# Danmarks Nationalbank

# Financial stability

2008

DANMARKS NATIONAL BANK 2008

# FINANCIAL STABILITY 2008

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



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Explanation of symbols:

| | |
|---|---|
| - | Magnitude nil |
| 0 | Less than one half of unit employed |
| • | Category not applicable |
| na. | Numbers not available |

Details may not add due to rounding.

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# Contents

# Foreword and Structure of the Report

Danmarks Nationalbank defines financial stability as a condition whereby the overall financial system is robust enough for any problems within the sector not to spread and prevent the financial markets from functioning as providers of capital and financial services.

In the annual publication *Financial stability*, Danmarks Nationalbank assesses financial stability in Denmark, with emphasis on financial institutions, financial markets and payment systems. The analyses are based on banks in the Danish Financial Supervisory Authority's groups 1 and 2.

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. On the basis of earnings and buffers in the financial sector, the sector's resilience to such events is assessed.

The chapter *Financial Institutions and Financial and Economic Developments* primarily describes the development in Danish banks and the financial, macroeconomic and structural framework for the banks' operations.

The chapter *The Risk Scenario* gives an account of significant risks to the financial sector. These are risks associated with financial market developments, macroeconomic risks of both international and Danish origin and the vulnerabilities characterising the financial sector in Denmark.

In the chapter *Testing the Banks' Resilience* risks are translated into quantitative, static and dynamic stress test scenarios, and the resilience of Danish banks to these scenarios is tested. This chapter also includes a section on the market's assessment of the Nordic groups.

In addition, the report contains a chapter outlining the development in the financial statements of a wide range of banks, a special chapter on payment systems, a chapter on measures to enhance stability and a topical chapter on Danmarks Nationalbank's stress test model.

# Summary
# Robust Financial Sector in Denmark

*The international financial markets have been characterised by turmoil since the summer of 2007. This is reflected in Danish banks' financial statements for 2007. Earnings rose in the 1st half of the year, but the 2nd half marked a turning point for many banks after a prolonged period of earnings growth. Looking ahead, the banking sector will continue to be affected by the financial turmoil and the less favourable outlook for the Danish economy. Risks to financial stability have become more pronounced recently. The banks have become more exposed in the light of their growing lending portfolios and the reduction of their capital buffers in recent years. The Danish financial sector is, however, deemed to be sufficiently resilient to withstand major economic shocks.*

**The financial turmoil affects Danish banks**

The current turmoil in the international financial markets stems from falling housing prices in the USA and the rising number of defaults on mortgages by less creditworthy homeowners, i.e. subprime borrowers.

At first, the strong price drops were mainly observed in structured financial products composed of subprime mortgages. However, the turmoil quickly spread to other parts of the financial system, and the period since August 2007 has been turbulent for both money and equity markets.

Banks in the USA and Europe have suffered considerable losses as a result of the subprime crisis. Consequently, several banks have tightened their credit policies. Growth prospects have deteriorated, and especially for the US economy the outlook is more gloomy.

The turmoil in the international financial markets is also visible in Danish banks' financial statements for 2007. The 1st half of 2007 saw continued earnings growth, while the 2nd half marked a turning point for many banks after a prolonged period of earnings growth. For the year as a whole, the banks' earnings fell by 14 per cent on 2006.[1] The decrease is attributable to capital losses on securities and higher write-downs on lending, among other things.

[1] Adjusted for Danske Bank's acquisition of Sampo Bank.

The banks' lending continues to increase, albeit at a diminishing pace. Higher financing costs and the financial turmoil have dampened the banks' expansion, and many banks have raised their lending rates in 2008.

The new capital-adequacy rules, Basel II, together with the International Financial Reporting Standards, IFRS, have contributed to the banks reducing their capital reserves. Consequently, the banks have become more exposed to adverse economic scenarios.

**The risk outlook**

The turmoil in the international financial markets impacts the risks faced by the banks.

Increased volatility in the financial markets entails higher market risk and hedging costs for the banks. In addition, the turmoil has brought the banks' liquidity risk into focus. Some banks operate with small liquidity reserves, which affects their scope of manoeuvre under unexpected circumstances. These banks may be forced to raise loans in periods when market conditions are unfavourable or to raise loans with shorter-than-required maturities in a situation where some markets tend to disappear completely.

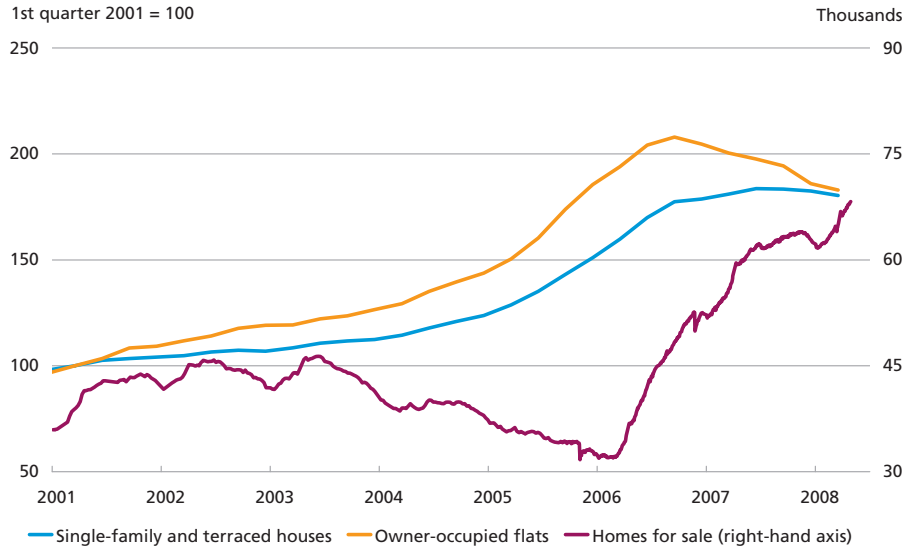
In the event of sustained turmoil in the international financial markets, with continuously high credit spreads, the price of the banks' financing via the money and capital markets may increase further. Banks with large deposit deficits and without a good rating are particularly exposed to interest-rate fluctuations in the money and capital markets.

In addition to risks related to the financial markets, there are also risks associated with the macroeconomic development. Expectations of economic growth in the USA have been steadily reduced as a result of the weak US housing market and the financial turmoil, and the probability of a recession in the USA has increased. A slowdown in the US economy and the global economy overall will also affect the Danish economy and Danish banks.

Unemployment has decreased further in Denmark in 2007 and the beginning of 2008. The capacity pressure is high in the Danish economy, and economic growth is expected to slow down. Rising wages and higher commodity prices may lead to intensified pressure on the companies' budgets, which will increase the probability of default on loans, resulting in losses for the Danish banks.

The depreciation of the dollar is an additional risk factor for banks with considerable lending to companies exporting to the USA and other dollar-priced markets.

HOUSING PRICES AND HOMES FOR SALE IN DENMARK — Chart 1




Source: The Danish Association of Chartered Estate Agents, www.boligsiden.dk and the Association of Danish Mortgage Banks.

Calculations based on Danmarks Nationalbank's failure-rate model, KIM, show higher estimated failure rates for Danish companies in general. This can be attributed to increased indebtedness, more companies with negative earnings, and the establishment of many new companies in 2007. Viewed in isolation, the estimated failure rate is higher for new companies than for well-established companies. The higher indebtedness and estimated failure rates for the companies imply that the banking sector's expected losses on corporate exposures have risen from 2006 to 2007, although they continue to be low.

In 2006, the surging housing prices made way for stagnating or falling prices, cf. Chart 1. Danish household finances are still sound overall, despite high and increasing debt, and unemployment is very low. There are no significant indications of the households having difficulties in servicing their loans. A more pronounced downturn in the housing market, with plummeting prices, is a risk factor, but it is only found to be probable in the event of significant increases in interest rates and unemployment.

**The Danish banking sector is still assessed to be robust overall**

The risk scenario described above is illustrated by the following three constructed stress test scenarios:

- *The subprime crisis continues and leads to a recession in the USA:* The price of interbank financing rises sharply. The increase is partially passed

on to the customers. Growth in the US economy is negative for eight quarters.

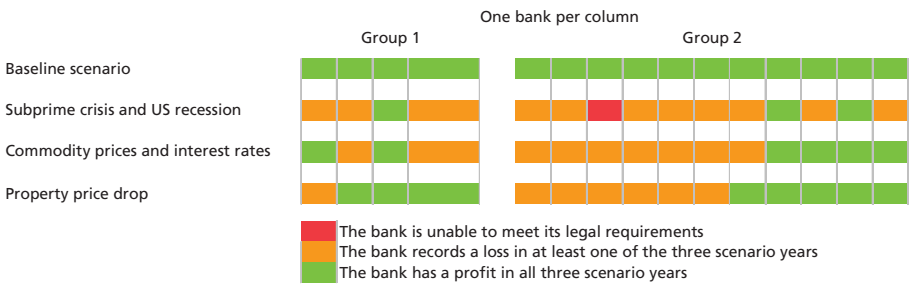
- *Increases in commodity prices:* Commodity prices, especially oil prices, rise sharply, and official interest rates are raised to keep inflation at bay.
- *Property price drop:* Interest rates and unemployment increase, while property prices and the value of assets pledged as collateral for bank loans decrease.

The stress test scenarios are compared with a baseline scenario that is considered to be the most likely development in the Danish economy and the financial sector. Calculations based on Danmarks Nationalbank's stress test model show that all banks classified by the Danish Financial Supervisory Authority in groups 1 and 2 will achieve a profit at almost the same level as in 2007 if Danmarks Nationalbank's baseline scenario is realised. In the stress test scenarios the financial result will be negative for most banks in at least one of the three scenario years, but without leading to solvency problems, cf. Chart 2. Only one bank will have solvency problems if exposed to the tough economic scenarios. All in all, the results show that the Danish financial system is resilient to the scenarios in question, but that it cannot be ruled out that a few banks will have problems.

A static sensitivity analysis also shows that the Danish financial sector is robust. However, the analysis shows greater exposure to rising financing costs and increasing losses on lending portfolios compared with corresponding calculations based on the banks' financial statements for 2006.

The Nordic groups have also become more exposed to both increasing losses and rising financing costs. At the same time, the market assessment of the resilience of the Nordic groups is on the decrease, although the resilience in most cases exceeds the level for other European and US banks.

MACRO STRESS TEST RESULTS (NUMBER OF BANKS) Chart 2




Note: The banks are in random order in the two groups.
Source: Own calculations.

# Financial Institutions and Financial and Economic Developments

*Since the summer of 2007, developments in the global financial markets have been characterised by turmoil. Uncertainty has increased, the prices of many types of securities have fallen, and the banks' costs for market financing have risen. The Danish banks have not been affected to the same extent as banks in many other countries. The financial statements of the Danish banks showed lower earnings in 2007 than in 2006. This decline is solely attributable to the 2nd half of the year, which was a turning point for many banks after a long period of growth in earnings.*

*The banks' lending growth subsided in 2007, and preliminary data for the 1st quarter of 2008 shows that lending growth has declined further. The turmoil in the financial markets and the higher financing costs have dampened the banks' expansion, and many banks have raised their lending rates.*

*New capital-adequacy rules, combined with international accounting standards, have contributed to a reduction in the banks' reserves, and all other things being equal the banks have become more exposed to rising losses.*

## TURMOIL IN THE FINANCIAL MARKETS

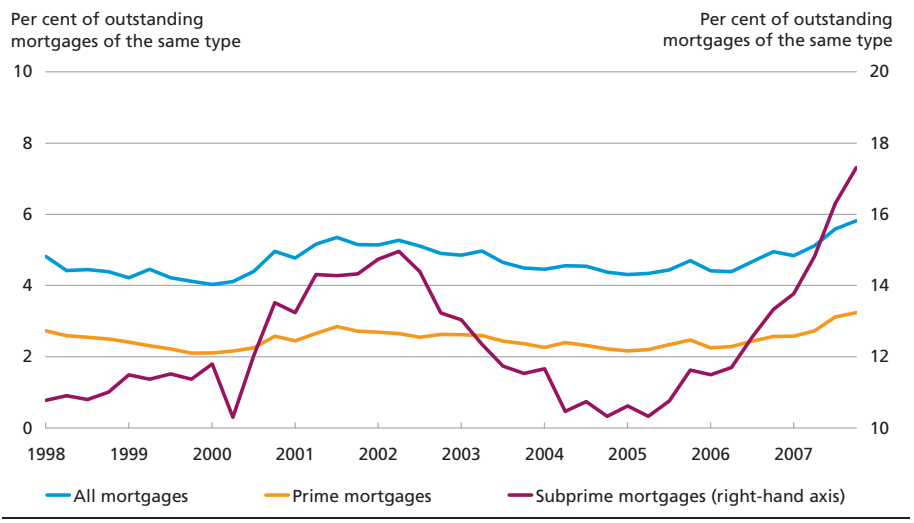
The problems in relation to US subprime mortgages[1] really surfaced in the summer of 2007, and since then the financial markets have been characterised by turmoil.

The turmoil was triggered by falling housing prices and an increasing rate of default on subprime mortgages in the USA, cf. Chart 3. The turmoil has spread through the international financial system due to opaque financial structures.[2] Over the last 10-20 years, international banks have been offering customers still more complex financial products, without the banks taking on the full credit risk. Banks have thus

[1] Subprime mortgages are loans against the home as collateral granted to less creditworthy customers. Examples are customers who have previously had problems servicing their debt, who have very poor repayment opportunities, or who can offer only small down payments. No equivalent subprime market exists in Denmark.

[2] For a more detailed description of the new financial structures, see Jakob Windfeld Lund, Turmoil in the Financial Markets, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2007.

DEFAULTED MORTGAGES IN THE USA Chart 3




Source: Bloomberg.

divested the credit risk on parts of their lending by issuing securities against pools of loans as collateral.

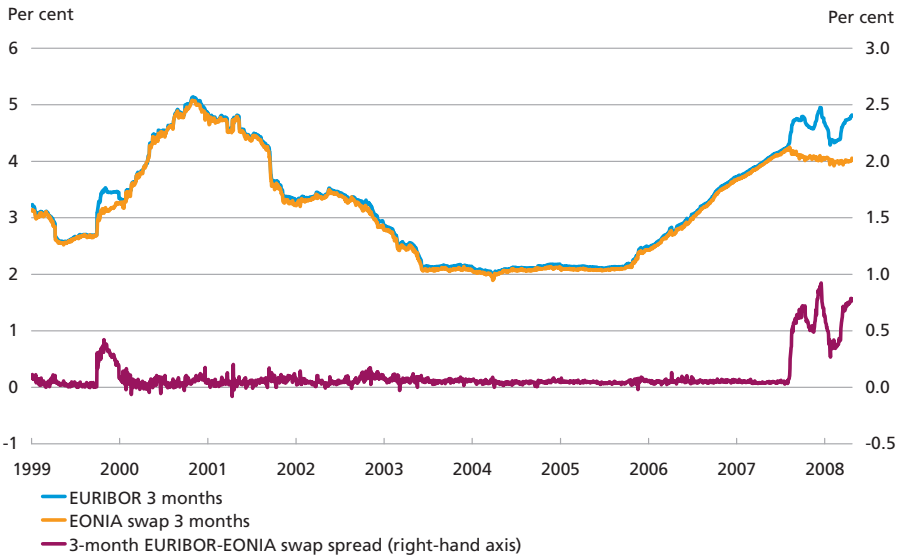
Regular payments to investors in such securities have depended on, inter alia, the borrowers' ability to fulfil their obligations. This was seen as a safe way for banks to divest credit risk, including credit risk on subprime mortgages to US homeowners.

The surge in the number of defaulted subprime mortgages shook confidence in this structure. The price of bonds based on subprime mortgages has dropped sharply since the summer of 2007, and the bonds have been downgraded. This has created major problems for e.g. the investment units that have specialised in purchasing securities based on housing loans with long maturities. Financing has been based on loans with short maturities, typically three months. In addition, some of the investment units had obtained commitments from banks for supply of liquidity in the event of financing problems, and several banks were co-owners of the units. This exposure has not been stated clearly in the banks' financial statements.

Lack of transparency in relation to exposure to subprime-related products led to general distrust among the banks and reluctance to provide liquidity in the money market. Particularly in the autumn of 2007 the US and European money markets were under severe pressure. In the first months of the subprime crisis the turmoil affected virtually only the uncollateralised money markets, and at the turn of the year 2007-08 the spread between collateralised and uncollateralised money-

COLLATERALISED AND UNCOLLATERALISED 3-MONTH INTEREST RATES IN THE EURO AREA

Chart 4




Source: Reuters, Ecowin.

market interest rates in the euro area was wider than ever before since the introduction of the euro in 1999, cf. Chart 4.

The tight money-market conditions landed the UK bank Northern Rock in dire financial straits in September 2007. Customers queued outside the bank's branches to withdraw their deposits, the Bank of England had to provide liquidity support, and coverage under the Financial Services Compensation Scheme was increased, cf. Box 1. In February 2008 Northern Rock was nationalised following vain attempts to find a private-sector solution.

In March 2008, the turmoil spilled over into the collateralised money market owing to lack of confidence in counterparties and collateral.

Central banks have responded to money-market developments by providing extra liquidity on several occasions, and some central banks have lowered their interest rates. In the period from the summer of 2007 to April 2008, the Federal Reserve lowered its policy rate by 3.25 percentage points to 2.00 per cent in an attempt to counteract the impact of housing-market developments on the economy, among other things. The ECB has kept its interest rate unchanged.

In the USA, the default wave has gradually spread from subprime mortgages to other parts of the US housing market, and to credit-card loans and car loans. In early 2008 this put the financial markets under renewed pressure. At the same time, confidence in credit strengthening for structured financial products was undermined by problems within the mono-

THE RUSH ON NORTHERN ROCK Box 1

In September 2007 a classical rush was seen with bank customers queuing to withdraw their deposits from the UK bank Northern Rock.[1]

Owing to a large deposit deficit and a maturity mismatch, i.e. lending over longer horizons than the underlying financing, Northern Rock was severely affected by the credit crunch in the wake of the subprime crisis. Consequently, it adjusted its earnings expectations downwards, and the Bank of England announced its preparedness to provide liquidity support for Northern Rock. This negative announcement gave rise to concern about the solvency of the bank.

One of the reasons for the rush of bank customers was the structure of the UK Financial Services Compensation Scheme. Previously, the Scheme covered the first 2,000 pounds in full, as well as 90 per cent of deposits up to 35,000 pounds. In addition, the money had to be paid out via the normal liquidation procedure, which can be lengthy. The combination of own risk and risk that the deposits may be frozen gave retail customers an incentive to withdraw their deposits as soon as the solvency of the bank was called into question.

In order to give Northern Rock and the banking system in general a little breathing space, the British government issued a guarantee to Northern Rock's customers stating that it would cover all deposits in the bank, but nevertheless it took some time before the queues of uneasy bank customers had dispersed. On 1 October 2007 the own risk under the Financial Services Compensation Scheme was abolished, whereby coverage was increased to 100 per cent of the first 35,000 pounds. In addition, the UK authorities in January 2008 issued a report on financial stability and depositor protection for public consultation[2]. The report calls for a more speedy compensation process in connection with payouts from the Scheme.

In Denmark, the Guarantee Fund for Depositors and Investors covers 100 per cent of the first kr. 300,000 and the money must be paid out as soon as possible and not later than three months after the suspension of payments or liquidation.

[1] Cf. Box A: "The Funding Crisis at Northern Rock" in Bank of England *Financial Stability Report*, October 2007, pp.10-12.

[2] Bank of England, HM Treasury and FSA *Financial stability and depositor protection: strengthening the framework*, January 2008.

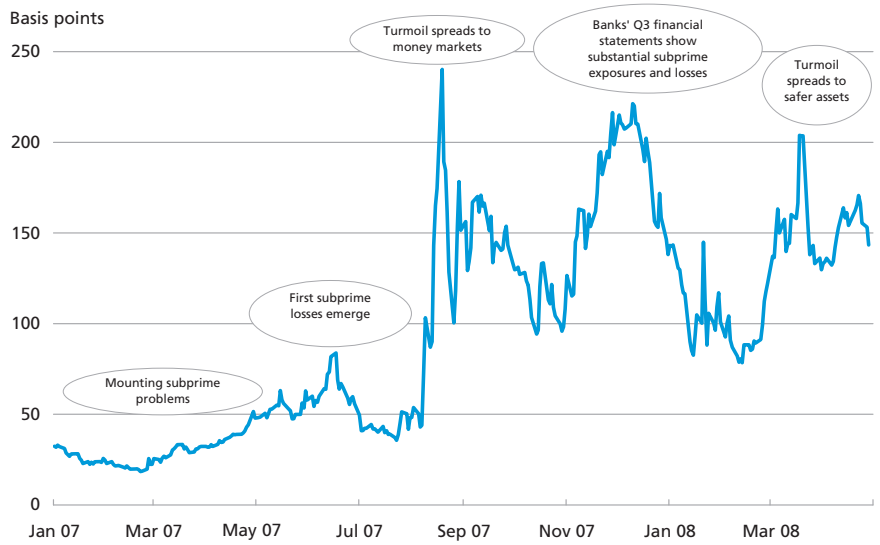
line insurance companies that have insured many subprime-related bonds against losses.[1] In addition, the spread between corporate and government bonds widened considerably further in the first months of the year, partly on account of concerns that more companies would fail.

Chart 5 illustrates the course of the subprime crisis as the development in the spread between 3-month money-market interest rates in the USA and the yield on US government bonds with the same maturity.

The financial turmoil has also caused equity prices to fall, while the yield on government bonds declined because investors' risk appetite waned, resulting in a "flight to safety". Widespread uncertainty regarding future developments is reflected in higher volatility in the financial markets, cf.

[1] Monolines are insurance companies that specialise in insuring highly rated bonds against losses.

