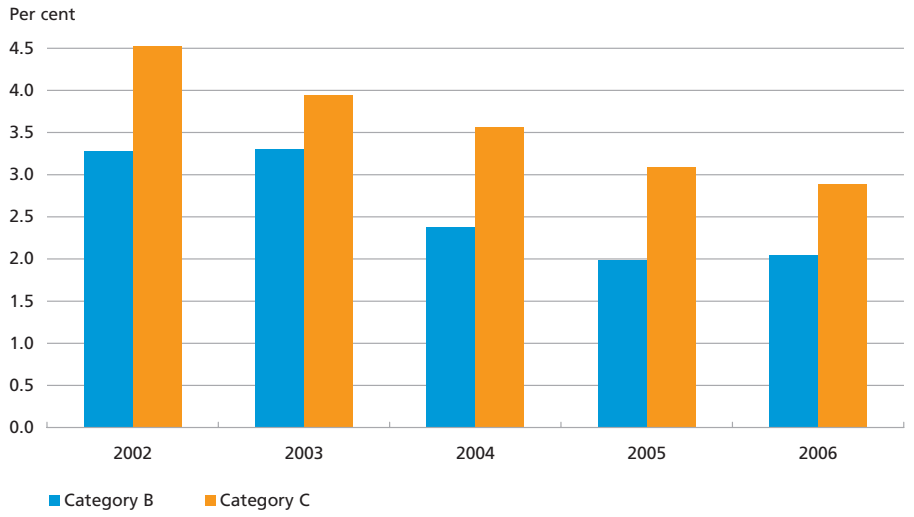
Source: Financial statements.

The interest-rate risk has declined over a number of years

Interest-rate risk is the risk of losses as a consequence of changes in interest rates in the financial markets and constitutes a major part of the banking institutions' market risk. Interest-rate risk is measured by the Danish Financial Supervisory Authority's key ratio for the share of the core capital that is lost on an increase in the interest rate by one percentage point. In 2006, the average interest-rate risk of the banking institutions in categories B and C was by and large unchanged at, respectively, 2.0 and 2.9 per cent, cf. Chart 10. For both categories, the interest-rate risk has declined substantially over a number of years.

The level of interest-rate risk at the end of 2006 means that on a 1-percentage-point increase in interest rates the banking institutions in categories B and C would overall lose kr. 1.5 billion. This is equivalent to 4.2 per cent of the income for the year in category B, and 7.5 per cent in category C.

INTEREST-RATE RISK, PROPORTION OF CORE CAPITAL LOST ON A 1-PERCENTAGE-POINT INCREASE IN INTEREST RATES, CATEGORIES B AND C, 2002-06 Chart 10



Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio "interest-rate risk". This key ratio is not available for the non-Danish Nordic groups.
Source: Financial statements.

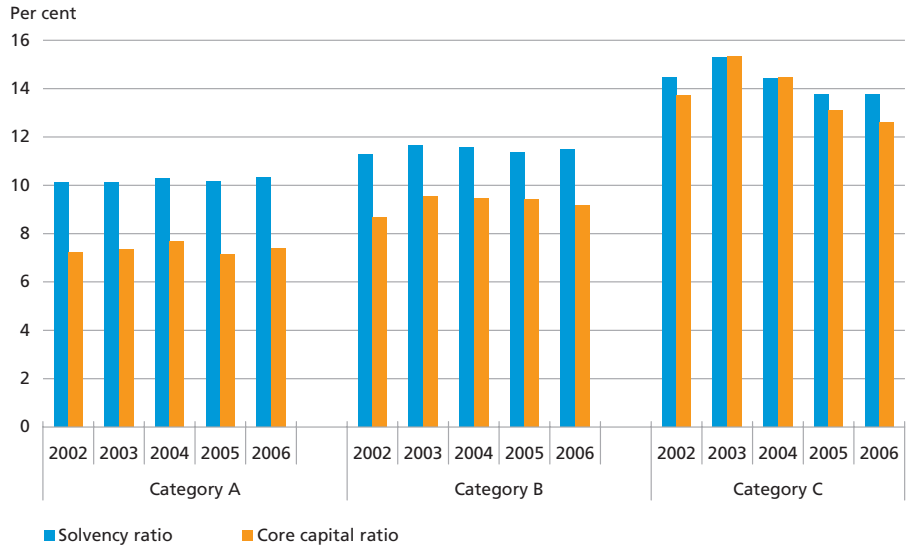
Marginally improved capital structure

The high lending growth makes demands of the capital structure of the banking institutions. In categories B and C, the risk-weighted items increased by just over 20 per cent in 2006. Nevertheless, the solvency ratio strengthened slightly in category B and was unchanged in category C, cf. Chart 11, since the capital base was increased in 2006, among other things via the issue of supplementary capital, but also hybrid core capital and share capital.

In the Nordic groups, risk-weighted items increased by 15 per cent in 2006, and these groups have also increased their capital base. The Danske Bank Group issued both share capital and subordinate capital totalling kr. 20.2 billion in 2006 in connection with the financing of its acquisition of Sampo Bank, Finland. This issuance alone affected the solvency ratio of category A by 0.4 percentage point, and the core capital ratio by 0.3 percentage point.

The solvency ratio is the banking institutions' capital including the statutory minimum of 8 per cent. Amounts in excess of the statutory 8-per-cent requirement constitute the banking institutions' reserves in the event of losses that are too large to be covered by earnings. With the introduction of the Basel II Capital Accord, banking institutions must

SOLVENCY AND CORE CAPITAL RATIOS, CATEGORIES A, B AND C, 2001-06 Chart 11



Source: Financial statements.

calculate their capital need, which may exceed the statutory 8 per cent, depending on the risks assumed. However, the banking institutions' capital need does not have to be published, and therefore calculations of their reserves cannot take the solvency requirements into account, but must be based on the statutory 8-per-cent requirement for all banking institutions.

Stress tests show unchanged strong resilience

The banking institutions' resilience can be tested in a number of stress scenarios, cf. Table 2. The analyses are static, 1-year analyses based on the result for the year and the capital structure at year-end, and the results thus do not apply to a prolonged period.

The consequences of a decline in net interest and fee income are analysed. The high earnings of the banking institutions in 2006 were achieved against the background of substantial lending growth and high activity in the securities markets. If the general level of activity in the securities markets is falling, the banking institutions' lending for e.g. investment credits must be assumed to be decreasing relatively quickly, and fee income from securities trading will also be affected. In scenario 1, net interest and fee income has therefore been reduced by 10 per cent, so that the income in 2006 would have been at the same level as 1-2 years earlier.

The volume of large exposures has risen considerably in parts of the sector over the last few years. In periods of generally increasing losses on loans, a high concentration risk may further aggravate the situation. In scenario 6, losses have been increased by 10 per cent of the total large exposures. Additional stress elements include rising losses on loans and

NUMBER OF BANKING INSTITUTIONS AND GROUPS WITH NEGATIVE RESULTS BEFORE TAX, CATEGORIES A, B AND C, 2005-06 Table 2

Scenarios	Category A		Category B		Category C	
	2006	2005	2006	2005	2006	2005
Baseline, ordinary operating result ..	0	0	0	0	0	0
Earnings risk						
1 Net interest and fee income reduced by 10 per cent	0	0	0	0	0	0
Credit risk						
2 An increase in losses by 1 percentage point	0	0	0	0	3	0
3 An increase in losses by 2.5 percentage points	6	6	11	11	22	26
4 An increase in losses by 1 percentage point for households and 2.5 percentage points for corporate customers	6	6	6	8	11	11
5 Failure of largest counterparty bank in the Danish uncollateralised day-to day money market	0	0	6	6	11	14
6 Loss equivalent to 10 per cent of the total large exposures	na.	na.	6	5	4	6
Interest-rate risk						
7 An increase in interest rates by 1 percentage point	na.	na.	0	0	0	0
8 An increase in interest rates by 3 percentage points	na.	na.	1	1	6	4
Combinations						
9 Scenarios 1, 2 and 7 simultaneously	na.	na.	2	2	7	8
10 Scenarios 1, 3 and 8 simultaneously	na.	na.	12	12	37	37
11 Scenarios 4 and 5 simultaneously.....	6	6	12	12	26	29
12 Scenarios 4 and 6 simultaneously.....	na.	na.	11	12	27	27
Number of banking institutions in the categories	6	6	12	12	37	37

Note: Scenario 5, failure of the largest counterparty bank in the uncollateralised day-to-day money market, includes only accounts between banking institutions holding current accounts at Danmarks Nationalbank. In scenarios 2, 3 and 4 losses are losses on loans and guarantees. Scenarios 6, 7 and 8 are calculated on the basis of the Danish Financial Supervisory Authority's key ratios. These key ratios are not available for the Nordic groups.
Source: Financial statements and Danmarks Nationalbank.

guarantees, higher interest rates, and the failure of the largest counterparty in the Danish uncollateralised day-to-day money market, which is used by the banking institutions for the exchange of krone-denominated liquidity and management of short-term interest-rate positions.

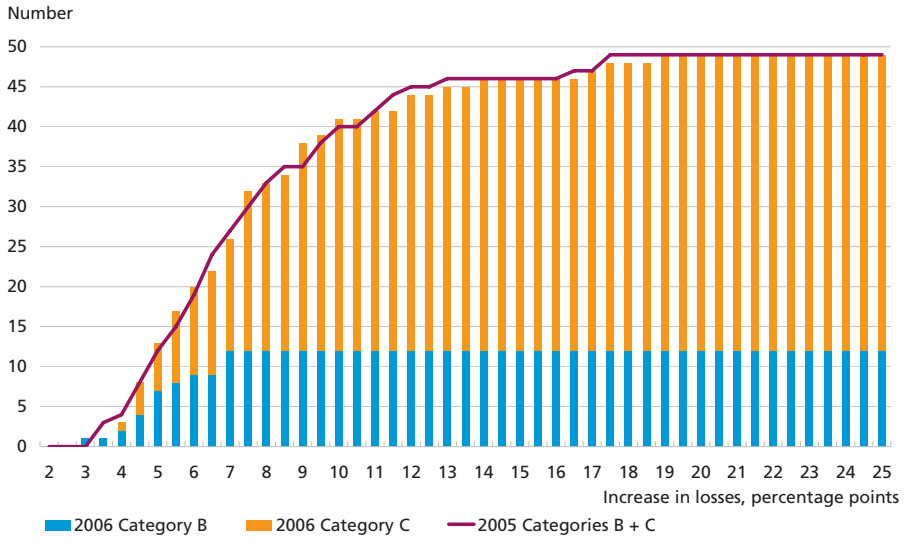
None of the banking institutions would have suffered a loss in 2006, even if net interest and fee income had been 10 per cent lower, cf. scenario 1. In combination with an increase in the loss ratio by 1 percentage point and a small increase in interest rates, also by 1 percentage point, two banking institutions in category B and seven in category C would have incurred losses, cf. scenario 9.

In the scenarios with rising losses on loans and guarantees, slightly fewer banking institutions in category C would have incurred losses in 2006 compared with 2005. However, three banking institutions in category C would have had negative results even if losses on loans and guarantees had risen by only 1 percentage point, cf. scenario 2. The exposure of the banking institutions in category B to the failure of the largest counterparty bank in the Danish day-to-day money market remained unchanged. On the other hand, the exposures of several category C banking institutions declined. On the loss of 10 per cent of the total large exposures, a total of 10 banking institutions in categories B and C would have incurred losses. One banking institution in category B would even have seen its capital adequacy fall below the statutory 8-per-cent requirement.

Taking the banking institutions' excess capital adequacy into account, Chart 12 shows the number of banking institutions that would have had a solvency ratio below the statutory 8 per cent as the loss ratio on loans and guarantees increased. In 2006, the loss ratio would have had to increase by 3 percentage points for a banking institution to experience problems in meeting the 8-per-cent solvency requirement. Compared with 2005 (the red curve) the resilience is virtually unchanged. Viewed in isolation, the banking institutions' higher lending volumes have had a negative impact on resilience, but this has been set off by rising earnings and the injection of new capital.

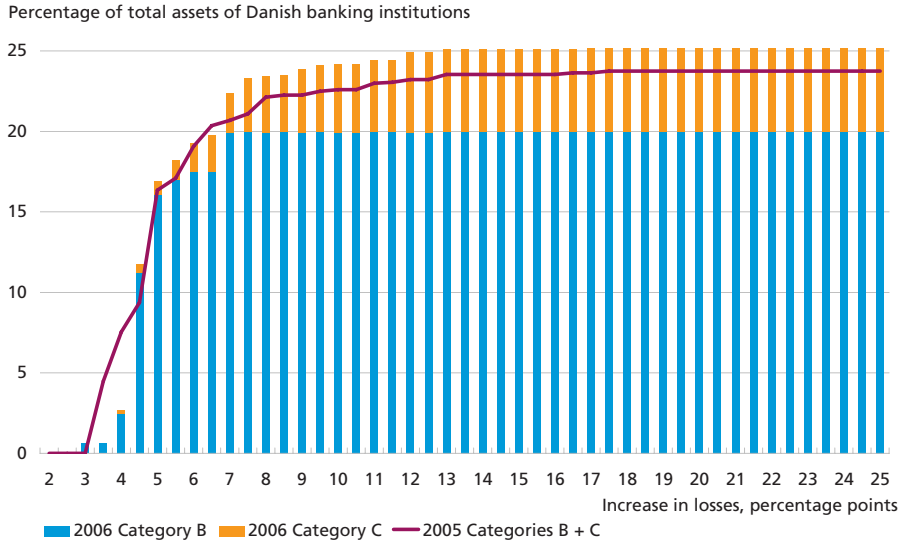
Chart 13 illustrates the same development, but in this case the sum of the banking institutions' total assets is shown. On an increase in the loss ratio by 4.5 percentage points, banking institutions with total assets equivalent to 12 per cent of the aggregate total for the Danish banking institutions would have had a solvency ratio of less than 8. The increase in the aggregate assets for categories B and C in 2006 compared with 2005 indicates that these banking institutions' overall market share has increased.

NUMBER OF BANKING INSTITUTIONS IN CATEGORIES B AND C WITH A SOLVENCY RATIO BELOW 8 ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2005-06 Chart 12



Source: Financial statements and own calculations.

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, 2005-06 Chart 13



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. 3,125 billion at end-2006 equivalent to 100 per cent on the y axis. Adjustments have been made for an estimate of Danske Bank's activities in branches abroad.

Source: Financial statements and own calculations.

Over the last decades, the highest average loss and provision ratio has been 2.5 per cent, which was in 1994.

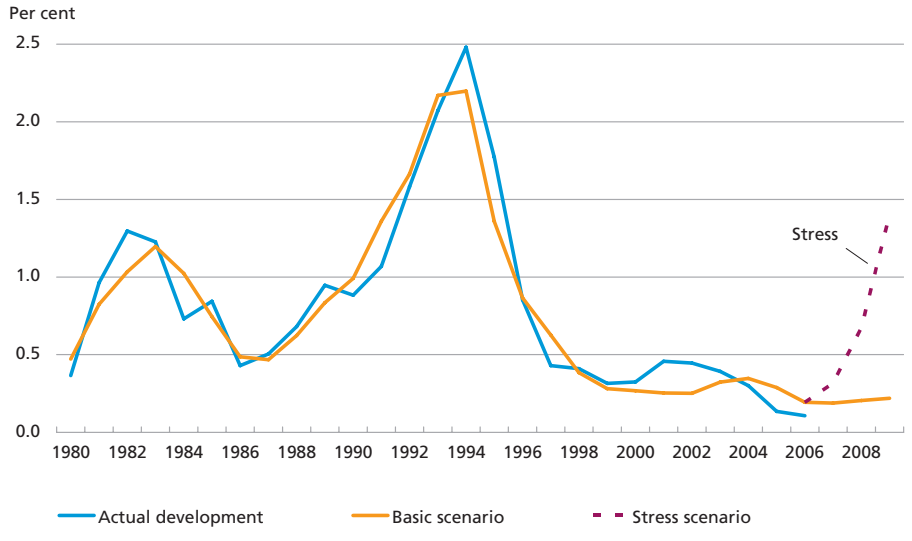
Among the Nordic groups, the loss ratio would have had to increase by 1.75 percentage points for one group to lose its excess capital adequacy. In 2005, the equivalent ratio would have to increase by 1.50 percentage points. All six groups would have faced solvency problems on an increase of 4.25 percentage points in 2006, compared with 3.75 percentage points in 2005. The Nordic groups are more immediately exposed to rising losses on loans and guarantees than the other Danish banking institutions. It is important to be aware that the stress test solely indicates the exposure, not the credit risk, of the individual institutions. A substantial proportion of the Nordic groups' lending portfolios comprise mortgage-credit loans, or similar loans, where the probability of losses is very low.

Macro stress test of the Danish banking sector

Chart 14 presents a simple model of losses in Danish banking institutions that can be used to project the sector's aggregate losses on loans and guarantees.

The blue line in the Chart indicates the actual loss development since 1980, while the yellow line shows model calculations of the historical development and the future development. The dashed line indicates the

STRESS TESTS AND ACTUAL AND ESTIMATED LOSSES AS RATIOS OF LOANS AND GUARANTEES IN THE DANISH BANKING SECTOR, 1980-2008 Chart 14



Note: The basic scenario is calculated on the basis of projections using Danmarks Nationalbank's market model, Mona.
Source: Danish Financial Supervisory Authority and own calculations.

development in losses during a dramatic stress scenario in which GDP falls by 3 per cent and unemployment rises by 5 percentage points over a 3-year period. In this scenario, the banking institutions' losses on loans and guarantees would rise to 1.4 per cent in year 3. This is below the corresponding calculations in *Financial stability 2006* because the drop in unemployment gives an improved baseline.

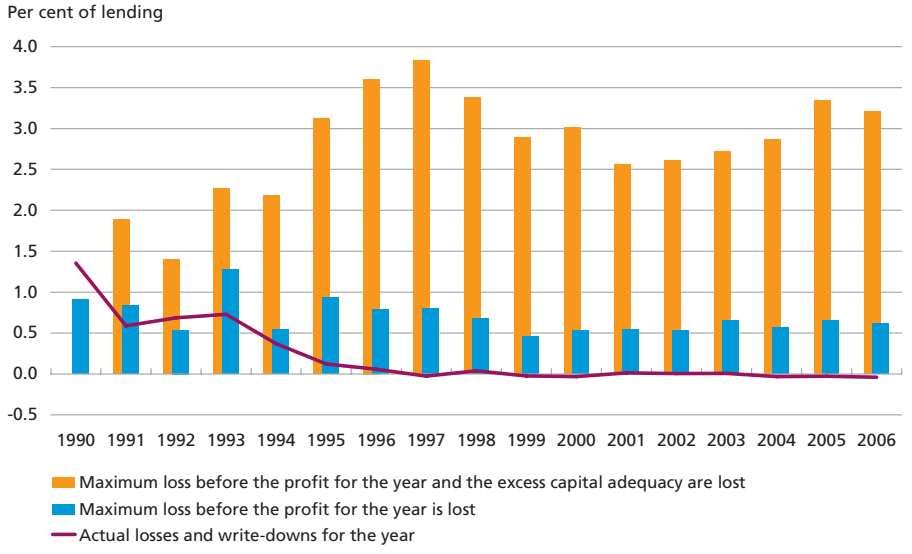
MORTGAGE-CREDIT INSTITUTES

The mortgage-credit institutes are still sound

The income of the mortgage-credit institutes fell marginally in 2006, by 0.3 per cent, reflecting a lower level of activity, while their costs rose by 5 per cent. A low level of new write-downs and the reversal of previous write-downs enabled the mortgage-credit institutes to recognise income of kr. 0.7 billion in 2006. Profit before tax totalled kr. 12.2 billion in 2006, up from kr. 11.7 billion in 2005.

Activity in the mortgage-credit market normalised in 2006 after the record-high level in 2005, which was characterised by a considerable level of remortgaging and redemptions. Gross lending fell from kr. 748 billion in 2005 to kr. 469 billion in 2006, while net lending was at the same high level as in 2005, due to fewer redemptions. Overall, mortgage-credit lending rose by 10 per cent in 2006, compared with 12 per cent the year before. The growth has been particularly strong for capped adjustable-

MORTGAGE-CREDIT INSTITUTES' RESERVES AGAINST LOSSES, 1990-2006 Chart 15



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

rate loans and fixed-rate loans. As the yield spread between adjustable-rate and fixed-rate mortgage-credit loans has narrowed, it has become less expensive to hedge against rising interest rates. In 2006 the mortgage-credit institutes continued to lose market shares to the banking institutions.

The ability of the mortgage-credit institutes to absorb losses remains extremely good, cf. Chart 15. Their resilience has declined slightly, since the impact from increased lending is not fully set off by an increase in capital base. In 2006 the overall sector would have been able to absorb losses of up to 3.2 per cent of the lending portfolio before the profit for the year and the excess capital adequacy would be undermined. The equivalent figure for 2005 was 3.3 per cent. Actual losses and write-downs for the period were again 0 per cent of lending.

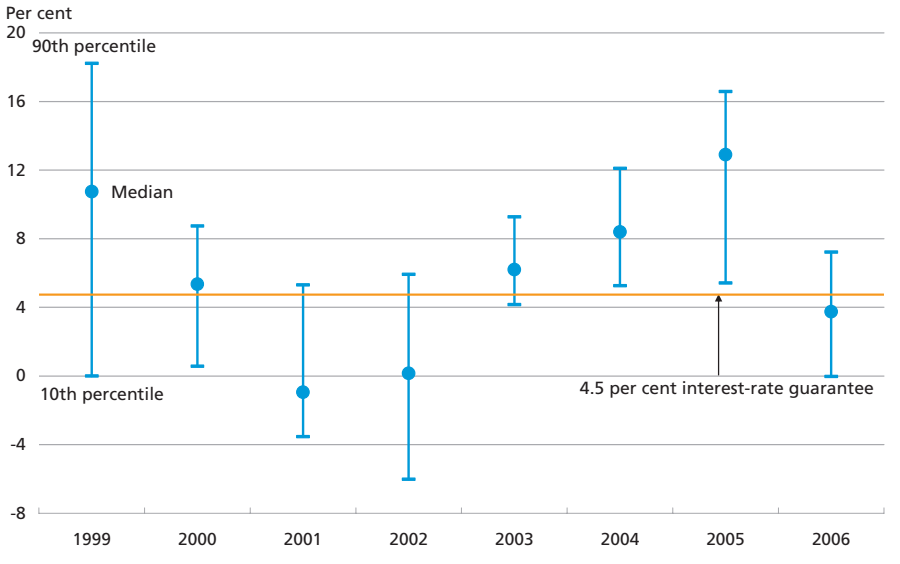
PENSION COMPANIES

The pension companies' returns after tax fell in 2006

After a number of years with increasing returns, the pension companies' returns on investments fell in 2006, cf. Chart 16. Nonetheless, the pension companies generally achieved positive returns. Sound returns on equities and properties were the primary driving forces.

Even though rising interest rates initially lead to losses on the pension companies' investment assets, the long-term effect of a higher level of

RETURNS AFTER TAX IN THE PENSION COMPANIES, 1999-2006 Chart 16



Note: 2006 figures are estimates based on published financial statements.
Source: Danish Financial Supervisory Authority and financial statements.

AGGREGATED EXPOSURE DATA FOR PENSION COMPANIES, 2006 Table 3

Kr. billion	Minimum effect on capital base	Total effect on balance sheet (net effect)
Increase in interest rates by 0.7 percentage point	-2.6	29.1
Fall in interest rates by 0.7 percentage point	2.1	-24.5
Fall in equity prices by 12 per cent	-4.5	-31.9
Fall in property prices by 8 per cent	-1.0	-7.1
Exchange-rate risk	-0.3	-3.1
Loss on counterparties of 8 per cent	-0.7	-7.2
Fall in mortality intensity by 10 per cent	-1.6	-14.5
Increase in mortality intensity by 10 per cent	3.0	13.7
Increase in disability intensity by 10 per cent	0.0	-1.7

Note: Aggregated data for the sector based on financial statements presented before this report went to press. Total effect on balance sheet (net effect) is calculated as "Minimum effect on capital base" plus "Maximum effect on collective bonus potential" plus "Maximum effect on bonus potential on paid-up policy benefits before change in applied bonus potential on paid-up policy benefits" plus "Maximum effect on applied bonus potential on paid-up policy benefits".

Source: Financial statements presented prior to the date of going to press.

interest rates is positive for the sector overall. The reason is that on an increase in interest rates the value of the pension companies' guaranteed benefits will probably depreciate more than the investment assets. In other words, the interest-rate exposure (duration) is greater for equity and liabilities than for assets.

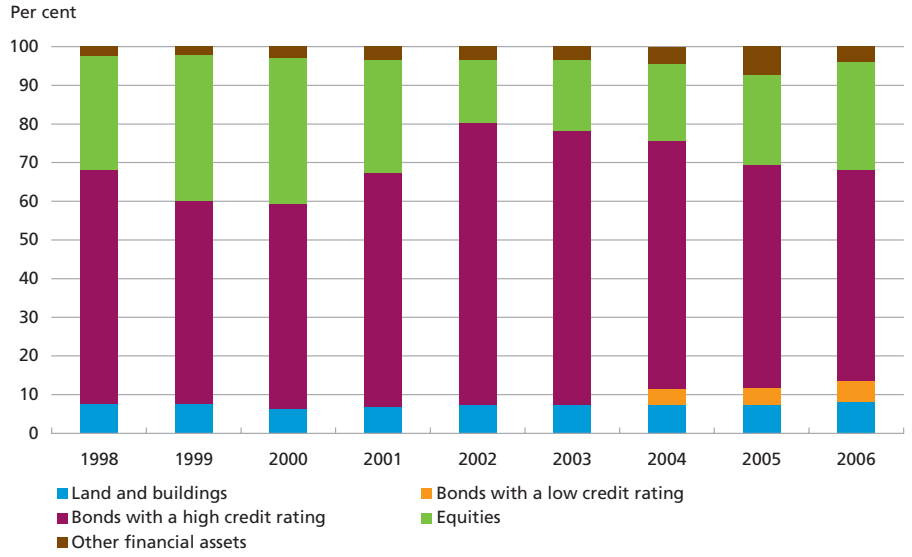
Exposure data from 2006 shows that the net balance-sheet effect is positive on an increase in interest rates by 0.7 percentage point, while it is negative on an equivalent fall in interest rates, cf. Table 3. However, a few companies have hedged their interest-rate risk on the asset side to such an extent that the net effect on an increase in interest rates is negative.

The solvency of the pension companies has improved in recent years, partly due to sound returns on investments. All other things being equal, higher solvency makes it possible for the pension companies to take higher investment risks without clashing with the stress scenarios of the Danish Financial Supervisory Authority.