DEVELOPMENT OF THE SUBPRIME CRISIS – SPREAD BETWEEN US 3-MONTH MONEY-MARKET INTEREST RATE AND GOVERNMENT BOND YIELD Chart 5

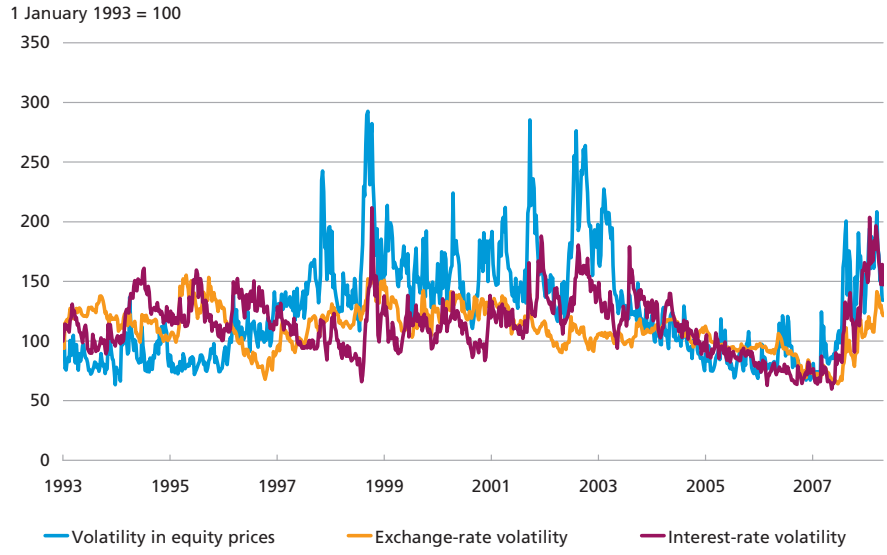



Source: Bloomberg and own presentation.

Chart 6. However, this increase follows period of unusually low volatility and low risk premiums, supported by factors such as ample liquidity.

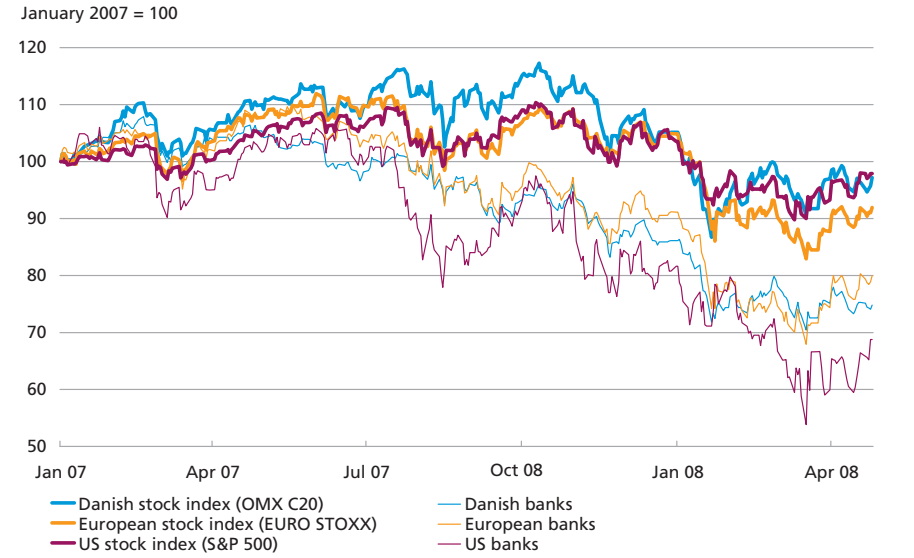
Economic prospects for the euro area are more favourable than for the USA, and the expected impact of the subprime crisis is less severe

IMPLIED VOLATILITY INDICES FOR EQUITIES, EXCHANGE RATES AND INTEREST RATES Chart 6




Note: Volatility in equity prices is the volatility in US equities, CBOE, VIX. Exchange-rate volatility is the volatility in the JPMorgan Chase World index, VXY. Interest-rate volatility is Merrill Lynch Option Volatility Index, MOVE.
Source: Bloomberg.

DEVELOPMENT IN BENCHMARK STOCK INDICES AND BANK INDICES Chart 7




Source: Bloomberg.

than in the USA. The dollar has been depreciating strongly as the slowdown in the US economy has become evident.

Market expectations of bank earnings have subsided as a result of the subprime crisis, bank credit spreads have widened, and bank shares have shown a more pronounced decline than the market in general, cf. Chart 7.

The IMF estimates that the total potential loss in connection with the subprime crisis is approximately 600 billion euro[1], of which half is expected to be incurred by the banks. The degree to which the individual banks have been affected varies considerably, cf. Box 2.

**Short-term Danish money-market interest rates only mildly affected**

In the Danish money market, the turmoil has largely been limited to long-term, uncollateralised money-market interest rates, a segment with relatively low turnover. The international financial turmoil does not seem to have limited the Danish banks' willingness to lend kroner to each other at the short end of the market. Until April 2008, turnover in uncollateralised day-to-day loans was at more or less the same level as previously, but in April turnover declined somewhat. The day-to-day interest rate has followed the rates of Danmarks Nationalbank. Fluctuations in interest rates have by no means been extraordinary. The same applies to 1-week CIBOR, except in the period around New Year,

[1] IMF *Global Financial Stability Report*, April 2008.

BANK LOSSES ON THE SUBPRIME CRISIS Box 2

The Table shows the largest 20 (in terms of balance-sheet assets) European and US banks' reported losses on the subprime crisis in 2007. Overall, the largest banks have lost more than 70 billion euro. As the Table shows, the losses vary considerably from bank to bank. In spite of large subprime-related losses, only two of the 20 banks came out of 2007 with a loss after tax. In the 1st quarter of 2008 several banks reported further subprime-related losses.

A number of slightly smaller banks have suffered substantial losses owing to large subprime-related exposures. These include the US bank Bear Stearns, which was acquired by JPMorgan Chase & Co. in March 2008. Several German banks have also experienced problems.

SUBPRIME-RELATED LOSSES OF THE LARGEST 20 EUROPEAN AND US BANKS IN 2007

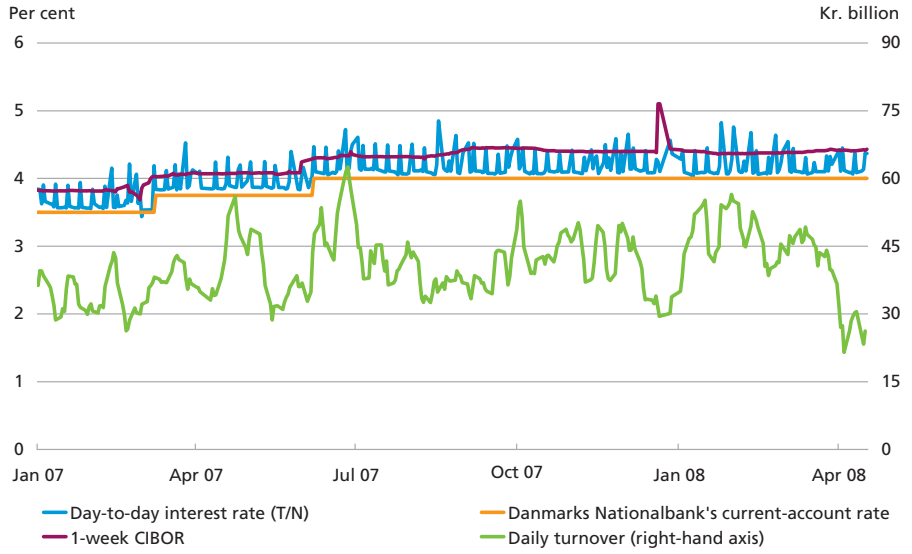
| Billion euro | Subprime-related losses, 2007[1] | Profit/loss after tax, 2007 | Profit/loss after tax, 2006 | Total assets, end-2007 |
|---|---|---|---|---|
| Merrill Lynch | -15.9 | -5.5 | 5.0 | 699 |
| Citigroup | -13.7 | 2.5 | 14.8 | 1,496 |
| UBS | -12.0 | -2.7 | 7.4 | 1,374 |
| Morgan Stanley | -6.4 | 2.2 | 5.1 | 717 |
| Credit Agricole | -2.9 | 6.0 | 7.1 | 1,414 |
| Société Générale[2] | -2.8 | 0.9 | 5.2 | 1,072 |
| Bank of America | -2.7 | 10.3 | 14.5 | 1,176 |
| Royal Bank of Scotland[3] | -2.6 | 10.3 | 8.4 | 1,373 |
| Fortis | -2.4 | 4.0 | 4.4 | 871 |
| Barclays | -2.2 | 6.0 | 6.2 | 1,670 |
| Goldman Sachs | -1.8 | 7.8 | 6.4 | 768 |
| HSBC | -1.5 | 13.1 | 10.8 | 1,614 |
| BNP Paribas | -1.3 | 7.8 | 7.3 | 1,694 |
| Credit Suisse | -1.2 | 5.2 | 6.8 | 823 |
| JPMorgan Chase & Co. | -0.9 | 10.5 | 9.9 | 1,071 |
| Unicredit | -0.7 | 6.6 | 6.6 | 1,022 |
| Deutsche Bank | -0.7 | 6.5 | 6.1 | 2,020 |
| Commerzbank | -0.6 | 1.9 | 1.8 | 617 |
| HBOS | 0.0 | 5.6 | 5.4 | 908 |
| Banco Santander | 0.0 | 9.1 | 7.6 | 913 |

Note: Local currencies have been converted at the exchange rates applying at end-2007.
Source: Financial statements and press releases from the banks.

[1] Subprime-related losses are losses and write-downs attributed to the subprime crisis by the banks themselves.
[2] Société Générale also lost 4.9 billion euro on unauthorised trading by a single employee.
[3] Excluding ABN AMRO.

The Danish banks have had only limited subprime exposure and thus few subprime-related losses. Several large Danish banks have liquidity commitments to structured investment vehicles (SIVs) and have to a lesser extent purchased capital certificates in SIVs. In the wake of the subprime crisis the Danish banks have reduced their liquidity commitments and direct investments in SIVs.

SHORT-TERM MONEY-MARKET INTEREST RATES IN DENMARK, AND DAILY TURNOVER IN THE DANISH DAY-TO-DAY MONEY MARKET, 2007-08 Chart 8




Note: The day-to-day interest rate is a turnover-weighted Tomorrow/Next interest rate. Daily turnover is a 5-day moving average.
Source: Danmarks Nationalbank.

which reflected the increase in euro area interest rates often seen at the turn of the year[1], cf. Chart 8.

A number of monetary-policy structures in Denmark have presumably helped to mitigate the impact. For example, the substantial market for mortgage-credit bonds means that the system as a whole has an ample supply of securities to pledge as collateral for loans from Danmarks Nationalbank. The structure of Danmarks Nationalbank's open market operations also enables banks to build up liquidity reserves in the form of certificates of deposit issued by Danmarks Nationalbank.[2]

The extensive shortage of dollar liquidity was felt in the Danish market for currency swaps (and the forward foreign-exchange market), in which the price of borrowing dollars – and to a lesser extent euro – against kroner rose considerably during the period, and much more than immediately warranted by the spread between the uncollateralised reference interest rates.

In March 2008, the turmoil in the international financial markets spread to highly rated European mortgage-credit and government bonds. The

[1] Euro area banks usually reduce their lending and build up portfolios of liquid assets around the turn of the year (year-end effect), cf. U. Bindseil, B. Weller and F. Würtz, Central Bank and Commercial Banks' Liquidity Management – What is the Relationship?, *Economic Notes*, Vol. 32(1), 2003, pp. 37-66 and ECB, *Monthly Bulletin*, October 2000.

[2] See Morten Kjærgaard and Lars Risbjerg, Financial Turmoil, Liquidity and Central Banks, *Monetary Review*, 1st Quarter 2008.

yield spread between Danish mortgage-credit and government bonds also widened. However, this is not in itself likely to have had an impact on the demand for housing loans in Denmark.

**Few indications of liquidity pressure in the Danish payment systems**

A well-functioning financial system requires safe and efficient settlement of payments and securities transactions between financial institutions. This is only possible if the financial institutions trust their counterparties to have the necessary liquidity to meet their own payment obligations and those of their customers.

In 2007 and 2008 so far, financial institutions participating in the Danish payment and settlement systems did not overall experience problems in procuring liquidity to meet their payment obligations and effect payments. This circumstance is attributable to their large portfolios of bonds, notably mortgage-credit bonds, that can be pledged as collateral to Danmarks Nationalbank. In recent years the financial institutions' excess liquidity cover in connection with settlement of payments has, however, declined slightly.

## MORE SUBDUED GROWTH IN THE DANISH ECONOMY

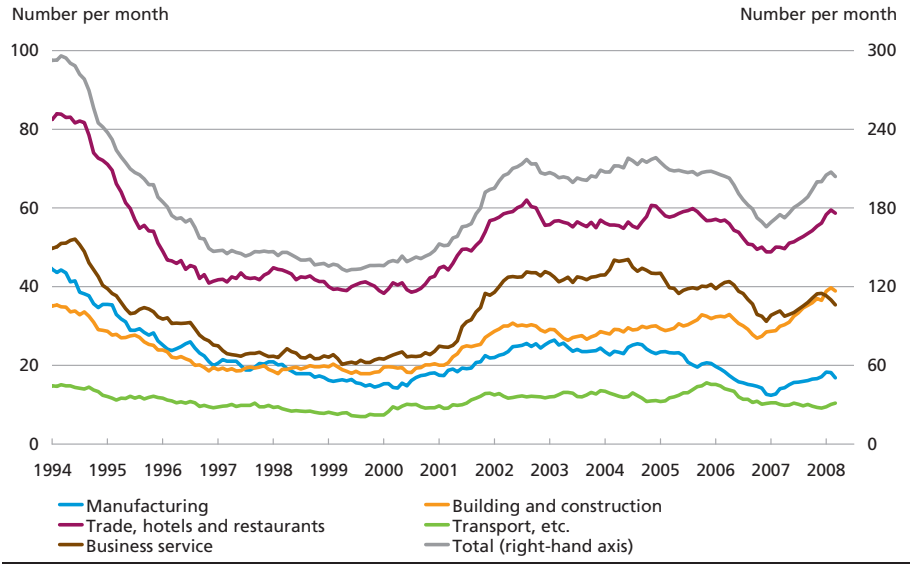
Growth in the Danish economy was high in 2007, but lower than during the strong upswing in the preceding years. The Danish economy is characterised by a tight labour market and rising wage growth. Supply-side limitations such as shortage of labour and pressure on the capital stock are the main reasons for the moderation in growth, which is expected to continue in the coming years, cf. Table 1.

DANMARKS NATIONALBANK'S ESTIMATES OF SELECTED ECONOMIC VARIABLES IN DENMARK, MARCH 2008 — Table 1

| Real growth over the preceding year, per cent | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| GDP | 1.8 | 1.9 | 1.0 | 0.4 |
| Private consumption | 2.7 | 3.0 | 1.4 | 0.8 |
| Exports | 3.7 | 3.2 | 2.6 | 3.3 |
| Unemployment, 1,000 persons | 76.7 | 54.9 | 65.7 | 95.2 |
| Hourly wages, per cent year-on-year | 4.0 | 4.8 | 4.8 | 4.2 |
| Cash prices of owner-occupied housing, per cent year on year, nominal | 4.4 | 0.2 | -0.6 | -1.0 |
| 3-month money-market interest rate, per cent p.a. | 4.1 | 3.9 | 3.6 | 3.7 |
| Dollar, DKK per USD | 5.4 | 5.0 | 4.9 | 4.9 |
| Oil price, Brent, USD per barrel | 72.7 | 97.0 | 96.2 | 95.2 |

[1] Statistics Denmark has restructured the unemployment statistics. In this Table, the new definition is applied. However, calculations have been made using the old definition and subtracting 16,000 persons, which is the average difference for 2007 overall.

COMPULSORY LIQUIDATIONS IN THE NON-FINANCIAL SECTOR Chart 9



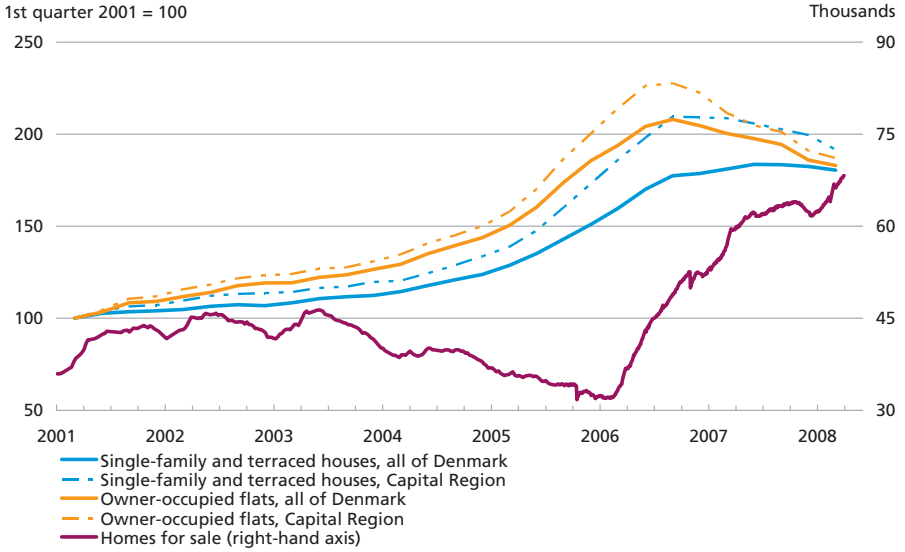

Note: The Chart shows monthly data for the number of compulsory liquidations, calculated as a 12-month moving average.
Source: Statistics Denmark.

The number of compulsory liquidations among Danish companies rose in 2007 to around the same level as in the period 2002-05, cf. Chart 9. The greatest increase is seen in building and construction, one of the most cyclically sensitive sectors of the economy, and one in which a dampening of growth is rapidly reflected.

In 2006, strong housing price increases made way for stagnating or falling prices. At the national level, prices of owner-occupied flats dropped, while prices of single-family and terraced houses remained more or less unchanged throughout 2007, cf. Chart 10. In the 1st quarter of 2008, the prices of single-family and terraced houses and owner-occupied flats all decreased. There are considerable regional differences in price developments. The slowdown in the housing market is also reflected in turnover in owner-occupied flats, which in 2007 was lower than in recent years. At the same time, the number of homes for sale is high, cf. Chart 10.

The development in the housing market should be seen against the background of the higher level of interest rates, as well as extensive building activity in recent years, whereby the stock of housing has increased. At the same time, there seems to be a change of sentiment in the housing market. Expectations of a sustained increase in prices have been replaced by expectations of stagnating or falling prices.

HOUSING PRICES AND HOMES FOR SALE Chart 10




Source: Association of Danish Mortgage Banks and Danish Association of Chartered Estate Agents, www.boligsiden.dk.

Unemployment is low, and Danish households generally have sound finances. The number of enforced sales rose slightly in 2007, but from a very low level.

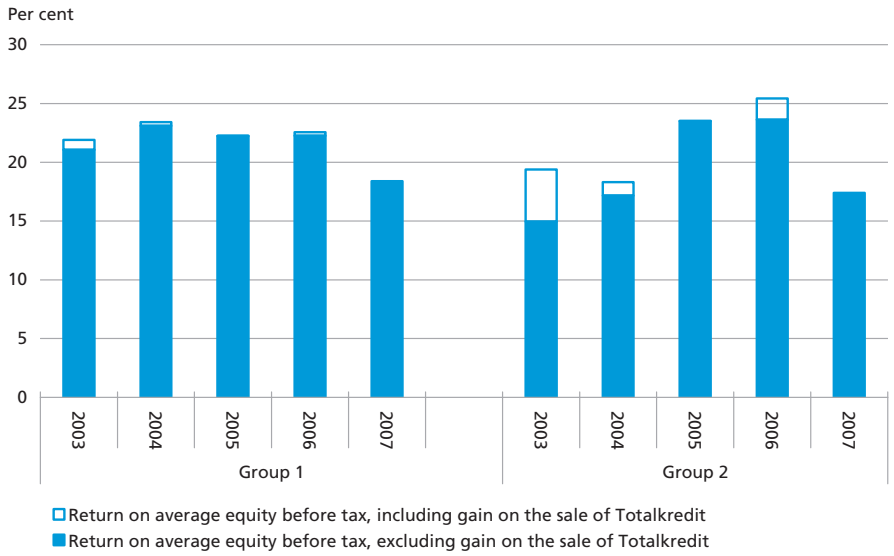
The households' total debt to banks and mortgage-credit institutes grew at a faster pace than their disposable gross income in 2007, but the growth gap is narrowing. At end-2007 the households' total debt was 2.5 times higher than their disposable gross income. There are no general indications that the Danes have major problems in servicing their loans.

The households' exposure to large interest-rate increases fell in 2007 due to a higher share of fixed-rate loans and activated capped loans. On the other hand, more homeowners are choosing deferred-amortisation loans, so that they no longer have the buffer which the possibility of shifting to deferred amortisation provides.

## FINANCIAL INSTITUTIONS – DECLINING BANK EARNINGS

Bank earnings in 2007 were influenced by the international financial turmoil. While earnings in the 1st half of 2007 rose, the 2nd half of the year was a turning point for many banks after several years with rising earnings. The total pre-tax profit for the largest 16 banks was kr. 31.8 billion in 2007, down by 8 per cent from 2006. Adjusted for Danske Bank's acquisition of Sampo Bank, the banks' total result declined by 14

DANISH BANKS' RETURN ON EQUITY Chart 11




Note: Return on equity calculated on the basis of an average of equity at the beginning and end of the period.
Source: Financial statements.

per cent. Preliminary bank data indicates that this trend has continued into 2008.

The banks saw considerable valuation losses in 2007; particularly bond portfolios were adjusted downwards.

In 2007, the banks made larger new write-downs on loans than in previous years. On account of reversal of previous write-downs, this item made a positive net contribution to income in 2007.

The financing costs of the Danish banks have increased since the financial turmoil began in mid-2007. For the full year, the banks' net interest income grew by 17 per cent against the background of 12.8 per cent lending growth and 20.3 per cent growth in deposits. In 2008 so far, several banks have raised their interest rates in response to the higher financing costs.

The return on the banks' equity fell in 2007, cf. Chart 11. A lower profit ratio, combined with lower earnings in relation to the business volume measured as risk-weighted items, has contributed to a lower return on equity for banks in both group 1 and group 2.

**Declining lending growth, but the deposit deficit is still large**

The turmoil in the financial markets and the high financing costs have dampened the banks' expansion. Lending growth therefore declined in 2007, cf. Chart 12. The lower lending growth was most pronounced for

OVERVIEW OF FINANCIAL INSTITUTIONS IN THE REPORT Box 3

BANKS IN THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S GROUPS 1 AND 2, MORTGAGE-CREDIT INSTITUTES, LIFE-INSURANCE COMPANIES, AND NORDIC GROUPS

| | Activities in Denmark | | |
|---|---|---|---|
| | *Banking* | *Mortgage credit* | *Life and pension* |
| **Group 1** | | | |
| Danske Bank | Danske Bank | Realkredit Danmark | Danica |
| FIH Erhvervsbank | FIH Erhvervsbank | FIH Realkredit | |
| Jyske Bank | Jyske Bank | | |
| Nordea | Nordea Bank Danmark | Nordea Kredit | Nordea Liv & Pension |
| Sydbank | Sydbank | | |
| **Group 2** | | | |
| Alm. Brand | Alm. Brand Bank | | Alm. Brand Liv og Pension |
| Amagerbanken | Amagerbanken | | |
| Arb. Landsbank | Arb. Landsbank | | |
| Fionia Bank | Fionia Bank | | |
| Forstædernes Bank | Forstædernes Bank | | |
| Nykredit | Nykredit Bank | Nykredit | |
| | | Totalkredit | |
| Ringkjøbing Landbobank | Ringkjøbing Landbobank | | |
| Roskilde Bank | Roskilde Bank | | |
| Spar Nord Bank | Spar Nord Bank | | |
| Sparbank | Sparbank | | |
| Vestjysk Bank | Vestjysk Bank | | |
| **Number of institutions** | **16** | **5** | **3** |
| **Nordic groups** | | | |
| Danske Bank | | | |
| DnB NOR | | | |
| Nordea | | | |
| SEB | | | |
| Svenska Handelsbanken | | | |
| Swedbank | | | |

Note: Nordea Liv & Pension is part of the Nordea Bank AB group.
Source: Financial statements.

The Danish financial sector is dominated by a few large groups whose activities and earnings cover various financial business areas. Banking is by far the largest and most important business area in relation to financial stability. Danish banks are sometimes parent companies, sometimes subsidiaries in groups comprising other financial enterprises too.

Ownership and the chosen group structure affect the earnings and risk profiles of the individual banks. Typically, most of a group's excess capital adequacy is held by the parent company, from which it is easiest to channel the funds to any parts of the group that need further capital. Consequently, subsidiaries often have lower capital adequacy in relation to risks. On the other hand, an assessment of a parent company must take into account that its capital adequacy must to some extent also hedge unexpected losses to subsidiaries.

Mortgage-credit institutions arrange loans for financing of real estate and in this capacity they are the largest bond issuers in Denmark. The development in the mortgage-credit institutes may have a direct impact on the banks via group structures and cooperation agreements or an indirect impact in that the mortgage-credit institutes compete with the banks in the home-financing market.

Life-insurance companies manage considerable assets and can thus impact price formation in the financial markets. They, too, can have a direct impact on the banks via group structures.

Mortgage-credit and life-insurance activities are undertaken by special institutions and subject to special rules aimed at mitigating risk.

CONTINUED Box 3

Asset management, including running investment associations, is assessed to be an area with limited risk for the banks and little impact on financial stability. The risk of investment losses as a result of changing market conditions is typically borne by the customer.

The analyses in this report focus on banks in the Danish Financial Supervisory Authority's groups 1 and 2, comprising the largest 16 banks as well as the mortgage-credit institutes and life-insurance companies affiliated with the selected Danish banks, cf. the Table below. Selected items from the financial statements of a wider selection of banks are described in the chapter "The Banking Institutions' Financial Results".

Danske Bank and Nordea Bank Danmark belong to large groups with activities in most of the Nordic region, the Baltics and a few other countries. In a group context, they are therefore compared with similar large Nordic banking groups.

Banks comprised by the analysis account for 93 per cent of the balance-sheet total of the Danish banks and have a market share of 77 per cent of total bank lending in Denmark.

the banks in group 1. Preliminary data for bank lending indicates that lending growth declined further in the 1st quarter of 2008.

The banks' deposit deficit has been increasing since early 2005. In 2007 the rate of increase was, however, far more subdued than in the preceding two years.[1] Data for the 1st quarter of 2008 points to a moderate fall in the deposit deficit, cf. Chart 13.

At end-2007, the deposit deficit accounted for 24 per cent of lending and 11 per cent of assets. Only one of the 16 banks had a deposit surplus, cf. Chart 14. The differences in deposit deficit among the banks not only reflect lending growth in recent years, they may also be attributable to different business models.

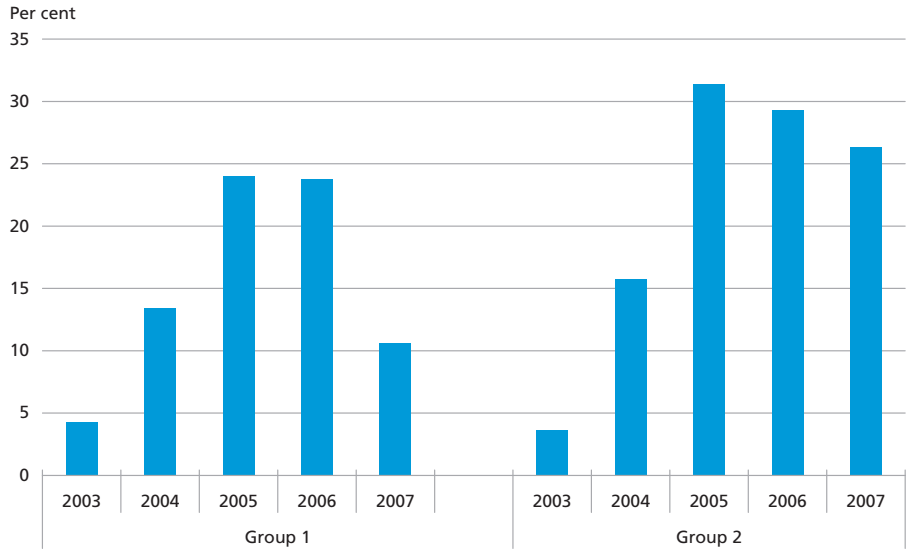
The banks in groups 1 and 2 finance their deposit deficits in different ways. In group 2, debt to other credit institutions is the preferred source of financing, while the group 1 banks rely more on bond issuance, cf. Chart 15. Group 2 has increased the maturity since 2006.

**The banks' reserves were reduced in 2007**

The banks' solvency and core capital ratios were reduced in 2007, cf. Chart 16. Part of the explanation for the pronounced reduction in group 1 is that Danske Bank's capital adequacy was extraordinarily high at end-2006 since the bank had issued new capital in the 2nd half of 2006 for the acquisition of Sampo Bank in Finland. Adjusted for this outlier, the

[1] Two special factors affected the development in the deposit deficit in 2007. Danske Bank's conversion of its subsidiaries in Norway and Ireland into branches contributed to an increase in the deposit deficit by approximately kr. 76 billion at the beginning of the 2nd quarter of 2007. In early 2007, FIH Erhvervsbank sold approximately kr. 13 billion of its lending portfolio to a subsidiary. Viewed in isolation, this reduced the deposit deficit.

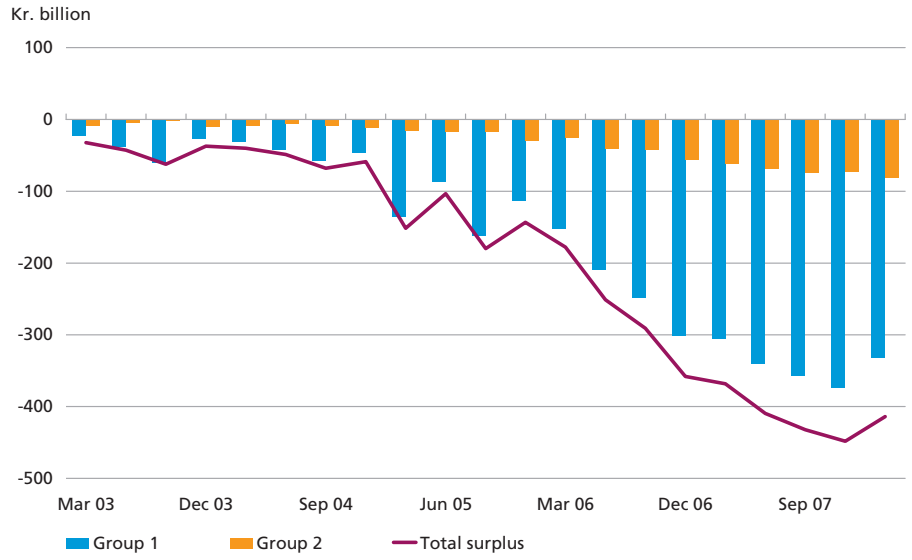
GROWTH IN LENDING BY DANISH BANKS — Chart 12




Note: Adjusted for the effect of Danske Bank's conversion of banking activities in Norway and Ireland into branches, and FIH Erhvervsbank's sale of part of its lending portfolio to a subsidiary.
Source: Financial statements.

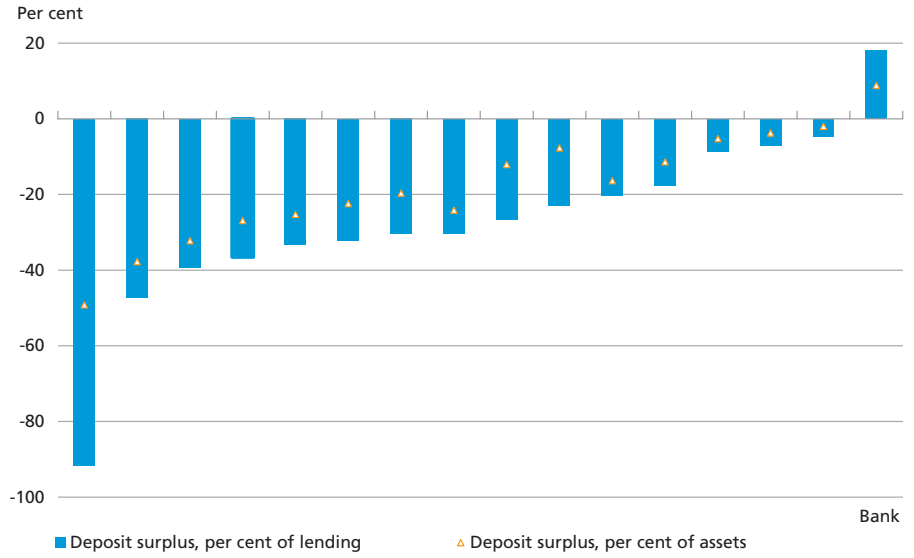
solvency and core capital ratios in 2007 were reduced by around 1 percentage point compared with 2006. The relatively modest reduction in both ratios in group 2 reflects that most of these banks issued supplementary capital in 2007, and a few also issued share capital.

DEPOSIT SURPLUS IN THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S GROUPS 1 AND 2 — Chart 13




Source: Danmarks Nationalbank.

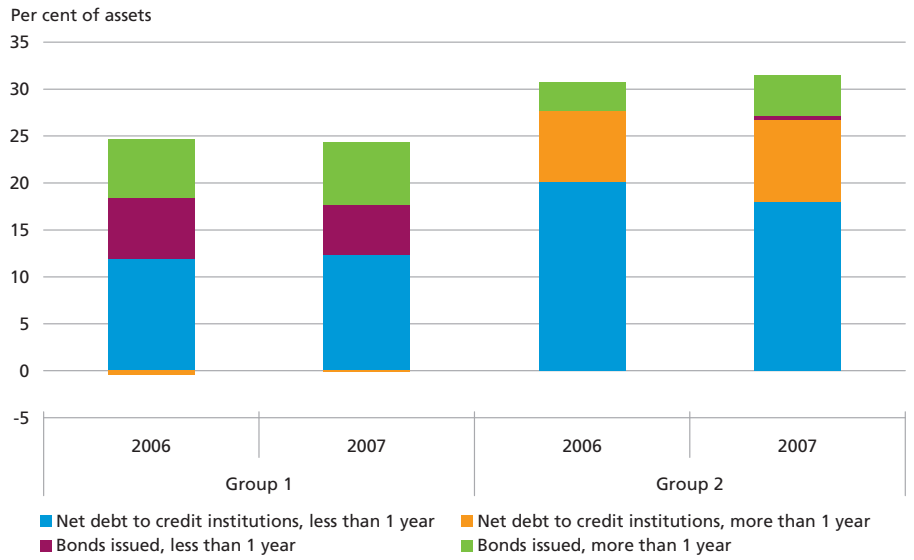
DEPOSIT SURPLUSES OF THE INDIVIDUAL BANKS, END-2007 Chart 14




Source: Danmarks Nationalbank and the banks' financial statements.

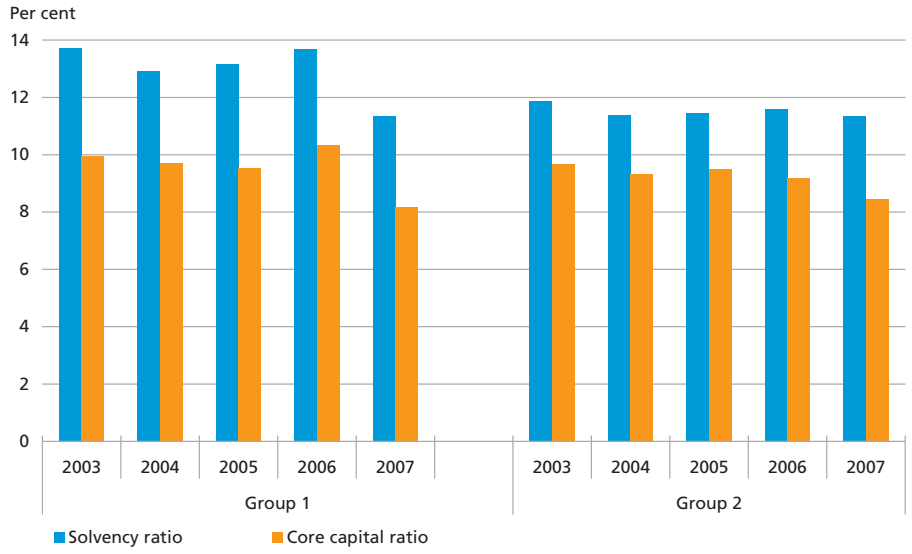
In 2007, new capital-adequacy rules, Basel II, entered into force with a transition period until 2010, after which the rules will be fully implemented. At end-2007 only two of the 16 banks in groups 1 and 2 had stated their solvency on the basis of Basel II, and the reported effect was a reduction of the capital requirement by kr. 2 billion. This should

NET DEBT TO OTHER CREDIT INSTITUTIONS, AND BONDS ISSUED Chart 15




Source: Financial statements.

DANISH BANKS' SOLVENCY AND CORE CAPITAL RATIOS Chart 16




Source: Financial statements.

be seen in relation to an estimated aggregate capital requirement for groups 1 and 2 of kr. 192 billion at year-end.[1]

In 2008, all banks must state their solvency in accordance with Basel II, and five – primarily large – banks expect their capital requirements to be reduced by a total of kr. 14 billion in 2008 and a further kr. 19 billion in the following years. Only one bank expects its capital requirement to increase under Basel II. Viewed in isolation, a total reduction of the capital requirement by kr. 34 billion is equivalent to an increase by 3 percentage points in the solvency ratio of the group 1 and 2 banks taken as one.

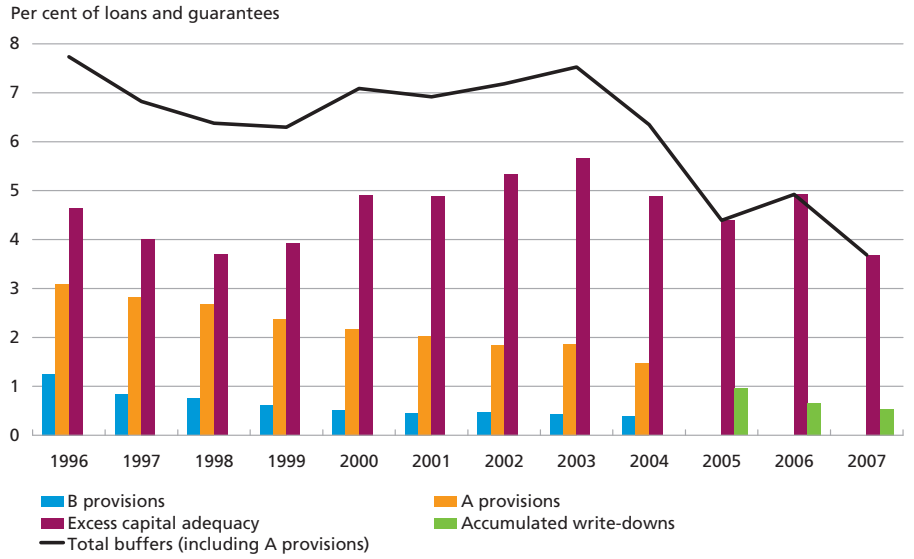
In recent years, Danish banks have made lower provisions, measured as a percentage of loans and guarantees, against losses that exceed earnings, cf. Chart 17. The reduced reserves have made the banks more exposed to rising losses. The reason for reducing the reserves could be that the banks see their exposures as less risky than previously. However, another reason is presumably the introduction of the International Financial Reporting Standards, IFRS, from 1 January 2005, and new capital-adequacy rules, Basel II, from 1 January 2007, whereby the reserve requirements have changed.

Under the previous accounting rules, the prudential principle applied, and provisions were broken down into A and B provisions. A provisions were for probable losses, while B provisions were for unavoidable losses.

[1] Estimated as 8 per cent of the risk-weighted items.

DEVELOPMENT IN THE BANKS' RESERVES, PER CENT OF LOANS AND GUARANTEES

Chart 17




Note: Based on all banks in the Danish Financial Supervisory Authority's groups 1-3.
Source: Danish Financial Supervisory Authority and financial statements.

A provisions could thus be included in the banks' reserves. Under IFRS, a neutrality principle applies, and provisions have been replaced by write-downs, which require an objective indication that the bank will lose money. Consequently, write-down takes place very close to the time of the actual loss, like the previous B provisions.

Under Basel I, all banks had to observe a statutory capital requirement of 8 per cent. Any capital adequacy beyond 8 per cent, i.e. excess capital adequacy, could thus be seen as a buffer against losses that exceeded earnings. Under Basel II, a new concept has been introduced, capital need. Banks must review their total risks and assess how much capital they need. This individual capital need should take into account factors such as deterioration of the credit quality of exposures, to the extent that this has not been done by means of write-downs. It is not a requirement that the capital need is published, but it must be reported to the Danish Financial Supervisory Authority, which may order the individual bank to raise its capital need if it finds that the bank has uncovered risks. The individual bank's capital requirement may thus exceed the statutory 8 per cent, and consequently not all capital in excess of 8 per cent can be included in the bank's capital buffers.

Interaction between IFRS and Basel II has made it more difficult for readers of the financial statements to assess the resilience of the banks.

SYDBANK ACQUIRES BANKTRELLEBORG Box 4

In January 2008, financial problems in bankTrelleborg led to a merger with Sydbank. bankTrelleborg was in the Danish Financial Supervisory Authority's group 3 with a balance-sheet total of kr. 8 billion at end-2007. The Annual Report 2007 for bankTrelleborg explains the course of events that led to the merger with Sydbank. The Annual Report describes how collateral issues and derived violation of contractual provisions concerning loans raised led to a pronounced and immediate increase in bankTrelleborg's liquidity requirement. In view of the worsened liquidity situation, the Danish Financial Supervisory Authority raised the bank's solvency requirement. The bank was unable to observe the new solvency requirement, and an acquisition agreement was concluded with Sydbank, which made the necessary capital available to bankTrelleborg.

Previously, a steady increase in credit risk would be reflected in higher provisions, which in turn would reduce the bank's profit. If the bank's earnings were not sufficient, its capital adequacy would decrease. This development could be read from the financial statements. However, the requirement that there must be objective indications of losses before loans are written down means that expectations of rising future losses will now increase the capital need – not published in the financial statements. Thus, readers of the accounts may perceive an ailing bank as a sound business with relatively low write-downs, a positive bottom-line result and capital adequacy well in excess of the statutory 8 per cent. Nevertheless, the bank may have a hidden capital need that may in effect have consumed a large share of the excess capital adequacy and thus of the bank's reserves.