In 2006 the pension companies further increased their portfolios of equities, primarily by reducing portfolios of highly-rated bonds, cf. Chart 17. The proportion of low-rated bonds also rose from 2005 to 2006.

Most pension companies include the results of their stress-test reporting to the Danish Financial Supervisory Authority in their financial statements. At end-2006 none of these pension companies had problems with the red or the more extreme part of the yellow stress-test scenario.

DEVELOPMENT IN THE PENSION COMPANIES' INVESTMENT ASSETS, 1998-2006 Chart 17



Note: Figures for 2006 are based on financial statements presented before this report went to press. Before 2004 it was not possible to distinguish between bonds with high and low credit ratings. Other financial assets comprise collateralised loans and financial derivatives.

Source: Financial statements and Danish Financial Supervisory Authority.

The Corporate Sector and the Households

The prospects for the Danish corporate sector are good. Earnings are high, but the low unemployment rate makes it difficult for companies to attract the necessary labour. The estimated failure rates are generally unchanged, but 1-2 years ahead the most vulnerable companies may experience increasing difficulties compared with prospects in the preceding year.

The credit institutions' expected losses on exposures to the corporate sector have increased, but remain low.

The households' real disposable incomes have risen considerably, partly because more people are in employment. The number of enforced sales is historically low. The households' exposure to changes in interest rates has diminished against the background of a slight increase in the proportion of fixed-rate loans and a higher ratio of capped adjustable-rate loans.

The development in housing prices has dampened, but no major price falls are expected for as long as the economy remains strong.

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

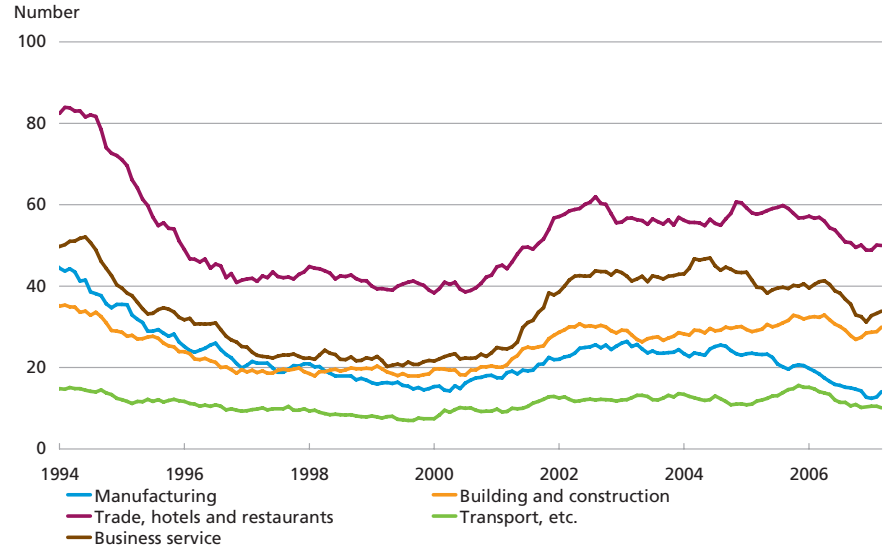
Extending credit to the corporate sector and the households is one of the primary functions of the banking institutions. In doing so, the banking institutions incur a credit risk. The finances of the corporate sector and the households and their robustness to adverse developments affect the banking institutions' earnings and capital structure, and thereby financial stability.

CORPORATE SECTOR

The Danish economy is booming. Growth in demand has outpaced production, so that imports have risen substantially. This has reduced the current-account surplus, which nonetheless remains sound. Employment is record high, and unemployment has dropped to the lowest level for more than 30 years. Despite the tightness of the labour market in recent years, wage and price increases have so far been moderate.

Since the autumn of 2006, the growth in lending to the corporate sector by banking institutions and mortgage-credit institutes has been

NUMBER OF COMPULSORY LIQUIDATIONS, 1994-2007 Chart 18



Note: The Chart shows monthly data for the number of compulsory liquidations, calculated as a 12-month moving average. IT and telecom cannot be shown as a separate sector, but are mainly part of the business service sector. Business service e.g. includes cleaning, real estate letting and administration, rental of cars, machinery and other equipment, legal services, consultant engineering services and accountancy, and other similar consulting and service.
Source: Statistics Denmark.

rising. This matches the general tendency for corporate lending to increase fairly late in an economic upswing.

Corporate earnings have been good, but the low rate of unemployment makes it difficult for companies to attract the necessary labour. Combined with the high level of wages in Denmark, this has led to substantial investment by the corporate sector, particularly in machinery and software.

The pressure on capacity is strongest in the building sector, where there is a pronounced shortage of labour, and many companies have to decline new orders. In addition, the prices of certain types of building materials have risen considerably more than prices in general.

The sustained upswing has reduced the number of compulsory liquidations among Danish companies, cf. Chart 18. Recently, however, there has been a slightly rising tendency for companies to fail.

The prospects for the corporate sector are good. The growth in domestic demand is expected to remain high, albeit slightly lower than in the last few years, and forecasts still point to robust growth in the largest Danish export markets. The positive outlook for Danish companies is supported by the confidence indicators, which remain high for all sectors.

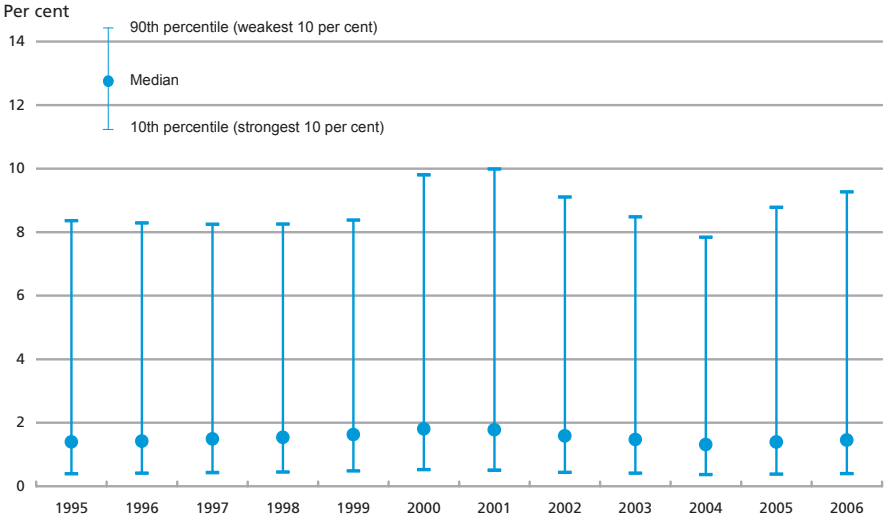
Sustained growth in Danish companies

Danmarks Nationalbank has developed a model to estimate the probability that a company fails within 1-2 years.[1] As a new element, the model now includes two macrovariables, cf. the chapter on the failure-rate model, KIM. The macrovariables capture the impact of cyclical factors on the estimated failure rate. The results in the model with macrovariables deviate from the results in *Financial stability 2006*.

Chart 19 shows the distribution of the estimated failure rates for Danish companies since 1995. The estimated failure rate for the median company was unchanged in 2006 compared with the preceding years, but the weakest companies, measured by the 90th percentile, may experience increasing difficulties. One reason is that in an upswing many new companies are established, and viewed in isolation new companies are more likely to fail than established companies.

The pattern is more or less the same for all sectors, cf. Chart 20. The IT and telecom sector still shows the largest spread between strong and weak companies, and the situation of the weakest companies has deteriorated marginally from 2005. Building, a sector which is particularly

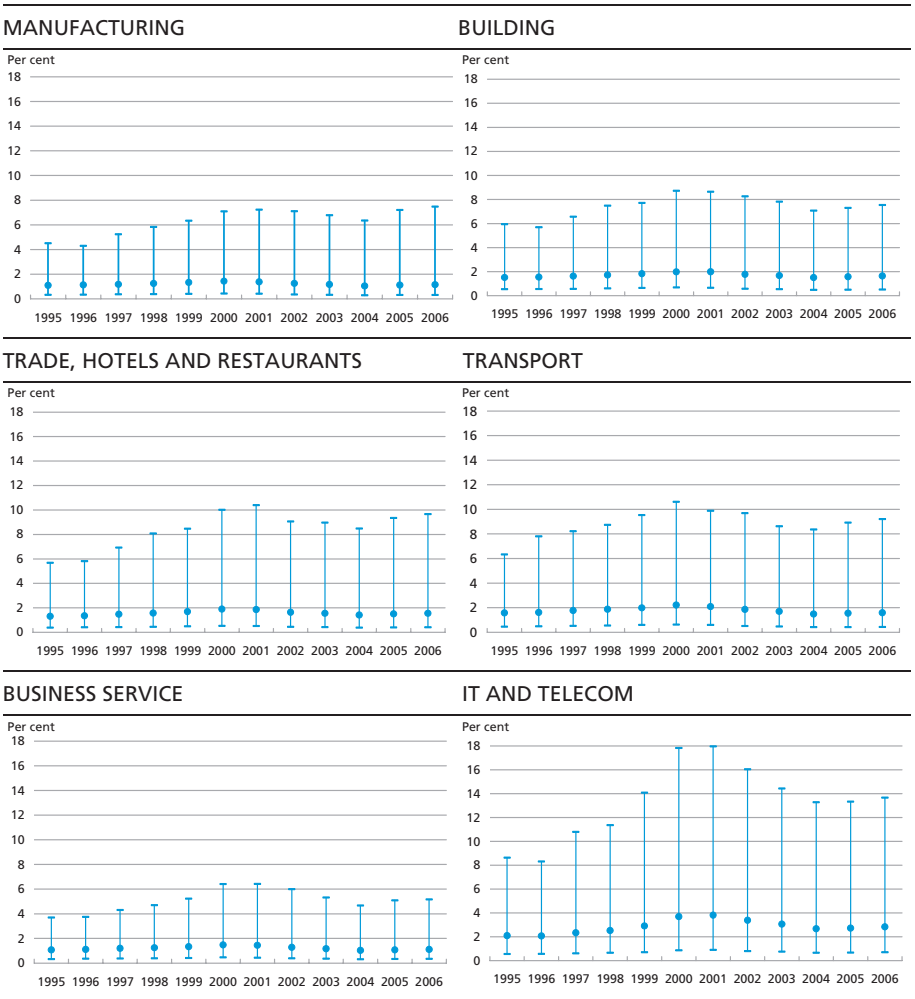
ESTIMATED FAILURE RATES, TOTAL, EXPRESSED AS THE 10TH, 50TH AND 90TH PERCENTILES, 1995-2006 Chart 19



Note: 2006 is a preliminary estimate based on around 37 per cent of the financial statements.
Source: Experian A/S, Statistics Denmark, OECD and own calculations.

[1] The model is based on financial statements for non-financial public and private limited liability companies. A company is deemed to have 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.

ESTIMATED FAILURE RATES FOR SELECTED SECTORS, EXPRESSED AS THE 10TH, 50TH AND 90TH PERCENTILES, 1995-2006 Chart 20



Note: 2006 is a preliminary estimate based on 37 per cent of the financial statements. Business service e.g. includes cleaning, real estate letting and administration, rental of cars, machinery and other equipment, legal services, consultant engineering services and accountancy, and other similar consulting and service.

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

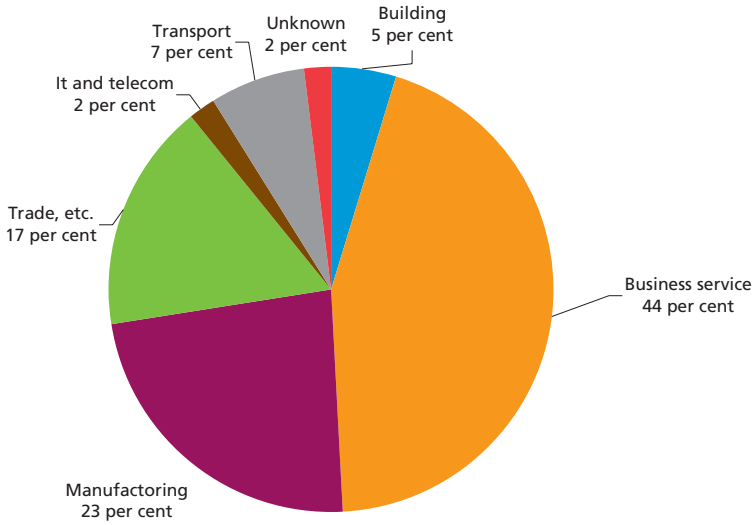
exposed to cyclical fluctuations, has seen the highest increase in the return on assets since 2004, combined with a reduced solvency ratio.

The stable development in the estimated failure rate of the median company in the various sectors is e.g. attributable to the favourable economy, which is reflected in continuing sound key ratios.

Major sectoral differences in expected losses

In order to assess the significance of an individual sector to financial stability, it is necessary to relate the estimated failure rate to the size of

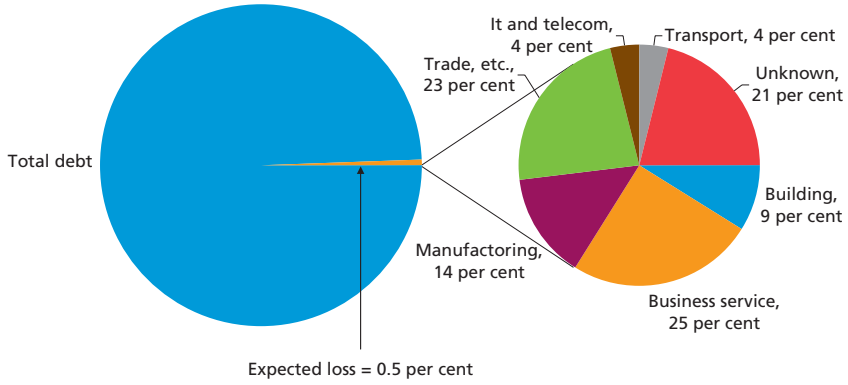
CORPORATE DEBT BY SECTOR, 2006 Chart 21



Note: The debt comprises bank and mortgage-credit debt. Business service e.g. comprises cleaning, real estate letting and administration, rental of cars, machinery and other equipment, legal services, consultant engineering services and accountancy, and other similar consulting and service.
Source: Experian A/S, Statistics Denmark, OECD and own calculations.

the total debt in the relevant sector. The debt comprises loans from banking institutions and mortgage-credit institutes. Business service ac-

EXPECTED LOSSES BY SECTOR, 2006 Chart 22



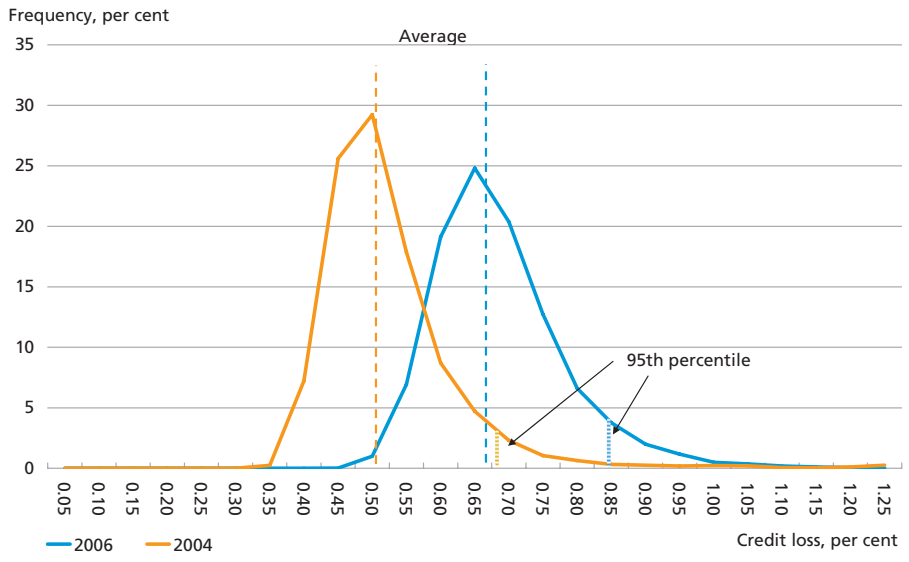
Note: The expected loss is calculated by weighting short- and long-term bank debt at, respectively, 100 and 50 per cent, and mortgage-credit debt at 10 per cent, thereby taking into account that in most cases the creditor does not lose the full outstanding amount. These values are then multiplied by the estimated failure rates from KIM.
Source: Experian A/S, Statistics Denmark, OECD and own calculations.

counts for the largest share of the total debt, cf. Chart 21, and this share has risen from 41 per cent in 2004 to 44 per cent in 2006. Manufacturing and trade, etc. also account for large proportions of the total debt.

Losses on loans to various sectors are dependent on the distribution of lending to sound and less sound companies. If the debt of the individual company is weighted by the company's estimated failure rate, a measure of the expected loss on the company is achieved. It is taken into account that, depending on the type of debt, a creditor will seldom lose the full amount of the loan.

The calculated expected loss ratio has increased from just over 0.3 per cent in 2004 to almost 0.5 per cent in 2006. The part of the expected loss that is attributable to business service in particular is substantially lower than the sector's share of the total debt, cf. Chart 22. On the other hand, the expected loss in the IT and telecom and building sectors as a share of the total expected loss is twice as high as these sectors' debt ratios. For companies whose sector is unknown, the expected loss ratio is around 11 times higher than the debt ratio. The reason is that two thirds of the companies in this group are newly established companies that in isolated terms are more likely to fail.

ESTIMATED DISTRIBUTION OF THE BANKING SECTOR'S EXPECTED LOSSES ON CORPORATE LENDING, 2004 AND 2006 Chart 23



Note: The actual losses are calculated as a ratio of total bank debt. In some scenarios the loss exceeds 1.25 per cent of the total bank debt, but this part of the distribution has been omitted for presentation reasons. The loss function is simulated on the basis of 10,000 different scenarios in which randomly selected companies are assumed to fail.
Source: Experian A/S, Statistics Denmark, OECD and own calculations.

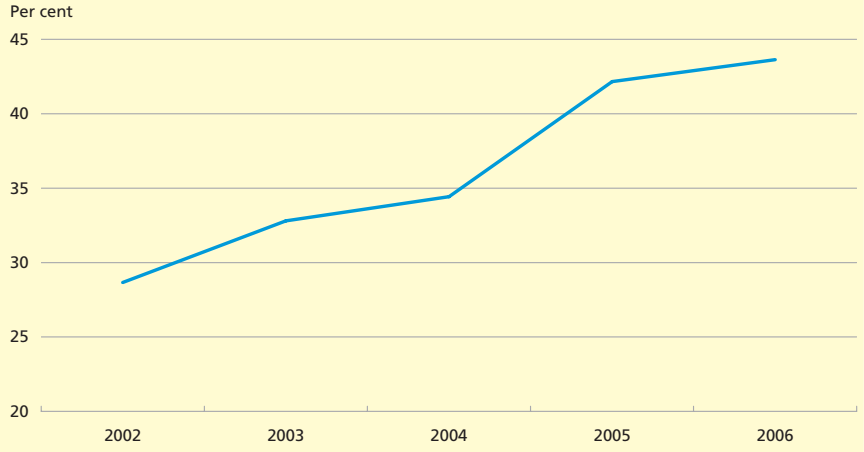
PROPERTY COMPANIES IN DENMARK — Box 1

In view of the activity in the Danish housing market in recent years, the debt of the property companies has increased. This Box is based partly on active Danish public and private limited liability companies grouped by Experian under "development and selling of real estate" and "buying and selling of own or leased real estate", and partly on "Danske Ejendomsprojektudbyderes Brancheforening".

The average age of companies in this sector has dropped from around 10 years in 1995 to just under six years in 2006. In 2006, one third of the companies were less than two years old. The return on assets varies greatly among the property companies. The median company has seen a small decline over the last three years, to just over 2 per cent in 2006. The return on equity has, however, doubled since 2003, to around 20 per cent in 2006. The solvency ratio, i.e. the companies' ability to sustain losses, has declined since 2002. For the median company, it was almost 17 per cent in 2006. The weakest companies, measured by the 10th percentile, had a solvency ratio of around 0. The property companies are dependent on external financing. Short-term debt as a ratio of total assets has risen slightly to around 40 per cent for the median company in 2006. For the weakest companies, short-term debt is approaching 100 per cent of the total assets. The property companies' aggregate debt to the credit institutions was kr. 12.4 billion in 2006, so that it has more than doubled since 2002. This should be compared to the total lending by credit institutions to non-monetary financial institutions of just over kr. 1,000 billion at end-2006. The property companies' total debt to credit institutions as a ratio of their total assets provides a measure of their gearing, which has increased from 29 per cent in 2002 to 44 per cent in 2006, cf. the Chart below.

Almost 10 per cent of the property companies had negative equity capital in 2006. In terms of total assets, these property companies account for a very small proportion.

GEARING OF THE PROPERTY COMPANIES, 2002-06



Source: Experian A/S and own calculations.

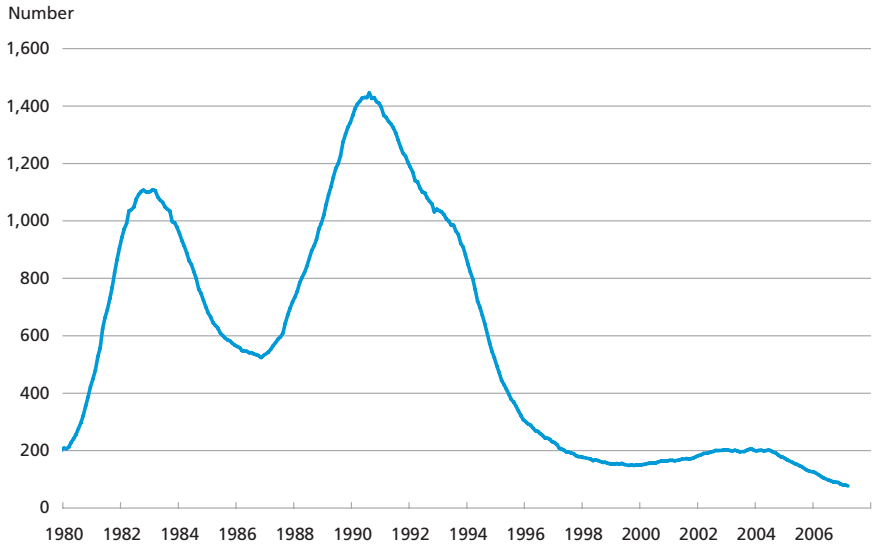
The banking institutions' expected losses on corporate exposures have increased

The banking institutions' expected losses on corporate exposures can also be simulated on the basis of information from Danmarks Nationalbank's failure-rate model, KIM[1]. Chart 23 shows the simulated distribution of the banking sector's expected losses on corporate exposures. The expected loss, given as the average, has increased from 2004 to 2006. On the other hand, the uncertainty of the expected loss, measured as the difference between the 95th percentile in the distribution and the average loss, is more or less constant. The expected loss on the banking institutions' corporate exposures in 2006 has been estimated at around 0.7 per cent of total lending to the corporate sector by the banking institutions, while the actual loss was around 0.3 per cent in 2005. Losses in this range are very low compared to losses in the early 1990s.

HOUSEHOLDS

The finances of the households have improved in recent years. Disposable real incomes have increased considerably because more people are in employment and real wages have risen. The easing of direct and indirect

ENFORCED SALES OF OWNER-OCCUPIED HOUSING, 1980-2007 Chart 24



Note: 12-month moving averages. In the Chart, owner-occupied housing is defined as the sum of published enforced sales of single-family houses, owner-occupied flats, summer cottages and multiple-family properties.
Source: Statistics Denmark.

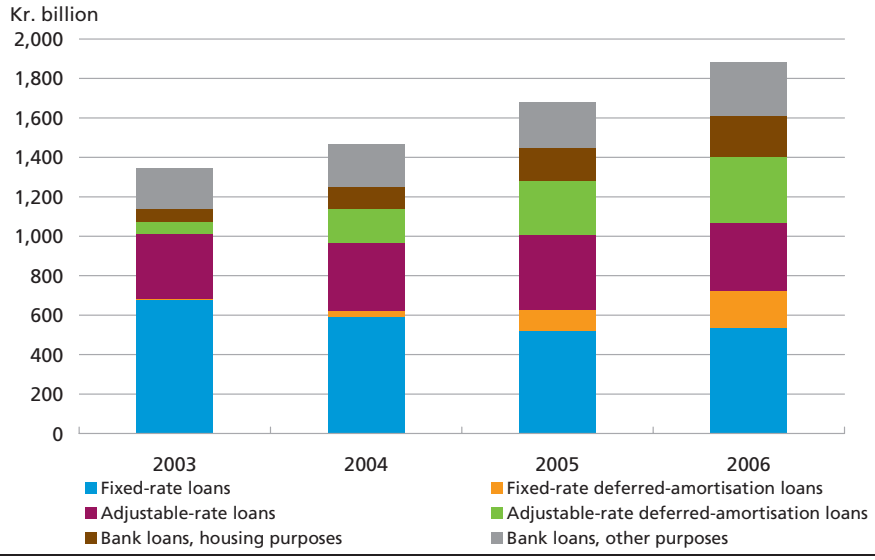
[1] For a more detailed description of how the expected losses on corporate exposures are calculated, see *Financial stability 2006*, Box 8.

taxation has also contributed. Wealth has increased quickly in step with the recent surge in housing prices. The households' strong financial position is emphasised by a very low level of enforced sales. The number has dropped to less than 100 per month, which is the lowest level in the almost 30 years that this data has been compiled, cf. Chart 24.

The households' higher real disposable incomes have contributed to a substantial expansion of private consumption since 2003. Since the mid-1990s, private consumption has not increased much faster than incomes, however, and the large capital gains have thus only been converted to consumption on a limited scale. Housing investments, on the other hand, have increased considerably in the same period.

According to preliminary national accounts data, consumption growth declined little in 2006 compared with 2005, but the growth is not expected to fade away. Interest rates have risen since 2005, particularly at the short end of the yield curve, and the housing market has slowed down in recent quarters, after strong price rises in preceding years. This may curb growth in private consumption, and especially in housing construction. High job security and the prospect of further growth in real incomes create the right conditions for a sustained expansion of consumption, however. The households' sound finances are reflected in ever-increasing indebtedness.

BORROWING BY HOUSEHOLDS FROM DANISH BANKS AND MORTGAGE-CREDIT INSTITUTES, 2003-06, YEAR-END — Chart 25



Note: Households include the self-employed. The breakdown by fixed-rate loans, variable-rate loans and loans with and without deferred amortisation is partly estimated on the basis of the distribution of mortgage-credit loans by property category and loan type. Fixed-rate loans include index-linked loans.

Source: Danmarks Nationalbank.

The chapter on macro stress testing of Danish households includes an analysis of the exposure of the households to higher interest rates and increasing unemployment.