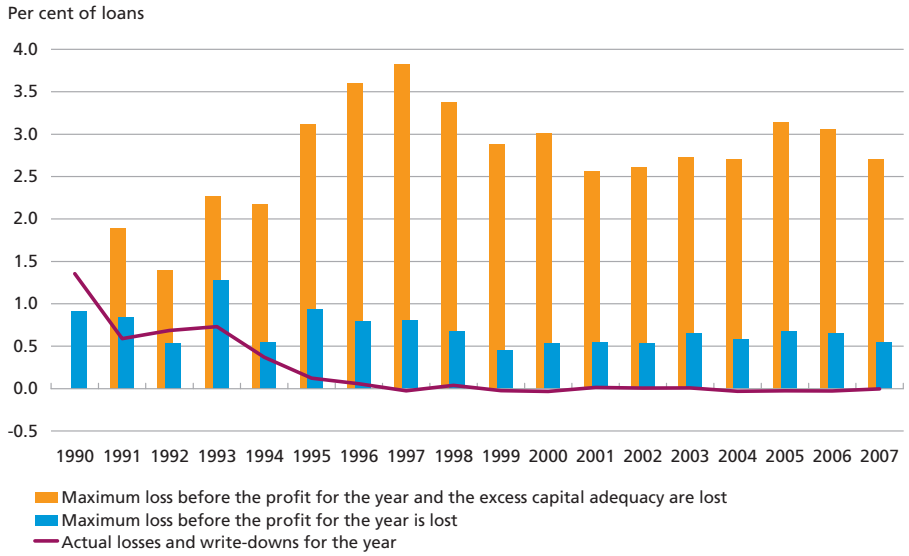
Danmarks Nationalbank finds it unfortunate that the EU has not been able to agree on a requirement to publish the capital need. In the opinion of Danmarks Nationalbank it would be an advantage for the banks to publish their own capital needs.

**Lower earnings in mortgage-credit institutes, but still no losses**

Following several years of rising earnings for the mortgage-credit institutes, the tide turned in 2007, and the profit was 12 per cent lower than in 2006. Lower capital gains than in 2006 contributed to reducing earnings in spite of growth in lending. The mortgage-credit institutes' earnings before tax in 2007, kr. 9,4 billion, are equivalent to a return on equity of 8.6 per cent p.a.

In line with the development in earnings, the resilience of the mortgage-credit institutes to higher losses fell in 2007, but remains considerable in relation to actual losses, cf. Chart 18.

MORTGAGE-CREDIT INSTITUTES' RESERVES AGAINST LOSSES Chart 18




Note: Maximum losses are compiled including actual losses and write-downs. The population changes from 2004 onwards. From 2004, the population comprises Nordea Kredit, Nykredit Realkredit, Realkredit Danmark and Totalkredit. Previously it also included BRFkredit, DLR Kredit, LR Realkredit and FIH Realkredit.
Source: Financial statements and Danish Financial Supervisory Authority.

**Low market returns in the financial groups' life-insurance companies**

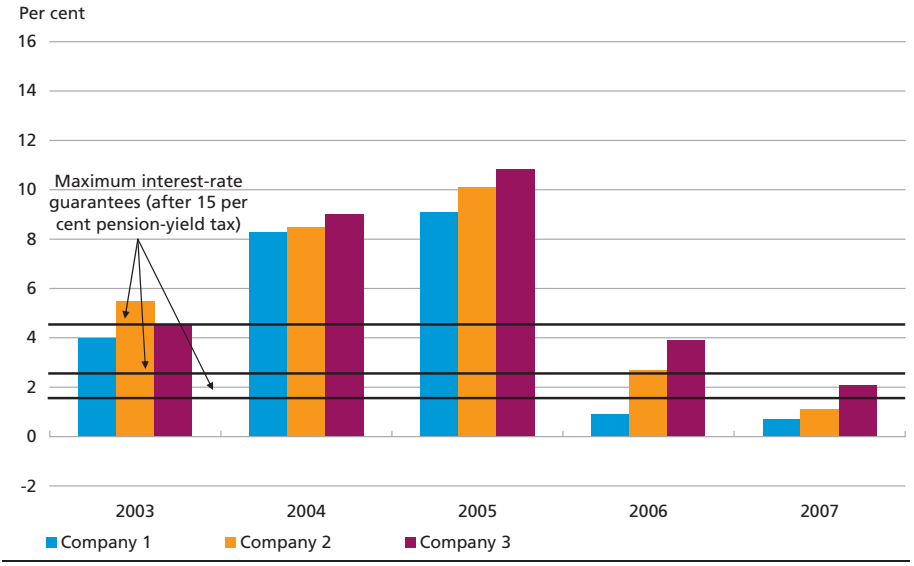
Financial groups incur an investment risk by owning life-insurance companies. The size of this risk depends on the commitments of the life-insurance company in terms of future pension payments and the expected return on investment assets. From 1982 until mid-1994, life-insurance companies were entitled to guarantee pension savers an annual minimum return after tax of up to 4.5 per cent. In 1994, the limit was reduced to 2.5 per cent and in 1999 to 1.5 per cent.

It is seen from Chart 19 that in 2007 none of the companies under review achieved an investment return after taxation of pension yields that exceeded the 4.5 per cent guarantee.

This was the second consecutive year that the market return of the pension companies did not make it past the 4.5 per cent mark. In a short-term perspective this is not alarming, particularly since returns were generally high in both 2004 and 2005. However, over a somewhat longer horizon it is evident that if the return on investments does not improve, the investment activities of the life-insurance companies will not generate sufficient income to meet their commitments, and, being the owners, the financial groups will have to inject extra capital.

In spite of low returns on investments, two of the three life-insurance companies reviewed have decided to raise the rate of interest on policy-

RETURN AFTER PENSION-YIELD TAX Chart 19




Source: Financial statements.

holders' savings in 2008, i.e. the interest accruing to customer accounts and payments in 2008. If a life-insurance company achieves a lower return than the announced rate of interest on policyholders' savings, the company must transfer funds from the collective bonus potential, cf. Box 5.

The investment mix chosen by the individual pension company varies considerably, but all three companies primarily invest in bonds. None of them have large portfolios of credit bonds, which have generally been severely affected by the subprime crisis.

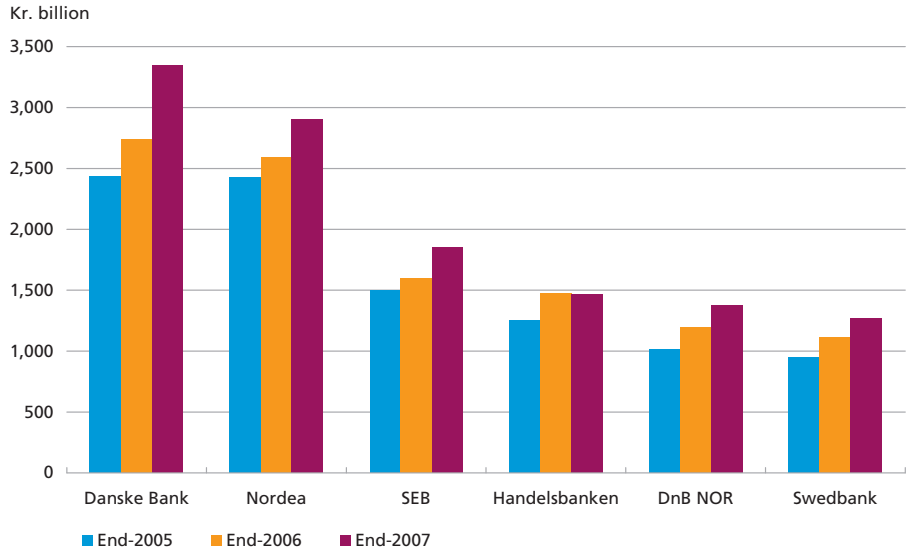
All three companies state that at end-2007 green light applied, as defined by the Danish Financial Supervisory Authority's risk scenarios.

LIFE-INSURANCE COMPANIES: FROM MARKET RETURN TO RATE OF INTEREST ON POLICYHOLDERS' SAVINGS Box 5

The sum below shows the link between the actual market return and the rate of interest on policyholders' savings:

| | |
|---|---|
| | Annual return on investments (net) |
| + | Change in value of life-insurance commitments |
| = | **Market return** |
| - | Pension-yield tax |
| - | Risk compensation for the year |
| + | Risk and expense result |
| + | Transfer to/from collective bonus potential |
| + | Other adjustments |
| = | **Rate of interest on policyholders' savings** |

BALANCE-SHEET TOTALS, NORDIC GROUPS Chart 20




Source: Financial statements.

**Nordic groups**

Danske Bank and Nordea are the largest banking groups in the Nordic region in terms of balance-sheet assets, cf. Chart 20. With the acquisition of Sampo Bank in the 1st half of 2007, Danske Bank further consolidated its position. In terms of the market value of outstanding shares at end-2007, Nordea is the larger of the two groups, with a value of kr. 221 billion, compared with Danske Bank's market value of kr. 137 billion.

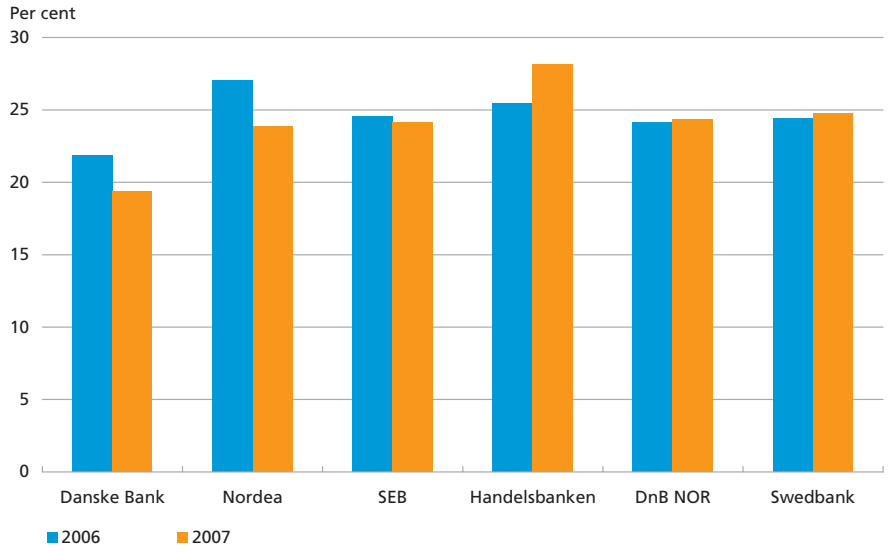
The aggregate profit before tax for the Nordic groups was kr. 106 billion in 2007, equivalent to an increase by 8 per cent on 2006. Adjusted for Danske Bank's acquisition of Sampo Bank in 2007, the increase is 5 per cent. The groups' average return on equity was 24 per cent p.a., down from 25 per cent p.a. in 2006. Danske Bank had the lowest return in 2007, just over 19 per cent, cf. Chart 21. Among other things, this is attributable to integration costs in connection with the acquisition of Sampo Bank.

On a net basis, write-downs on loans was an income item for Nordea, while it was an expense item for the five other groups.

Lending by the Nordic groups grew by an average of 14 per cent in 2007, which is in line with the preceding two years. The differences between the groups, cf. Chart 22, reflects factors such as varying volumes of repo transactions.

A breakdown of activities by geographical areas shows some differences between the Nordic groups. The Baltic customer segment consti-

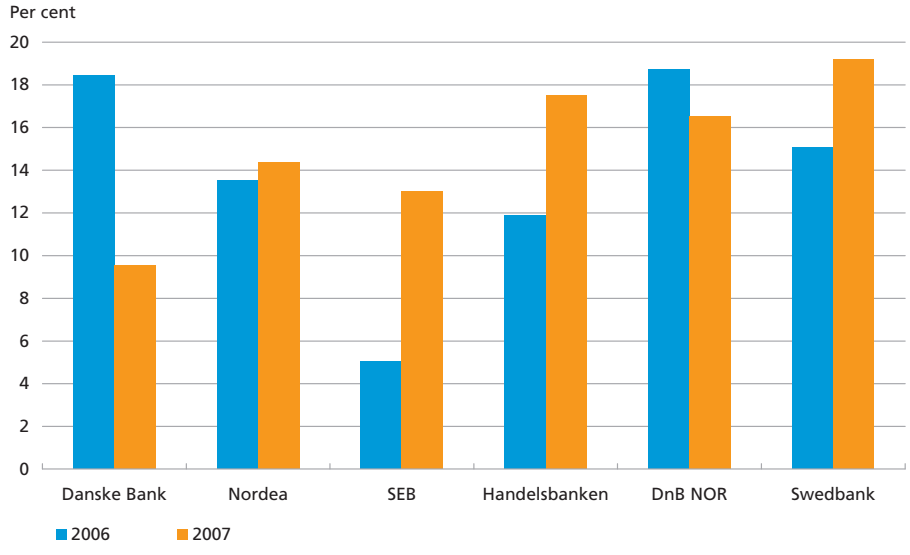
RETURN ON EQUITY BEFORE TAX, NORDIC GROUPS Chart 21




Note: Return on equity calculated on the basis of an average of equity, beginning of period, and equity, end of period.
Source: Financial statements.

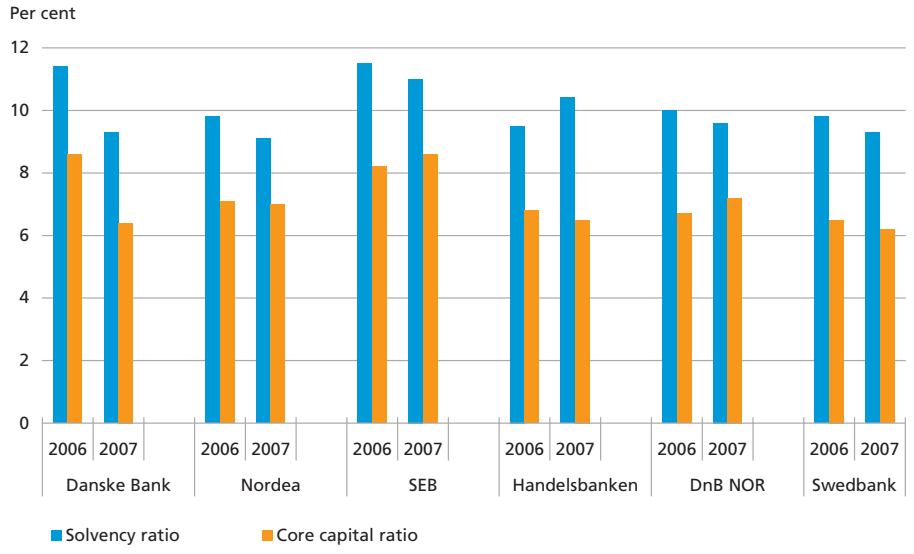
tutes a larger proportion in Swedbank and SEB than in the other Nordic banks. After several years' strong increase in growth, the Baltic economies are now overheated with high inflation in all three countries.

LENDING GROWTH, NORDIC GROUPS Chart 22




Note: Adjusted for the impact of significant acquisitions and sales of activities.
Source: Financial statements.

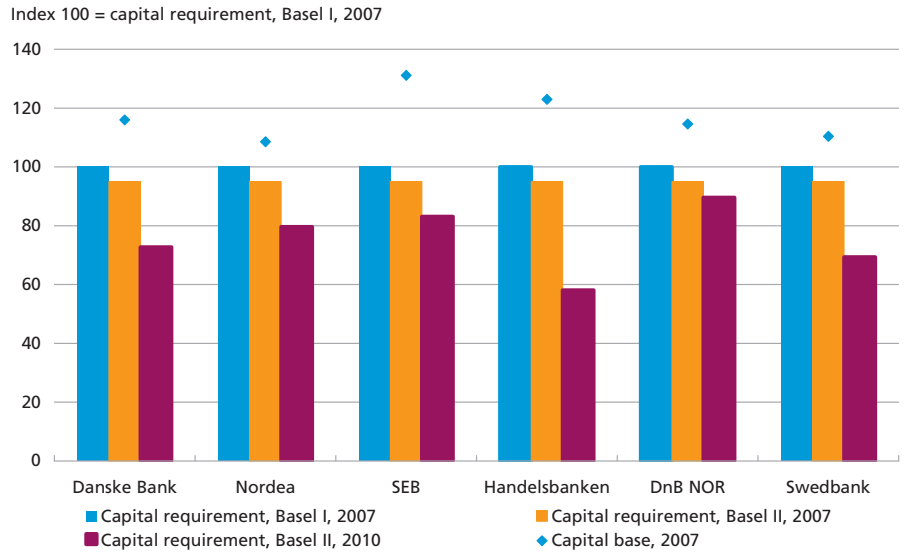
SOLVENCY AND CORE CAPITAL RATIOS — Chart 23




Source: Financial statements.

The development in the Nordic groups' capital adequacy is relatively stable, cf. Chart 23. Only Danske Bank registered a pronounced fall from end-2006 to 2007 on account of its acquisition of Sampo Bank in February 2007.

CAPITAL BASE AND DEVELOPMENT IN CAPITAL REQUIREMENT ON IMPLEMENTATION OF BASEL II — Chart 24




Note: Capital base stated in accordance with the models applied at end-2007. Capital requirements calculated on the basis of risk-weighted items in accordance with Pillar 1.
Source: Financial statements and risk reports.

With the exception of Danske Bank, all the Nordic groups implemented parts of Basel II in 2007. Danske Bank has exercised the option provided by the transition rules to state its capital adequacy in 2007 in accordance with Basel I.

All groups have reported lower capital requirements in connection with the implementation of Basel II, cf. Chart 24. The greatest impact is seen for Handelsbanken, which will be able to reduce its capital requirement in kroner to 58 per cent of the requirement under Basel I. The reduction will be implemented gradually until 2010, and in accordance with the transition rules only 5 per cent was implemented in 2007.

The reductions vary on account of the groups' different choices of model and different business profiles. It should be emphasised that the assessment of a bank's risks by its management or by supervisory authorities may entail higher capital requirements by way of individual capital needs.

# The Risk Outlook

*The risk outlook is strongly influenced by the subprime crisis and derived effects on the international financial markets and the global economy. The banks' financing costs have risen as a result of the turmoil. Banks with large deposit deficits, especially those without a good rating, are exposed to these increases. In addition, the banks' market risk has risen as a result of the uncertainty and greater volatility in the financial markets.*

*The expected slowdown in Danish economic growth also entails risks for the banks. Household finances are sound, but the continually increasing debt makes the households more exposed. The estimated failure rates for companies rose, and the banking sector's expected losses on corporate exposures increased in 2007 compared with 2006, albeit from a low level.*

## OVERVIEW OF SIGNIFICANT RISKS TO FINANCIAL STABILITY

This chapter describes significant risks to financial stability, i.e. risks associated with the financial markets, macroeconomic risks of both international and Danish origin and any vulnerabilities in the Danish financial sector, cf. Table 2.

In the next chapter, risks to financial stability are translated into a number of hypothetical scenarios, which form the basis for stress tests of the Danish financial sector in comparison to the expected development, or the baseline scenario.

## THE SUBPRIME CRISIS SETS THE AGENDA

The risk outlook is strongly influenced by the subprime crisis and derived effects on the financial markets and the macroeconomy.

The strength and duration of the turmoil have generally come as a surprise and been difficult to predict. The turmoil has spread extensively through the international financial system since the summer of 2007, and there is a risk of the subprime crisis escalating, which could include further spill-over effects between financial markets. There are a number of specific risks that can threaten the conditions in the financial sector. The primary risk implies continued adverse development in the US housing market and the US economy. Major international banks' announce-

OVERVIEW OF RISKS TO FINANCIAL STABILITY IN DENMARK Tabel 2

| Risk | Origin |
|---|---|
| Subprime crisis continues | International |
| Recession in the USA followed by lower growth in international trade | International |
| Property price drop combined with high household debt | Denmark |
| Further commodity price increases | International |
| Liquidity risk – including financing of deposit deficit | International/Denmark |
| Strong increase in losses on corporate lending | Denmark |
| Risks associated with implementation of legislation | International/Denmark |
| Operational risks | International/Denmark |

ment of further significant losses is also viewed as a risk. Finally, it is uncertain how much the subprime crisis will affect the macroeconomy and vice versa, i.e. there is a risk of a negative spiral with escalating turmoil and further weakening of the real economy.

As a consequence of the turmoil and the resulting uncertainty, the US banks have already tightened their credit policies. This has made it more difficult for households and companies to raise loans. There is a risk that tighter credit policies may cause the US housing market to deteriorate further. In combination with other factors, such as a weak labour market, this may lead to a sustained recession in the US economy.

## RISKS TO THE DANISH ECONOMY

The capacity pressure in the Danish economy remains high, and unemployment is below the level that is assumed to be compatible with wage and price stability. There is a risk of high wage increases and thus further deterioration of competitiveness, which would weaken exports. In addition, there is a risk of a stronger-than-expected downturn in the USA with more pronounced effects on Europe and the rest of the world. This scenario would imply considerably weaker growth in Denmark's export markets.

Weaker economic growth and higher unemployment will increase the risk of default on loans, just as lower demand for loans will reduce the banks' basis for earnings. Further depreciation of the dollar also constitutes a risk factor for banks with considerable exposures to companies trading with the USA and other markets where profits are dollar-related.

The low unemployment and Danish households' generally sound finances are expected to buoy up housing prices. The baseline scenario assumes a modest decline in cash prices in nominal terms. However,

there is a risk of stronger price drops, especially if interest rates climb to a considerably higher level, or in the event of a marked rise in unemployment. This scenario implies deterioration of household finances. The value of the banks' collateral would thus be reduced, and the banks would be affected in those cases where homeowners' are unable to service their loans.

A further increase in commodity prices is another significant risk. Higher commodity prices would reinforce budget pressures for companies and households. This would imply a higher probability of default on loans from Danish banks.

## RISING FINANCING COSTS FOR BANKS

Liquidity and financing problems have been two key characteristics of the subprime crisis. Credit institutions without any significant exposure to subprime and structured credit have also been affected through the widening of the credit spreads and higher costs of financing in the money market. Danish banks have already raised their interest rates due to the higher financing costs.

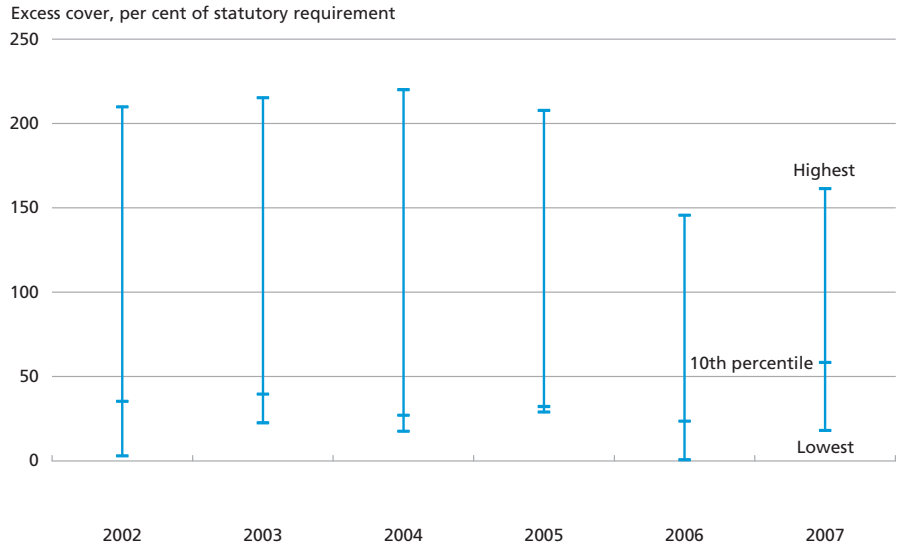
Rising financing costs pose a risk to banks with large deposit deficits, especially those without a good rating. When interest rates increase, there is a higher risk that the interest rate for financing the deposit deficit will exceed the lending rate. The banks are thus exposed to a risk of lower earnings on lending. This exposure can be amplified by further deterioration of the banks' credit standing. The higher costs for the banks can often be passed on to the customers.[1] Higher interest costs for the customer can lead to a higher probability of default on loans and thus to losses for the bank.

Some banks have a safety valve in the form of mortgage loans since, under certain circumstances, the banks can pledge these loans as collateral for issuance of covered bonds. The latter constitute a stable source of financing equivalent to mortgage-credit bonds and enable the banks to match the maturities of bonds and loans. In addition, covered bonds are classified as eligible collateral by Danmarks Nationalbank, which means that they are included in the banks' liquidity reserves.

In 2007, the banks' excess liquidity cover beyond the statutory minimum requirement generally remained at the level of the preceding period, cf. Chart 25. However, several banks had very little excess cover; the lowest was 18 per cent at end-2007. Low excess liquidity cover makes

[1] For loans at a variable, non-contractual interest rate.

EXCESS LIQUIDITY COVER IN DANISH BANKS Chart 25




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 Danish 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. The key ratio contains no information about the maturity of the liquidity.
Source: Financial statements.

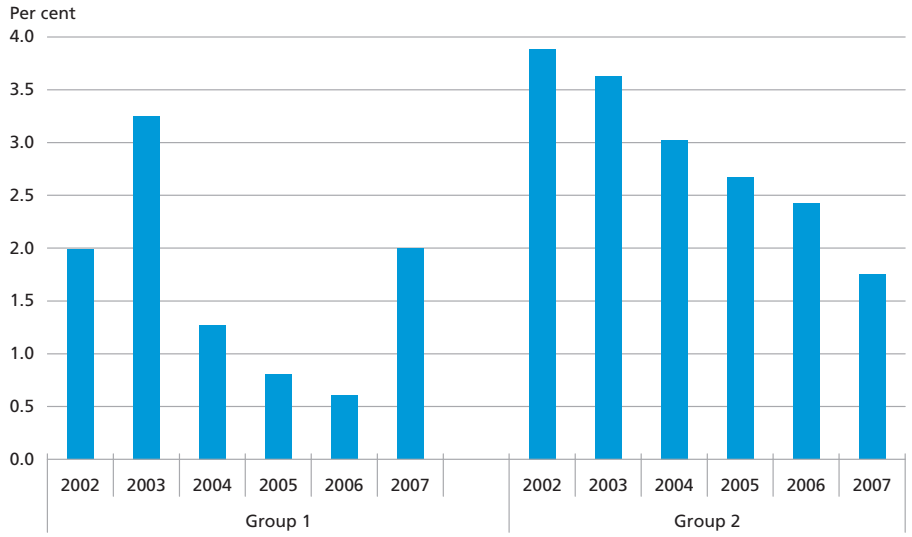
the banks' more vulnerable, particularly in periods of turbulent financial markets. Banks may be forced to raise loans in periods when market conditions are unfavourable, or to raise loans with shorter-than-required maturities in a situation where some markets are not functioning.

## HIGHER INTEREST-RATE RISK FOR THE LARGE BANKS

The recent turmoil has led to increased volatility in the financial markets, and to higher costs of hedging against fluctuations in the market value of assets.

In 2007, the exposure to interest-rate fluctuations increased for a few banks. The banks in the Danish Financial Supervisory Authority's group 1 would have lost on average 2.0 per cent of their capital at the end of 2007 if interest rates had increased by 1 percentage point, compared with 0.6 per cent at the end of 2006. The interest-rate risk for the medium-sized banks in group 2 has generally decreased over the last year and is now close to the level for the banks in group 1, cf. Chart 26. This is in line with the tendency of previous years, i.e. bond holdings accounting for a diminishing share of assets in group 2.

INTEREST-RATE RISK OF DANISH BANKS Chart 26




Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio "interest-rate risk". The figure shows the proportion of the core capital, less deductions, that is lost if interest rates increase by 1 percentage point.
Source: Financial statements.

## HIGHER CREDIT RISK FOR DANISH BANKS

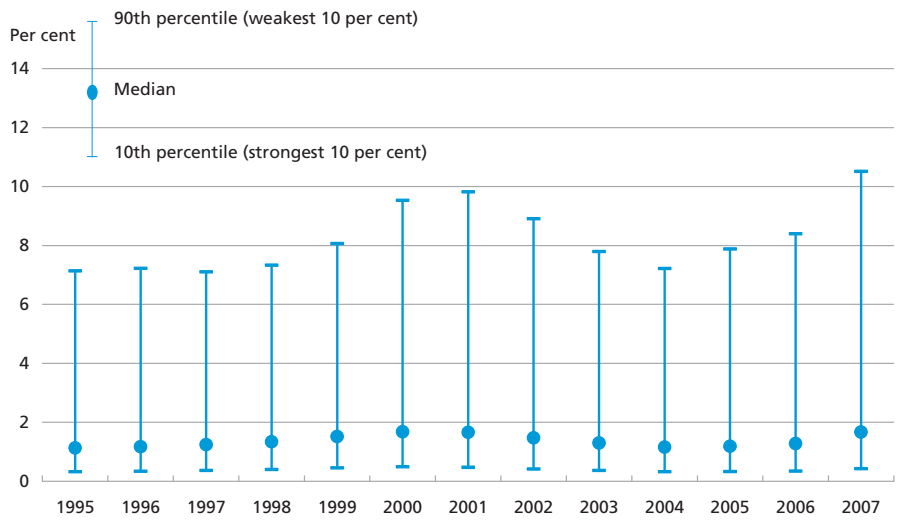
Extending credit to the corporate sector and the households is one of the primary functions of the banks. In doing so, the banks incur a credit risk. The finances of the corporate sector and the households and their resilience to adverse developments affect the banks' earnings, losses and capital structure,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

### Increase in the estimated failure rates[1] for Danish companies and the banking sector's expected losses on corporate exposures

The risk of especially the weakest Danish companies failing in the next few years rose considerably in 2007 compared with the preceding years, cf. Chart 27. The reasons are increased indebtedness, more companies with negative earnings, and the establishment of many new companies in 2007. Viewed in isolation, the estimated failure rate is higher for new companies than for established ones. The estimated failure rate for the median company also rose in 2007. The increase in estimated failure rates is broadly based across sectors, reflecting a general trend in the economy.

[1] Danmarks Nationalbank's failure-rate model, KIM, is used to estimate the probability of a company failing. KIM is described in more detail in *Financial stability 2007*.

ESTIMATED FAILURE RATES FOR DANISH COMPANIES Chart 27




Note: The figure for 2007 is a preliminary estimate.
Source: Own calculations based on data from Experian A/S.

The banks' expected losses on corporate exposures[1] rose considerably in 2007, albeit from a low level. The increase particularly reflects the higher estimated failure rates for companies. The banks' expected losses on corporate exposures amounted to around 0.8 per cent of total lending, compared with approximately 0.6 per cent in 2007. The losses may be greater if risks to the Danish economy are realised.

**The banks' credit risk on households is still moderate**

Capital gains on homes and equities have contributed strongly to the households' accumulation of wealth in recent years. The households are thus well-consolidated.

The households' debt as a ratio of income has, however, risen so that their ability to meet payments has become more sensitive to a decrease in income. The development in incomes is strongly related to the development in employment and unemployment, where some mild deterioration is expected during 2008 and 2009.

Danmarks Nationalbank has developed a method to simulate the effect of higher unemployment and interest-rate increases on the finances of Danish households, cf. *Financial stability 2007*. An analysis is performed of the share of Danish households that are financially vul-

[1] Calculation of expected losses on corporate exposures is described in more detail in Box 8 in *Financial stability 2006*.

nerable, assessed on the basis of their financial margin[1]. The financial margin is compiled as the household's disposable income less a standard consumption budget and income-dependent housing costs.

On the basis of actual data for 2006 and simulated data for 2007, the households are still deemed to be robust, even in tough scenarios for the development in interest-rate costs and falling income.[2] The calculations show that the situation of the households improved marginally in 2007, both in terms of the number of vulnerable households and the percentage of total household debt attributable to these households. Debt and interest costs rose substantially in 2007, but the impact was more than offset by rising incomes and falling unemployment.

Against that background, the banks' credit-risk exposure to households is assessed to remain moderate. However, uncertainty about the housing market in some parts of Denmark still constitutes a risk factor that these calculations are unable to capture.

**Upward trend in credit-risk measures for banks**

On the basis of Danmarks Nationalbank's failure-rate model, KIM, and assumptions of expected losses on exposures to households and agriculture, a credit-risk measure can be calculated for each bank.[3] The credit-risk measure expresses the individual bank's expected loss ratio on its entire lending portfolio. The credit risk increased for all banks in groups 1 and 2 in 2007, cf. Chart 28. The increase is primarily attributable to the generally higher credit risk on corporate exposures. In addition, the banks have expanded their corporate exposures relative to other types of lending, and corporate exposures are normally associated with a higher credit risk than lending to e.g. households. The credit-risk measure is generally higher for banks in group 2 than for those in group 1, and these banks also accounted for the strongest growth in the credit-risk measure in 2007.

Weaker-than-expected economic growth or a downturn in the housing market may further reduce the ability of households and companies to service their bank debt.

---

1 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.

2 The calculations are sensitive to changes in the consumption assumptions.

3 The credit-risk measure is calculated as $PD_i^{corporate} \bullet U_i^{corporate} + PD^{households} \bullet U_i^{households} + PD^{agriculture} \bullet U_i^{agriculture}$. $PD_i^{corporate}$ is the debt-weighted estimated failure rate for the companies using bank *i*. As an approximation of the estimated failure rate for households ($PD^{households}$) and agriculture ($PD^{agriculture}$) the previous year's average loss ratio for each of the two groups is applied. $U_i$ is the proportion of bank *i*'s lending to the corporate sector, the households and agriculture, respectively. Credit-risk measure is specified in the glossary in *Financial stability 2007*.

CREDIT-RISK MEASURES FOR THE BANKS' LENDING PORTFOLIOS IN 2006 AND 2007 Chart 28


Note: The analysis includes only institutions covering at least 30 companies as customers, which excludes four banks. The sum of loans and guarantees is used as weights in the weighted averages.
Source: Danish Financial Supervisory Authority, financial statements and own calculations.

**Group 1 banks are more exposed to large exposures**

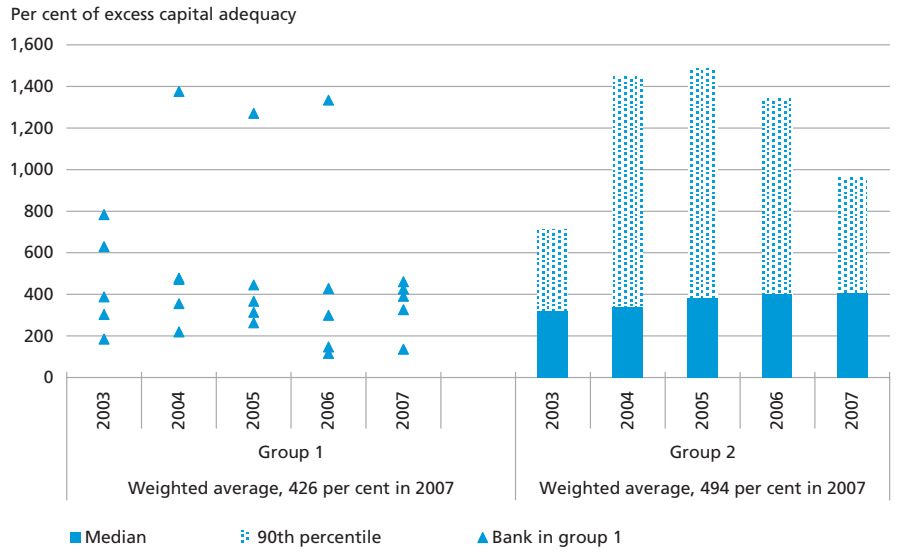
The concentration of exposures in a bank affects its credit risk. A lending portfolio can be concentrated on a few customers, sectors or geographical areas. A high concentration on a few customers entails a greater risk of large losses, which is amplified by a high correlation between the estimated failure rates of the customers.

To gain an impression of the size of large exposures relative to the banks' buffers, large exposures are stated as a percentage of the excess capital adequacy, i.e. the part of the capital that exceeds the minimum requirement of 8 per cent, cf. Chart 29. The key ratio does not say anything about the correlation between the individual exposures.

At the end of 2007, the weighted average of large exposures amounted to 426 per cent of the excess capital adequacy for the banks in group 1. This is an increase by just over 100 percentage points on end-2006. The dispersion in group 1 was considerably lower at end-2007, cf. Chart 29.

For banks in group 2, the weighted average of large exposures as a ratio of excess capital adequacy fell in 2007 compared with 2006. Some banks are still operating with a substantial concentration of large exposures, and the correlation between exposures is likely to constitute a risk for these banks in particular.

DEVELOPMENT IN THE SUM OF LARGE EXPOSURES IN DANISH BANKS Chart 29




Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio "total amount of large exposures".
Source: Financial statements.

## RISKS IN IMPLEMENTATION OF INTERNATIONAL LEGISLATION

### Transition risks in new capital-adequacy rules

The new capital-adequacy rules, Basel II, entered into force on 1 January 2007 with transitional provisions applying until the end of 2009. The transition to the new rules entails a number of risks to the banks.

The risks in the transition to Basel II are especially system-related and data-related risks associated with the new ways of calculating the minimum capital requirement. This is a very extensive and complex set of rules. In relation to Danish institutions, implementation of the new rules will result in a considerable overall reduction of the minimum capital requirement. This emphasises the significance of ensuring, from the outset, a good basis for determination of the institutions' individual solvency requirements and any additional capital requirements.

The implementation of the International Financial Reporting Standards, IFRS, in 2005 is an example of how difficult it can be to implement new models that are different from the previous procedures. In Denmark, the challenges related in particular to write-downs (impairments) on loans. In several cases the Danish Securities Council decided to request supplementary or new financial statements from the institutions in question as they had initially set their impairments too high. The Danish Financial Supervisory Authority extended the deadline for imple-

mentation several times. As a result, final implementation of the new rules did not take place until the presentation of the financial statements for 2007.

## OPERATIONAL RISK

Payments, credit transfers and securities and foreign-exchange transactions are executed via the financial infrastructure. At the core of the infrastructure are a few systems handling very large amounts on a daily basis. Less reliable and efficient functioning of these systems would impose risks and costs on the financial institutions.

There are several other types of operational risk, e.g. fraud that results in an unexpected loss for the bank in question. In 2007, the French bank Société Générale suffered a loss equivalent to 0.5 per cent of its assets and 15.7 per cent of its equity as a result of a single employees unauthorised dealings.

**Focus on operational risk and liquidity risk in the financial infrastructure**

In recent years, Danmarks Nationalbank's oversight of the financial infrastructure in Denmark has focused on the core systems operational stability, etc., and on liquidity conditions for system participants.

In 2007, the core systems were characterised by a high degree of operational stability. This is particularly important in a situation with financial turmoil, as a system failure is reflected in unintentional accumulation of liquidity and credit exposure among participants. A lack of confidence in the operational stability of the systems may have negative implications for the settlement of payments, etc., for example if the participants withhold payments to avoid liquidity shortages. If the participants start to withhold payments, this will be observed by Danmarks Nationalbank as a shift in the time profile for interbank payments in the Kronos payment system, among other indications. The time profile has been very stable over the last three years.

The participants' holdings of liquidity for transaction of payments are found to be generally sufficient despite the slight decrease in the excess liquidity cover for settlement of payments via Danmarks Nationalbank in recent years.

# Testing the Banks' Resilience

*Danish banks are generally found to be robust. Stress tests show that most Danish banks would record losses if exposed to tough economic scenarios, but that they would generally avoid solvency problems.*

*A static sensitivity analysis, based on the banks' earnings and capital structure at end-2007, shows virtually unchanged resilience compared with 2006. The banks have become more exposed to rising financing costs and increased losses on credit portfolios.*

*The recent financial turmoil is reflected in market expectations towards the banks. The expectations have generally been adjusted downwards, but the market's expectations of the Nordic banks are still higher than market expectations of other European banks and US banks.*

## METHODS FOR TESTING THE BANKS' RESILIENCE

In this chapter, the resilience of the Danish banks is tested in dynamic macro stress tests – where the results reflect the interaction between macroeconomic conditions, financial conditions and banking conditions over a prolonged period – and in static sensitivity analyses based solely on the banks' financial statements.

Three macroeconomic and financial stress test scenarios have been constructed on the basis of the risks described in the previous chapter. The effect, over a 3-year horizon, on the banks' earnings and solvency of these extreme scenarios is examined. The purpose is to provide an estimate of the implications for the banking sector of an extreme shock to the economy in general or the financial sector specifically.

A static sensitivity analysis is performed in which selected accounting items are changed according to a ceteris paribus approach, based on the latest annual profit/loss statements and capital structures. The earnings parameters are changed one by one, and for each scenario the effect on the banks' profit and capital structure is calculated. The results are compared with corresponding scenarios for the preceding year.

Finally, the market's assessment of the Nordic banking groups is analysed. The first step is to examine CDS (credit default swap) spreads, reflecting the market's assessment of the estimated failure rate for the groups. The second step is to estimate how much the market value of

the Nordic banking groups' assets may fluctuate and still be accommodated by the liquidity reserves.

## MACRO STRESS TEST – DANISH BANKS FOUND TO BE ROBUST

The robustness of the banking sector is tested by means of Danmarks Nationalbank's stress test model, cf. the chapter Stress Testing of the Financial System. Three scenarios have been constructed for testing the robustness of the Danish financial system, cf. Box 6:

- *Scenario 1: The subprime crisis continues and leads to a prolonged recession in the USA.* The price of interbank financing rises sharply. The increase is partially passed on to the customers. Growth in the US economy is negative for eight quarters.
- *Scenario 2: Increases in commodity prices.* Commodity prices, especially oil prices, rise sharply, and interest rates are raised to keep inflation at bay.
- *Scenario 3: Property price drop.* Interest rates and unemployment increase, while property prices and the value of assets pledged as collateral for bank loans decrease.

The stress test scenarios are compared with a baseline scenario that is considered to be the most likely development in the Danish economy and the financial sector.[1] The time horizon for each scenario is three years.

In order to illustrate the results of the stress test model, the banks have been divided into three categories for each scenario, i.e. green, yellow and red. The green banks post profits in all three scenario years. The yellow banks post a loss in at least one of the scenario years. The red banks are unable to meet the statutory capital requirement over the three years.

None of the analysed banks will record losses over the horizon of the baseline scenario, and the return on the banks' core capital is stable in the period, cf. Charts 30 and 31. The earnings of 13 of the 16 banks become negative in scenario 2, and one of the banks experiences solvency problems within the scenario horizon, cf. Chart 30. In scenarios 2 and 3, 10 and 7 banks, respectively, record losses in at least one of the three years.

The scenario with higher oil prices and interest rates has a relatively strong impact on the larger banks, while the scenario with a property

[1] On a biannual basis, Danmarks Nationalbank publishes the course of the Danish economy that is considered to be the most likely in its *Monetary Review*. The most recent forecast is published in Danmarks Nationalbank, *Monetary Review*, 1st Quarter 2008.

STRESS TEST SCENARIOS Box 6

***Scenario 1**: The subprime crisis continues and leads to a recession in the USA.* This scenario assumes continuation of distrust between the banks that has arisen in the wake of the subprime crisis of last autumn. This is assumed to lead to an increase in inter-bank rates by 2.5 percentage points compared with the baseline scenario, and funding via issuance of bonds becomes more difficult for the banks. The higher interest rate for interbank debt is expected to entail intensified competition for deposits, for which the interest rate will be raised by 0.5 percentage point. The banks are assumed to pass part of the higher risk premium on to their customers. This is equivalent to an increase in interest rates to a level 1 percentage point above the baseline scenario over the period. This scenario assumes a recession in the USA as a result of the subprime crisis, and negative growth for eight consecutive quarters. This will affect the Danish economy via exports.

***Scenario 2**: Increases in commodity prices.* This scenario assumes an oil price increase by 100 dollars per barrel at the beginning of the period, compared with the baseline scenario, and that this level is sustained throughout the period. A simultaneous increase in food prices is assumed, which contributes to even higher inflation. The latter triggers a monetary-policy response, and interest rates are assumed to rise by 3 percentage points compared with the baseline scenario.

***Scenario 3**: Property price drop.* This scenario assumes an increase by 2.4 percentage points in unemployment and by 2.2 percentage points in interest rates, and a drop in housing prices by approximately 40 per cent. It is assumed that the banks will suffer losses on loans to households and the building and construction and property administration sectors that are 2.5-5 times higher than those estimated by the stress test model for each of the three scenario years.

The Table below illustrates the effect of the various shocks on key macroeconomic variables in the period 2008-10 and in the baseline scenario.