More widespread use of fixed-rate loans and capped loans

At end-2006, the households' borrowing from banking institutions and mortgage-credit institutes had increased by around 12 per cent in relation to end-2005, cf. Chart 25. The repeated tightening of monetary policy has pushed up short-term interest rates. Long-term yields have risen rather less, so that the yield curve is almost flat. This has considerably reduced the immediate financial advantages of adjustable-rate loans. Consequently, the ratio of fixed-rate loans to the households' total outstanding loans has increased slightly over the past six months, after falling for a number of years. At the same time, data from the Association of Danish Mortgage Banks shows that a growing proportion of adjustable-rate loans are capped. This reduces the households' exposure to rising interest rates.

Deferred-amortisation loans are becoming ever more popular. While these loans accounted for 30 per cent of the total outstanding volume of mortgage-credit loans to households in 2005, the figure had risen to 37 per cent in 2006. Around two thirds of the deferred-amortisation loans are at adjustable interest rates. However, fixed-rate loans account for a considerable share of the growth in deferred-amortisation loans.

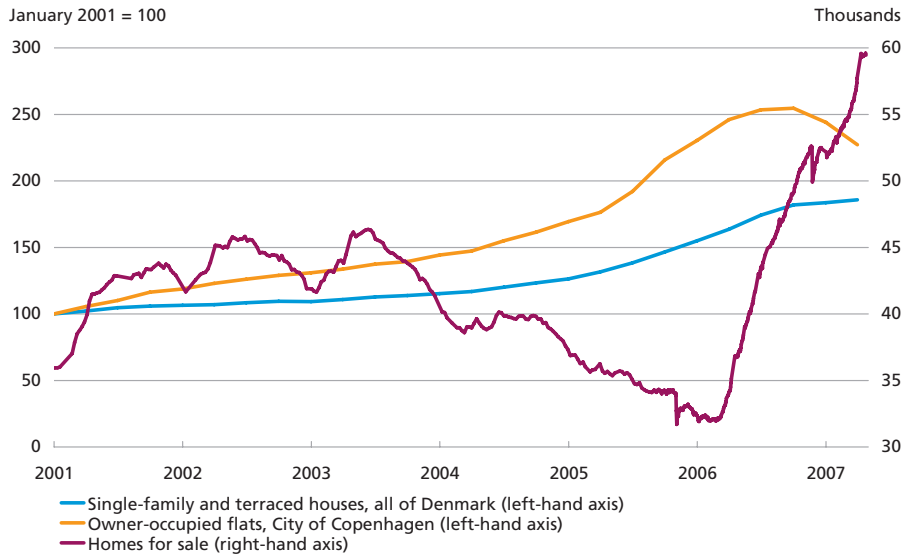
Dampened price development in the housing market

Prices in the housing market have dampened during the past year, following a period of very high growth in cash prices. Price increases were modest in the 1st quarter of 2007, and the number of homes put up for sale continued to rise substantially, cf. Chart 26. In the City of Copenhagen, the prices of single-family and terraced houses were by and large unchanged during the 1st quarter of 2007, while prices of owner-occupied flats fell.

Even though the mood in the housing market has changed, there is no reason to expect a general price dive for as long as the economy remains strong. At the regional level, some downward price adjustment cannot be ruled out, however.

The slowdown in the housing market is attributable to such factors as a higher level of interest rates, primarily at the short end of the maturity range. Particularly in the Greater Copenhagen area, there also seems to have been a shift in expectations of future housing prices. In recent years a rapidly rising market has been buoyed up by expectations of further price increases in the future.

HOMES FOR SALE AND SALES PRICES FOR HOUSING, 2001-07 Chart 26



Source: The Danish Association of Chartered Estate Agents and the Association of Danish Mortgage Banks.

In general, the households have only mortgaged a small proportion of the capital gains on owner-occupied homes achieved in recent years. This means that the households have substantial buffers against falling prices. For the households that bought their homes when prices peaked, any price drops will naturally be less welcome, but are hardly likely to entail major losses for the banks or to jeopardise financial stability.

Financial Markets

Equity prices rose considerably in 2006 despite falling prices in mid-year. The tightening of monetary policy in both the USA and the euro area had only little impact on the long-term yields, so that the yield curves became flatter. At the same time, credit spreads remained historically low.

The volatility in mid-2006 shows how exposed the financial markets are to even small changes in market expectations. Large geared positions in different currencies, including carry trades, contribute to increased volatility in the market.

INTERNATIONAL FINANCIAL MARKETS AND FINANCIAL STABILITY

The financial markets are of great importance to the banking institutions' earnings and balance sheets. There is a direct impact through various channels as value adjustments of the banking institutions' bond and equity portfolios, and via fee and commission income from financial-market-related customer services. 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.

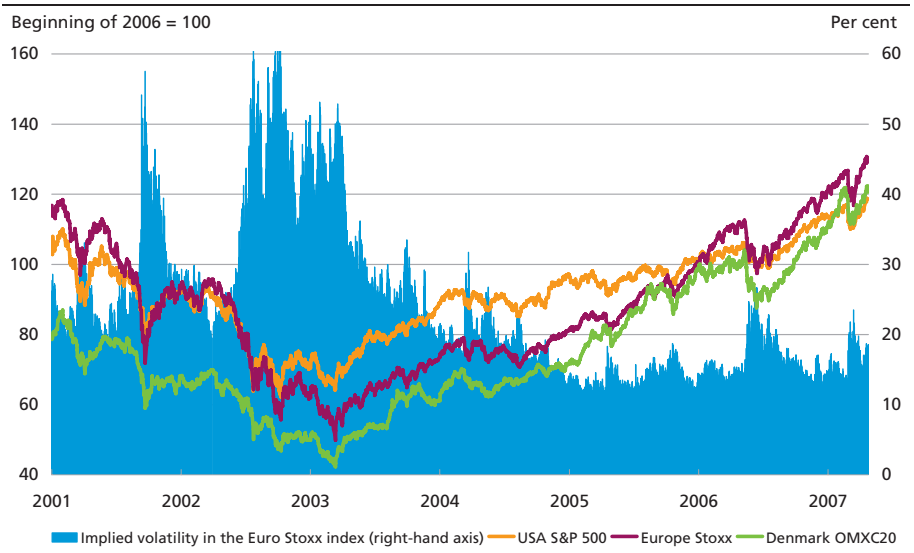
EQUITY AND BOND MARKETS

Equity markets continued to rise in 2006

Global equity prices rose considerably in 2006 despite falling prices in mid-year. The European Stoxx index rose by 20 per cent, while the US S&P 500 index increased by 14 per cent, cf. Chart 27. The Danish OMXC20 index mirrored the development in the international markets closely, rising by 12 per cent in 2006. The relatively large price drops in mid-year were attributable to increasing uncertainty among investors, who moved towards assets entailing lower risk. Despite significant increases in recent years, the price-earnings ratios seem to indicate that the equity markets are not yet at the same high price levels seen before the dotcom bubble burst in 2001.

Expectations of the banks' earnings remained strong in 2006, so that the bank equity indices rose more than the general equity indices. The bank equity indices increased by almost 23 per cent in both the euro

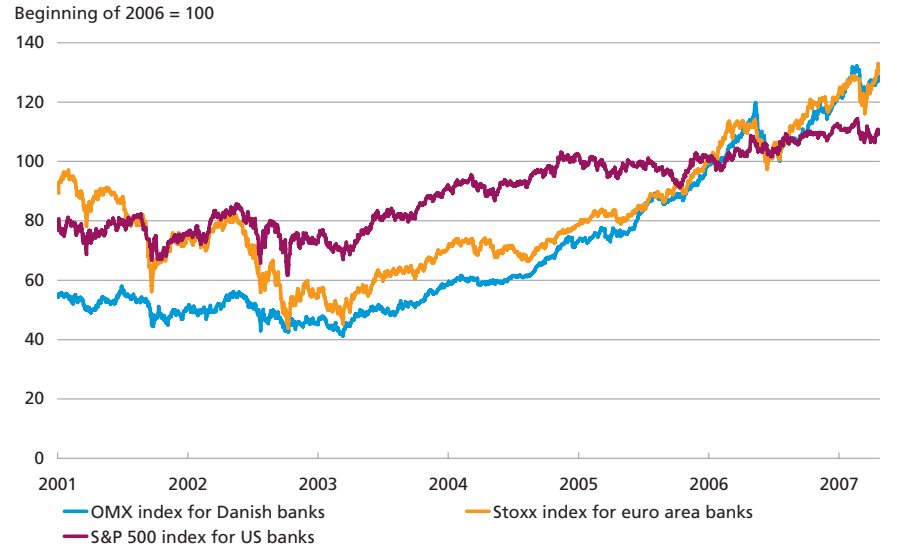
EQUITY INDICES IN DENMARK, THE EURO AREA AND THE USA, AND VOLATILITY IN THE EURO AREA, 2001-07 Chart 27



Note: The volatility is based on 50 option prices and measures market expectations of short-term volatility. It is calculated by taking the square root of the implied variance across all options for a given period until they mature.
Source: Ecowin.

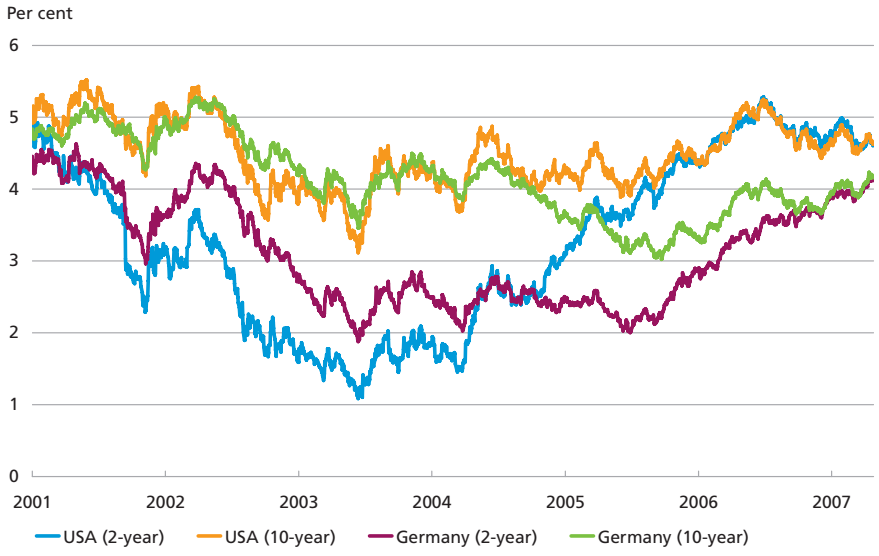
area and Denmark, cf. Chart 28. The increase was less pronounced in the USA, where the bank index rose by just over 12 per cent.

EQUITY INDICES FOR DANISH, EUROPEAN AND US BANKS, 2001-07 Chart 28



Source: Ecowin.

2-YEAR AND 10-YEAR YIELDS ON BENCHMARK GOVERNMENT BONDS IN THE USA AND GERMANY, 2001-07 Chart 29



Source: Ecowin.

Yield curves in the USA and Europe flatten out

10-year yields rose slightly in 2006, in spite of a decrease in the 2nd half of the year, cf. Chart 29. The increase in the 1st half-year was driven by high economic activity and rising core inflation. In step with expectations of lower growth in the economy, however, the US 10-year yield fell in the 2nd half-year. The European 10-year yield followed the development in the US market.

In general, long-term yields rose less than short-term yields, so that the yield curves flattened out in 2006. Especially in the euro area the short-term yield rose strongly as a result of sound economic growth. The European Central Bank, ECB, raised its official interest rate from 2.25 per cent to 3.75 per cent in six increments during 2006 and the start of 2007. The substantial increases in short-term interest rates in Europe and the USA, and in other countries with sound economic growth, led to increasing carry-trade speculation, cf. Box 2. The market utilised the low interest rates in countries such as Japan and Switzerland to invest in countries with relatively higher interest rates.

In the USA, the 2-year yield exceeded the 10-year yield throughout most of 2006. Normally, this has indicated an imminent recession in the US economy. This time, however, the low long-term yields are attributed to low and stable inflation expectations, investments by OPEC countries and Asian central banks in long-term US government bonds, and high demand for duration on the part of pension funds.

CARRY TRADES Box 2

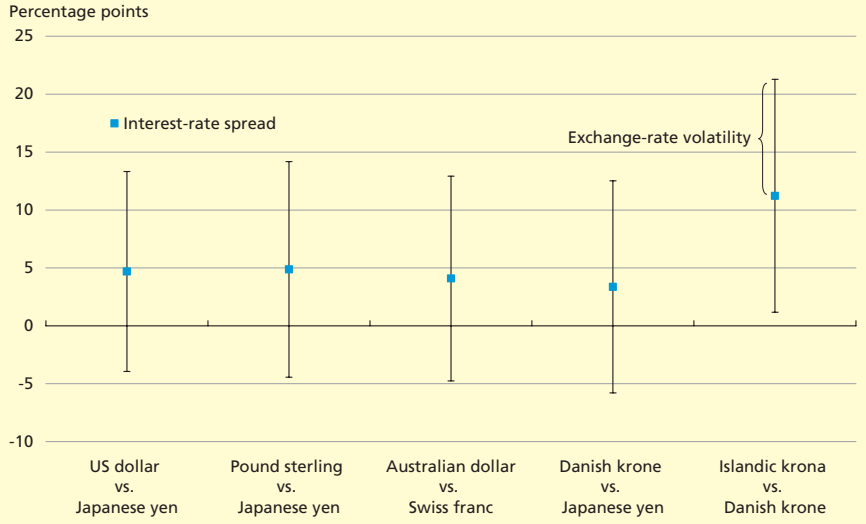
The carry-trade strategy is a well-known phenomenon and essentially reflects that investors seek out assets yielding a relatively high return. In this case, an investor borrows an amount in a currency with a low interest rate (the funding currency) and invests in a currency that pays a higher interest rate (the target currency). Assuming that exchange rates are constant, the investor's profit is the interest-rate spread between the two currencies.

Exchange rates are not constant, however. The Chart below shows the interest-rate spread and the exchange-rate volatility for a number of currency pairs. The interest gain at the various crosses is clearly positive, but is subject to uncertainty in the form of exchange-rate volatility.

It is difficult to assess the actual size of carry trades since, for many investors, carry trades are effected as off-balance-sheet transactions. Some assessments of the total volume of carry trades are as high as 1,000 billion dollars.[1] Once the volume of carry trades becomes sufficiently large, the strategy becomes self-enhancing. The reason is that when large volumes of capital flow from a low-interest currency to a high-interest currency, the latter will appreciate vis-à-vis the former. This means that the gain on carry trades is equivalent to the interest-rate spread *and* the appreciation of the high-interest currency. For example, the total yield on sterling-yen carry trades was 19.3 per cent in 2006, but only 8.5 per cent in 2005.

A major risk factor in connection with carry trades is the threat of an exchange-rate bubble. The formation of a bubble leads to further uncertainty in addition to the historical exchange-rate volatility. When a bubble bursts, it does so very quickly, and it tends to spread. The consequences may be pronounced depreciation of various target currencies vis-à-vis funding currencies.

INTEREST-RATE SPREADS AND HISTORICAL EXCHANGE-RATE VOLATILITY



Note.: 3-month LIBOR rates from 26 February 2007 have been applied. The historical exchange-rate volatility has been calculated as the annualised standard deviation for the period since 2003.
Source: Reuters and Ecowin.

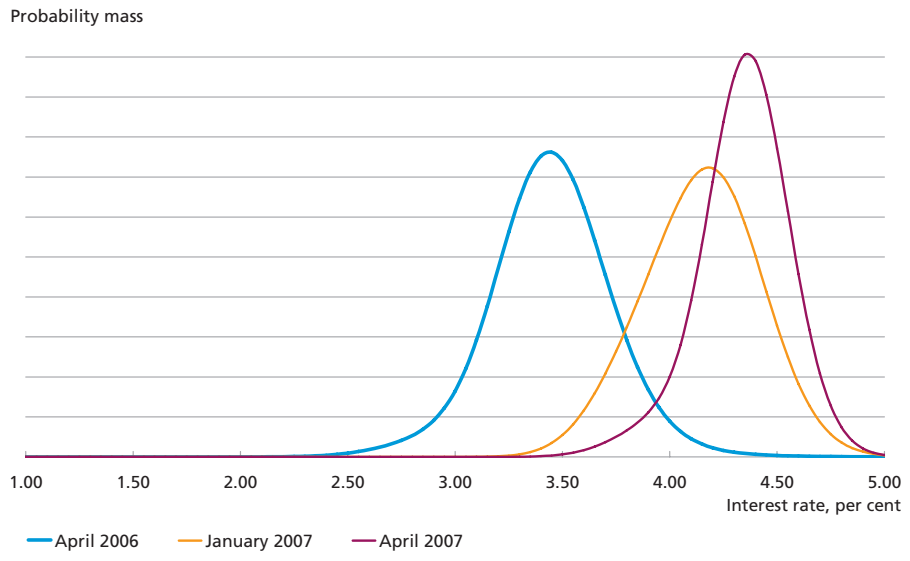
[1] The Economist, 10-16 February 2007.

The market expects further interest-rate increases in Europe

Prices of financial assets contain information on market participants' expectations of future market developments. Future interest rates, called forward rates, can be calculated on the basis of yields on bonds with different maturities. A forward rate can be perceived as a break-even interest rate that indicates how much the spot yield curve must change if bonds with different maturities are to provide the same yield. 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 receive the same yield from purchasing either a 2-year bond – of which the yield is known today – or a 1-year bond – of which the yield is known today – followed by another 1-year bond at the forward interest rate.

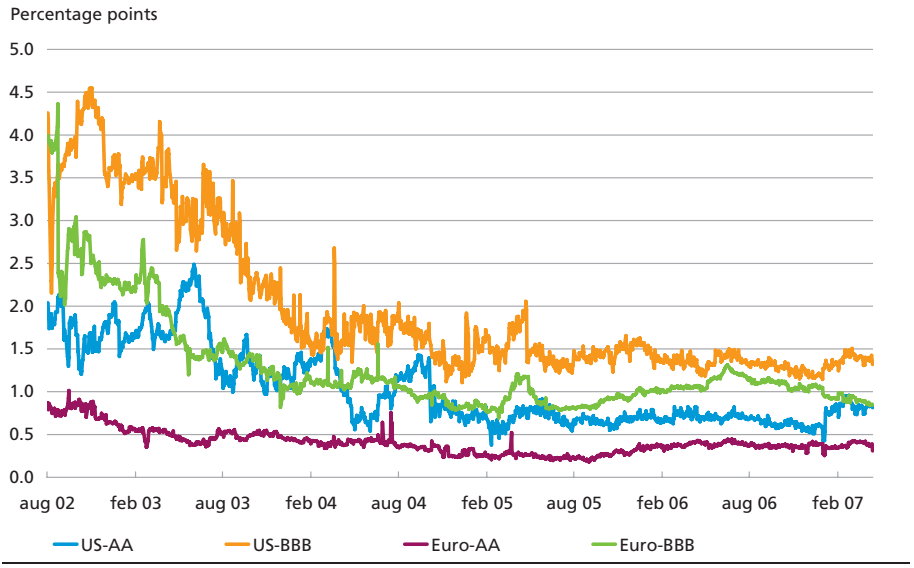
The full break-even probability distribution for the future short-term European interest rate can be derived on the basis of the prices of interest-rate options. In Chart 30 it is seen that the interest rate is still expected to increase as the short-term interest rate is around 4 per cent at the end of April 2007. This reflects market confidence in the economic development and thereby expectations of a further tightening of monetary policy. The uncertainty of interest-rate expectations has also diminished from the spring of 2006, as the distribution has narrowed.

PROBABILITY DISTRIBUTIONS FOR EURIBOR DERIVED FROM OPTION PRICES Chart 30



Note: The risk-neutral probabilities are estimated using a combination of log-normal distributions. The calculations are made with a constant horizon/maturity of eight months.
Source: Bloomberg and own calculations.

CREDIT SPREADS FOR BONDS IN THE USA AND THE EURO AREA, 2002-07 Chart 31



Source: Ecowin.

Credit spreads in Europe and the USA remain narrow

Ample international liquidity has significantly narrowed the credit spreads between corporate bonds in recent years, cf. Chart 31. The falling trend in the USA continued in 2006, while the spread widened slightly in the European market.

Most recently the spreads have widened a little in the USA, among other things due to increasing uncertainty concerning the economic development in the USA. Investors have sold higher-risk assets in favour of more secure government bonds. Another factor of uncertainty is related to increasing payment difficulties among less creditworthy US homeowners in the "subprime" mortgage-credit market. The bond index, which reflects the price development for the high-risk mortgage-credit bonds, thus fell by more than 30 per cent towards the end of February.

IMPLICATIONS FOR THE FINANCIAL MARKETS OF A WEAKENING US HOUSING MARKET — Box 3

Following several years' strong expansion, over the last six months the US housing market has shown clear signs of a slowdown. A major factor contributing to the growth in the housing market has been an aggressive lending policy vis-à-vis less creditworthy homeowners (known as the subprime lending market). Loans to this homeowner segment are today approximately 1,000 billion dollars, and constitute approximately 12 per cent of the total portfolio of housing loans in the USA, against 7.5 per cent in 2001. The significant expansion was attributable to such factors as large volumes of liquidity seeking higher returns than the low yields on more secure assets.

As housing prices have begun to fall and short-term US interest rates have risen, the number of defaulted loans in the subprime market has risen substantially. Previously, it was easier for borrowers to refinance their loans in the expectation that housing prices would rise, and a large proportion have raised adjustable-rate loans. In the 4th quarter of 2006, defaulted subprime loans increased to almost 15 per cent of the total subprime loan portfolio. More than 20 subprime lenders have been closed or acquired by larger operators since the beginning of 2006.

The increasing nervousness in the market is reflected in large price increases to safeguard against overdue housing loans.

Mounting payment problems in the mortgage-credit market have led to fears of credit rationing in the US economy. These fears have been amplified by the spread of payment problems to more creditworthy borrowers. The banks are more hesitant to issue new housing loans, and it is feared that this will further weaken the housing market. At the same time, the risk premium on corporate bonds outside the housing sector has risen recently, and equity prices for a number of financial institutions that are exposed to the housing sector have also fallen substantially.

Issues related to financial stability

Danmarks Nationalbank's Policy for Oversight of the Danish Financial Infrastructure

Danmarks Nationalbank oversees the financial infrastructure in Denmark in order to promote safe and efficient settlement of payments, securities trades, etc. Oversight is part of Danmarks Nationalbank's contribution to the stability of the Danish financial system.

The focus of Danmarks Nationalbank's oversight is on three systems that together comprise the core of the Danish financial infrastructure: the payment systems Kronos and the Sumclearing, and the VP Settlement for clearing and settlement of securities. Primarily incidents in this part of the infrastructure are assessed to have a potential widespread economic impact that could ultimately jeopardise financial stability in Denmark.

Oversight is based on international standards for respectively payment and securities settlement systems. These standards lay down the overall requirements that a well-functioning system should fulfil in relation to risk management and efficiency.

Danmarks Nationalbank has prepared its oversight policy in accordance with the general principles for oversight by central banks. In addition, the management of oversight is conducted within the scope laid down in the Danmarks Nationalbank Act and the Securities Trading Act.

Oversight of the financial infrastructure affects many areas, including the remits of other Danish authorities. This applies particularly to the Danish Financial Supervisory Authority, with which the cooperation has been regulated by a Memorandum of Understanding since 2001.

INTERNATIONAL STANDARDS FOR OVERSIGHT

Since the late 1980s international organisations have issued standards in order to contribute to safe and efficient payment and settlement systems. In most countries, oversight of the financial infrastructure by central banks is now based on these common standards, cf. Box 4. This also applies to oversight by Danmarks Nationalbank.

In parallel with the issue of standards, principles have also been developed for the central banks' oversight of the systems' compliance with international standards. These principles were clarified and elaborated on in 2005, and formulated in five general principles in the

INTERNATIONAL STANDARDS FOR FINANCIAL INFRASTRUCTURES Box 4

The international standards for financial infrastructures determine the overall requirements to be met by a well-functioning system in relation to risk management and efficiency.

With regard to risk management in a system, it must comprise and limit the following four types of risk:

- *Credit risk*, i.e. the risk of financial loss as a consequence of a counterparty's inability to meet its obligations in connection with the settlement of payments, securities transactions, etc. Credit risk depends on the value of the assets that are being settled but have not yet been received, the quality of the collateral received and the credit rating of the counterparty. Credit risk increases with the maturity of the exposure.
- *Liquidity risk*, i.e. the risk of incurring a loss because a payment is not received at the expected time. The loss can occur if the liquidity has already been deployed and liquidity therefore has to be obtained from another source at short notice. This often entails extraordinary costs, e.g. a higher interest rate.
- *Legal risk*, i.e. the risk of suffering a loss as a consequence of unforeseen interpretations of the systems' contractual basis or the legislation on which the contracts between the parties are based, e.g. in connection with a court ruling.
- *Operational risk*, i.e. the risk of economic loss resulting from inadequate or failed internal processes and systems, human errors, or from external events such as natural disasters, terrorism, etc. Operational risks entail loss of tangible (hardware) and intangible (software) assets, or unexpected credit and liquidity exposures.

Likewise, the efficiency with which a system settles financial transactions can be described and assessed on the basis of:

- *Costs*, which are a key element in the assessment of whether the system is efficient for the participants. Besides the cost level, the assessment comprises the financing of the costs, including whether the fee structure is appropriate and transparent.
- *Applicability*, i.e. whether the services offered to the participants in connection with settlement meet the participants' business needs. In addition, the applicability of the system depends on whether the services are easy to fit into the participants' own systems, so that the indirect costs of using the system are kept as low as possible.

report *Central Bank Oversight of Payment and Settlement Systems*.[1] The principles are listed in Box 5. The principles in the report are generalised so as to be applicable to all types of payment and settlement systems. Danmarks Nationalbank's policy for oversight has been prepared in accordance with these principles.

[1] The report is available at www.bis.org/cpss.

GENERAL PRINCIPLES FOR OVERSIGHT Box 5

A. *Transparency*: Central banks should set out publicly their oversight policies, including the policy requirements or standards for systems and the criteria for determining which systems these apply to.
B. *International standards*: Central banks should adopt, where relevant, internationally recognised standards for payment and settlement systems.
C. *Effective powers and capacity*: Central banks should have the powers and capacity to carry out their oversight responsibilities effectively.
D. *Consistency*: Oversight standards should be applied consistently to comparable payment and settlement systems, including systems operated by the central bank.
E. *Cooperation*: Central banks, in promoting the safety and efficiency of payment and settlement systems, should cooperate with other relevant central banks and authorities.