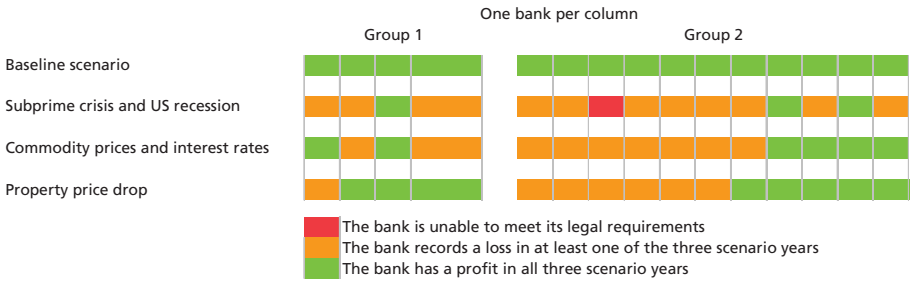
DEVELOPMENT IN KEY MACROECONOMIC VARIABLES

| | GDP growth, per cent | | | Unemployment rate, per cent | | | Long-term interest rates, per cent | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Baseline scenario ..... | 1.9 | 1.0 | 0.4 | 2.3 | 2.6 | 3.6 | 4.6 | 4.6 | 4.9 |
| Subprime crisis continues .. | 1.9 | 0.1 | -1.0 | 2.3 | 3.0 | 4.9 | 5.0 | 5.6 | 5.9 |
| Commodity price increases | 1.6 | -1.4 | -2.2 | 2.3 | 3.5 | 5.9 | 5.0 | 6.9 | 7.9 |
| Property price drop ..... | 1.8 | 0.2 | -0.4 | 2.6 | 3.7 | 5.3 | 5.3 | 6.6 | 6.9 |

Note: The baseline scenario includes Danmarks Nationalbank's estimate of macroeconomic variables in March 2008.

price drop and higher loss ratios, especially on building-related sectors, has the strongest effect on the banks in group 2. The subprime crisis scenario affects the banks particularly through higher financing costs, while the economic slowdown as a consequence of the US recession has only a minor effect. Correspondingly, the effect of rising oil prices is moderate when viewed in isolation, but relatively strong if accompanied by rapidly increasing interest rates. The timing of the impact on

MACRO STRESS TEST RESULTS (NUMBER OF BANKS) Chart 30




Note: The banks are in random order in the two groups.
Source: Own calculations.

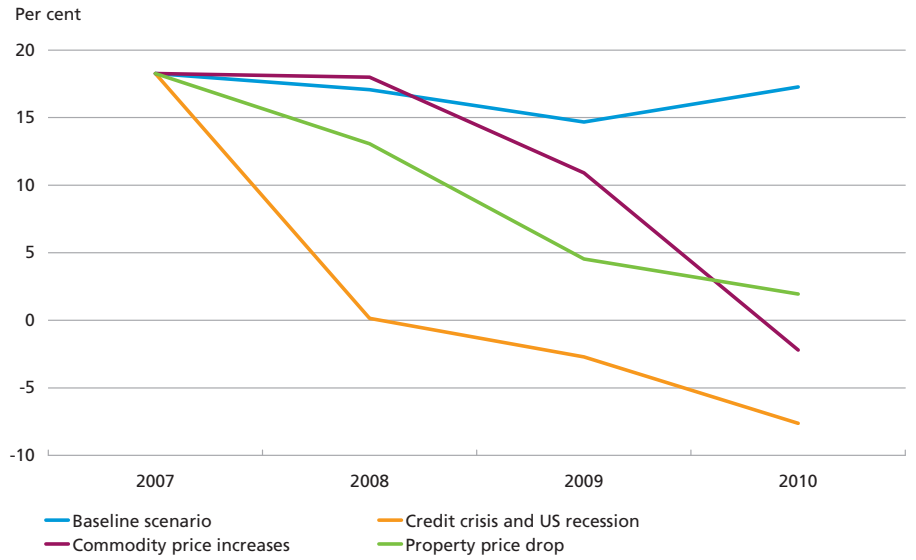
the banks' financial results of the stress test scenarios also varies, cf. Chart 31.

Overall, the results of the stress test model show that the banks are generally robust to the very tough shocks in the constructed scenarios.

## SENSITIVITY ANALYSIS – UNCHANGED RESILIENCE IN 2007

The banks' resilience is virtually unchanged compared with 2006, cf. Chart 32. The banks are slightly more exposed to rising financing costs and increasing losses on lending portfolios. An increase by 1 percentage point in losses on loans for the sector as a whole would have resulted in

MEDIAN RATE OF RETURN ON CORE CAPITAL (BEFORE TAX) Chart 31




Source: Own calculations.

SENSITIVITY ANALYSIS Chart 32


Note: The banks are in random order in the two groups. Losses on loans for the sector are allocated to the individual banks in proportion to their credit-risk measure.
Source: Financial statements and own calculations.

eight banks recording losses, i.e. twice as many as in 2006. More banks would have recorded losses in the event that the largest counterparty bank in the Danish uncollateralised day-to-day money market failed, while the effect of losses amounting to 10 per cent of large exposures would have been virtually unchanged in 2007 compared with 2006.

A corresponding test of the Nordic groups shows that none of the groups would have had solvency problems in 2007 if loan losses had increased by 1 percentage point, although one group would have posted losses. An increase by 2.5 percentage points would have caused solvency problems for several of the groups. Compared with 2006, the Nordic groups have become more exposed to both increasing losses and rising financing costs.

## THE MARKET ASSESSMENT OF THE NORDIC GROUPS HAS DETERIORATED

### Substantial widening of credit default swap spreads for the banks[1]

A credit default swap, *CDS,* is a financial instrument that is used e.g. to hedge the credit risk on a bank. The price development, typically measured as interest-rate spreads, on a bank's CDSs thus reflects the market's assessment of the probability that the bank will fail within a given period. All other things being equal, a wider CDS spread indicates market expectations of a higher failure rate for the bank.

As the US subprime crisis has evolved, the CDS spreads for financial companies have widened to record levels. This development can be attributed to such factors as subprime-related losses in the financial sector, concerns about the macroeconomic development in the USA and unrest associated with several monoline bond insurance companies.

The spreads for European banks also widened considerably. Thus, the market's assessment of the probability of the European banks failing within a 5-year period has risen substantially in 2008, cf. Chart 33. This shows that problems in the financial sector increasingly tend to spread due to the higher degree of financial integration.

Nordic banks have also been affected, and the CDS spreads have widened strongly in 2008, cf. Chart 33. In terms of CDS spreads for financial companies, the Nordic banks are still at the narrow end of the scale, however. One reason is that Nordic banks' direct exposure to the subprime market has been smaller than that of other banks, so the Nordic banks have initially steered clear of large losses.

Since the beginning of 2008, CDS spreads associated with the two large Icelandic banks have widened substantially, by more than 1,000 basis points.

### The market assessment is that Nordic groups are more exposed

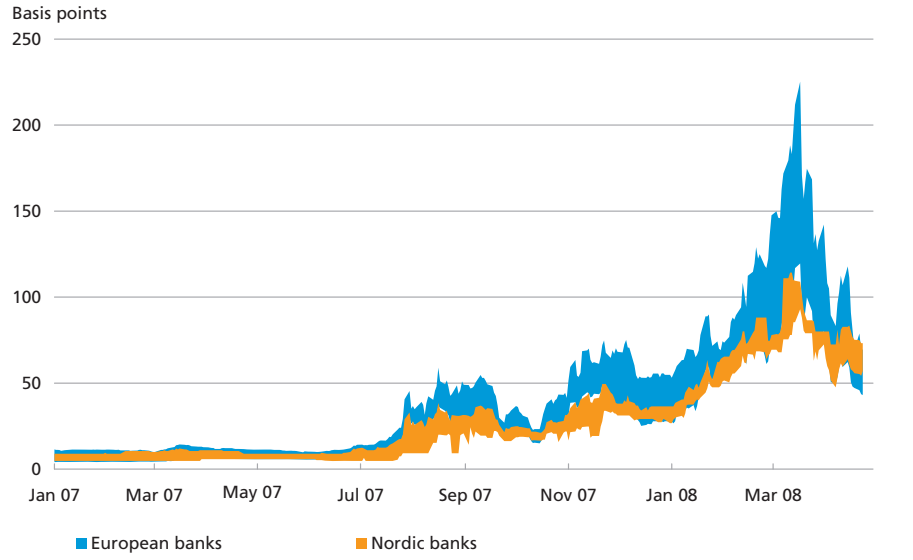
On the basis of equity prices and accounting data, Danmarks Nationalbank has estimated a market-based risk measure, distance to insolvency[2], for the Nordic groups. The distance to insolvency measures the fluctuations in asset market value that can be accommodated within the

[1] "In CDS contracts, the protection seller promises to buy the reference bond at its par value when a pre-defined credit event occurs. In return, the protection buyer makes periodic payments to the seller until the CDS matures or until a credit event is triggered. The periodic payments are determined as a certain percentage of the principal of the underlying contract. This rate of payment, measured in annualised terms and in basis points, is called a CDS spread. In theory, the CDS spread should approximately equal the corresponding yield spread between the bond of a reference entity and a risk-free bond", *ECB Monthly Bulletin*, September 2005.

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

CDS SPREADS FOR SELECTED EUROPEAN AND NORDIC BANKING GROUPS, 5-YEAR SENIOR DEBT

Chart 33




Note: European banks consist of Deutsche Bank, ABN Amro, BNP Paribas, Barclays, HSBC, Royal Bank of Scotland and UBS, while Nordic banks consist of Danske Bank, DnB Nor, Nordea and SEB. The Chart shows the development in the interval between maximum and minimum CDS spreads for each category.
Source: Bloomberg.

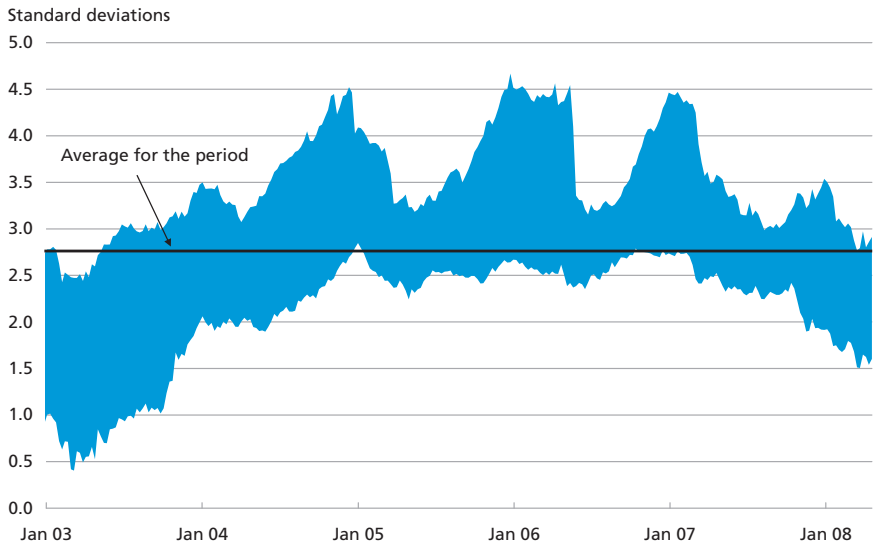
banking groups' buffers while still observing the minimum capital requirement of 8 per cent.

The distance to insolvency is measured by the number of standard deviations for fluctuations in the estimated market value of the bank's assets. The greater the distance to insolvency, the more robust are the banks, according to the market assessment. A distance to insolvency of e.g. two standard deviations can be interpreted as a risk of around 2.3 per cent that the asset value will decline so much that the bank becomes unable to meet the statutory minimum capital requirement.[1]

The distance to insolvency for the individual Nordic groups is 1.5-3 standard deviations, compared to 2.5-4.5 at the beginning of 2007, cf. Chart 34. The market-based risk measure shows that the probability of solvency problems for the Nordic groups is greater today than at the beginning of 2007, according to the market assessment.

[1] 2.3 per cent corresponds to the probability mass in a normal distribution for events of more than two standard deviations.

DISTANCE TO INSOLVENCY FOR NORDIC GROUPS Chart 34




Source: Financial statements and Bloomberg.

# The Banking Institutions' Financial Results

*This chapter describes the development in selected key items from the financial statements 2007 of 52 Danish banking institutions. The population accounts for a market share of 87 per cent of total lending by banking institutions in Denmark.*

**Declining profits, but still at a sound level**

The Danish banking institutions posted lower profits in 2007 than in the record year 2006, cf. Table 3. The pre-tax profit declined by approximately 6 per cent for the largest Danish banking institutions in group 1, and by approximately 20 per cent for the institutions in group 2. For the small banking institutions in group 3, the profit fell by 10 per cent. The decrease in earnings can be partially attributed to the extraordinary gain

PRE-TAX PROFITS IN DANISH BANKING INSTITUTIONS Table 3

| | Group 1 | | Group 2 | | Group 3 | |
|---|---|---|---|---|---|---|
| Kr. billion | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 |
| *Income* | | | | | | |
| Net interest income | 26.6 | 22.6 | 7.2 | 6.1 | 5.1 | 4.4 |
| Net fee income | 13.6 | 12.4 | 2.9 | 2.5 | 2.1 | 1.9 |
| Value adj. of securities, etc. | 4.4 | 8.3 | 1.0 | 2.2 | 0.3 | 1.2 |
| Value adj. of capital interests | 8.7 | 6.4 | 0.4 | 0.4 | 0.4 | 0.2 |
| Other income from ordinary activities | 2.7 | 3.3 | 0.2 | 0.3 | 0.2 | 0.2 |
| *Costs* | | | | | | |
| Operating costs, etc. | 29.3 | 25.6 | 6.7 | 5.9 | 4.8 | 4.4 |
| Write-downs on loans | -0.4 | -1.4 | 0.2 | -0.3 | -0.1 | -0.2 |
| Pre-tax profit | 27.2 | 28.9 | 4.7 | 5.8 | 3.4 | 3.8 |
| Of which gains (Totalkredit) | - | 0.4 | - | 0.4 | - | 0.3 |
| Profit after tax | 22.6 | 22.8 | 3.7 | 4.5 | 2.7 | 3.0 |
| Total equity, end-2007 | 154.0 | 141.4 | 28.9 | 24.9 | 24.4 | 21.1 |
| ROE before tax | 18.4 | 22.6 | 17.4 | 25.4 | 14.9 | 19.4 |
| Market share of Danish lending, per cent | 59 | 62 | 18 | 18 | 10 | 10 |

Note: The market share is measured in terms of lending to residents except credit institutions. The total market share of groups 1, 2 and 3 amounted to 87 per cent at end-2007. The remaining market shares are distributed on banking institutions not included in group 1, 2 or 3.

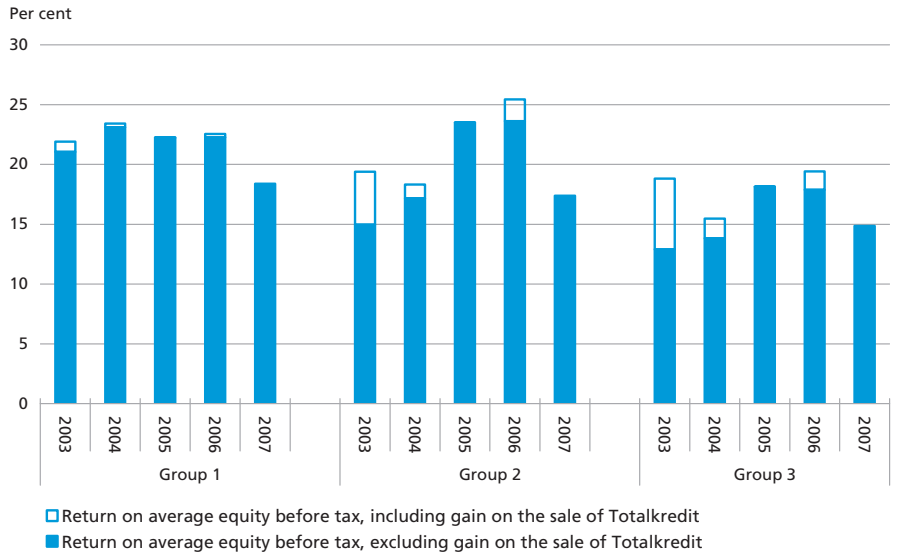
Source: Financial statements and Danmarks Nationalbank.

in 2006 from the sale of shares in Totalkredit. Net interest and fee income rose for all three groups as a result of generally higher business volumes. Value adjustments of securities were lower in 2007 than in 2006. The decline is primarily attributed to last autumn's financial turmoil, which has affected credit bonds and equities. Write-downs on loans increased in 2007, although overall, on a net basis, write-downs still made a positive contribution to income. Preliminary data for the 1st quarter of 2008 shows that the falling trend in earnings has continued into 2008.

An increase in costs was also observed, following recent years' strong growth in business volumes. 2007 saw a total increase by 14 per cent in operating costs. Many banking institutions now record higher cost ratios due to staff increases and establishment of new branches. At the same time, the institutions generally applied more resources to the implementation of new regulations in 2007, e.g. MiFID and Basel II. The development in the banking institutions' costs will require efficient cost control in periods of lower economic activity.

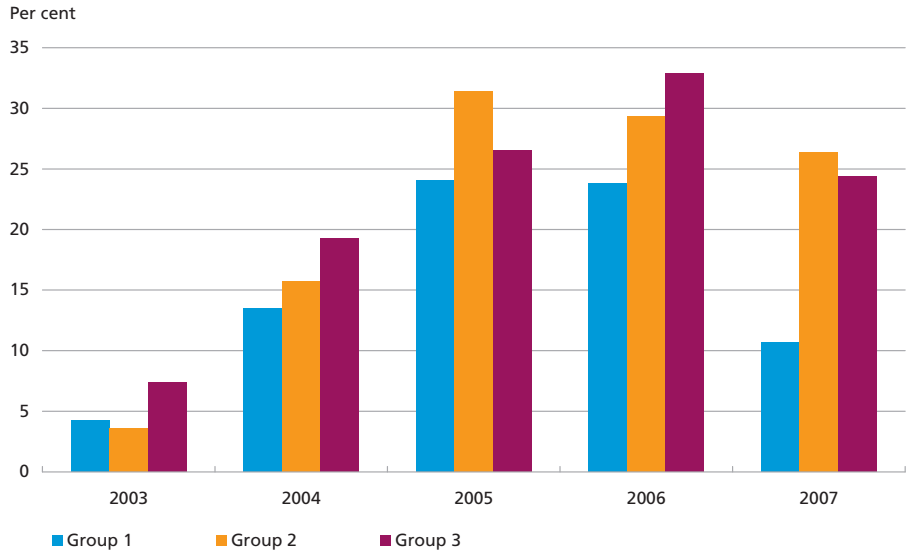
In 2007, return on equity before tax was just over 18 per cent for banking institutions in group 1, just over 17 per cent for group 2 and almost 15 per cent for group 3, cf. Chart 35. For all three groups, a lower profit ratio and lower income in relation to business volumes, measured as risk-weighted items, imply a lower return on equity compared with 2006.

RETURN ON EQUITY BEFORE TAX — Chart 35




Note: Return on equity calculated on the basis of an average of equity at the beginning and end of the year.
Source: Financial statements.

GROWTH IN LENDING BY DANISH BANKING INSTITUTIONS Chart 36




Note: Adjusted for the effect of Danske Bank's conversion of subsidiaries in Norway and Ireland into branches, and FIH Erhvervsbank's sale of part of its lending portfolio to a subsidiary.
Source: Financial statements.

**High, but declining, lending growth**

Lending growth continued to be strong in 2007 for groups 2 and 3, cf. Chart 36, although a clear downward trend is observed from the very high growth rates in the preceding years. The large Danish banking institutions posted lending growth of approximately 11 per cent, while banking institutions in groups 2 and 3 recorded lending growth of approximately 25 per cent. Preliminary data for the banks' lending indicate a further slowdown in lending growth in the 1st quarter of 2008.

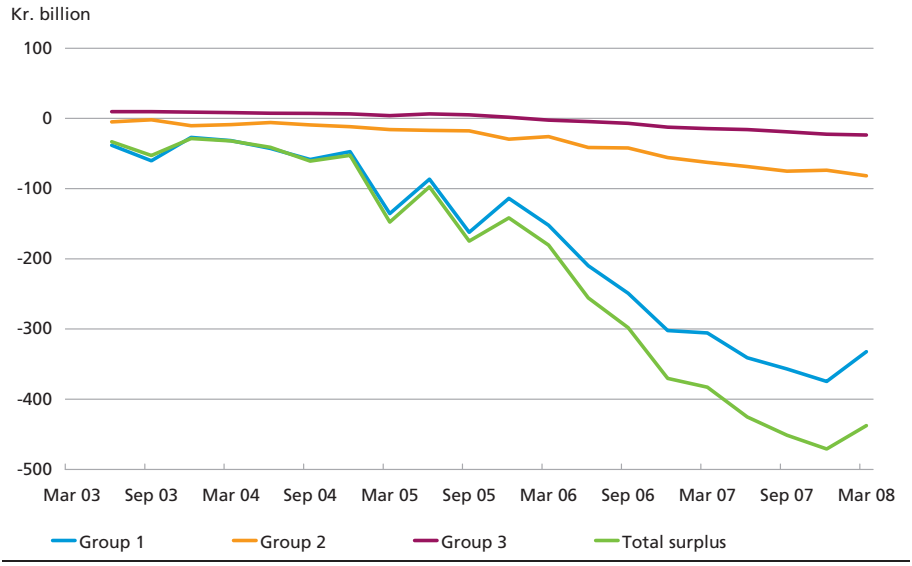
**Deposit deficits**

The banking institutions' deposit deficits rose further in 2007, by kr. 101 billion to kr. 471 billion in total, cf. Chart 37. The growth rate is declining, however. A major factor contributing to the increase in group 1 is Danske Bank's conversion of subsidiaries in Norway and Ireland to branches. The deposit deficit accounts for 23 per cent of lending in group 1, 28 per cent in group 2 and 17 per cent in group 3. At end-2007 no institutions in group 1, 1 in group 2 and 8 in group 3 posted deposit surpluses.

**Stable capital structure in groups 2 and 3**

The solvency ratio of Danish banking institutions is still considerably higher than the statutory requirement of 8 per cent. However, the high

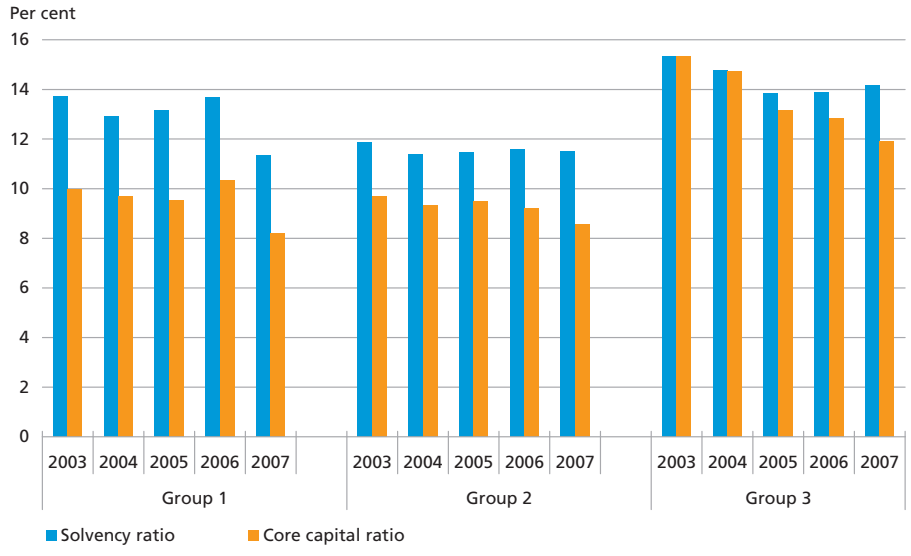
DEPOSIT SURPLUS Chart 37




Source: Danmarks Nationalbank.

lending growth in recent years places demands on the institutions' capital, and all three groups recorded an increase by just over 20 per cent in risk-weighted items in 2007. The banking institutions in group 3 succeeded in increasing their solvency ratio compared with 2006, whereas it remained virtually unchanged for group 2 and decreased for group 1, cf. Chart 38. One factor contributing to the decrease for group

SOLVENCY AND CORE CAPITAL RATIOS Chart 38




Source: Financial statements.

1 is Danske Bank's extraordinarily high excess capital adequacy at end-2006, since the bank had issued capital for the acquisition of Sampo Bank in 2007.

Some banking institutions introduced the new capital-adequacy rules, i.e. Basel II, in 2007, while others opted for the transitional scheme that allowed the banking institutions to postpone implementation of the new methods and principles for calculation of the capital requirement until 1 January 2008. For most of the institutions by far, the new capital-adequacy rules will initially reduce risk-weighted items and thus improve the solvency ratio. Depending on the banking institutions' risk profile, this effect may, however, be offset by a supplementary capital requirement.

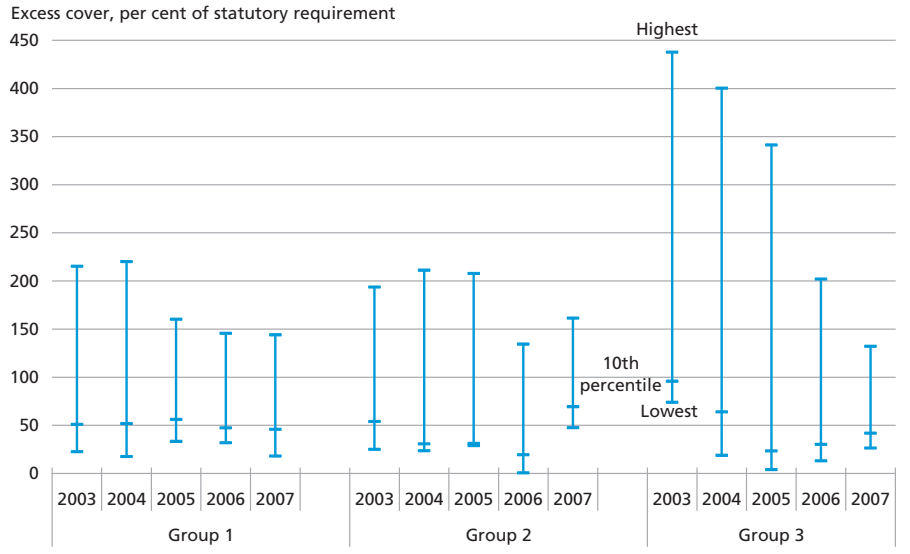
The capital that exceeds the statutory minimum of 8 per cent or more, depending on the institution's individually calculated capital need, must be large enough to cover the losses that are not otherwise covered by earnings. The excess capital adequacy in relation to loans and guarantees tends to be higher for banking institutions in group 3 than for the other two groups. A few institutions in group 3 have an unfortunate combination of very high lending growth and low excess capital adequacy. The total excess capital adequacy for group 1 accounted for 2.8 per cent of loans and guarantees in 2007, while the corresponding figures for groups 2 and 3 were 3.6 per cent and 6.1 per cent, respectively.

**Liquidity reserve reduced in recent years**

The banking institutions' liquidity reserve can be measured e.g. using the Danish Financial Supervisory Authority's key ratio for liquidity, which shows excess liquidity in relation to the statutory minimum, cf. section 152 of the Danish Financial Business Act. The liquidity reserve, cf. Chart 39, has been considerably reduced in step with the strong lending growth in recent years, particularly for banking institutions in group 3. Out of 36 banking institutions in group 3, 28 had liquidity reserves of less than 100 per cent in 2007, compared with only seven institutions in 2003. Groups 1 and 2 have seen a more stable development, and the liquidity situation has improved a little for group 2.

The banking institutions' average liquidity reserves have decreased from 151 per cent in 2003 to 83 per cent in 2007. The development in the banking institutions' liquidity buffers is important as tight liquidity can limit the institutions' scope for manoeuvre. Ultimately a banking institution may thus be unable to meet its payment obligations in a timely manner.

LIQUIDITY RESERVES Chart 39




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 capital base.

Source: Financial statements.

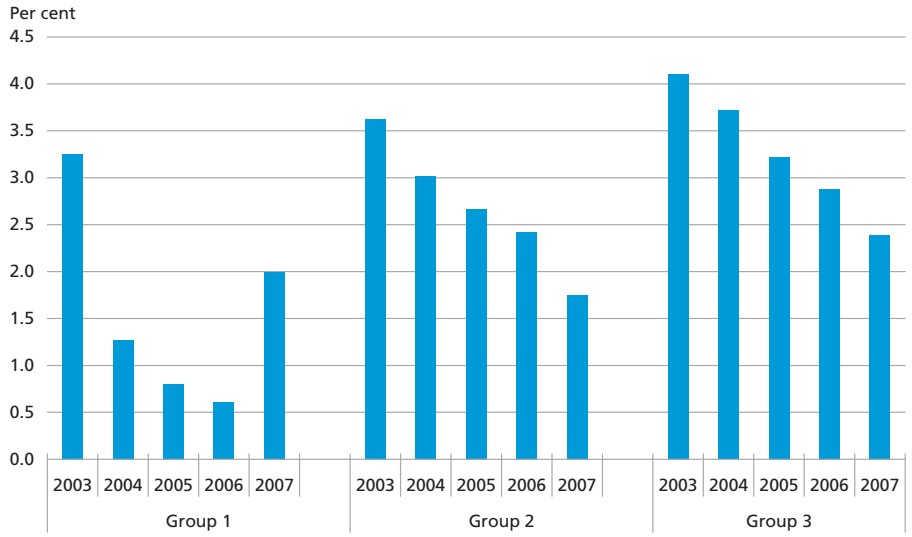
**Reduced interest-rate risk in groups 2 and 3**

The banking institutions' interest-rate risk is measured by the Danish Financial Supervisory Authority's key ratio for the share of the core capital, less deductions, that is lost on an increase in the interest rate by 1 percentage point. In accordance with the trend in recent years, the interest-rate risk of small and medium-sized banking institutions has declined to 2.4 and 1.8 per cent, respectively, in 2007, cf. Chart 40. The largest banks' interest-rate risk rose from 0.6 per cent in 2006 to 2.0 per cent in 2007. In group 1, the total interest-rate risk corresponded to 4.9 per cent of total income in 2007, while the figure was 4.4 per cent for group 2 and 6.9 per cent for group 3.

**The banking institutions' resilience remained unchanged in 2007**

The banking institutions' resilience to mounting losses on loans can be tested in a static analysis based on earnings in 2007 and the capital structure at year-end. Increasing losses on loans tend to initially reduce the profit for the year and then the institution's capital. Chart 41 shows the number of banking institutions that would have had a lower solvency ratio than the statutory 8 per cent given a gradual increase in the loss ratio on loan and guarantees. The resilience is almost unchanged in

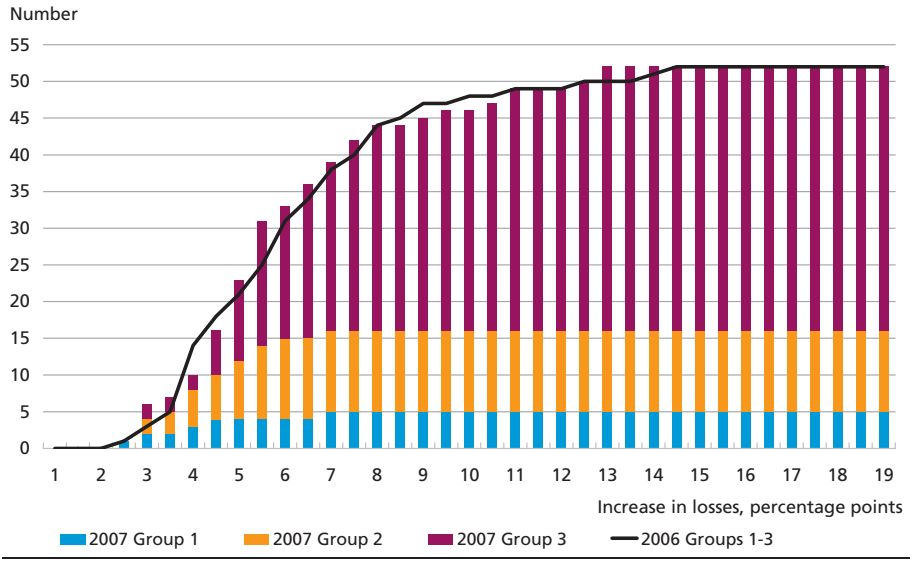
INTEREST-RATE RISK AS A RATIO OF CORE CAPITAL Chart 40




Note: Calculated on the basis of the Danish Financial Supervisory Authority's key ratio "interest-rate risk", which shows the share of the core capital, less deductions, that is lost on an increase in the interest rate by 1 percentage point.
Source: Financial statements.

2007. Out of the 10 most exposed banking institutions (the first institutions to lose their excess capital adequacy) 3 are in group 1, 5 in group 2 and 2 in group 3.

NUMBER OF BANKING INSTITUTIONS WITH A SOLVENCY RATIO BELOW 8 PER CENT ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2006-07 Chart 41




Source: Financial statements and own calculations.

# Danmarks Nationalbank's Oversight of the Financial Infrastructure in Denmark

Like an increasing number of other central banks, Danmarks Nationalbank has decided to issue an annual report on oversight of the financial infrastructure. The purpose is to describe the developments and risks in core infrastructure systems and to give an account of the activities and measures that make up Danmarks Nationalbank's oversight, cf. Box 7. This is followed by a progress report on Danmarks Nationalbank's response to the recommendations made by the IMF in connection with its assessment of the Danish systems in 2005-06.

On the basis of the oversight, Danmarks Nationalbank finds the risks in the core systems of the Danish financial infrastructure to be moderate and subject to adequate risk management. In the current situation, credit risk and legal risk are not assessed to constitute a major problem for system participants (credit institutions, etc.). Likewise, the systems seem to be able to handle operational risks and ensure a high degree of stability in the settlement of payments, securities transactions, etc. This also applies to Danmarks Nationalbank's own payment system, Kronos, which saw a substantial improvement of operational stability from 2006 to 2007. Finally, there are no indications that settlement in the systems is threatened by shortage of liquidity among participants. Thus, participants have not generally experienced problems in procuring the liquidity required for smooth and efficient settlement in the systems, even if a few credit institutions in Denmark may experience a liquidity squeeze.

The Danish payment and settlement systems do not seem to have been affected by the current financial turmoil, whereas the number of reported transactions in CLS, the international system for settlement of foreign-exchange transactions, reached a record-high level in August 2007 in connection with the turmoil. The extraordinarily high number of reported transactions led to temporary capacity problems in CLS in August. This also affected Danish CLS participants.

FRAMEWORK FOR OVERSIGHT BY DANMARKS NATIONALBANK Box 7

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. Oversight is based on a public policy.[1]

The focus of Danmarks Nationalbank's oversight is on three systems that together comprise the core of the Danish financial infrastructure:

- Kronos, Danmarks Nationalbank's RTGS system[2] for settlement of primarily large, time-critical payments between banks, etc.
- The Sumclearing, a multilateral net settlement system[2] in which retail payments, are settled.
- VP Settlement, a multilateral net settlement system for clearing and settlement of securities registered by and deposited with VP Securities Services.

Primarily incidents in this part of the infrastructure are assessed to have a potential economic impact that could ultimately jeopardise financial stability in Denmark. In addition, Danmarks Nationalbank participates in the oversight of two foreign systems that are also of major significance to the financial system in Denmark:

- TARGET, the trans-European RTGS system for settlement of primarily large, time-critical payments in euro.
- CLS[3], an international, multilateral clearing and settlement system for foreign-exchange transactions, etc. in 15 currencies, including Danish kroner. (In 2008 the system will be expanded to include settlement of foreign-exchange transactions in Israeli shekels and Mexican pesos.)

Oversight is based on international standards for payment and securities settlement systems, respectively. 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 internationally recognised principles for oversight by central banks. Management of oversight is also 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 cooperation has been regulated by a Memorandum of Understanding since 2001.

[1] Danmarks Nationalbank's oversight policy is published in full in *Financial stability 2006*.

[2] In a real-time gross settlement (RTGS) system, payments and securities are settled finally and irrevocably during the system's opening hours, immediately after receipt of the payment instructions. In a multilateral net settlement system, payments and securities are netted, i.e. set off against opposite transactions, and settled at fixed times during the settlement day. For a more detailed description of the systems, see Danmarks Nationalbank, *Payment Systems in Denmark*, 2005.

[3] Continuous Linked Settlement.

## KRONOS

The volume of interbank payments settled in Kronos has been rising for several years, but fell by just over 7 per cent in 2007, cf. Table 4. This is

PAYMENTS IN KRONOS/DANMARKS NATIONALBANK Table 4

| Kr. billion | 2005 | 2006 | 2007 |
|---|---|---|---|
| Interbank payments between participants | 31,792 | 33,310 | 30,876 |
| Monetary-policy operations | 7,885 | 8,130 | 13,662 |
| Other payments | 668 | 450 | 535 |
| Payments for participants in ancillary systems | | | |
| - Sumclearing | 1,113 | 1,194 | 1,339 |
| - VP settlement | 2,500 | 2,129 | 1,855 |
| - CLS | 2,020 | 2,120 | 2,020 |
| All payments | 45,978 | 47,153 | 50,287 |

Note: Interbank payments, monetary-policy operations and other payments are stated as gross amounts settled in Kronos, while payments for participants in ancillary systems are net positions settled after offsetting opposite payments.
The increase in payments related to monetary-policy operations in 2007 reflects that on 3 May 2007 Danmarks Nationalbank shifted from a maturity of 14 days for monetary-policy operations to 7 days.
Source: Danmarks Nationalbank.

attributable to a 22 per cent decrease in payments by the largest 10 participants. Payments by other Kronos participants increased by more than 100 per cent, but since there is a high degree of concentration on the largest participants, the fall seen for this group dominates the overall result.[1]

**Improved operational stability in Kronos**

Following a somewhat unsatisfactory operational stability in 2006[2], Danmarks Nationalbank's payment system, Kronos, operated satisfactorily in 2007. The improvement is the result of a number of stability-enhancing measures in connection with the processing of the SWIFT messages sent between Kronos (Danmarks Nationalbank) and the participants, which are a prerequisite for settling payments.

In view of the very large daily traffic in Kronos, it is important to financial stability in Denmark that system disruptions are kept at a very low level.[3] In the event of interruptions in the settlement of payments, recipients' claims on remitters are prolonged, which may result in unforeseen credit and liquidity exposures.

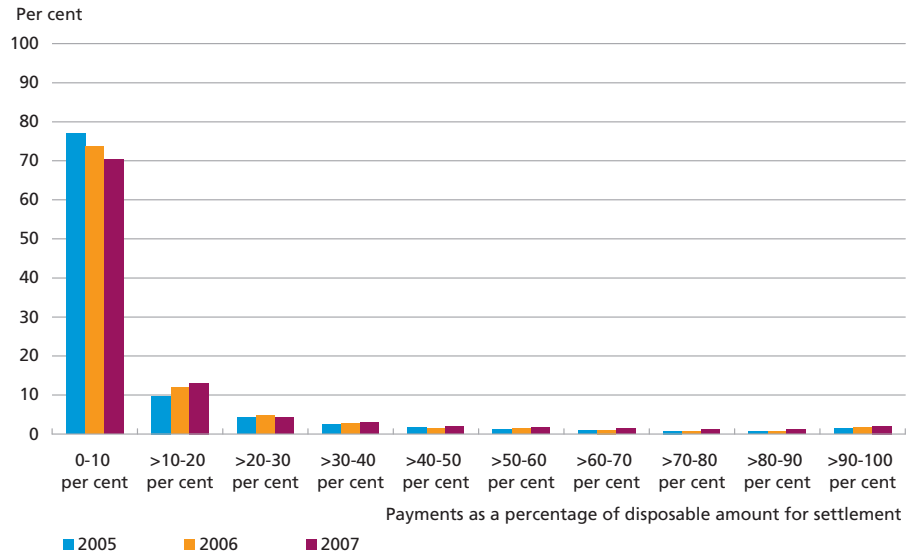
**Considerable liquidity reserved for payments in Kronos**

Kronos is an RTGS system, which means that immediately after receipt of the payment instructions payments are settled individually as transfers

1 See The Financial Sector's Payments via Kronos, Danmarks Nationalbank, *Monetary Review,* 1st Quarter 2008.
2 See Danmarks Nationalbank, *Report and Accounts 2006*, p. 67.
3 In recent years, it has become an international requirement that systemically important payment systems must have a maximum restart time of 2 hours after a major failure. In addition, best practice for the availability of such systems is typically very high. For European central banks, the target is 99.65 per cent availability during opening hours.

PARTICIPANTS' UTILISATION OF DISPOSABLE AMOUNTS FOR SETTLEMENT OF INTERBANK PAYMENTS

Chart 42




Note: In the compilation payments have been weighted by size. Payments of less than kr. 1 million have been excluded.
Source: Danmarks Nationalbank.

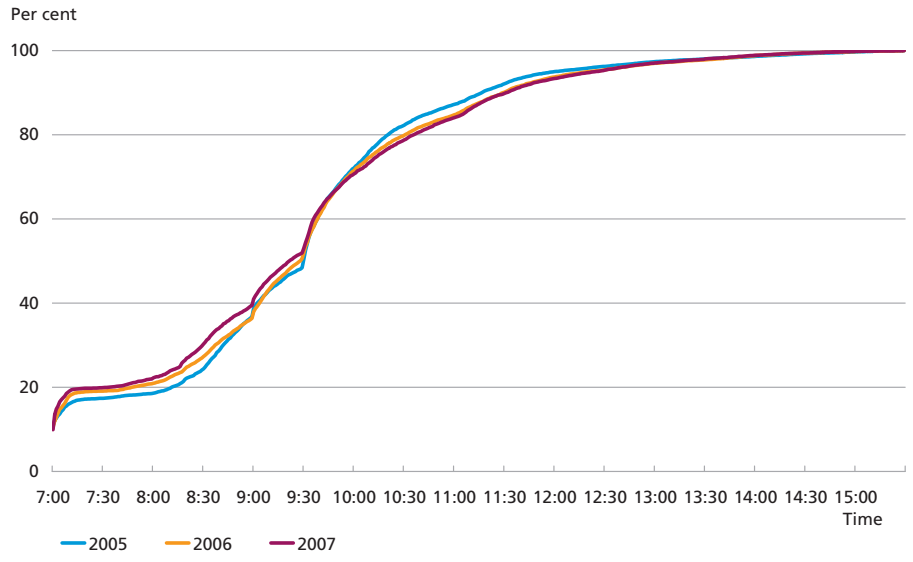
between the participants' accounts at Danmarks Nationalbank. Under normal circumstances, the system does not entail any credit risk to participants.

On the other hand, the participants' liquidity requirements are higher than in net settlement systems such as the Sumclearing (see below) since they must take into account situations where incoming payments are received later in the day than outgoing payments. In order to address this issue and support a smooth flow of payments, Danmarks Nationalbank provides intraday credit to participants against liquid securities, primarily government and mortgage-credit bonds and covered bonds, as collateral. Statements of participants' payments in relation to their disposable amounts[1] at Danmarks Nationalbank show that in 2007, as in previous years, participants had reserved considerable liquidity for payments, cf. Chart 42. Since 2005, however, there has been a tendency for payments settled to constitute a slightly larger share of the disposable amounts.

In addition, an important reason for the smooth functioning of Kronos is that over the years participants have developed payment patterns that entail a very stable time profile for daily payments, cf. Chart 43. This means that participants typically remit and receive approximately 95 per

[1] During Kronos' opening hours, a participant's disposable amount is calculated on an ongoing basis as the participant's maximum credit line at Danmarks Nationalbank plus its current-account balance.