In addition, central banks that participate in the oversight of cross-border systems or systems that settle in several currencies should observe the principles of *international cooperative oversight*.[1]

[1] See *Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries* (Lamfalussy Report), BIS, 1990. The report can be downloaded from www.bis.org/cpss.

THE FINANCIAL INFRASTRUCTURE IN DENMARK

In a modern economy, the settlement of payments, securities, etc. is concentrated on a few large systems, via which very large amounts are settled every year. This is also the case in Denmark, where the following three systems are at the core of the financial infrastructure:

- *Kronos*, Danmarks Nationalbank's real-time gross settlement system[1], which is used for large, time-critical payments in kroner between banking institutions, etc., monetary-policy transactions, net payments concerning the VP Settlement, the Sumclearing and the international currency-settlement system CLS, as well as the pledging of collateral when using the Scandinavian Cash Pool[2].
- The *VP Settlement*, which is VP Securities Services' multilateral net settlement system[1] for clearing and settlement of securities transactions, etc.
- The *Sumclearing*, which is the Danish Bankers Association's multilateral net settlement system for settlement of retail payments, e.g. Dankort (debit card) transactions and Betalingsservice (direct debit).

[1] In a real-time gross settlement system, payments and securities are settled finally and irrevocably during the system's opening hours immediately after receipt of payment or settlement instructions, while payments and securities in a multilateral net settlement system are settled on a net basis at fixed times during the settlement day. For further descriptions of the systems, see Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapters 3 and 6.

[2] For a description of the Scandinavian Cash Pool, see Danmarks Nationalbank, *Payment Systems in Denmark*, 2005, Chapter 5.

TRANSACTIONS IN DANISH SYSTEMS — Table 4

Kr. billion	2004	2005	2006
Kronos	53,040	60,633	66,089
VP Settlement	27,951	25,198	23,581
Sumclearing	4,421	5,027	5,349
CLS (krone-denominated payments)	19,812	31,333	47,596
TARGET (payments by Danish participants)	24,362	28,123	23,520
Gross domestic product	1,459	1,552	1,638

Source: VP Securities Services, PBS, Statistics Denmark and Danmarks Nationalbank.

In addition, transactions in Danish kroner are to a large extent settled in the international multilateral clearing and settlement system for foreign-exchange transactions, CLS[1]. Another system of major importance to the Danish financial sector is the trans-European payment system, Target, which is used for settlement of payments in euro.

The value of transactions in these systems far exceeds Denmark's gross domestic product, cf. Table 4.

Danmarks Nationalbank's oversight of the financial infrastructure focuses first of all on the three Danish systems. The reason is that primarily incidents in these systems are assessed to have a potential widespread economic impact that could ultimately jeopardise financial stability in Denmark, cf. Box 6. Danmarks Nationalbank participates in the oversight of CLS and Target, cf. the description below of Danmarks Nationalbank's cooperation with other authorities and central banks in relation to oversight.

Payments and financial transactions outside the systems

In practice, the value of payments and financial transactions in Denmark is even higher than Table 4 shows. This applies particularly to payments and financial transactions where one of the parties is a non-resident. These transactions may, for example, be executed via foreign payment and settlement systems or via correspondent banks. Since such transactions are, however, less concentrated on a few systems, and are not in Danish kroner, the consequences of a possible failure of one of these systems for the Danish financial sector and economy will in normal circumstances be far less pronounced.[2]

1 Continuous Linked Settlement.

2 Transactions in foreign systems equivalent to Kronos, VP Settlement and the Sumclearing are also fundamentally subject to oversight by the host country's central bank in the same way that Danmarks Nationalbank oversees the Danish systems.

CONSEQUENCES OF INCIDENTS IN PAYMENT AND SETTLEMENT SYSTEMS Box 6

Modern payment and settlement systems are characterised by a high degree of stability due to the extensive measures taken to enhance system security. Consequently, the probability of a prolonged system disruption is very small.

If disruption nevertheless occurs – e.g. due to the failure of a key system or insufficient liquidity among participants – the consequences may be considerable.[1] The reason is that large, unforeseen outstandings may build up rapidly if transactions are not settled as planned.

Generally, the consequences of a disruption in the settlement of payments, securities transactions, etc. may be grouped under two headings:

- The disruption may have a *widespread economic impact* by interrupting the settlement of payments and financial transactions – e.g. due to delays or because transactions are not executed as expected.
- In a worst-case scenario, the disruption may *jeopardise financial stability* – if the inability of one or more banking institutions to honour their obligations triggers a chain reaction whereby other banking institutions cannot meet their obligations either.

Systems are referred to as systemically important if a system incident could have such consequences.

[1] This is clearly illustrated by incidents in payment and settlement systems worldwide within the last few decades. A description of some of these incidents can be found in *Payment Systems in Denmark,* Danmarks Nationalbank, 2005, Chapter 1.

Finally, many transactions, primarily retail payments, are internalised, i.e. funds are transferred between customers (accounts) in the same banking institution. In a financial sector such as Denmark's, which is dominated by a few large institutions, these transactions account for a considerable proportion of all transactions.[1]

THE STATUTORY BASIS FOR DANMARKS NATIONALBANK'S OVERSIGHT

Oversight by Danmarks Nationalbank must comprise all elements that are of major significance to settlement of payments in Denmark, cf. section 1 of the Danmarks Nationalbank Act from 1936. Oversight is also conducted on the basis of the powers vested in Danmarks Nationalbank since 1 March 2006 pursuant to the Securities Trading Act.

In practice, however, oversight is seldom undertaken with direct reference to the powers under the Securities Trading Act. The reason is that the aim of Danmarks Nationalbank's oversight is typically to contribute to preparing the financial infrastructure for future challenges, so

[1] In general, the central banks' oversight of payment and settlement systems is directed at the overall system complex. As regards the circumstances of the participants and system operators, oversight is based on that they are subject to financial supervision. This also applies in situations where the settlement process is internalised in an institution that is subject to supervision.

that problems in relation to the safety and efficiency of the systems are avoided as far as possible. In the experience of Danmarks Nationalbank, this is best achieved through ongoing dialogue with system owners, operators, participants and other stakeholders.

Oversight whereby central banks seek to implement system adjustments in a dialogue with stakeholders is internationally often referred to as moral suasion.

The Danmarks Nationalbank Act

Danmarks Nationalbank's role in relation to payment and settlement systems has historically been defined in section 1 of the Danmarks Nationalbank Act, which states that the role of the bank is to "maintain a safe and secure currency system in Denmark, and to facilitate and regulate the traffic in money and the extension of credit". This section empowers Danmarks Nationalbank to pursue an objective of promoting safe and efficient payment and settlement systems in Denmark, including by overseeing the systems.

Section 1 of the Danmarks Nationalbank Act comprises a number of regulatory tasks that are not directed at any particular recipient. In relation to oversight of a payment and settlement system, this has in practice been interpreted as being aimed at the system owner and the system's management. In principle, requests for information about the system must therefore be addressed to these persons. Oversight is not the only means by which Danmarks Nationalbank can fulfil its objective in relation to payment and settlement systems, cf. Box 7.

The objectives stated in section 1 of the Danmarks Nationalbank Act are also one of the reasons that Danmarks Nationalbank – like most other central banks – operates a payment system (Kronos). The role as both overseer and owner of a payment system requires special attention to how the central bank handles its oversight tasks, cf. Box 5 (principle D). This is reflected in Danmarks Nationalbank's general management and organisation of the oversight of the Danish systems, cf. below.

The Securities Trading Act

Since 1 March 2006, Danmarks Nationalbank's powers to oversee payment systems have been defined in the Securities Trading Act. Pursuant to section 86 (2), Danmarks Nationalbank must oversee the payment systems that it deems to be of major significance to the settlement of payments in Denmark or the achievement of Danmarks Nationalbank's monetary-policy transactions. The 2006 amendment to the Securities Trading Act also regulates the division of work between Danmarks Nationalbank and the Danish Financial Supervisory Authority,

DANMARKS NATIONALBANK'S ROLE IN PAYMENTS IN DENMARK[1] Box 7

Danmarks Nationalbank has been actively involved in the settlement of payments in Denmark for many years. Since the emergence of bank-based settlement of payments in Denmark in the mid-19th century, Danmarks Nationalbank has been at the hub of the settlement of payments between Danish banking institutions, both directly and as the settlement bank for payment and settlement systems outside Danmarks Nationalbank. Danmarks Nationalbank's initiatives to promote safe and efficient settlement of payments in Denmark have therefore often included adjustment of the terms and conditions for settlement of payments via accounts at Danmarks Nationalbank.

Likewise, Danmarks Nationalbank has been active in the development of the financial infrastructure in Denmark. In 1927, Danmarks Nationalbank thus participated in the establishment of a retail payment system in Denmark (the Checkclearing, a forerunner of the present Sumclearing). Danmarks Nationalbank also participated in the establishment of VP Securities Services in connection with the dematerialisation of Danish bonds in 1983. In both cases, the aim was to rationalise clearing and settlement – thereby enhancing safety, too.

The series of adjustments to Danmarks Nationalbank's monetary-policy instruments in the 1990s was also aimed at facilitating transactions in the interbank money market (e.g. by developing a repo market in Danish kroner) and to minimise the risk on settlement of payments (e.g. by requiring collateral on the settlement of payments on the basis of credit extended by Danmarks Nationalbank).

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

in that Danmarks Nationalbank has taken over a number of regulatory tasks from the Danish Financial Supervisory Authority in relation to the systems that are subject to oversight, cf. section 57 a (7). For registered systems not subject to oversight by Danmarks Nationalbank, these tasks are still undertaken by the Danish Financial Supervisory Authority, cf. section 86 (1).

The amendment to the Securities Trading Act has not changed the purpose of the oversight. The explanatory notes to the Bill presented to the Folketing (Parliament) thus state that oversight is still based on the Danmarks Nationalbank Act and international standards.

The payment systems that are subject to oversight by Danmarks Nationalbank are listed in an executive order issued by the Danish Financial Supervisory Authority, cf. section 86 (3).[1] Oversight takes place on the basis of information requested in accordance with the provisions of section 87.

[1] Executive Order No. 769 of 5 July 2006 on the payment systems that are subject to oversight by Danmarks Nationalbank. At present the Executive Order only lists the Sumclearing. However, the principle that oversight must be consistent implies that Danmarks Nationalbank's own system is subject to equivalent oversight, cf. Box 5.

Section 93 (2) empowers Danmarks Nationalbank to order the owner and management of a payment system to supply the information that Danmarks Nationalbank finds necessary for its oversight of the system, and to make the necessary adjustments so that the system complies with section 86 (2). Failure to do so is a criminal offence.

In addition, section 95 empowers Danmarks Nationalbank to impose default fines on the persons responsible for a systemically important payment system in the event that an order issued in connection with oversight is not observed. Danmarks Nationalbank has never previously had access to this remedy. The Danish Financial Supervisory Authority has similar powers in relation to the payment systems that it supervises.

Unlike the activities of the Danish Financial Supervisory Authority, oversight by Danmarks Nationalbank is not subject to the authority of the Danish Securities Council. This difference is attributable to the independence of Danmarks Nationalbank. Likewise, Danmarks Nationalbank's oversight decisions cannot be appealed to the Company Appeals Board. Should a payment system find it necessary to have a decision made by Danmarks Nationalbank in its oversight capacity reversed, the case must be referred to a court of law.

Danmarks Nationalbank's oversight of the VP Settlement is not explicitly regulated by the Securities Trading Act. Since oversight of this system takes place in cooperation with the Danish Financial Supervisory Authority, it will, however, be possible to apply similar provisions to this system in accordance with the powers vested in the Danish Financial Supervisory Authority. The explanatory notes to the Securities Trading Act acknowledge Danmarks Nationalbank's oversight of other systems than payment systems, including securities settlement systems such as the VP Settlement.

DANMARKS NATIONALBANK'S ADMINISTRATION OF ITS OVERSIGHT

Oversight by Danmarks Nationalbank is a regulatory task undertaken in accordance with Danish administrative practice. This applies irrespective of whether the oversight is based solely on section 1 of the Danmarks Nationalbank Act or the powers defined in the Securities Trading Act.

Framework for undertaking oversight

Danmarks Nationalbank obtains the information it requires in order to oversee payment and settlement systems, including confidential information. Such information is protected by the rules of confidentiality to which Danmarks Nationalbank's employees are subject, i.e.

sections 27-31 of the Public Administration Act and section 152 of the Danish Penal Code.

Information obtained in connection with oversight may be passed on to another administrative authority if it can be assumed that the information will be of major significance to the activities of this authority, or to a decision the authority is to take.

All decisions by Danmarks Nationalbank in its oversight capacity will be given in writing, stating the reasons. In this connection an account will be given of all significant facts and circumstances of relevance to the decision, including the legal provisions and administrative assessments on which it is based. In connection with oversight it is of particular relevance how international standards have been implemented in a decision, cf. below.

Before a decision in relation to a system is taken, the management of the system in question will always be given the opportunity to submit a statement.

The implementation of oversight by Danmarks Nationalbank in practice is described in Box 8.

Organisation of Danmarks Nationalbank's oversight

The basic administrative principles concerning the impartiality of Danish authorities are of special significance in relation to oversight of the financial infrastructure since Danmarks Nationalbank itself operates the Kronos payment system.

The operation of Kronos is part of Danmarks Nationalbank's fulfilment of its overall objectives, as stated in section 1 of the Danmarks Nationalbank Act, including promoting safe and efficient payment and settlement systems. In this connection, great importance is attached to consistency in the oversight of the Danish systems, cf. Box 5 (principle D), i.e. that oversight of Kronos and the privately owned systems, the VP Settlement and the Sumclearing, takes place in accordance with the administrative principles of equal treatment and proportionality.

In terms of the practical planning of the oversight tasks, including observation of the general principles for oversight, Danmarks Nationalbank has chosen to segregate the oversight function from the development and operation of Kronos. The aim is to prevent irrelevant considerations from influencing the decisions made by the staff of the oversight function in relation to Kronos.

As regards oversight of Kronos, importance is also attached to enabling participants to give their assessment of whether the system is sufficiently safe and efficient. This is based on a long-standing tradition

DANMARKS NATIONALBANK'S OVERSIGHT IN PRACTICE Box 8

Danmarks Nationalbank's oversight of payment and settlement systems can overall be split into three tasks.

The first task is to *monitor the development* in the systems by collecting information. There are multiple sources of information, including:

- The statutory basis for the systems
- Agreements between system owners, operators, participants and settlement banks
- System descriptions, user guidelines and procedures
- Contingency plans
- Outcome of security analyses, scenario analyses and stress tests
- Statistics of transaction values and volumes and system performance
- Management reporting and accounts, including audit reports.

The second task is to *assess* whether the systems comply with international standards. The assessment of whether the functioning of the systems is satisfactory will not be limited to compliance with international standards. If specific circumstances are of major significance to the functioning of the systems, these circumstances will be taken into account in Danmarks Nationalbank's oversight, even if they are not described in international standards.

The third task is to *induce changes* to the systems if such changes are considered necessary. Depending on the circumstances and the statutory basis, Danmarks Nationalbank may bring about changes in several ways, including by:

- Dialogue with the stakeholders to promote adjustments to the systems and the financial infrastructure that Danmarks Nationalbank finds desirable.
- Publishing assessment reports on the systems with recommendations for improvements.
- Indicating its position on payment and settlement services and the financial infrastructure in Denmark in articles and publications.[1]
- Cooperation with other authorities and central banks. This may e.g. be necessary if the change relates to circumstances within the remit of other authorities, e.g. supervisory or competition authorities.
- Issuing orders – when legally empowered to do so – concerning system improvements, possibly supplemented with fines.

[1] An example of this can be found in Torben Nielsen, Risks on Settlement of Large Payments, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2005.

not to implement major system amendments until after consultation with the participants has taken place.

The scope of Danmarks Nationalbank's oversight

As described above, oversight of the financial infrastructure in Denmark is concentrated on the three systemically important payment and settlement systems, Kronos, the VP Settlement and the Sumclearing. For these systems, it is necessary to clarify the limits to the oversight with a

view to specifying the responsibility incurred by Danmarks Nationalbank in connection with oversight. This raises three issues:

- Oversight must include all elements of significance to settlement via the systems. The extent thereof – and thus the scope of the information requested by Danmarks Nationalbank – will depend on how the systems are delimited.
- Danmarks Nationalbank defines a payment system as "the total set of payment instruments, procedures and IT systems used in the settlement of payments". Correspondingly, a securities settlement system is defined as "the total set of institutional arrangements used for confirmation, clearing and settlement of securities transactions and provision of custody services for securities".
- Danmarks Nationalbank's oversight is normally directed at those responsible for the systems (system owners). This raises special issues if settlement has been outsourced to a service provider.
- Outsourcing of services does not in any way limit the system owner's responsibility for the system, so in that situation Danmarks Nationalbank's oversight takes the system owner's contracts with the service provider as the point of departure. If these contracts do not make it possible for Danmarks Nationalbank to determine whether the system is safe and efficient, the system owner will be requested to adjust the contracts to the extent required.
- Correspondingly, Danmarks Nationalbank's oversight cannot be directed at subcontractors to the systems.

If the circumstances of a subcontractor (e.g. a telecom or electricity company) constitute a weakness for the system's safety and efficiency, and the system owner has done everything it can to remedy the weaknesses, Danmarks Nationalbank may, where relevant, involve other authorities that have the necessary powers in relation to the subcontractors.

Translation of international standards into system requirements

An important element of Danmarks Nationalbank's oversight is to assess whether the Danish systems comply with international standards in respect of risk management and efficiency, as described in Box 4. For Kronos and the Sumclearing, such assessments are based on the *Core Principles for Systemically Important Payment Systems*, while the VP Settlement is assessed in relation to the *Recommendations for Securities Settlement Systems*.[1]

[1] The reports are available at www.bis.org/cpss.

SCALE OF ASSESSMENT FOR OBSERVANCE OF INTERNATIONAL STANDARDS Box 9

The assessment of whether the systems comply with international standards is based on the following scale:

- *Observed*: Only less significant issues and shortcomings, if any, found. Danmarks Nationalbank will appropriately follow up on the issues found, e.g. in connection with the ongoing dialogue with the system owner.
- *Broadly observed*: The issues and shortcomings found can only jeopardise financial stability to a limited extent. Nevertheless, the issues and shortcomings are deemed to be so significant that the system owner is recommended to find a solution. No binding deadline is set for implementation of the solution. Danmarks Nationalbank will follow up on the recommendation from time to time so as to ensure that the situation does not deteriorate.
- *Partly observed*: Serious issues and shortcomings found that may jeopardise financial stability and should therefore be remedied. If this is not done, Danmarks Nationalbank can issue an order to a payment system, cf. its power under the Securities Trading Act. A deadline is set for implementation of a solution in cooperation between Danmarks Nationalbank and the system owner. Close follow-up on the part of Danmarks Nationalbank, often including regular status reports by the system owner.
- *Non-observed*: Very serious issues and shortcomings found that may to an unacceptable degree jeopardise financial stability and must therefore be remedied as soon as possible. If this is not done, Danmarks Nationalbank will issue an order concerning the payment system, cf. its power under the Securities Trading Act. The order will include a tight deadline for the system owner's implementation of a solution. Very close follow-up, including frequent status reporting.

If a system does not fully comply with a specific standard, Danmarks Nationalbank may decide that this must be remedied within a given time horizon. To the extent that a decision is not fully in favour of a system, the grounds will be stated, cf. section 22 of the Public Administration Act. The grounds must clearly state what is required in order to rectify the matter, cf. section 24 of the Act.

This entails that the international standards must be adequately translated into specific, measurable requirements, since in many aspects the standards are formulated as overall principles that cannot immediately be applied to the Danish systems. One reason for this is that the standards are aimed at a wide range of financial infrastructures and system designs. In addition, the international standards have in many respects been formulated to allow for special circumstances, including country-specific circumstances. There may thus be requirements that should be fulfilled by one system, but not necessarily by another system.

The translation of standards is e.g. based on the extensive notes provided in connection with the publication of the standards. In addition, more specialised standards will be incorporated in a number of areas.

In relation to securities settlement systems, the translation of the standards into specific requirements has already taken place to a great extent. The *Recommendations for Securities Settlement Systems* have thus been supplemented with an *Assessment Methodology* that elaborates on and amplifies the standards with which safe and efficient securities settlement systems should comply. The Assessment Methodology also qualifies the degree of non-compliance in the event that a system does not comply with all of the requirements.

The scale used by Danmarks Nationalbank in its assessment of the compliance of the Danish systems with international standards is described in Box 9.

Trade-off between safety and efficiency

A key issue in connection with Danmarks Nationalbank's oversight is to ensure a suitable trade-off between respectively the safety and the efficiency of the Danish payment and settlement systems. The international standards for payment and settlement systems thus state that a significant element in the design of the systems should be not only to ensure low risk, but also to provide a high degree of efficiency, cf. Box 4.

In many cases, ensuring efficiency and limiting risks are complementary objectives since the increased safety of a system only contributes to reducing risk if the systems are used as envisaged. This will only be the case if the participants perceive the systems as efficient. However, there will always be a certain trade-off between safety and efficiency since the investment in enhanced safety measures could otherwise have been used for improved services to participants, or the reduction of their fees for using the system.

It cannot be assumed either that all stakeholders will share the same view on the optimum safety level.[1] In certain situations society in general calls for a higher level of safety than the participants consider to be optimal from a commercial point of view. This is among other things because the probability of payment system disruptions is very little, but on the other hand the consequences for the Danish economy will be significant if the systems are not well-functioning. The small probability means that it does not always make a good business case for participants to dedicate considerable resources to the safety of the systems, while the potential consequences for society mean that from an economic point of view the optimum solution is to make sure that the systems are sufficiently safe.

[1] For a description of the impact of network effects, externalities and economies of scale on the design of payment and settlement systems, see *Payment Systems in Denmark*, Danmarks Nationalbank, 2005, Chapter 1.

COOPERATION WITH OTHER AUTHORITIES AND CENTRAL BANKS

Pursuant to section 1 of the Danmarks Nationalbank Act, Danmarks Nationalbank's oversight affects many areas, including the remits of other Danish authorities.

Danmarks Nationalbank's oversight takes place in cooperation with the Danish Financial Supervisory Authority, which is responsible for the supervision of financial institutions in Denmark. This responsibility comprises both Danish system participants and data processing centres owned by the financial institutions. In addition, the Danish Financial Supervisory Authority supervises the securities markets. Against this background, in 2001 Danmarks Nationalbank concluded a Memorandum of Understanding (MoU) with the Danish Financial Supervisory Authority. This MoU was revised on the incorporation in the Securities Trading Act as of 1 March 2006 of the rights and obligations vested in Danmarks Nationalbank in connection with the oversight of payment systems. The MoU lays down the overall framework for this cooperation, including:

- The statutory framework for Danmarks Nationalbank's oversight and the Danish Financial Supervisory Authority's supervision of payment systems, clearing centres, etc.
- The international standards to be observed by the systems, etc.
- Organisation of the cooperation so that all relevant matters are subject to oversight and supervision in a manner whereby no excessive administrative burdens are imposed on the system owners, etc.
- The payment systems, clearing centres, etc. comprised by the MoU.[1]

The oversight of the VP Settlement and the Sumclearing also affects areas within the remit of the Danish Competition Authority. This e.g. applies to the element of oversight that relates to the systems' efficiency. The same applies in relation to the Consumer Ombudsman, who is responsible for the rules on payment instruments laid down in the Act on Certain Means of Payment. However, it has not been deemed necessary to formalise the cooperation with these authorities in the same way as for the Danish Financial Supervisory Authority.

Internationally, Danmarks Nationalbank participates in the oversight of Target, the ECB's RTGS system for settlement of large, time-critical payments in euro. Oversight of this system is undertaken by the central banks that are connected to the system, headed by the European

[1] The MoU is included as Annex 3 of the general MoU between Danmarks Nationalbank and the Danish Financial Supervisory Authority and is available at www.nationalbanken.dk under Rules/Memorandum of Understanding.

Central Bank (ECB). Likewise, Danmarks Nationalbank participates in the oversight of CLS, the international system for settlement of foreign-exchange transactions. Oversight of this system is undertaken by the national central banks for the participating currencies[1]. The Federal Reserve Bank of New York holds the overall responsibility for the oversight of CLS. Oversight of Target and CLS are based on the principles for international cooperative oversight laid down in connection with the publication of the Lamfalussy Report in 1990, cf. Box 5.

[1] For further information on CLS, see Lone Natorp and Tina Skotte Sørensen, Settlement of Foreign-Exchange Transactions, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2006.

Effects of New Accounting and Capital-Adequacy Rules

The new accounting and capital-adequacy rules that came into force on 1 January 2005 and 1 January 2007, respectively, are of major significance to the banking institutions. Both entail new calculation and management methods, and thereby new game rules. This chapter reviews some of the effects of the new accounting and capital-adequacy rules and how they will interact.

The new accounting rules entail that, compared with the previous provisions, write-downs are reduced. According to calculations published by the banks themselves and the calculations in this chapter, the new capital-adequacy rules imply that the banking institutions' calculated capital requirements will decline in monetary terms.

The capital that exceeds the capital requirement constitutes the banking institutions' excess capital adequacy, which can be seen as a buffer in the event of unforeseen losses. The board and management of a banking institution are responsible for ensuring that the banking institution has sufficient capital to meet the risks it faces. The excess capital adequacy held by a banking institution depends on a number of factors, e.g. the banking institution's assessment of the effect of the new accounting rules, the rating agencies' assessment of the banking institution, and its own assessment of the opportunities to procure new capital.

INTRODUCTION

The new accounting and capital-adequacy rules are of major significance to the banking institutions. The accounting rules regulate the banking institutions' reporting and include rules on valuation of the lending portfolio, while the capital-adequacy rules regulate the banking institutions' capital requirements.

New accounting rules entered into force on 1 January 2005. Among other things, the rules entail that provisions for future losses must no longer be based on a prudential principle, but on a neutrality principle. The prudential principle entailed that the banking institutions previously made provisions for losses assessed to be unavoidable (B provisions) and for probable losses (A provisions). In contrast, the neutrality principle

entails that the banking institutions may only write down an exposure when there is objective evidence of impairment.

The new capital-adequacy rules, Basel II, entered into force on 1 January 2007. The capital requirements of banking institutions have been changed substantially in relation to the previous rules, Basel I. The requirements are now more institution-specific and to a greater extent reflect concrete risks incurred by the individual banking institution.

Below, the key elements of the two new rule sets are outlined, and their effects are assessed. The focus is on ceteris paribus assumptions, while the implementation in practice will also depend on e.g. the behaviour of the banks. Both sets of rules entail new calculation and management methods, and thus also new game rules. The actual effects of the rules will therefore depend on how the boards and managements of the banks choose to act. The board and management of a banking institution are responsible for ensuring that it has sufficient capital to meet the risks it faces. The excess capital adequacy held by a banking institution depends on a number of factors, e.g. the banking institution's assessment of the effect of the new accounting rules, the rating agencies' assessment of the banking institution, and its own assessment of the opportunities to procure new capital.

THE NEW RULES

Accounting rules

As from 1 January 2005, the consolidated financial statements of all financial enterprises must be presented in accordance with IFRS[1]. Other financial statements are presented in accordance with Danish accounting rules that are issued by the Danish Financial Supervisory Authority and compatible with IFRS.[2] All banking institutions may, however, opt for IFRS for both the group and the parent company.

The following focuses on the rules concerning write-downs on loans and receivables.[3] However, not only the rules concerning write-downs on loans affect the banks' capital, since the accounting rules introduce a large number of other changes that affect the accounts and thereby the capital, but these are disregarded here.

Under the new accounting rules, the valuation of loans is changed. Until now, loans have been stated at nominal value less provisions. Now, they must be stated at amortised cost less any impairment (write-down).

[1] The International Financial Reporting Standards.
[2] That the Danish accounting rules are compatible with IFRS means that the rules are as far as possible within the framework of IFRS. There are, however, exceptions, e.g. concerning measurement of subsidiaries and associates.
[3] In the rest of the text, the term loans is used for loans and receivables.

Loans are written down when there is objective evidence of impairment, e.g. because the borrower is in dire financial straits or in breach of contract. The loan must be written down to the present value of the expected future payments on the loan, including realisation of collateral.

The new accounting rules entail that write-downs will typically be made at a later time than the provisions under the previous rules. The reason is that provisions must no longer be made for probable losses, but only in the event of objective evidence of losses. This prevents the banking institutions from building up hidden reserves.

Capital-adequacy rules

The new capital-adequacy rules rest on three pillars.[1] Pillar I specifies the rules for calculation of the minimum capital requirement for credit risk, market risk and operational risk. The most extensive changes are seen in relation to credit risk, where the uniform Basel I rules have been replaced by more institution-specific rules, whereby the capital requirements to a greater extent reflect the risks incurred by each individual banking institution. Operational risk has not previously been explicitly subject to the capital-adequacy rules. In terms of market risk, the new rules differ little from the old rules.

Under Basel II, the banking institutions have a choice of three different approaches to calculation of their capital requirements for credit risk: the standardised approach, which will be applied by the vast majority of Danish banking institutions, the foundation internal ratings based (IRB) approach and the advanced IRB approach.[2] The following banking institutions have announced in their financial statements that they expect to apply IRB approaches: Danske Bank, Nordea Bank Danmark, Jyske Bank, Sydbank, Alm. Brand Bank, FIH Erhvervsbank, Nykredit Bank and Lån & Spar Bank. The total assets of these banking institutions constitute around 90 per cent of the aggregate assets of the banking institutions in Denmark.

Under Pillar II, the board and management of the individual banking institution must calculate its solvency requirement, which may exceed the statutory 8 per cent. On calculating the solvency requirement, the

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

[2] The standardised approach is based on Basel I, but the exposures must be broken down into more risk classes with different risk weights. For loans to private individuals and to certain small and medium-sized enterprises, the risk weights, and thereby the capital requirements, have been reduced compared with Basel I. The two other approaches to calculation of the capital requirement for credit risk are based on application of the banking institutions' own knowledge of credit risk on the various exposures, and are therefore referred to as internal ratings based approaches.

board and management must take into account the significant risks faced by the banking institution, e.g. earnings capacity, earnings stability, quality of assets, expected future growth, concentration risk, opportunities to procure capital, dividend policy, cyclical factors, strategic risk and reputational risk. The board and management's assessment of the solvency requirement must be discussed with the Danish Financial Supervisory Authority, which can ultimately order the banking institution to hold capital in excess of the statutory 8 per cent.

Pillar III of the capital-adequacy rules contains provisions on the information to be published, e.g. concerning risk, risk management and capital structure. If the Danish Financial Supervisory Authority orders a banking institution to hold capital in excess of the statutory minimum of 8 per cent, there is, however, no requirement to publish this, unless required by a stock exchange, and nor is there any requirement to publish the banking institutions' solvency requirements.

Under the new capital-adequacy rules, the responsibility of the board and management has become more clear. While the capital requirement under Basel I was determined on the basis of mechanical rules, the board and management of the banking institution must now actively assess a number of risks.

Interaction between the new accounting and capital-adequacy rules

The accounting and capital-adequacy rules are two independent sets of rules. The underlying philosophies differ, as do several of the definitions. The capital-adequacy rules are based on "expected loss", which means that expected future loss events must be taken into account. A default is deemed to have occurred when the banking institution considers that the borrower is unlikely to pay its credit obligations in full, or material credit obligations have been past due for more than 90 days. The accounting rules, on the other hand, are based on "incurred loss", whereby only events that have already occurred are to be taken into account. There must be objective evidence of impairment before the value of an exposure can be written down. The time horizons in the two sets of rules also differ. Under the accounting rules, the loan must be written down to the current value of all expected future payments on the loan. Under the capital-adequacy rules, the probability of default is, on the other hand, taken to mean the probability of default within one year.

Regarding the interaction between the two sets of rules, the Danish Financial Supervisory Authority writes that there "is an error [in the presentation of the accounts] if a model is based on the use of PD [probability of default] without this probability being adjusted so that it

can be used not only for capital-adequacy purposes, but also for accounting purposes".[1]

Even though the fundamental philosophies differ, the accounting and capital-adequacy rules are naturally interrelated. If a loan is written down, the banking institution's lending will decrease by the value of the write-down. Under the standardised approach, whereby a banking institution's capital requirement is calculated on the basis of the lending portfolio, write-down of the loan will entail a reduction of the capital requirement.[2] If the write-downs are lower than the previous provisions, the value of loans under the new rules will exceed the value under the old rules, and the new accounting rules will thus in themselves augment the capital requirement.[3]

The accounting and capital-adequacy rules are also interrelated via Pillar II of the capital-adequacy rules. The banking institutions must assess the quality of their assets with special focus the on loans that have not been written down in the accounts, or which have only been partly written down. If the quality of the loans is impaired, or the loans are assessed to be undergoing impairment, this must be taken into account under Pillar II. Under the capital-adequacy rules, the Danish Financial Supervisory Authority may order the banking institution to write down its assets, etc. for the purpose of calculation of the base capital under Pillar II. This provision may be applied as an alternative to determining an individual solvency requirement.

EFFECTS OF THE NEW RULES

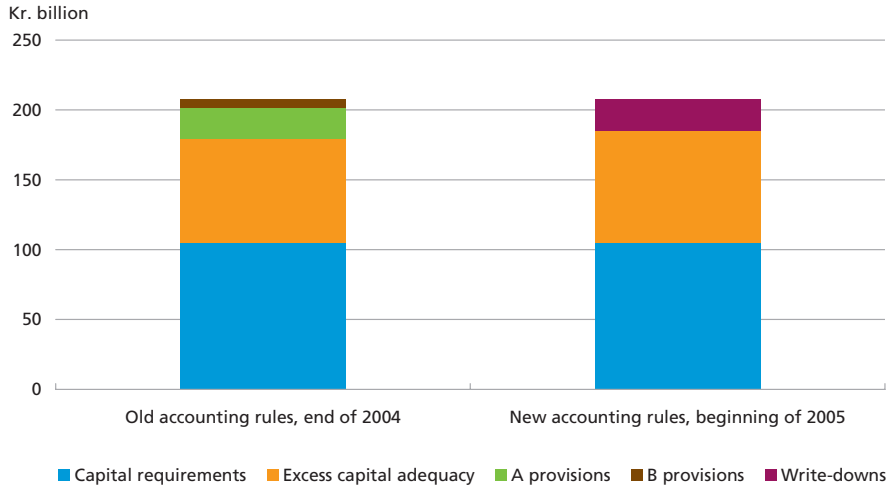
Accounting rules

The first column of Chart 32 describes the situation at end-2004, before the new accounting rules entered into force. At the end of 2004 the financial statements were presented in accordance with the old rules, with both A and B provisions. Under the old rules, it could be argued that the banking institutions' buffer comprises the excess capital adequacy, i.e. the part of the capital that exceeds the statutory 8 per cent, as well as a large part of the A provisions, i.e. the provisions for probable losses. If this definition is applied, the buffer amounted to almost kr. 100 billion at end-2004 (the yellow and green areas of the first column).

[1] Briefing on accounting rules for recognition and measurement of loans and guarantees, etc. (in Danish only), Danish Financial Supervisory Authority, 6 December 2006, page 8.
[2] For banking institutions applying the IRB approaches this simple correlation does not exist.
[3] As stated in the section on the new accounting rules, the valuation of loans is changed. So far, loans have been stated at nominal value less provisions. Now loans must be stated at amortised cost less any impairment (write-down). The above consideration does not take account of the change from nominal value to amortised cost.

OLD AND NEW ACCOUNTING RULES: EXCESS CAPITAL ADEQUACY AND PROVISIONS/WRITE-DOWNS, KR. BILLION

Chart 32



Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. These banking institutions' total assets constitute 97 per cent of the total assets of the banking institutions in the Danish Financial Supervisory Authority's groups 1-3. The first column is based on balance-sheet data at the end of 2004. The second column is based on the banking institutions' opening balance sheets at the beginning of 2005. Only the impact of the changed accounting rules on provisions for/write-downs on loans is considered, i.e. the effects of other changes in the accounting rules are not taken into account.

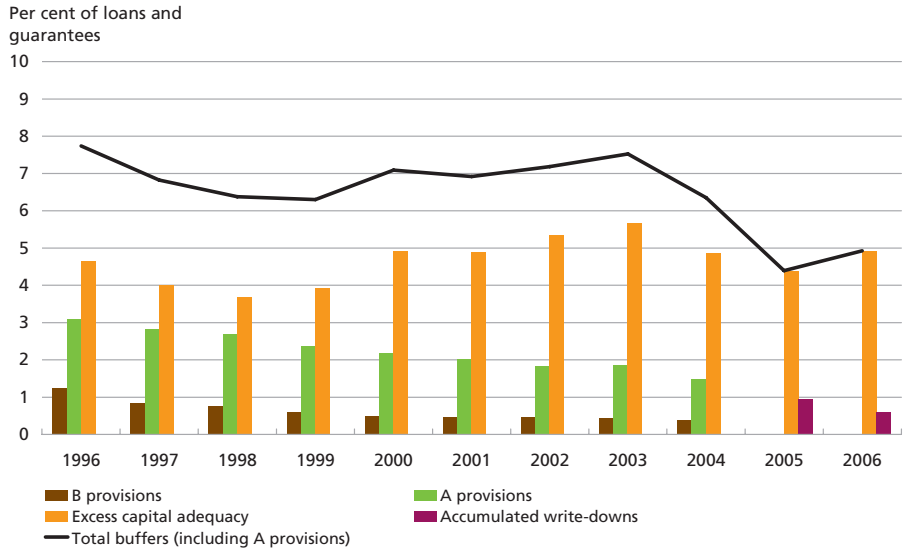
Source: Financial statements and Danish Financial Supervisory Authority.

As from the beginning of 2005, when the new accounting rules entered into force, there are no longer A and B provisions, and a loan may only be written down if there is objective evidence of impairment. The new rules were implemented in practice at the beginning of 2005 when the banking institutions prepared new opening balance sheets in compliance with the new rules. The value of loans was written up by an amount equivalent to the reversed provisions, which had a derived positive effect on equity capital. The banking institutions' opening balance sheets show that the difference between the aggregate A and B provisions at end-2004 and the write-downs at the beginning of 2005 is almost kr. 6 billion.[1] [2] The new accounting rules have thus increased equity capital, and thereby the excess capital adequacy, by elements of the amounts that were previously reserved for provisions, without affecting the risk and risk profile.

[1] Reservations are made for the banking institutions' subsequent adjustments of the opening balance sheets.

[2] It should be emphasised that A and B provisions are not directly comparable with the current write-downs. For example, B provisions are not "identical" to write-downs.

THE BANKING INSTITUTIONS' EXCESS CAPITAL ADEQUACY, PROVISIONS AND WRITE-DOWNS AS RATIOS OF LOANS AND GUARANTEES, 1996-2006 Chart 33



Note: The Chart comprises all banking institutions in the Danish Financial Supervisory Authority's groups 1-3. As from 2005, the new accounting principles are applied to write-downs on loans and guarantees. Write-downs are not directly comparable with the previous A and B provisions for losses on loans and guarantees.
Source: Danish Financial Supervisory Authority.

The situation at the beginning of 2005 is illustrated by the second column of Chart 32, where the banks' buffer now solely comprise the excess capital adequacy.

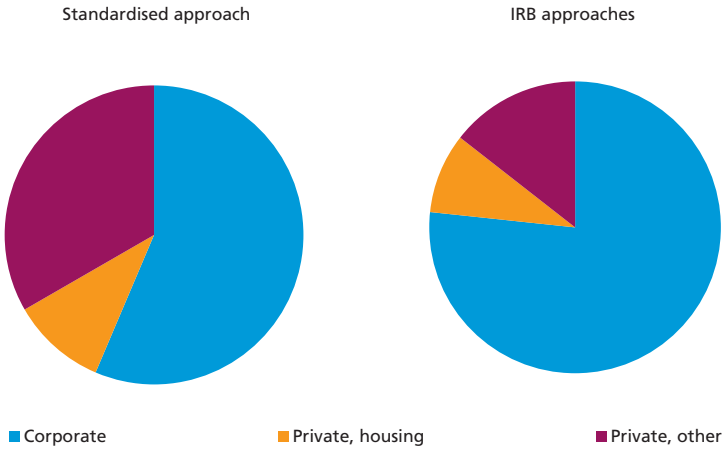
Since the new accounting rules were implemented at the beginning of 2005, the write-downs have decreased further, cf. Chart 33. This is partly attributable to the favourable cyclical position, and partly to the banking institutions' ongoing adjustment to the new accounting rules.

The actual development from 1996 to 2006 in Chart 33 shows that the banking institutions' buffers as a ratio of loans and guarantees were more or less stable in the period from 1996 to 2003, when the level fluctuated around 7 per cent, and that the buffers have subsequently decreased to around 5 per cent.

Capital-adequacy rules

On 1 January 2007 the new capital-adequacy rules, Basel II, entered into force, albeit with effect from 1 January 2008 with regard to the application of the most advanced IRB approaches. In this section, the effect of the new capital-adequacy rules is quantified by comparing the minimum capital requirement in krone terms under Basel I and the capital requirement under Pillar I of Basel II. Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank and categories B and C are analysed.

BREAKDOWN OF LENDING BY CORPORATE, PRIVATE (HOUSING), AND PRIVATE (OTHER) FOR BANKING INSTITUTIONS APPLYING THE STANDARDISED APPROACH AND THE IRB APPROACHES, END-2004, PER CENT Chart 34



Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. Financial statements are the basis for the breakdown by corporate and private lending. The MFI statistics are used to break down lending to the private sector by housing and other lending. Data from end-2004.
Source: Financial statements and MFI statistics.

Calculations are made of the changes in the minimum capital requirements for credit risk and operational risk, respectively. The minimum capital requirement for market risk is assumed to remain more or less unchanged on the transition to the new rules. In the calculations and the reporting of the results, the effects of Pillar II are disregarded. The fact that banking institutions applying IRB approaches must observe a transitional arrangement is not taken into account either. In 2007, 2008 and 2009, these banking institutions must have base capital at least amounting to, respectively, 95 per cent, 90 per cent and 80 per cent of the base capital that would have been required under Basel I.

Capital requirements for credit risk with regard to banking institutions applying the standardised approach and the IRB approaches are calculated, cf. Box 10. The breakdown of lending to the corporate and private sectors differs for the banking institutions applying, respectively, the standardised and IRB approaches, cf. Chart 34. The latter have relatively higher lending to the corporate sector, while the former have relatively higher lending to the private sector (other). The ratio of lending to the private sector (housing) is virtually the same.

The introduction of Basel II entails an easing of the capital requirement for credit risk for the banking institutions applying the standardised approach, as well as for those applying the IRB approaches.

CALCULATION OF CAPITAL REQUIREMENTS FOR CREDIT RISK AND OPERATIONAL RISK — Box 10

Credit risk

For banking institutions applying the standardised approach, the capital requirement is calculated as follows: the Experian database of Danish public and private limited liability companies is used as a hypothetical corporate portfolio for the average banking institution. Companies with loans of less than 0.5 million euro are included in the calculations as small and medium-sized enterprises, for which the capital requirement is reduced as a result of the downward adjustment of the risk weight from 100 to 75 per cent. Companies with loans exceeding 0.5 million euro are included as companies without ratings with a risk weight of 100 per cent, as was the case under Basel I. The credit risk on private exposures is calculated on the basis of balance-sheet data: the capital requirement for private lending (housing) with sufficient real property as collateral falls as a result of downward adjustment of the risk weight from 50 to 35 per cent. The capital requirement for private lending (other) falls due to downward adjustment of the risk weight from 100 to 75 per cent.

For banking institutions applying the IRB approaches, the Experian database of Danish public and private limited liability companies is used as a hypothetical corporate portfolio for the average banking institution applying an IRB approach. The effect of a change from Basel I to the foundation IRB approach has been calculated. Loans of less than 0.5 million euro are classified as retail loans. The formulae used to calculate the foundation IRB approach are stated in the Executive Order on Capital Adequacy (Executive Order No. 10113 of 22 December 2006) and presented in the chapter "Advanced Approaches to Calculation of Capital Requirements under Basel II" in *Financial stability 2006*. The calculations in this article are based on the following:

Probability of default (PD): Danmarks Nationalbank's failure-rate model is used to generate PD. Eight rating classes and a "flat structure" are applied, cf. the above chapter from 2006.

Loss given default (LGD): LGD is set at 45.

Maturity of the loan (M): M is set at 2.5 years.

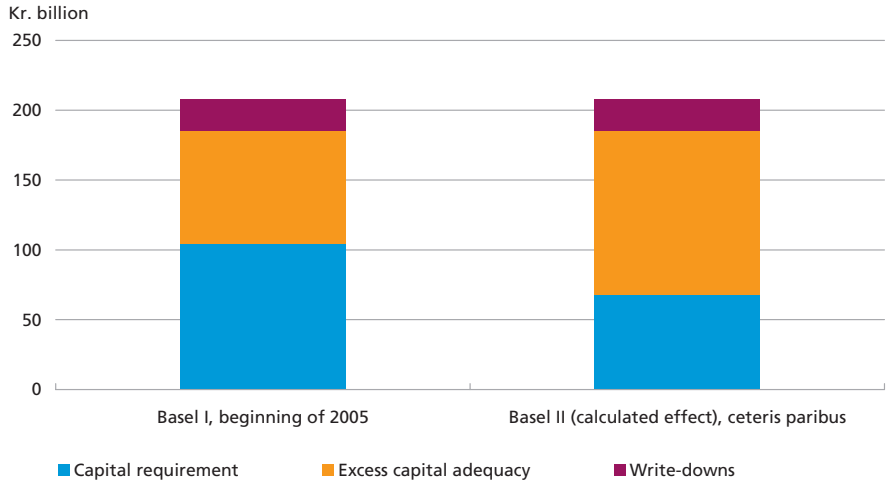
Adjustment for small and medium-sized enterprises (SME): adjustments are made for SME (except where this is not possible due to lack of data).

Credit risk on private exposures is calculated using the standardised approach, irrespective of whether the banking institution applies the IRB approaches to the corporate portfolio. Data is not available for individual private exposures so the IRB approaches cannot be applied. The easing of capital requirements under the standardised approach is a result of the downward adjustment of the risk weights for private lending (from 100 to 75 per cent) and mortgage loans with sufficient real estate as collateral (from 50 to 35 per cent).

Operational risk

Operational risk is calculated for all the banking institutions analysed, cf. the foundation IRB approach. Under this approach, the minimum capital requirement for operational risk is calculated as 15 per cent of the average gross income for 2002-04. Gross income is stated as net fee and commission income and other operational income.

CAPITAL REQUIREMENTS, EXCESS CAPITAL ADEQUACY AND WRITE-DOWNS, CETERIS PARIBUS COMPARISON OF BASEL I AND BASEL II, KR. BILLION Chart 35



Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. In the first column, the capital requirement has been calculated under the Basel I rules, cf. the banks' financial statements. The second column is a ceteris paribus assumption based on calculations of changes in the minimum capita requirement under Pillar I as a result of the new capital-adequacy rules.
Source: Financial statements, Danish Financial Supervisory Authority, Experian and own calculations.

As a new element, there is also a capital requirement for operational risk. Chart 35 shows how the aggregate minimum capital requirement (Pillar I) under Basel II is changed from the capital requirement under Basel I. The first column in the Chart shows the banking institutions' capital requirements, excess capital adequacy and write-downs at the beginning of 2005, and corresponds to the second column in Chart 32. The second column in Chart 35 shows the calculated effect of the new capital-adequacy rules.

The aggregate reduction of the minimum capital requirement in krone terms under Pillar I is considerable, and totals approximately 35 per cent, which is equivalent to an easing of the capital requirement by around kr. 35 billion. According to the calculations, the reduction of the minimum capital requirement under Pillar I is, on average, in the range of 40 per cent for the banking institutions applying the IRB approaches, and approximately 10 per cent for the banking institutions applying the standardised approach.[1] All other things being equal, a lower aggregate

[1] Norges Bank has calculated that the minimum capital requirement for the Norwegian banks that are expected to apply the standardised approach can, on average, be reduced by 11 per cent under Pillar I compared with Basel I, cf. *Financial Stability 2/2006*, Norges Bank, p. 42. The Financial Supervisory Authority of Norway has calculated that the capital requirement for banks that are expected to apply the IRB approaches can be reduced by 35-45 per cent, cf. the speech held on 16 November 2006 at Vest-Norsk Sparebanklag by Bjørn Skogstad Aamo of the Financial Supervisory Authority of Norway.

minimum capital requirement in krone terms will lead to higher excess capital adequacy. It is important to emphasise that this is a ceteris paribus assumption. Even if the capital requirement in kroner (including Pillar II requirements) falls below Basel II, it is not certain that the banking institutions' excess capital adequacy increases. The banking institutions may choose to reduce their excess capital adequacy, e.g. by paying out dividend, buying back shares or increasing lending.

The excess capital adequacy held by the banking institutions is dependent on several factors, including the estimated effect of the new accounting rules and the volatility of the calculated minimum capital requirement. All other things being equal, a banking institution with considerable excess capital adequacy will appear to be more sound than a banking institution with less excess capital adequacy. The banking institution's appetite for risk also plays a role. A banking institution with considerable excess capital adequacy will have time to restructure its activities if earnings fall and the banking institution is therefore approaching the minimum capital requirement. The rating agencies will probably also influence the banking institutions' capital-adequacy decisions, e.g. by requiring a certain excess capital adequacy in order to give a banking institution a certain rating.

WHAT WILL HAPPEN IN A RECESSION?

Accounting rules

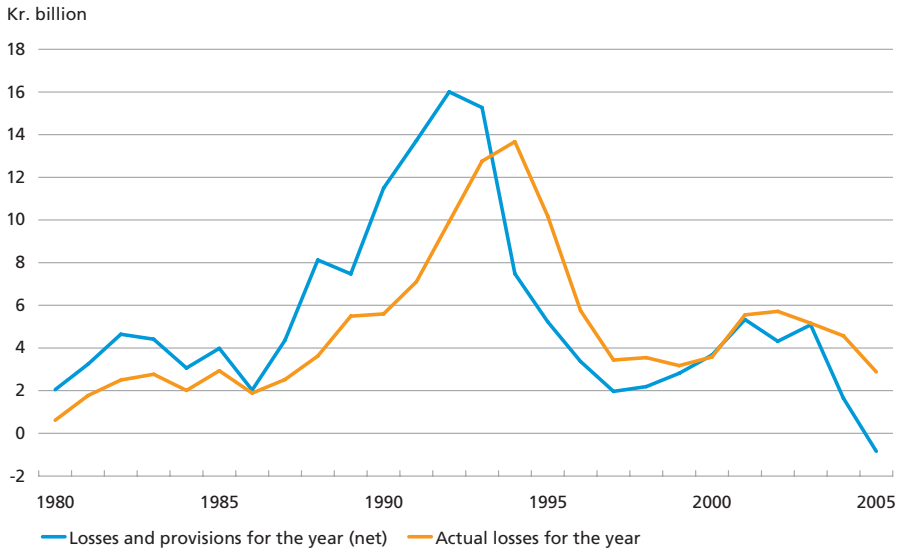
Banking activities fluctuate with the economy in general, and the economic situation is reflected in their financial statements. In an upswing, lending often increases, while the opposite effect is observed in a recession.

In periods of high lending growth credit quality often diminishes, leading to higher losses and provisions in the subsequent periods. The financial sector was affected particularly in 1990-94 as a result of the recession in 1987-93. Losses and provisions were exceptionally high in the early 1990s, when average earnings were negative. Since 1996, losses and provisions have been at a low level, and annual profits have been high. The economic downturn in Denmark in 2001-03 did not lead to a pronounced increase in losses and provisions. The reason may be that it was a relatively mild recession, but also that the banking institutions have generally become better at managing their credit risk than they were in the early 1990s.

For some years, the old accounting rules have led to a discrepancy between the losses and provisions for the year and the actual losses, cf. Chart 36. For a number of years, the fluctuations in annual losses and

LOSSES AND PROVISIONS/WRITE-DOWNS FOR THE YEAR (NET) AND ACTUAL LOSSES FOR THE YEAR, 1980-2005, KR. BILLION

Chart 36

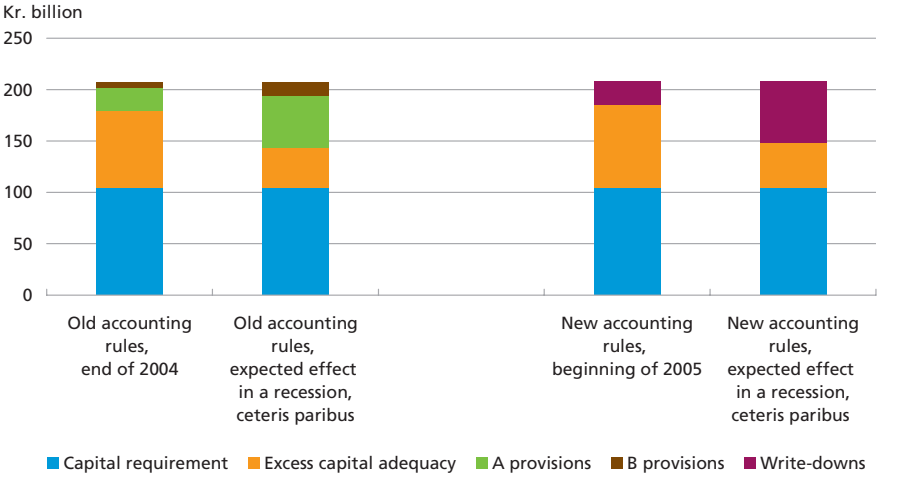


Note: The new accounting rules that entered into force on 1 January 2005 entail that the banking institutions must write down exposures when there is objective evidence of impairment. Under the old accounting rules, the banking institutions had to make provisions for losses deemed to be unavoidable (B provisions), but also for probable losses (A provisions).

Source: Danish Financial Supervisory Authority.

EXAMPLE OF CETERIS PARIBUS EFFECT OF A RECESSION UNDER THE OLD AND THE NEW ACCOUNTING RULES

Chart 37



Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. "Old accounting rules" and "New accounting rules" are based on data from financial statements as of, respectively, the close of 2004 and the beginning of 2005. "Old accounting rules, expected ceteris paribus effect in a recession" and "New accounting rules, expected ceteris paribus effect in a recession" show the expected ceteris paribus effects in a recession.

Source: Financial statements, Danish Financial Supervisory Authority and own calculations.

provisions are greater than the actual losses, and the annual losses and provisions are typically recognised earlier than the actual losses.

Under the new accounting rules, a loan cannot be written down merely because the borrower may potentially experience financial difficulties if there is a cyclical downturn. In other words, a recession is not in itself sufficient grounds to write down loans. However, there may be more objective evidence of impairment and thereby financial difficulties for a borrower in a period of economic slowdown. For example, there are often more defaulters in a recession due to rising unemployment.

Looking ahead, it is expected that the new accounting rules will entail a closer correlation between write-downs for the year and actual losses than in Chart 36. In other words, the banks will recognise write-downs at a later stage than the previous provisions, and the fluctuations between write-downs for the year and actual losses will be smaller.

Chart 37 illustrates how in a recession the write-downs under the new rules are expected to increase less than the provisions under the old rules. The comparison of the old and new accounting rules before and during a potential recession is again based on ceteris paribus assumptions.

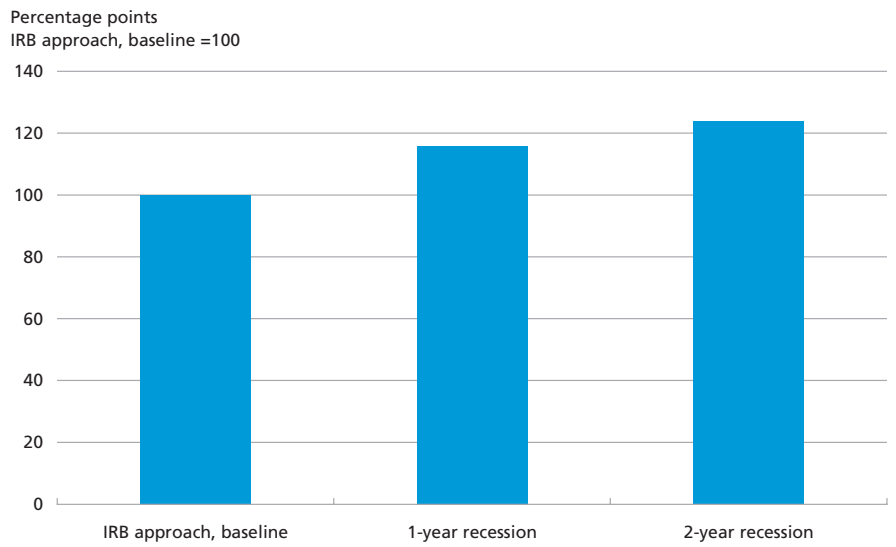
Capital-adequacy rules

The underlying philosophy of the new capital-adequacy rules is that the banks must hold more capital for high-risk activities, and less capital for low-risk activities. In other words, the rules reflect the specific risks incurred by an individual banking institution. In an upswing, the capital requirement under Pillar I will decrease for the banking institutions that apply the IRB approaches, e.g. if the borrowers' probability of default (PD) declines. On the other hand, in a recession the banking institutions will face higher capital requirements, e.g. if the borrowers' PD rises.

If an increase in the capital requirements has a restrictive effect on lending, the cycle will be amplified in a recession. In contrast, if an increase in the capital requirements does not have a restrictive effect on lending, it is not certain that the cycle is amplified in a recession. Whether the capital requirement has a restrictive effect on a bank's extension of credit is dependent on such factors as its capital objective. If the capital objective is for the bank to hold a certain percentage of excess capital in relation to the statutory requirement, a recession may have an impact on lending, even if the bank holds excess capital adequacy that is well above the statutory requirement.

An analysis of the actual effects of the new capital-adequacy rules requires extensive data work and can, ideally, not be performed until data is available for an entire economic cycle. The ESCB Banking Supervision Committee and the CEBS (Committee of European Banking

EXAMPLE OF THE EFFECT OF A RECESSION ON THE MINIMUM CAPITAL REQUIREMENT FOR CREDIT RISK (CORPORATE PORTFOLIO) Chart 38



Note: Rating classes: After a 1-year recession all average PDs (probabilities of default) have been downgraded by one rating class (except for the lowest class, which is still the lowest). After a 2-year recession all average PDs have been downgraded by two rating classes. The capital requirement achieved when the PDs are not stressed by the foundation IRB approach is set at 100.

Source: Experian and own calculations.

Supervisors) have set up a working group to investigate the consequences of the new capital-adequacy rules.

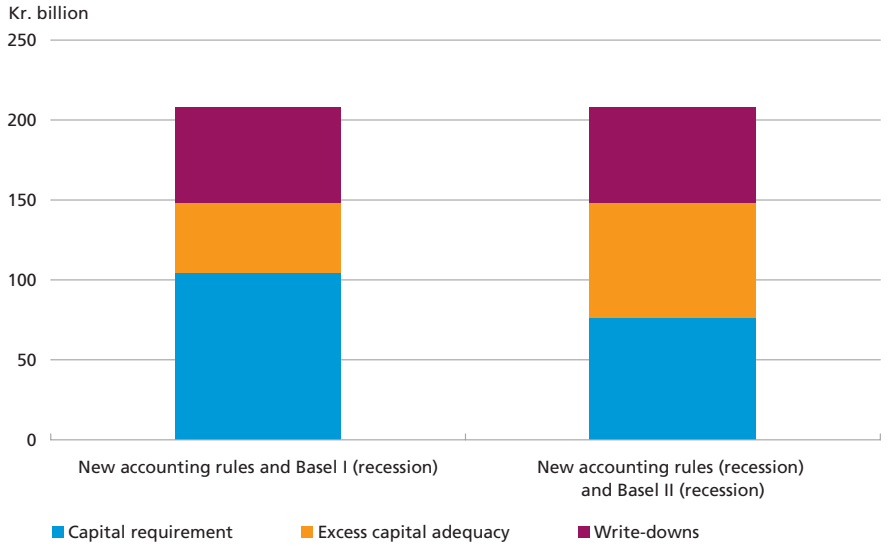
Chart 38 shows the calculated effect of a 2-year recession scenario in which all PDs for Danish companies migrate one class downwards in the first year and once again in the second year. It is, perhaps, not very likely that all borrowers are downgraded, but the example has deliberately been simplified.

In order to be resilient to the 2-year recession scenario, the excess capital adequacy for credit risk on the corporate portfolio must be around 25 per cent higher than the calculated minimum capital requirement for credit risk on the corporate portfolio under Pillar I.[1] The effect on the aggregate capital requirement is shown by the last column in Chart 39. A larger kroner amount is now required to observe the 8-per-cent capital requirement. This is taken from the excess capital adequacy.

[1] Under Pillar II, the banks applying the IRB approaches must take a mild recession scenario into account when determining their solvency requirements. However, the capital requirement is higher than the requirement calculated under Pillar I only if the Danish Financial Supervisory Authority requires the banking institutions to hold capital in excess of the capital requirement calculated under Pillar I.

EXAMPLE OF THE EXPECTED CETERIS PARIBUS EFFECT OF A RECESSION UNDER BASEL II

Chart 39



Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. "New accounting rules and Basel I (recession)"is based on the banking institutions' balance sheets at the beginning of 2005.

Source: Financial statements, Danish Financial Supervisory Authority, Experian and own calculations.

Overall, the expected effect of the change from the old to the new accounting and capital-adequacy rules can be illustrated by the difference between the first and the second columns in Chart 40. The first column shows the situation under the old accounting and capital-adequacy rules, while the second column shows the situation under the new accounting rules, cf. the opening balance sheets at the beginning of 2005 and the calculated new capital requirement. The expected, stylised, ceteris paribus change in a recession scenario is illustrated by the third column in Chart 40. Once again, it should be emphasised that Chart 40 shows the potential effects without taking any changes in the banks' behaviour into account.

NEW ACCOUNTING AND CAPITAL-ADEQUACY RULES, CETERIS PARIBUS EFFECTS

Chart 40

Note: The Chart comprises Danske Bank, Nordea Bank Danmark, FIH Erhvervsbank, categories B and C. The Chart shows the development from the old accounting rules and Basel I, end of 2004, to the situation under the new accounting and capital-adequacy rules and the ceteris paribus effect of a recession.

Source: Financial statements, Danish Financial Supervisory Authority, Experian and own calculations.

Macro Stress Testing of Danish Households

This chapter analyses the financial vulnerability of the Danish household sector on the basis of microdata and presents a method to simulate the effect of higher unemployment and interest-rate increases on the households' ability to service their debt. This method is part of Danmarks Nationalbank's overall stress testing project, cf. the chapter on macro stress testing of the financial system.

The analysis shows that even in the event of strong increases in unemployment in combination with interest-rate increases the household sector will not inflict losses on the banking sector that might threaten financial stability.

Households with relatively high incomes account for most of the household sector's debt. Only a small proportion of the financial institutions' lending to households is concentrated in financially vulnerable households, and by far the largest share is mortgage-credit debt, which is collateralised to a high degree.

The results presented in this chapter are sensitive to changes in the assumptions on which the analysis is based. In view of data limitations, the assets of the households are excluded from the analysis. These assets can serve as a buffer and thereby protect the financial institutions against losses.

INTRODUCTION

The purpose of the analysis is to quantify the debt raised by financially vulnerable households, and to analyse the effect of higher unemployment and interest-rate increases. Due to the scale of calculation of the scenario-determined simulation experiments, the calculations are based on a 10 per cent random sample of data on all Danish households.

The data basis is the income statistics from Statistics Denmark. The analysis is prepared on the basis of data for the 2005 fiscal year. The unit in the applied database is the household[1] defined as one or more individuals residing at the same address, and who have certain mutual relations.

Since only employed persons risk losing their jobs, only wage-earner households (with no children over the age of 18 living at home) are

[1] Statistics Denmark uses the term "family".

DESCRIPTIVE STATISTICS FOR SELECTED VARIABLES IN THE DATA MATERIAL USED, 2005 Table 5

	Total (kr. billion)	Average per household	99th percentile	Median	1st percentile
		---------- kr. thousand ----------			
Income from employment	54.7	417	1,047	370	59
Interest income	0.2	2	20	0	0
Interest expenses	4.2	32	128	24	0
Other net investment income	0.3	2	85	0	0
Transfer incomes	4.8	37	201	18	0
Income before tax, etc.	60.9	464	1,093	443	97
Tax, etc.	21.4	163	491	146	16
Labour-market contributions, etc.	4.4	33	84	30	4
Disposable income	35.3	269	548	264	68
Debt	87.4	666	2,876	470	0
Bond debt	64.0	488	2,417	199	0
Mortgage deeds held with custodian institutions	0.8	6	195	0	0
Bank debt, etc.	22.5	172	1,192	82	0

Note: The table is based on calculations of selected variables from a 10-per-cent sample. The sample data is adjusted. The three percentile columns state the percentile values for the individual items in the rows, and a column may thus comprise values from different households.
Source: Statistics Denmark and own calculations.

included. The descriptive statistics for the data material applied are shown in Table 5.

DEFINITION OF FINANCIALLY VULNERABLE HOUSEHOLDS

Definitions of when a household has financial difficulties are hard to establish. There is no data available on the private consumption, including housing occupancy, of the individual households.

A measure of *the financial margin of households*[1] is defined by Norges Bank and Sveriges Riksbank in similar analyses. The financial margin is compiled as the households' disposable income less a measure of the basic cost of living and housing costs, including maintenance, etc. of the home and servicing of debt. Norges Bank's analysis includes repayments on loans, which are excluded from Sveriges Riksbank's analysis.

[1] Johansson and Persson, Swedish households' indebtedness and ability to pay – a household level study, *Economic Review 2006:3,* Sveriges Riksbank, 2006; Bjørn H. Vatne, How large are the financial margins of Norwegian households? An analysis of microdata for the period 1987-2004*, Economic Bulletin 4/2006*, Norges Bank; and Household margins*, Financial Stability 1/2006,* Norges Bank, 2006.

DEFINITION OF THE FINANCIAL MARGIN Table 6

Financial margin =	+ Household's disposable income (after interest expenses and tax)
	– Standardised consumption budget
	– Housing-related expenses (excluding repayments on loans)

Below, a budget method is also used to define the financial margin of Danish households, cf. Table 6. A financial margin of zero should not be perceived as a poverty line. The financial margin serves to indicate whether a household, with a given amount at its disposal (the household's disposable income), is able to maintain a basic level of consumption while also paying housing costs, excluding repayments on loans. A positive financial margin indicates that the household has the financial scope for consumption beyond the basic level, or e.g. for savings or investments. A household with a negative financial margin is classified as financially vulnerable.

Consumption budgets

Forbrugerinformationen's[1] household budget (*standard budget*) provides general information on what is characterised as a normal, fairly average, standard of living in Denmark. The standard budget thus exceeds a basic level of consumption. The breakdown of consumption for a *discount budget* is the same as for the standard budget, but all purchases are made in discount stores.

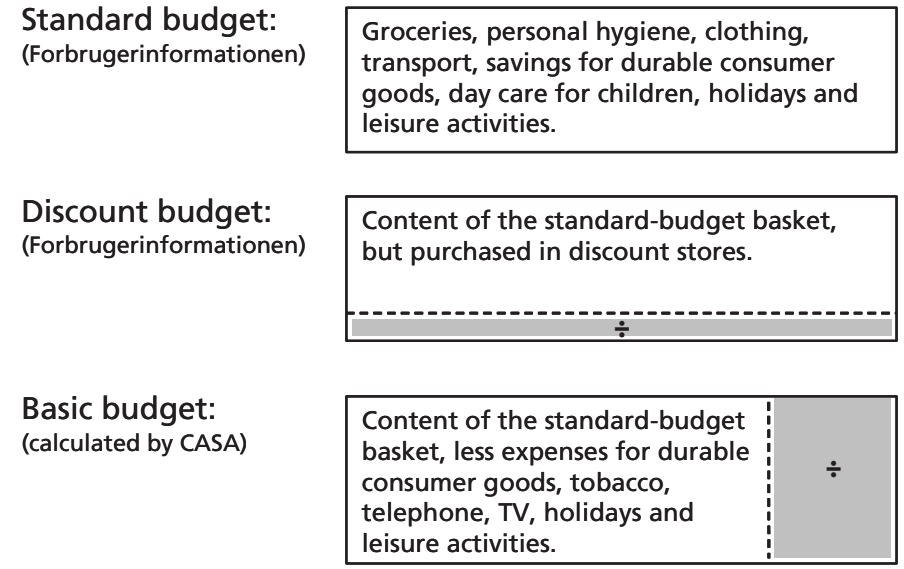
The Centre for Alternative Social Analysis, CASA, has defined a *basic budget* that is based on Forbrugerinformationen's standard budget.[2] The basic budget does not include savings for consumer durables, or spending on holidays and leisure activities. On the other hand, the basic budget does not take into account that households may shop in discount stores. The differences between the three budgets are shown in Chart 41.

In this analysis, the basic budget will be applied as an expression of a standardised consumption budget for Danish households. In order to analyse the sensitivity to choice of consumption budget, the two other budgets are included in the analysis below. In the sensitivity analysis, high-income households are assumed to apply the standard budget, while medium-income households are allocated the discount budget, and low-income households retain the basic budget. The analysis does

[1] Forbrugerinformationen (consumer information), which was part of the National Consumer Agency for a number of years, no longer exists. Originally, the National Consumer Agency in 1993 set out a household budget. The budget was most recently updated by Forbrugerinformationen in 2001.

[2] Social benefits in a poverty perspective (in Danish only), *Rådets småskriftserie No. 1/2003*, The Council for Socially Marginalised People, Appendix 3 (prepared by CASA), 2003.

STANDARDISED CONSUMPTION BUDGETS Chart 41



Note: Forbrugerinformationen's budgets do not include information on housing costs, utilities, heating, property tax, loans, interest and repayments, maintenance of the home, trade union membership, unemployment fund contributions, or insurance premiums and pension savings.

Source: Social benefits in a poverty perspective (in Danish only), *Rådets småskriftserie No. 1/2003*, The Council for Socially Marginalised People, Appendix 3 (prepared by CASA), 2003 and "*To subsist or to live*" *Poverty and low incomes in Denmark – how do we measure poverty?* (in Danish only), CASA, 2004.

not take into account that the households can adjust their consumption if their finances deteriorate. The annual standard, discount and basic budgets by household category are shown in Table 7.

ANNUAL STANDARDISED CONSUMPTION BUDGETS IN KR. THOUSAND PER HOUSEHOLD BY CATEGORY, 2005 Table 7

	Single – no children	Single – one child	Single – two children	Single – three children	Couple – no children	Couple – one child	Couple – two children	Couple – > two children
Standard	87.4	112.3	132.3	147.2	180.9	207.0	227.9	243.5
Discount	76.0	96.8	113.4	125.8	162.4	182.9	199.3	211.6
Basic	45.6	63.5	77.9	88.6	104.3	123.6	139.0	150.6

Note: The budget does not include expenses for housing, insurance, trade union membership and medicine. Budgets for households with two or three children are estimated on the assumption that the second and third child increase the budget by, respectively, factors 0.8 and 0.6 of the first child's contribution. The basket of goods in the budgets does not entail any economies of scale for couples (without children) in relation to the expenses of two single people (without children). The 2005 level is projected by the development in consumer prices from 2003 to 2005.

Source: Social benefits in a poverty perspective (in Danish only), *Rådets småskriftserie No. 1/2003*, The Council for Socially Marginalised People, Appendix 3 (prepared by CASA), 2003.

In addition, the households' housing costs from Statistics Denmark's publication *Consumption Survey 2003-2005*[1] are taken into account. Repayments of housing loans or other debt are thus not included.

METHOD FOR MACRO STRESS TESTING OF DANISH HOUSEHOLDS

The finances of the households are influenced by many factors. If income is no longer earned, or interest expenses increase, this can have major financial consequences for the individual household. Social events such as a divorce or illness also have a number of financial consequences. The analysis below focuses on changes in the households' ability to service their debt, in order to determine the impact on financial stability.

Choice of scenarios

Partial scenarios comprising higher unemployment and interest-rate increases are modelled, cf. Box 11. The scenarios generally correspond to those prepared by the IMF in connection with its FSAP for Denmark in 2006.[2] The consequence of an increase in unemployment by 1-5 percentage points and in interest rates by 1-4 percentage points are analysed. Since the early 1970s, the maximum annual increase in unemployment has been almost 3 percentage points (1974-75), while the equivalent maximum annual increase in the average bond yield has been almost 3.5 percentage points (1973-74).[3] Scenarios comprise combinations of increased unemployment and higher interest rates as well. Historically, there are no indications of correlation between 1-year changes in unemployment and interest rates. Nevertheless, there have been periods in which unemployment and interest rates rose simultaneously. In the period 1980-82, unemployment rose by almost 3.5 percentage points, and the average rate of interest by just over 3 percentage points. In the specified scenarios, second-round effects of changed behaviour among the financial institutions or households are not taken into account.

Results

From the viewpoint of financial stability, it is relevant to quantify the debt raised by households with limited financial scope. If the households are no longer able to service their debt, the financial institutions may

1 In Danish only, but data is available at www.statbank.dk.

2 In connection with the IMF's macro stress test during the FSAP mission in 2006, three different macroeconomic scenarios were prepared, in which unemployment rose by 3-5 percentage points. For a description of the scenarios, see Box 2 of *Denmark: Financial System Stability Assessment*, IMF, 2006, www.imf.org/external/pubs/ft/scr/2006/cr06343.pdf.

3 For both the unemployment rate and the average bond yield changes are calculated on the basis of the annual average.

lose the loan amounts less any collateral pledged. Most of the households' debt is raised by households with relatively high incomes. The debt of working households with disposable incomes in the 5th (upper) quintile constitutes 33 per cent of the total debt, while working households with disposable incomes in the 1st (lower) quintile account for almost 8 per cent of the total debt, cf. Chart 42. In the 2nd to 4th quintiles, households with high incomes have relatively more debt than low-income households, since the average debt burden increases with income.

In the analysis, households with financial problems are limited to households with a negative financial margin. A negative financial margin implies that the household is unable to pay both the sum of its housing costs and consumption equivalent to the budgets stated in Table 7.

As a baseline, just over 4 per cent of the total debt of the working households has been raised by households with negative financial margins. For some of the debt, the home is pledged as collateral, since three quarters of the total debt is mortgage-credit debt, cf. Table 5. In addition, any financial wealth will also serve as a buffer against losses on lending to the households. This is not taken into account in the analysis, and all other things being equal it moderates the potential losses of the households' creditors.

Each scenario comprises 500 simulations[1], where each iteration recalculates which working households become unemployed and which homeowners have fixed or adjustable-rate housing loans. The simulations are static in that housing and consumption costs remain constant and that any reserves such as financial or real wealth are not used. For various scenarios, Table 8 shows the proportion of the debt that is raised by households with negative financial margin.

In this analysis, the households are generally not particularly exposed to increased unemployment. Even if unemployment rises by 5 percentage points, households with a negative financial margin will account for only 5 per cent of the total debt. One of the reasons for the modest increase in the number of financially vulnerable households and their debt in the event of large increases in unemployment is the size of unemployment benefits compared to the tight basic budget. An isolated increase in interest rates by 2 percentage points would increase the

[1] The number of simulations is limited, but not at the expense of precision. Analyses show that the average for the share of households with a negative margin remains by and large unchanged when more than 500 simulations are performed. With 500 scenarios, the average and the median do not deviate until the third decimal.

MODELLING THE EFFECT OF UNEMPLOYMENT AND HIGHER INTEREST RATES Box 11

General

The scenarios are calculated as Monte Carlo simulations. In each simulation scenario, comprising 500 iterations, the disposable income and financial margin for each household are recalculated, cf. below.

Unemployment

Unemployment benefits are payable to a member of an unemployment fund who becomes unemployed. The simulations of unemployment assume that all wage earners belong to an unemployment fund. This assumption is plausible in that 77 per cent of the labour force were insured against unemployment in 2005. It is also assumed that people who lose their jobs are entitled to benefits. Unemployment benefit constitutes 90 per cent of the income previously earned, but not more than kr. 170,040 per year (2005 figure). Most wage earners receive compensation that is lower than 90 per cent of their previous income.

A simple approach is taken to modelling the Danish system of unemployment benefits. If a member of the household becomes unemployed, it is assumed that investment income and any transfer income remains unchanged. The wage income is replaced by unemployment benefit. Subsequently the tax that is payable on the new gross income is calculated. The relationship between income and the marginal tax rate is taken into account.

The household data is the sum of the data for the people making up the household. This is of significance to the modelling of unemployment among households that comprise couples. It is assumed that the two adults in the household earn, respectively, one and two thirds of the wage income. They have the same risk of losing their jobs. In addition there is a – very small – risk that both lose their jobs, whereby the household's entire wage income is eliminated.

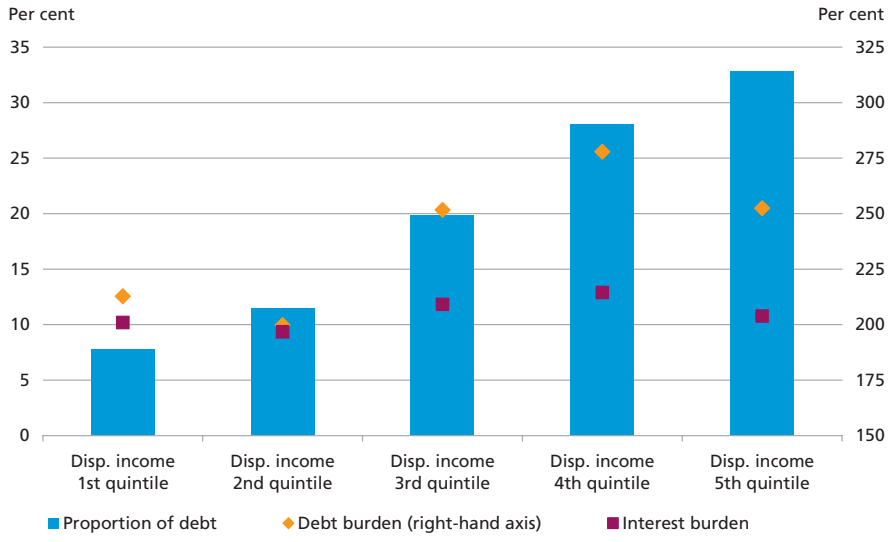
In the model, random households are affected by unemployment. It is not taken into account that the probability of becoming unemployed is dependent on such factors as level of education, sector, seniority, etc. This type of information has not been available in the data analysed.

Higher interest rates

The income statistics do not contain any information on the households' loan types. It is assumed that any debt raised by non-homeowners is at a variable rate of interest. For homeowners, it is assumed that 50 per cent of the households have adjustable-rate housing loans, while the rest have fixed-rate housing loans.[1] This is equivalent to the actual distribution of the mortgage-credit institutes' domestic lending for owner-occupied housing and leisure cottages at end-2005. A number of scenarios are simulated, in which homeowners are allocated fixed-rate or adjustable-rate housing loans, respectively, so that the aggregate distribution matches the actual distribution. In each scenario, the households' new interest expenses are calculated. It is assumed that all adjustable-rate housing loans have a fixed-interest period of one year. Higher interest expenses, in which the tax deductibility of interest expenses is taken into account, are deducted from the households' disposable income.

[1] It is assumed that homeowners with fixed-rate loans may also have fixed-rate mortgage deeds. Only few households have debt via mortgage deeds, cf. Table 5. The use of capped loans has not been modelled. All other things being equal, this overestimates the effect of strong increases in interest rates.

AVERAGE DEBT BURDEN, AVERAGE INTEREST BURDEN AND PROPORTION OF DEBT HELD BY WORKING HOUSEHOLDS CLASSIFIED BY DISPOSABLE INCOME (AFTER INTEREST AND TAX), 2005 Chart 42



Note: 1st quintile: households with disposable incomes below kr. 163,000 kr.; 2nd quintile: households with disposable incomes of kr. 163,000-223,000; 3rd quintile: households with disposables incomes of kr. 223,000-302,000; 4th quintile: households with disposables incomes of kr. 302,000-371,000; 5th quintile: households with disposables incomes exceeding kr. 371,000. The debt burden is calculated as the households' total debt as a ratio of their disposable incomes. The interest burden is calculated as net interest expenses as a ratio of disposable income.
Source: Statistics Denmark and own calculations.

proportion of the total debt that is raised by financially vulnerable households by almost 2 percentage points compared with the baseline. Doubling this interest-rate rise will increase the debt ratio of the financially vulnerable households from approximately 4 per cent to almost 9 per cent. In the most extreme scenario with an increase in unemployment by 5 percentage points and in interest rates by 4 percentage points, households with a negative financial margin have raised just over 9 per cent of the total debt.

The results in Table 8 are sensitive to the choice of consumption budget. Applying the standard budget to households in the 4th and 5th income quintiles, and the discount budget to those in the 2nd and 3rd income quintiles, the financial margin of more households becomes negative if unemployment rises. The baseline therefore differs significantly from Table 8. With the change in consumption, households with a negative financial margin as the baseline will have 15.5 per cent of the total debt of working households. An isolated increase in unemployment by 3 percentage points would increase the debt ratio of financially vulnerable households to 16.5 per cent. For each percentage point that the interest rate is raised in the sensitivity analysis, the

PROPORTION OF TOTAL DEBT ATTRIBUTABLE TO FINANCIALLY VULNERABLE HOUSEHOLDS, 2005 Table 8

Percentage of total debt of working households	Baseline	*Interest rates rise by* 1 percentage point	2 percentage points	3 percentage points	4 percentage points
Baseline	4.1	4.9	5.9	7.2	8.7
Unemployment increases by					
1 percentage point	4.2	5.1	6.1	7.3	8.8
3 percentage points	4.4	5.3	6.4	7.6	9.1
5 percentage points	4.7	5.6	6.6	7.9	9.4

Note: In total there are 131,158 households with 207,078 adults. 50 per cent of homeowners are assumed to have adjustable-rate debt. The basic budget is applied to consumption, cf. Table 7. The total debt in the data analysed is kr. 87.4 billion.

Source: Statistics Denmark and own calculations.

proportion of the total debt that is attributable to financially vulnerable households increases by approximately 4 percentage points.

In its calculations of the financial margins of Norwegian households, Norges Bank finds that raising the lending rate by 2 percentage points increases the debt of households with a negative financial margin from 16 to 22 per cent of the total debt.[1] Sveriges Riksbank has equivalently found that the debt of financially vulnerable households increases from 5.6 per cent to 7.2 per cent on an increase in interest rates by 3 percentage points. The debt ratio increases from 5.6 per cent to 6.3 per cent on an isolated rise in unemployment by 3 percentage points.[2] The analyses are not fully comparable with the results in this chapter since they are based on different assumptions. For example, everyone with debt is included in the Swedish analysis (whether employed or not), and the unemployment benefit system and percentage of households with debt at adjustable interest rates also differ in Sweden and Denmark. The analysis of Danish households in this chapter only includes people in employment. All other things being equal, this implies an underestimation of the total interest-rate exposure.

[1] Bjørn H. Vatne, How large are the financial margins of Norwegian households? An analysis of microdata for the period 1987-2004*, Economic Bulletin 4/2006*, Norges Bank.

[2] Johansson and Persson, Swedish households' indebtedness and ability to pay – a household level study, *Economic Review 2006:3,* Sveriges Riksbank, 2006.

Macro Stress Testing of the Financial System

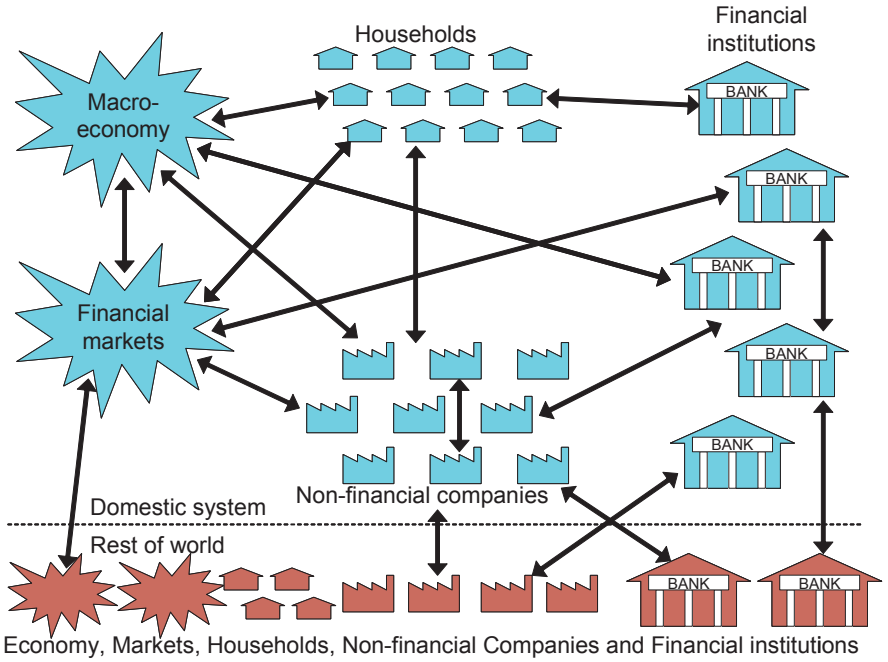
Danmarks Nationalbank, like many other central banks, is developing models for macro stress testing of the financial system. This chapter presents an overall model architecture and discusses the methodology and choice of population, as well as the sectoral and geographical demarcation. Some preliminary model specifications are also discussed.

INTRODUCTION

Macro stress testing, as described in Box 12, is the stress testing of the financial system, typically in relation to macroeconomic shocks.

The financial system is illustrated in Chart 43. The system is a complex network of hundreds of financial enterprises with thousands of counterparties. To be manageable and understandable, a model for stress testing of the financial system in Denmark necessitates simplification of the real world's complex network.

THE FINANCIAL SYSTEM AS A COMPLEX NETWORK — Chart 43



The process of developing the model involves numerous choices concerning the geographical and sectoral delineation of the financial system, as well as the degree of coverage and detail, and the risk sources to be focused on. Danmarks Nationalbank's overall model architecture and preliminary model specifications are described below.

OVERALL MODEL ARCHITECTURE

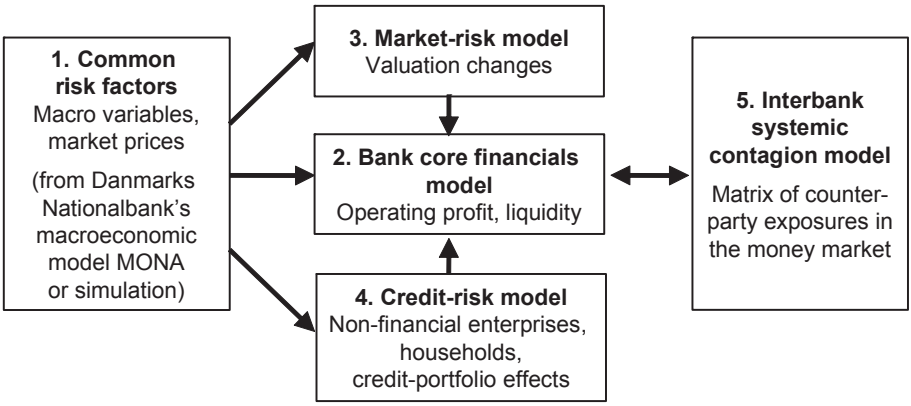
The planned model architecture for macro stress testing is open and flexible, with a toolbox of stress test models that can be used end to end, cf. Chart 44.

The five risk modules in the model architecture focus on:

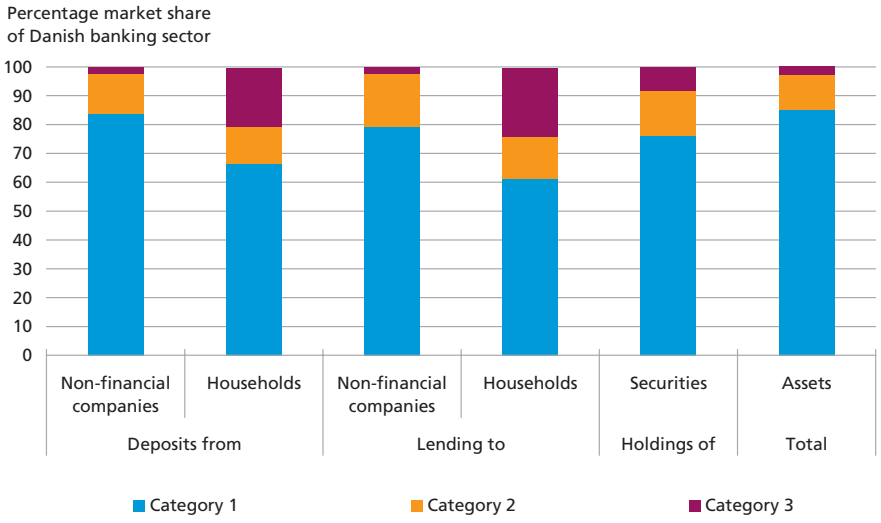
- The resilience of the banking institutions (module 2 in the Chart). The initial focus is on operating profit and excess capital adequacy, but the module could be expanded to cover liquidity risk buffers.
- Market and credit risks (modules 3 and 4 respectively). This includes application of the failure-rate model (KIM) and macro stress testing of households.
- Two potential sources of systemic risk: common risk factors (module 1) and domino effects via counterparty exposures (module 5). A third source of systemic risk – feedback effects via credit crunch or fire sale – is discussed at the end of this chapter.

Through-processing using the five risk modules will require a set of overall model specifications.

STRESS TEST MODEL ARCHITECTURE Chart 44



MARKET SHARES FOR MACRO STRESS TEST POPULATION Chart 45



Population

The preliminary population for the implementation of the model is the Danish Financial Supervisory Authority's categories 1 and 2.

The combined market share of categories 1 and 2 is shown in Chart 45 as the blue column plus the yellow column, and totals more than 75 per cent for all business areas.

These 14 banking institutions represent a relatively broad selection of institutions with different business strategies, balance-sheet structures and risk profiles. In sectoral terms, the population is limited to banking institutions. The balance-sheet structure of the banking institutions (i.e. short-term deposits and longer-term lending), and their role in payment systems and the overall economy, make them "special" and potentially "systemic". Furthermore, from a modelling perspective it is easier to limit the population to institutions of the same type that are subject to the same legal and supervisory regime. The banking institutions' exposures to other financial intermediaries may to some extent be incorporated in the credit-risk module.

Geographical delineation

The model's geographical focus is the financial system in Denmark, so the analysis of the population relates first and foremost to Danish banking institutions. For foreign-owned banks in the population, the model will disregard any support from the parent company. For Danish

BACKGROUND TO MACRO STRESS TESTING Box 12

"Stress tests" are applied in many areas, e.g. construction, IT, medicine, etc., to test stability or resilience to extraordinary stress. Banking institutions apply stress tests in their market risk management process. Under the new capital adequacy rules, Basel II, this is also required for credit risk if the banking institutions apply internal methods. Since the first edition of *Financial stability* in 2002, Danmarks Nationalbank has presented simple stress tests of the banks' financial statements, cf. Table 2 and Charts 12 and 13 in the chapter on the financial sector.

Macro stress testing is a new discipline which differs from stress testing in individual financial institutions in that it focuses on the overall financial system and on the shared (typically macroeconomic) risk factors that can affect several financial institutions at the same time.[1]

Bottom-up versus top-down

In macro stress testing, a distinction is made between the "bottom-up" and "top-down" approaches. The bottom-up approach entails calculation of the consequences for the individual banking institutions, typically by the institutions themselves. The top-down approach entails calculation of the consequences based on a centralised model, normally using aggregated data for the banking sector as a whole.

The advantages of the bottom-up approach are that the results reflect the risk profiles of the individual banking institutions. This can identify vulnerabilities in individual banking institutions, even if the overall risk profile and buffers of the sector appear to be robust. Any differences in the banking institutions' calculation methods may, however, complicate the aggregation and compilation of the results. It may also impose a cost burden on the participating banking institutions.

The advantages of the top-down approach are that these stress tests are relatively easy to implement without burdening the banking institutions. The drawback is that the aggregated data only captures the effects for the sector as a whole, and not the different risk profiles and vulnerabilities of the individual banking institutions.

In its planned macro stress tests, Danmarks Nationalbank's approach is to use centralised model calculations for the risk profiles of individual banking institutions. This compromise between bottom-up and top-down hopefully combines the advantages of the two approaches and minimises the drawbacks. It is possible to build on risk data from the banking institutions' latest financial statements and on historical correlations estimated using panel data econometrics. The model will reflect the different risk profiles of the individual banking institutions within a consistent analytical model framework, without adding to the institutions' reporting burden.

[1] Some of the earliest reports on macro stress testing are from 2000, from the Committee on the Global Financial System's Working Group on Macro Stress Testing and the IMF's Financial Sector Assessment Program. Macro stress tests including top-down and bottom-up calculations were included in the IMF's FSAP report for Denmark, which is available at http://www.imf.org.

financial groups with foreign units, the model may cover international credit exposures, depending on data availability.

Since the geographical focus is on Denmark, in the first instance the internationalisation of the financial system is disregarded. The two largest banking groups in Denmark have a significant volume of foreign

activities. The market share of foreign banks' units in Denmark is around 30 per cent.[1] Overall, Danish banks have financed a large proportion of their widening deposit shortfall via international borrowing and securities issuance. At the same time, the financial markets in Denmark are directly influenced by developments in the global markets. Internationalisation has positive consequences for financial stability in terms of diversification of risk and the diversity of institutions in the financial system. On the other hand, it also increases the complexity of financial activities and can heighten the risk of contagion from financial problems in other countries, especially if several countries are affected by the same shock.

The geographical focus on the domestic financial system reflects the need to simplify the model by reducing its complexity. In addition, Danmarks Nationalbank has no comparative advantage in analysing business and credit risks in other countries. The international perspectives should nevertheless be borne in mind, for example through dialogue and cooperation with other central banks[2] and with banks that have international activities and incorporate their international exposures into their own internal stress tests. In the longer term, the macro stress test model may be extended to cover more broadly the international interlinkages of the financial system.

Preliminary model specifications

A key challenge in the development of macro stress test models is to link up the various modules in a way that utilises the information in the various available data. The exact data and model specifications are decided during this process.

Module 1: Common risk factors

Common risk factors are an important source of systemic risk and thus form the basis for the specification of risk scenarios for macro stress tests. The model framework must be flexible enough to accommodate changes to the risk-factor specifications, e.g. in order to improve the explanatory power of the model or to analyse new types of risk. The risk factors are chosen and specified on the basis of the following criteria:

- They must be able to quantify the risk scenarios implemented in the macro stress test.

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1 Market shares vary among customer and product segments, cf. Jakob Windfeld Lund and Kristine Rasmussen, Foreign Banks in Denmark, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2006.

2 In its publication *Financial Stability 2006:1*, Sveriges Riksbank for example established credit-risk models for the total international credit portfolios of each of the four large Swedish banking groups, while in *FSR June 2006* the ECB addressed coordinated stress testing of the financial system in the euro area.

- They must be relevant input to the other modules in the macro stress test model (i.e. a potential direct or indirect impact on the market risk, credit risk or operating profit of the banks).
- They must ideally be calibrated and projected in Danmarks Nationalbank's macroeconomic model, MONA, so as to ensure internal consistency in the projection of risk scenarios. As a minimum, there must be a historical data basis for the risk factors with which the projection in the risk scenarios can be compared.

Calibration of risk scenarios for macro stress testing is a delicate balance. The scenarios must be extreme enough to affect system stability, but plausible enough to be taken seriously.

In stress tests, a distinction is generally made between sensitivity analysis of the effect of changes in an individual risk factor and scenario-based stress tests involving changes to several risk factors.

Sensitivity analysis is applied to stress testing of market risk, e.g. the beta of an equities portfolio against a market index, or the duration of a bond portfolio, i.e. its sensitivity to shifts in the yield curve. Sensitivity analyses are typically viewed in an "all-other-things-being-equal" perspective and therefore rarely take account of the risk of indirect effects and changes in correlations, e.g. in connection with extreme changes in market prices.

Scenario-based stress tests entail projection of a number of common risk factors that can affect the financial system. There are several possible approaches to the projection of scenarios:

- Repetition of historical stress episodes, e.g. the recession from 1987 to 1993.
- Hypothetical scenarios, e.g. based on crises in other countries.
- Probability-based scenarios, e.g. based on the 1st percentile for empirical data for the actual development in the risk factors.
- "Reverse engineering", i.e. calculating back the level of stress needed to cause systemic damage.

So far, historical or hypothetical stress test scenarios have been most commonly used in macro stress tests in other countries.

Module 2: Bank core financials model

The bank core financials model must estimate the scenario-dependent development in the core operating profits of the individual banks. Core operating profit excludes the financial items associated directly with market and credit risk, e.g. valuation changes and write-downs on lending, which are covered by more detailed models in modules 3 and 4.

The banking institutions' current earnings (together with excess capital adequacy) account for a significant share of their buffer against losses. Economic developments in recent years have had very favourable consequences for the banking institutions' earnings, and are not necessarily a reliable indicator of their future earnings potential. On the other hand, it would probably be unfair just to assume in a macro stress test that earnings will disappear.

There is a need to identify the drivers of the banking institutions' earnings and to link them to the development in the common risk factors (e.g. macro and market variables), and to the special characteristics of the individual banking institutions.

Module 3: Market-risk model

The market-risk model must estimate the scenario-dependent development in the individual banking institutions' valuation changes on equities and bonds. Risk scenarios will typically specify the general development in the equity and bond markets. This can be linked to data for the individual banking institutions' holdings of equities and bonds, subject to adjustment for the market sensitivity of these holdings.

The correlation between trends in the financial markets and the banking institutions' market risk exposure, and the resulting valuation changes, will be tested.

The choice of time horizon is a modelling challenge. The banks' financial statements typically cover a quarter, six months or a whole year, which are short horizons for credit-risk models, but very long horizons for market-risk models.

Module 4: Credit-risk model

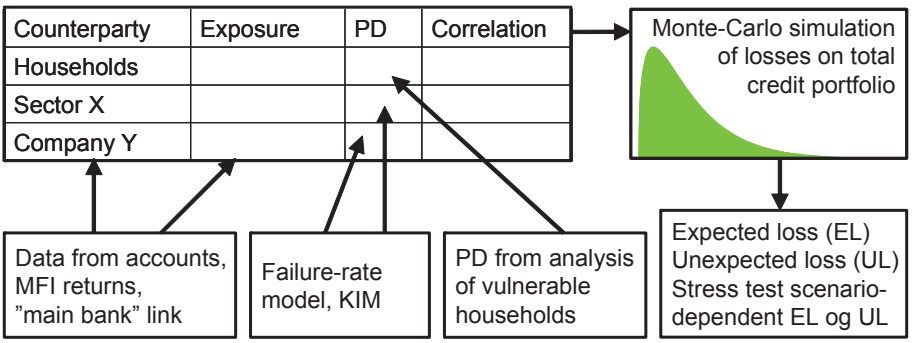
The credit-risk model must estimate the banking institutions' expected and unexpected credit losses, based on the development in the common risk factors in the risk scenario and the individual banking institution's actual credit-risk exposure. Quantitative credit-risk modelling is a rapidly evolving discipline that offers a wide range of opportunities for implementation in macro stress tests.

The simplest linkage of the banking institutions' losses as a result of macroeconomic risk factors can be illustrated by a single-equation model[1], cf. Chart 14 in the chapter on the financial sector.

Credit risk is the most important area of risk for the banking institutions. Chart 46 outlines the planned credit-risk model for macro

[1] The single-equation model and the IMF's FSAP stress test scenarios are described in *Financial stability 2006*, Box 6, Macro stress test of the Danish banking sector, pp. 34-35.

STYLISED CREDIT PORTFOLIO MODEL FOR A BANKING INSTITUTION Chart 46



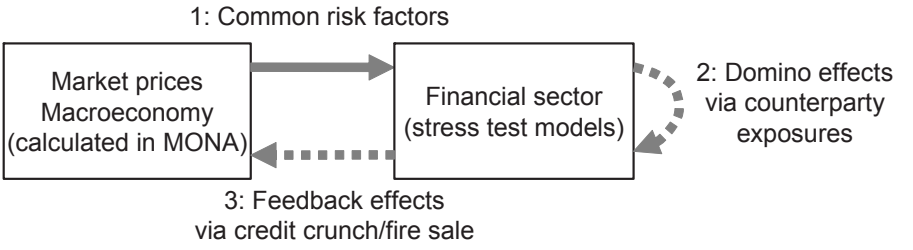
stress testing, based on modelling of loss ratios for each credit risk category as functions of the common risk factors.

The dissection of the credit portfolios and the layout of the exposure tables will be based primarily on the banking institutions' published accounting and risk management data. However, the econometric analysis will also include the historical correlation between the banking institutions' losses, write-downs, risk exposures, market-based risk measures (e.g. distance to insolvency), and interest margins on lending, as well as the macroeconomic development. The risk profiles can be estimated in various ways:

- With regard to the credit risk on business lending, the failure-rate model (KIM) is an appropriate starting point for estimating default frequencies. The linkage to the individual banking institution can be based on companies' indication of "main bank", and on the banks' indicated industry and sector exposures. A model of expected failure rates at sector level can also be estimated from historical failure rates as a function of the development in macro variables.
- Regarding the credit risk on lending to households, the overall risk structure of the banking institutions can be calculated on the basis of the data and models that are presented in the chapter on macro stress testing of Danish households. The linkage to each individual banking institution can be based on an estimate of the banking institution's credit risk appetite based on recent years' growth in lending to households, key credit risk figures and data for interest margins on lending to households.

The chapter on the financial sector applies a credit-risk measure to the exposure-weighted credit risks of the individual banking institutions. For stress testing purposes, this credit-risk measure should be refined to

SOURCES OF SYSTEMIC RISK Chart 47



describe the banking institutions' loss-distribution, i.e. their expected and unexpected losses both in general and under specific risk scenarios.

Module 5: Interbank systemic contagion model

If stress testing of the banking institutions' earnings, market risk and credit risk results in a capital shortfall, this may have systemic consequences via e.g. uncollateralised day-to-day money-market exposures among the banking institutions. In such case, the balance sheets of the other banking institutions should be recalculated with losses (or the freezing of funds) on their exposures to the crisis-stricken institution(s).

The individual bilateral money-market exposures are not known, but payment data in Kronos[1] has been used to estimate a significant proportion of the banking institutions' uncollateralised interbank assets.

Further processing of systemic risk in macro stress tests

Macro stress tests should focus on systemic risk, and the model architecture presented here takes account of common risk factors (module 1) and interbank contagion channels (module 5) – two of the three sources of systemic risk shown in Chart 47.

The third source of systemic risk – feedback effects from financial sector behaviour to the macroeconomy via credit crunch or fire sale – is harder to incorporate into macro stress test models. There are several possible approaches, e.g.:

- A satellite model for financial stability variables (e.g. bankruptcies, house prices, profit margins), of which the results are included in the recalculation of the risk scenario in the macro model.
- Bottom-up stress test exercises whereby financial institutions base their calculations on the risk scenario for one year at a time, and where their

[1] See Amundsen and Arnt, Contagion Risk in the Danish Interbank Market, Danmarks Nationalbank, *Working Paper no. 127*, 2005.

risk management decisions are included in the scenario projections for the following year.
- Explicit modelling in the macro model of credit-crunch mechanisms (e.g. via capital accelerator effects) and financial market feedback (via demand equations).[1]
- A separate general equilibrium model for financial stability analysis purposes, with heterogeneous, utility-optimising borrowers and banking institutions, and default risk and uncertainty.[2]
- Pragmatic choice of risk scenarios.[3]

Danmarks Nationalbank will continually assess the optimum implementation of the stability analysis and macro stress tests for the financial system in Denmark.

[1] See e.g. Bernanke, Gertler and Gilchrist, The Financial Accelerator in a Quantitative Business Cycle Framework, 1999 and Grossman and Miller, Liquidity and Market Structure, 1988.

[2] A model of this type, calibrated for financial and economic conditions in the UK, is described in Goodhart and Zicchino, A Model to Analyse Financial Fragility, Bank of England, *June FSR*, 2005. The model is described in more detail in Goodhart, Sunirand and Tsomocos, A Risk Assessment Model for Banks and A Time Series Analysis of Financial Fragility in the UK Banking System, 2004.

[3] This appears to be the current approach to most macro stress tests.

Danmarks Nationalbank's Failure-Rate Model, KIM

Danmarks Nationalbank's failure-rate model, KIM, was initially presented in Financial stability 2003. Boxes in subsequent editions of Financial stability and a working paper[1] have described KIM further. The model is subject to ongoing development, most recently the introduction of macrovariables. This chapter describes the model tool on which the results of the analysis of Danish companies are based, and the results of the present model with macrovariables and of the former model are compared.

Scope of application

Danmarks Nationalbank's failure-rate model is used to assess the risk that Danish companies will fail. KIM estimates the probability that a company will fail within 1-2 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 estimated failure rates are also influenced by cyclical movements. The estimates are based solely on public and private limited liability companies. Agriculture and financial enterprises are not included in KIM.

Explanatory variables

The model comprises 12 explanatory variables, i.e. six quantitative variables and six dummy variables, cf. Table 9. A dummy variable is assigned the value 1 if a given criterion is fulfilled, and otherwise the value 0. Of the six quantitative variables, two are macrovariables that capture the effect of cyclical developments on the estimated failure rate.

The *Sign* column indicates the direction in which the variable in question affects the estimated failure rate, all other things being equal. Plus (+) means that the estimated failure rate increases, while minus (-) indicates a reduction of the estimated failure rate.

[1] Lykke, Pedersen and Vinther, A Failure-Rate Model for the Danish Corporate Sector, Danmarks Nationalbank, W*orking Paper No. 16*, 2004.

EXPLANATORY VARIABLES IN KIM — Table 9

	Sign	Description/criterion
Quantitative variables		
Return on assets	-	The company's return on assets relative to the median return for the relevant sector.
Solvency	-	Equity capital as a ratio of total assets.
Debt ratio	+	Short-term debt as a ratio of total assets.
Size	-	Logarithm of total assets.
Output gap	+	The output gap for the Danish economy is defined as the difference between actual and potential GDP as a percentage of potential GDP. Data for the output gap is from *Economic Outlook No. 80*, OECD.
Confidence indicator	-	The confidence indicator from Statistics Denmark expresses the building and construction sector's expectations of the immediate future. The indicator is based on voluntary questionnaire surveys.
Dummy variables		
Reduction of the capital base	+	The dummy variable is set at 1 if the company has a deficit for two successive years, whereby the company's equity capital falls below the statutory capital requirement. Otherwise, it is set at 0.
Auditor qualification	+	The dummy variable is set at 1 if the financial statements have one or more critical auditor qualifications. Companies without any auditor qualifications are the reference group, for which the dummy variable is set at 0.
Form of ownership	+	The dummy variable is set at 1 if the company is a private limited liability company. Public limited liability companies, for which the statutory capital requirement is higher, are the reference group (with the value 0).
Age	-	Dummy variables for the specific age of a company. The reference group (with the value 0) comprises newly established companies aged 0-3 years.
Diversification	-	Dummy variables describing the number of sectors and/or subsectors in which the company operates. The reference group (with the value 0) comprises companies represented in one sector.
Municipality group	-	Dummy variables ranking the companies' domiciles by municipality group, with Greater Copenhagen as the reference group (with the value 0). Greater Copenhagen is more sensitive to cyclical fluctuations than the provinces.

Note: The value of a dummy variable can be either 1 or 0 (reference group). A positive parameter estimate for a dummy variable thus implies that a company meeting the criterion in question is allocated a higher estimated failure rate than the reference group, i.e. companies that do not meet the criterion. For example, private limited liability companies are expected to have more risk capital than public limited liability companies, which constitute the reference group, since the capital requirement is lower.

Source: Experian A/S, Statistics Denmark and OECD.

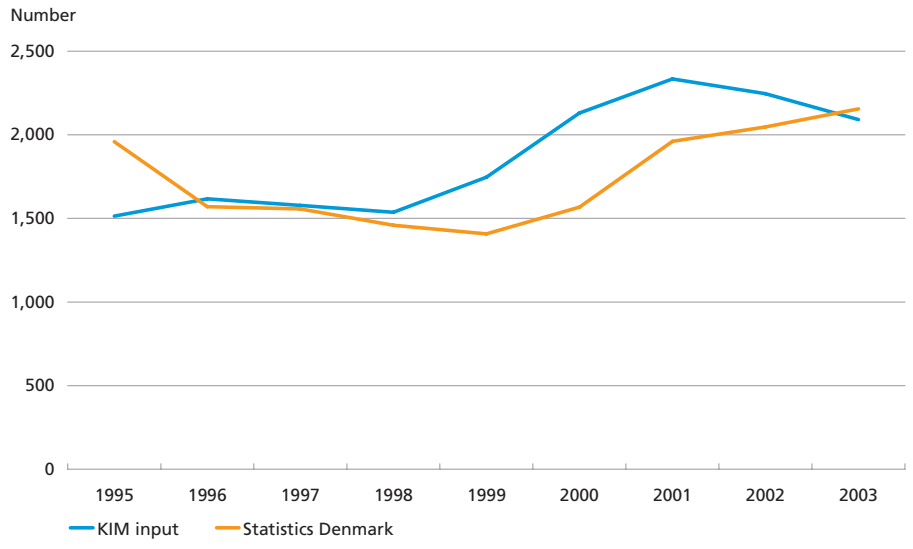
Estimation basis and definition of failure

The model is estimated on the basis of almost half a million annual financial statements presented in the period 1995-2003 by Danish public and private limited liability companies, of which almost 17,000 by failed companies.

The last financial statement presented by an active company before it fails is regarded as being presented by a failed company. The period from the presentation of the last financial statement as an active company to the time when the company is registered as having failed is 1-2 years. In KIM, 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, or compulsory composition being negotiated. This broader definition ensures a better linkage to the time of the company's payment problems than the definition applied by Statistics Denmark.

The development in the number of failures in the model is consistent with the data from Statistics Denmark, cf. Chart 48. The broader definition increases the number of failures in KIM compared with the official statistics. On the other hand, the fact that the estimation basis solely includes public and private limited liability companies, while the data from Statistics Denmark includes all Danish enterprises, has the opposite effect.

COMPULSORY LIQUIDATIONS OF NON-FINANCIAL ENTERPRISES, 1995-2003 Chart 48



Note: Concerning the time series *Statistics Denmark*, non-financial enterprises are calculated as the number of failures in manufacturing, building and construction, trade, hotels and restaurants, transport, postal services and telecommunications, real-estate and renting activities, other business activities, activity not known.

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

Implementation of macrovariables

Two macrovariables have been added to KIM since *Financial stability 2006*. The confidence indicator reflects the companies' perception of the current situation, as well as expectations of the coming quarter in terms of employment, sales, prices, new orders and limits to production. The confidence indicator for building and construction has been chosen because this industry is more exposed to cyclical developments than other industries, e.g. manufacturing and business service.

The second macrovariable is the output gap, which indicates output in the economy in relation to the calculated potential output. A positive output gap means that output is higher than envisaged in model calculations of the economy's long-term potential.

A company's estimated failure rate is affected by company-specific factors, as well as the macroeconomic development. The macroeconomic impulses are naturally identical for all companies, but the macroeconomic scenarios have varying impacts on the companies. In an analysis of Swedish companies, Carling, Jacobson, Lindé and Roszbach[1] find that output gap, consumer expectations and the slope of the yield curve, combined with company-specific accounting data, have a significant impact on the companies' estimated failure rates.

The first step towards inclusion of macrovariables is to specify preliminary "year dummies" with a view to capturing the contribution from the cyclical development in the given year. Year dummies are specified for 1995-2003, with 1995 as the reference year. Year dummies capture the scale of the cyclical impact in relation to the reference year.

The second step is to find macroeconomic variables that follow the development in the parameter estimates for the year dummies. To some extent, both the confidence indicator for building and construction and the output gap seem to follow the development in the parameter estimates for the year dummies, cf. Charts 49 and 50. There are, however, deviations in the first couple of years of the estimation period, particularly for the confidence indicator. The two macrovariables capture effects from, respectively, changes of mood among companies and external macroeconomic factors.

Both the output gap and the confidence indicator are significant and are included in the model at the 1-per-cent significance level. The parameter estimates for the model's other explanatory variables are to a great extent unchanged after inclusion of the macrovariables.

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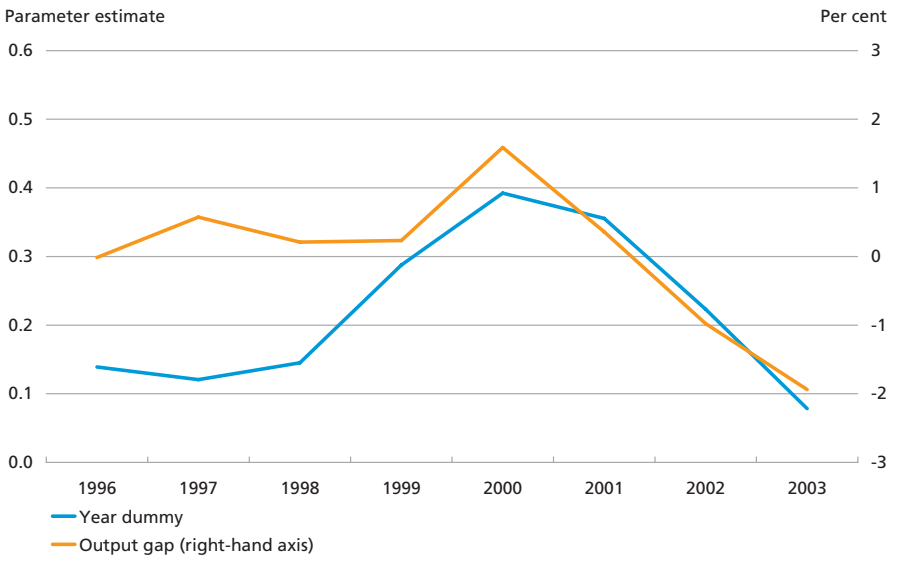
[1] Carling, Jacobson, Lindé and Roszbach, Corporate Credit Risk Modelling and the Macroeconomy, *Journal of Banking & Finance, Vol. 31, Issue 3,* 2007.

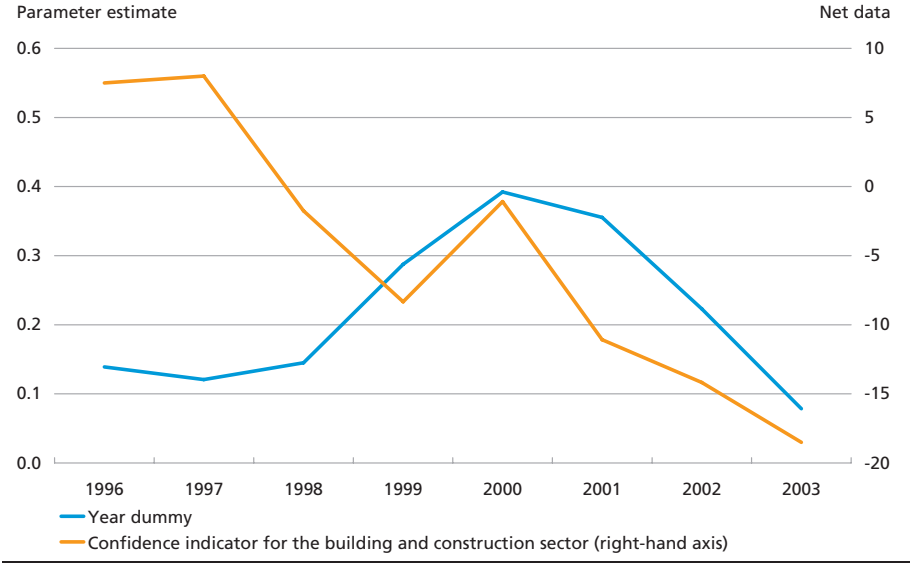
OUTPUT GAPS AND PARAMETER ESTIMATES FOR YEAR DUMMIES IN KIM, 1996-2003 Chart 49



Note: The period 1995-2003 comprises nine years, so that eight dummy variables are estimated, since 1995 is the reference year.
Source: Experian A/S, OECD and own calculations.

The coefficient to the output gap is included with a positive sign. This means that a positive output gap in the current year increases the gen-

CONFIDENCE INDICATORS AND PARAMETER ESTIMATES FOR YEAR DUMMIES IN KIM, 1996-2003 Chart 50



Note: The period 1995-2003 comprises nine years, so that eight dummy variables are estimated, since 1995 is the reference year.
Source: Experian A/S, Statistics Denmark and own calculations.

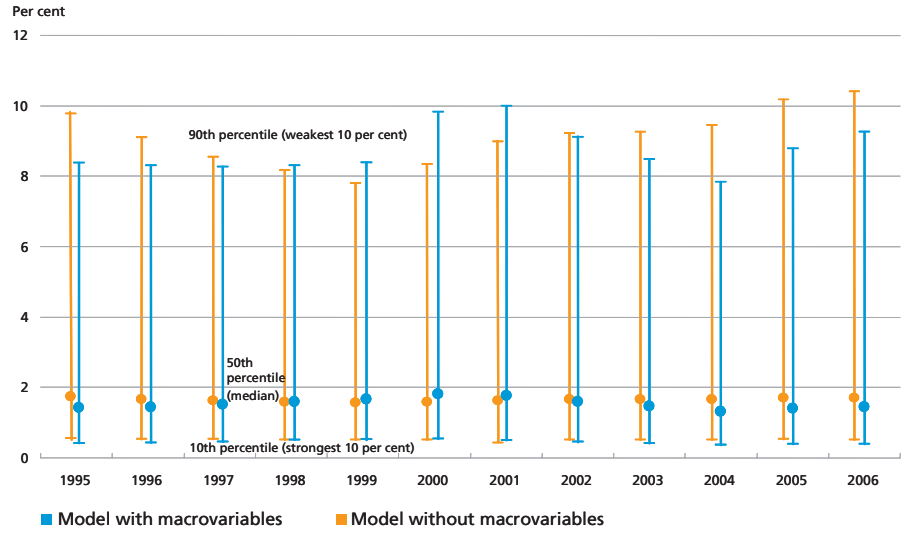
eral probability that companies will experience financial difficulties in 1-2 years' time. The explanation is that periods with a positive output gap typically see the establishment of many new companies, which are generally more likely to fail.

The confidence indicator for building and construction gives an intuitively negative sign. If the confidence indicator rises, reflecting increased optimism about the immediate future, the general estimated failure rate is reduced.

The distribution of the estimated failure rates over the years changes with the inclusion of macrovariables, cf. Chart 51. The macrovariables increase the fluctuation in the estimated failure rate for the median company. At the same time, the development in the estimated failure rate for the 90th percentile since the millennium rollover is closer to the a priori expected development than in the model without macrovariables. It is certainly among the weakest 10 per cent of the companies that the vast majority of failures occur.

Since KIM is estimated over a relatively short period during which there have been no major cyclical fluctuations, the parameter estimate for the two macrovariables, which have proved to be significant, should be interpreted with caution. It should also be remembered that the output gap is a calculated entity and that its historical values are revised on an ongoing basis by recalculating the deviation between the actual and potential economic activity.

ESTIMATED FAILURE RATES IN KIM WITH AND WITHOUT MACROVARIABLES, 1995-2006 Chart 51



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

Framework Conditions for the Financial System

The framework for the financial system and financial stability

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

New capital-adequacy rules

On 1 January 2007 new capital-adequacy rules, called Basel II, came into force. The new rules entail a more contemporary approach to the capital requirements of credit institutions, whereby the capital requirements of each credit institution to a greater extent reflect the risks undertaken by that institution. At the same time, the new rules give the credit institutions an incentive to implement the best possible risk management. Danish credit institutions already have the opportunity to operate within the framework of the most simple of the new methods to calculate capital requirements, i.e. the standardised approach. The credit institutions that plan to use the more advanced approaches are preparing for this, among other things via the necessary dialogue on implementation with the Danish Financial Supervisory Authority.

The new rules are very extensive and both the authorities and the sector have faced the considerable task of transposing and implementing the new capital-adequacy rules. Some of this work is still ongoing.

Since the rules were adopted in 2005, the EU has worked for the uniform implementation of the new rules in the national legislation of the member states. The aim is for the national supervisory authorities to administer the rules on a uniform basis, to ensure the credit institutions equal terms throughout the EU.

The new rules put the onus on the European Commission, in cooperation with the member states and the ECB, to monitor whether the new capital-adequacy rules have significant effects on the economic cycle.[1] This work commenced at the end of 2006.

[1] Article156 of directive 2006/48/EC.

MiFID/Regulation of financial instruments[1]

MiFID is a comprehensive directive that is described as a new stock-exchange reform. The purpose of the directive is to contribute to developing the single securities market within the EU by harmonising the securities trading rules. Among other things, this relates to protection of investors and expansion of competition.

The directive has been implemented in Denmark via an act to amend both the Securities Trading Act and the Financial Business Act. The Act and the related executive orders will entail a number of adjustments to the current rules for securities trading in Denmark.

A new type of market is introduced, i.e. a multilateral trading facility (MTF). In addition, stock exchanges and authorised marketplaces are given the new designation of regulated markets.

New investor protection rules are introduced, with requirements of customer categories, customer information, advisory services and best execution. At the same time, new organisational requirements are made of securities traders, including registration of customer orders and handling of conflicts of interest.

A number of adjustments are made to the current rules for market transparency. First and foremost, the rules for market oversight (market manipulation and insider trading) and for market transparency are separated. The current rules require reporting to the Copenhagen Stock Exchange (OMX) but do not specify that this reporting also serves to ensure transparency. Today, the rules for transparency are determined solely by the individual market, e.g. the Copenhagen Stock Exchange. In future, there will be two reports: one for the authorities (to the Financial Supervisory Authority) to facilitate market oversight; and a report/publication to ensure market transparency. Pursuant to the directive, only equities are subject to the new transparency rules. However, it is possible to determine national rules for the transparency of other securities besides shares.

The Act requires the Financial Supervisory Authority to issue an executive order on the post-trading transparency of bonds. According to the explanatory notes to the Act, the objective is for these powers to be exercised primarily with regard to bonds with a substantial retail trading volume. On this basis, the draft executive order regulates mortgage-credit bonds, corporate bonds and investment certificates.

[1] Within the EU, new framework conditions for the European securities markets have been formulated in recent years. The changes are very extensive. For an overview of the most important changes, and how they affect the various market participants, see Jesper Ulriksen Thuesen, New Regulatory Regime for European Securities Markets, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2007.

In 2006, the European Commission took the initiative to collect information from markets and market participants on whether it is appropriate to expand the new transparency rules for shares to include bonds, or to otherwise establish common transparency rules for bonds.

As before, the individual market may determine rules for the trading that takes place via its systems.

With a few exceptions, the Act enters into force on 1 November 2007. The implementation of the overall MiFID regulation in the financial enterprises will be an extensive and expensive process that will affect the enterprises in the immediate future.

Covered bonds (SDO)

On 28 March 2007 the Minister for Economic and Business Affairs presented a bill on covered bonds (SDO). The purpose of the proposed legislative amendment is to introduce the opportunity for banking institutions to issue covered bonds, and for mortgage-credit institutes and Danish Ship Finance A/S to continue to issue covered bonds. The Act is expected to enter into force on 1 July 2007. Reference is also made to the section on covered bonds in Recent Economic and Monetary Trends in *Danmarks Nationalbank's Monetary Review,* 1st Quarter 2007.

The new directive provisions e.g. specify which LTV (loan-to-value) ratios are to be complied with for a bond issue to qualify for covered bond status. For housing loans, an LTV of 80 per cent applies. The LTV must be complied with on a continuous basis, in contrast to the current rules for Danish mortgage-credit bonds, whereby the limit only applies when the loan is established. If falling house prices, for example, entail that the LTV of 80 per cent cannot be complied with, the bond issuer must immediately supplement the assets pledged as collateral for the issue, e.g. with government bonds.

The bill proposes to allow credit institutions to issue covered bonds using two different models. Under the first model, the existing limitations apply, i.e. a maximum maturity of 30 years and a maximum of 10 years' deferred amortisation. In this case, LTV at the time of granting the loan and for the loan's duration must not exceed 80 per cent for loans for residential properties, which account for the largest share of loans against real estate as collateral. The second model imposes no limitations on terms and redemption profiles, and for residential properties the upper limit for LTV is reduced to 70 per cent at the time that the loan is granted. From 1 July 2009, this limit will be raised to 75 per cent. For these loans too, the maximum current LTV will be 80 per cent.

The ongoing observance of an LTV of maximum 80 per cent will help to ensure that covered bonds are extremely secure bonds with a very low credit risk and thus a low interest rate compared with other bonds. However, if house prices fall abruptly on a downturn in the economy, considerable additional collateral may be required, which the credit institution will have to transfer from its other assets, or buy for borrowed funds in order to maintain the status of covered bonds. This may reduce the general strength of the credit institution in a situation where the economy is already declining and earnings are squeezed, which in turn may weaken financial stability. Lowering the LTV limit to below 80 per cent when the loan is granted will thus make it easier for credit institutions to observe the Directive's requirement of a current maximum LTV of 80 per cent.

In connection with the new regulation of covered bonds, a new balance principle will be established. The purpose of a balance principle is to limit the issuer's risk to the credit risk. For both the existing and the proposed new balance principles the fundamental rule is that no interest-rate risk, option risk or exchange-rate risk may be taken. Today, risks are primarily hedged by selling bonds that exactly correspond to the housing loans. This will also be possible under the new balance principle. However, the new balance principle also makes it possible to make greater use of modern financial instruments to cover risk.

Depositor guarantee – private scheme

A bill has been tabled whereby the opportunity for the Depositor Guarantee Fund to participate in the winding up of a failing banking institution by transferring assets and liabilities to another banking institution will be removed from the Act on a depositor guarantee fund. The reason is that the European Commission finds this opportunity to be in conflict with the rules on state aid. At the same time, the opportunity is given for a private scheme to be established, which among other things requires amendment of the rules on confidentiality. For some time the Danish Bankers Association has worked to establish a scheme under its own auspices that in the event of a crisis must have access to participate in the winding up of failing banking institutions by transferring assets and liabilities to another banking institution, if this solution entails lower costs than compulsory liquidation.

Target2-Securities

On 8 March 2007 the ECB announced[1], that the Governing Council has decided to proceed with the Target2-Securities (T2S) project[2]. The purpose is to integrate European securities settlement with the future trans-European payment system, Target2[3].

The final decision on development of T2S is expected to be taken at the beginning of 2008. Up to then, the ECB and the Eurosystem, in cooperation with the European central securities depositories and their participants, must determine user requirements of T2S. Danmarks Nationalbank coordinates the Danish participants' user requirements. In this connection, a briefing was held by Danmarks Nationalbank in March 2007.

Payment Services Directive

At the meeting of the ECOFIN Council on 27 March 2007 political agreement on the Payment Services Directive was reached. The Directive was adopted by the European Parliament on 24 April 2007 and must be implemented in national legislation by 1 November 2009.

A key objective of the Directive is to support the development of a Single Euro Payments Area (SEPA) by harmonising the EU member states' legislation in the area of retail payments.[4] The Directive is aimed not only at euro-denominated payments, but will also cover payment services in other EU currencies, including payments in Danish kroner.

Among other things, the Directive introduces a new type of institution in EU law, namely payment institutions. These can conduct cross-border payment services within the EU on the basis of a national authorisation. Payment institutions will be subject to various supervisory regulations, including capital requirements.

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1 The ECB's press release is available at www.ecb.int/press/pr/date/2007/html/pr070308_2.en.html.
2 See Danmarks Nationalbank, *Report and Accounts*, 2006, p. 74.
3 See Danmarks Nationalbank, *Report and Accounts*, 2006, p. 70.
4 See Elin Amundsen, SEPA – Single Euro Payments Area, Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2007.

Glossary

Additional capital. Subordinate loan capital in credit institutions, offered as part of the *capital base*, 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*.

Basel II. Description of the *Basel Committee's* standards for new capital-adequacy rules that entered 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.

Capital adequacy. See *solvency ratio*.

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

Capital need. A credit institution must assess its capital need, i.e. capital adequacy in relation to its risks and report this to the Danish Financial Supervisory Authority. See also *capital requirement*.

Capital requirement. The statutory capital requirement imposed on financial companies. In a credit institution, the *capital base* must constitute at least 8 per cent of its *risk-weighted items*. In a pension company, the capital requirement is calculated on the basis of life-insurance provisions with a number of minor additions. The Danish Financial Supervisory Authority may order a credit institution to hold capital in excess of 8 per cent. See also *solvency ratio*.

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 group 1 have working capital of kr. 50 billion and above; group 2 from kr. 10 billion to kr. 50 billion; group 3 from kr. 250 million to kr. 10 billion; and group 4 less than kr. 250 million. See the list of *categories/groups applied*.

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 12 selected major Danish banking institutions, i.e. selected banking institutions in the Danish Financial Supervisory Authority's groups 1 and 2 that are not included in category A. Category C comprises 37 selected small Danish banking institutions and is part of the Danish Financial Supervisory Authority's group 3.

CATEGORIES APPLIED

	Danmarks Nationalbank			Danish Financial Supervisory Authority			
Categories/groups	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 of kr. 10-50 billion		10			10		
Banking institutions with working capital of kr. 250 million to kr. 10 billion			37			88	
Banking institutions with working capital of less than kr. 250 million							49
Total number of groups/institutions	6	12	37	5	10	88	49
Balance sheet end-2006, kr. billion	10,708	624	167	2,904	349	224	na.

Note: In categories B and C, the data is based on financial statements from the parent companies, while the data for category A is based on consolidated financial statements. The Danish Financial Supervisory Authority's group 1 comprises FIH Erhvervsbank in addition to the banking institutions listed..

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 equity capital adjusted for e.g. undistributed dividend. Furthermore, *hybrid core capital* may be included.

Cost ratio. A banking institution's costs, excluding losses and write-downs, 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-risk measure. Calculation of banking institution *i's* credit risk on the lending portfolio is based on the following formula:

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

$P_i^{corporate}$ is the weighted estimated failure rate for the companies using banking institution *i*. The estimated failure rate of the individual company using the individual banking institution is weighted by the company's debt as a ratio of the total debt of all companies using the banking institution in question. As an approximation of the estimated failure rate for households ($P^{households}$) and agriculture ($P^{agriculture}$) the current year's average loss ratio for each of the two groups is applied. U_i is the proportion of banking institution *i's* lending granted to, respectively, the corporate sector, the households and agriculture.

Credit spread. The difference between the yield on two otherwise similar bonds where the issuers have different *credit standings*.

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

Deposit margin. The difference between the banking institutions' rate of interest on deposits and a reference interest rate, e.g. *CIBOR*.

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 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 *Value-at-Risk*.

Equity capital. The owners' share of the company's capital, including share capital, accumulated profits, etc. Calculated as the value of the assets less debt and other liabilities.

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.

Excess capital adequacy. The part of a credit institution's capital base that exceeds the statutory *solvency requirement.*

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 expression 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.

Gearing. An expression of a company's debt ratio. Can be calculated as debt (loan capital) as a ratio of equity or assets as a ratio of equity.

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 are not 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 additional 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. International Accounting Standards. See *IFRS*.

IFRS. International Financial Reporting Standards. 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.

Interbank market. In Denmark, the market for krone-denominated loan agreements and interest-rate derivatives with a maturity of up to a year transacted among 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. See also *market risk*.

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.

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 legislative 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.

Lending margin. The difference between the banking institution's lending rate and a reference interest rate, e.g. *CIBOR*.

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 reserve. Excess liquidity in relation to the statutory minimum requirement.

Liquidity risk. The risk of incurring a loss because the current liquidity is not sufficient to cover the current payment obligations.

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*.

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.

Operational risk. The risk of losses due to IT system failure, 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 share 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.

Profit ratio. Calculated as operating profit over operating income.

Profitability. See *return on equity*.

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*.

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.*

Return on assets. A measure of a 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*. Under *Basel II*, the banking institutions will also have to take the operational risk into account. See also *solvency requirement*.

S&P 500. US abbreviation of Standard & Poor's 500 stock 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.

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 *capital base* as a ratio of *risk-weighted items*. See also *capital requirement*.

Solvency requirement. See *capital requirement.*

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 *capital base*.

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. 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 jeopardise financial stability. Events leading to systemic risk may occur suddenly and unexpectedly, or the risk builds over time, e.g. in case of insufficient regulation.

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. 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. Red light illustrates the

consequences of a medium-severe negative market development, including a change in interest rates by 0.7 percentage point in the most detrimental direction and a fall in equity prices by 12 per cent. Yellow light illustrates a very severe market development, including a change in interest rates by 1 percentage point in the most detrimental direction and a fall in interest rates by 30 per cent.

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 the fluctuations in an asset's price, e.g. the fluctuations in a share price. See also *implied volatility*.

VP. VP Securities Services A/S. 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.

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. For loans on which a loss is expected (i.e. there is an objective evidence of impairment), 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.*

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.