TIME PROFILE FOR INTERBANK PAYMENTS IN KRONOS (ACCUMULATED) Chart 43




Note: Accumulation of interbank payments over Kronos' opening hours (7:00 a.m. to 3:30 p.m.).
Source: Danmarks Nationalbank.

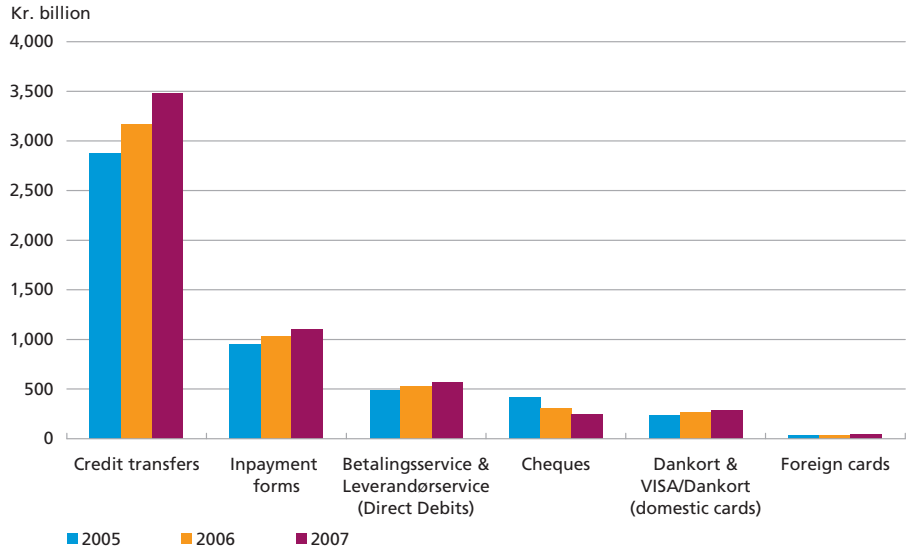
cent of the daily payments before noon. Consequently, participants seldom find themselves in a situation with long delays while outgoing payments are awaiting incoming payments or where they must rely heavily on their credit lines at Danmarks Nationalbank.

Internationally, central-bank RTGS systems are increasingly being upgraded to include functions to facilitate liquidity management by participants and to minimise liquidity requirements in connection with use of the systems. Since participants have traditionally held large bond portfolios that can be pledged as collateral to Danmarks Nationalbank, and on account of the payment patterns observed among participants, there has not been any pronounced need for such functionalities in the Danish financial system so far.

## THE SUMCLEARING

In 2007, payment transactions settled in the Sumclearing increased by 7.5 per cent to a total of kr. 5,750 billion. A breakdown by major payment instruments is shown in Chart 44. Except for cheques, the value of transactions has been rising. Foreign payment cards accounted for the largest increase in 2007 (15 per cent), but use of such cards by Danes is still relatively modest compared with use of the Dankort.

SUMCLEARING SETTLEMENT Chart 44




Source: Danish Bankers Association.

**Liquidity and credit risks in the Sumclearing are modest**

The Sumclearing is a multilateral net settlement system in which retail payments on behalf of participants' customers are settled during the night. Net settlement of payments entails a credit risk since a participant with a net debit position vis-à-vis the other participants may fail before the payments from the previous day are settled. However, Danmarks Nationalbank has on several occasions assessed that the credit risk in connection with net settlement in the Sumclearing is modest.[1]

Liquidity risk in the system is also found to be limited. The netting of payments between participants that takes place in the Sumclearing thus reduces the liquidity requirement for system participants. In 2007 this meant that cash settlement between Sumclearing participants constituted only 23 per cent of the underlying gross payments.

However, there is the risk that participants do not know exactly how much liquidity they need to reserve for settlement during the night because they have not received information about all payments initiated by their customers before settlement takes place. From time to time – particularly on large settlement days – a participant in a net debit position during a settlement cycle therefore fails to reserve sufficient liquidity for settlement. In that case, the relevant participant is postponed (removed from the settlement), and the net positions of the remaining

[1] For a more detailed review of credit and liquidity risk in the Sumclearing, see the chapter Protection of Settlement in Danish Payment Systems in *Financial stability 2006*.

participants are recalculated. This may trigger a "domino effect", whereby other participants who were net creditors of the postponed participant must also be postponed.

Payments relating to postponed participants are subsequently settled in the morning when the participants have had an opportunity to procure and reserve the liquidity at Danmarks Nationalbank that is required in order to settle the outstanding net positions. In 2007, net positions that could not be settled during the night in the Sumclearing as planned accounted for 1.1 per cent of the total net positions. This is in line with the 2006 level. Delayed settlement of net positions is primarily attributable to one-off handling errors by participants, cf. below.

**High operational stability in the Sumclearing**

In 2007, the systems for compilation and clearing of retail payments with a view to calculating the net positions to be settled between participants functioned satisfactorily. In general, there were few delays in these systems, and on all days except three the calculation of net positions was completed within the normal settlement cycles. The delays experienced were only small, and compilation and clearing of retail payments was completed during the night.

One incident experienced by a participant in 2007 did, however, mean that a very considerable number of transactions were not settled on time. Since Danmarks Nationalbank does not grant uncollateralised credit, it was not possible to implement a solution in time, and the participant was removed from the settlement cycle. The delay resulted in extensive clean-up efforts at PBS and among participants in order to ensure correct entry of transactions to customer accounts.

Together with PBS and the Danish Bankers Association, Danmarks Nationalbank has therefore implemented measures to prevent such incidents in future. This has led to the introduction of a new contingency procedure. In addition, PBS and the participants are enhancing their system controls. Finally, an analysis will be performed of whether the Sumclearing settlement procedure should be changed from one settlement cycle during the night to a more flexible clearing and settlement of retail payments over a 24-hour period. The IMF, too, has recommended such an analysis, cf. Box 8, page 76.

**Participants' handling of Sumclearing settlement should be improved**

In spite of high operational stability, settlement in the Sumclearing could not be completed as planned during the night on 21 days in 2007 (compared with 19 days in 2006) as participants had not reserved sufficient liquidity. In addition, on 13 days in 2007 (compared with 4 days in

2006) extraordinary settlement cycles were required before settlement could be completed. This is attributable to a combination of the following:

- operational factors such as non-observance of settlement procedures by certain participants, e.g. during the summer holiday period, and
- too little attention to large payment days when participants should reserve extra liquidity for settlement, e.g. on days when mortgages and taxes are paid and around the turn of the month.

As stated above, the risk that a participant has reserved too little liquidity cannot completely be eliminated. Reservations are based on estimates of the payments that are unknown to the participants prior to settlement, e.g. payments by cards issued by the participant in shops banking with other participants.

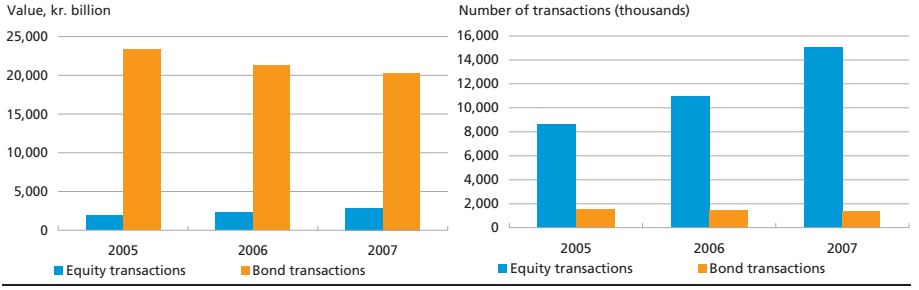
Danmarks Nationalbank has not found any indications that settlement delays in the Sumclearing are caused by a liquidity squeeze in the Danish financial system. Even on large settlement days, participants had generally reserved far more liquidity than they needed.

In 2007, the Danish Bankers Association emphasised to members participating in the Sumclearing the terms and conditions for participation in the system with a view to limiting the number of days on which settlement cannot be completed until Kronos has opened in the morning.

## VP SETTLEMENT

The value of trading transactions in the VP settlement fell by 1.3 per cent in 2007, to a total of kr. 23,467 billion, cf. Chart 45. This is attributable to lower trade in bonds. The value of equity transactions settled in VP rose by 26 per cent in 2007, but this could not offset the decline in

EQUITIES AND BONDS SETTLED IN VP — Chart 45




Source: VP Securities Services.

bond trading. The strong rise in the transaction volume in VP, driven by equity trading, contributed to VP's decision in 2007 to lower the fee per trading transaction from kr. 6 to kr. 4.

**High operational stability in VP Settlement**

Settlement of securities transactions, etc. in VP Securities Services has been very stable for many years with few major disruptions. That was also the case in 2007, when only one such incident was observed. It lasted for approximately two hours, but did not entail substantial settlement problems.

**Handling risk on large settlement days**

In terms of financial stability, a safe and efficient settlement procedure is particularly important on large settlement days. Consequently, Danmarks Nationalbank has analysed VP Settlement at the beginning of January. In recent years this has been a time when securities trading and corporate actions for very large amounts have been settled due to refinancing of the mortgage-credit institutes' adjustable-rate mortgages. The analysis showed that the existing settlement procedure does not give rise to excessive liquidity risks for participants. This can be attributed to three factors:

- The overall liquidity position of the participants has largely been unaffected by the refinancing of adjustable-rate mortgages since the underlying mortgage-credit bonds are eligible as collateral to Danmarks Nationalbank.
- The need to redistribute liquidity among participants accounts for only a small proportion of the gross value of trades and corporate actions settled. On 2 January 2008, the gross value of trades settled was kr. 562 billion, but after offsetting of opposite payments, the net positions to be exchanged between participants amounted to only kr. 70 billion. Likewise, the respective gross and net values of periodic payments on 2 January 2008 were kr. 404 billion and kr. 72 billion.
- For virtually all participants, net positions concerning trade settlement and corporate actions, respectively, at the beginning of January are opposite, i.e. net creditors in the trading blocks are net debtors in terms of corporate actions.

Nevertheless, the analysis confirmed certain weaknesses in the block for settlement of corporate actions (VP35). This issue will be resolved when VP35 is upgraded to include procedures for removing individual ISIN codes where a participant does not have sufficient cover. This is not possible today and consequently VP35 can only be run if all participants'

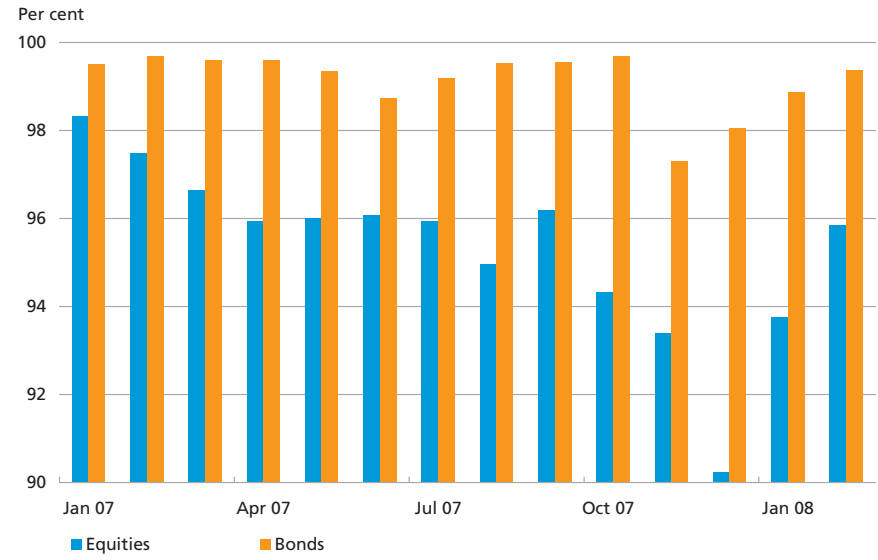
payment obligations in this block are sufficiently covered by liquidity on the settlement accounts. A new block will also be introduced in VP Settlement, whereby corporate actions for ISIN codes removed from VP35 can subsequently be settled when the relevant participants have procured sufficient liquidity. The work to upgrade VP35 will be resumed when the migration to TARGET2 has been completed in May 2008.

**Participants' handling of securities settlement should be improved**

Settlement in VP comprises several settlement blocks, in which trades and corporate actions (e.g. interest, repayments and dividend) are settled. The settlement schedule entails that even if a transaction is not settled in the first block – e.g. because the seller does not have the securities, or because the buyer has not reserved sufficient liquidity to pay for the securities purchased – it is possible to settle it in a later block. VP is thus entitled to check the reported transactions with a view to selecting and completing those for which cover can be found. This means that it is not necessary to remove all of a participant's transactions from a block, but only enough to ensure cover for both securities and cash. In 2007, just over 90 per cent of all trading transactions were settled in the first block (VP10). This is more or less the same as in 2006.

In recent years, the percentage of securities transactions settled in a timely manner (i.e. the settlement rate) has been falling marginally, primarily for equities, cf. Chart 46.

SETTLEMENT RATES FOR SECURITIES TRANSACTIONS — Chart 46




Source: VP Securities Services.

VP Securities Services has carefully monitored the development and will therefore, effective from mid-2008, adapt its sanctions policy with the aim of reversing the trend. Consequently, the existing sanctions for monetary overdrafts will also apply to securities shortfalls. At the same time, the sanctions policy will apply to more VP Settlement participants. The aim is to achieve a minimum settlement rate of 98 per cent on an annual basis, which is equivalent to the EU benchmark.

## TARGET

Settlement of payments in euro by Danish credit institutions via the trans-European payment system, TARGET, through accounts at Danmarks Nationalbank, increased by 29 per cent in 2007, to a total of 4,080 billion euro (kr. 30,398 billion).

The majority by far of these payments were made to and received from euro area participants. The fact that Danish credit institutions have been able to participate in Target since 1999 has thus, all other things being equal, reduced the exposure of the Danish credit institutions (and thereby their credit risk) to commercial correspondent banks in the euro area.

### TARGET2

The migration of TARGET to a new, single shared platform, TARGET2, began in November 2007. The new single platform replaces the current decentralised system in which the payment systems of the participating central banks, including Danmarks Nationalbank, are connected via an interlinking module. The third and final stage of the migration to TARGET2, which includes the Danish participants, will take place on 19 May 2008.

The transition from interlinked platforms to a single shared platform with operations in two regions (Germany and Italy, both places with real-time mirroring of data between two data centres) observes international best practice for settlement of payments, including the requirement that operations can be resumed within two hours after a major failure.

## CLS

The value of foreign-exchange transactions in kroner in CLS rose by 6 per cent to kr. 50,446 billion in 2007. Among other things, this increase is attributable to a higher number of indirect participants in the CLS settlement in Denmark.

The onset of the financial turmoil in August 2007 affected the number of transactions settled in CLS, whereas no effect can be registered on the total gross value of the transactions settled. The average number of daily transactions in CLS rose by approximately 35 per cent from July to August 2007, while the average daily gross value of transactions increased by only around 5 per cent. The financial turmoil is not deemed to have had any impact on the settlement of Danish kroner in CLS. However, a very large number of reported foreign-exchange transactions for settlement in CLS caused temporary capacity problems on 16-21 August. This also affected Danish system participants since there were periods when foreign-exchange transactions could not be reported for settlement. Following an appeal from the participating central banks, including Danmarks Nationalbank, CLS has expanded its capacity to a level assessed to be sufficient. In addition, measures have been taken to ensure settlement in CLS in the event of e.g. financial problems among CLS participants.

**Netting opposite payments in CLS reduces liquidity requirements**

CLS settlement is characterised by substantial netting of opposite payments by participants (e.g. Danish kroner bought and sold on the same value date) before they effect pay-ins to CLS. Using CLS to settle foreign-exchange transactions thus entails a far lower liquidity requirement for participants when compared with gross settlement via correspondent banks. In 2007, netting of opposite krone payments meant that pay-ins to CLS amounted to only 4 per cent of the gross value of krone transactions settled in the system. This is the lowest level since 2003 when the Danish krone joined CLS.

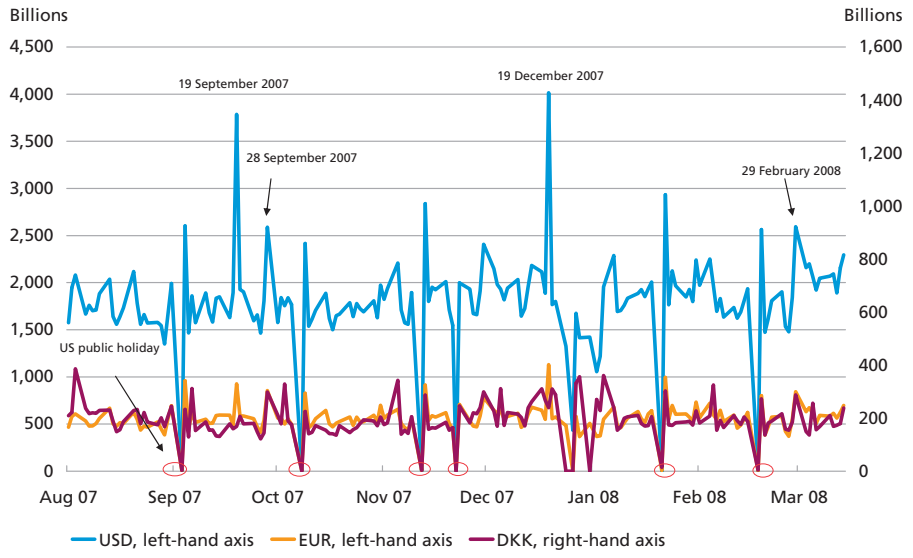
**Calendar days and CLS settlement**

Most of the foreign-exchange transactions settled in CLS have one leg in USD. Consequently, a very large number of transactions with a high gross value, equivalent to two days' trading, are settled on the first banking day after a US public holiday, cf. Chart 47. Financial calendar days are also important to CLS settlement. For example, in the months of March, June, September and December the third Wednesday is an IMM (International Monetary Market) day, on which e.g. futures contracts are settled. The gross value of foreign-exchange transactions settled on 19 September and 19 December 2007 was therefore exceptionally large.

**Credit derivatives in CLS settlement**

In November 2007, the CLS system was extended to include settlement of payments related to OTC credit derivatives registered by the US

GROSS VALUE OF TRANSACTIONS SETTLED IN CLS (USD, EUR AND DKK) Chart 47




Source: CLS Bank.

Depository Trust & Clearing Corporation (DTCC). Initially, settlement of OTC credit derivatives will include payments in the major currencies (USD, EUR, JPY, GBP and CHF). Thus an infrastructure is established for settlement in a market where the volume of outstanding contracts has grown substantially in recent years, so that it has been difficult for market participants to ensure satisfactory administration of the contracts after trading.

The establishment of the CLS settlement has required considerable investments in IT systems, etc., and therefore it is generally an advantage for participants that the system is used for settlement of as many instruments as possible with a view to reducing unit costs.

## DANMARKS NATIONALBANK'S RESPONSE TO THE IMF RECOMMENDATIONS

Although the Danish systems meet the international standards, it is necessary to consider potential improvements on an ongoing basis. At present the main focus is on following up on the recommendations made by the IMF in connection with its review of the Danish financial infrastructure. This review was completed in the autumn of 2006, cf. Box 8. The aim is to comply with all IMF recommendations, or to initiate projects to address outstanding issues, by the end of 2008.

IMF'S ASSESSMENT OF THE DANISH PAYMENT AND SETTLEMENT SYSTEMS Box 8

In 2005-06, the IMF assessed the Danish payment and settlement systems in relation to international standards, as well as Danmarks Nationalbank's oversight of the systems. The assessment was predominantly positive. The infrastructure was thus described as highly developed and technologically well advanced, cf. the IMF's concluding reports, which can be found at Danmarks Nationalbank's website.[1] However, in a number of areas the IMF recommended investigating whether changes were required. Highlights of the recommendations were as follows:

- *Kronos*: Various operational issues were pointed out, which have been or are being resolved. In addition, the IMF recommended that a new risk analysis methodology be developed when, as from 19 May 2008, the system is no longer linked to the ECB's payment system, TARGET. Likewise, the IMF found it relevant to analyse the complexity of the system design and its interaction with the Sumclearing and VP Settlement. Finally, the IMF called for a further analysis of system efficiency.
- *Sumclearing*: To reduce the financial risk in connection with participation in the system, the IMF recommended establishing a pool of collateral or lowering the net positions settled, for instance by restructuring the settlement cycle. The former proposal has subsequently been analysed by Danmarks Nationalbank and found not to be expedient in a Danish context.[2] Also with a view to reducing financial risk, the IMF recommended changing the practice in relation to Betalingsservice (Direct debits) so that booking of payments in customer accounts does not take place until money have been exchanged between participants. PBS is currently redesigning Betalingsservice and will address this issue, among others. As recommended by the IMF, the Danish Bankers Association has also published a more extensive description of the system.[3]
- *VP Settlement*: The IMF recommended analysing the pros and cons of introducing a central counterparty in the Danish securities market in order to reduce settlement risk. Danmarks Nationalbank did this in 2006-07 and concluded that the need for a central counterparty is limited in respect of spot transactions.[4] Moreover, the IMF recommended that VP Settlement was ensured via the establishment of a pool of collateral, as it did for the Sumclearing. Again, a subsequent analysis by Danmarks Nationalbank showed that this was not necessary.[2]
- *Oversight by Danmarks Nationalbank*: In certain areas, the IMF recommended strengthening the oversight of the infrastructure. As a first step, oversight of the retail payment infrastructure was enhanced to match international best practice. In continuation thereof the Memorandum of Understanding[5] with the Danish Financial Supervisory Authority was extended. Moreover, the purpose of and framework for oversight have been incorporated into a new policy[6]. Finally, Danmarks Nationalbank has established regular contacts with the financial sector to discuss relevant oversight issues.

[1] See www.nationalbanken.dk under Press/IMF Consultation.
[2] See *Financial stability 2006*, Protection of Settlement in Danish Payment Systems.
[3] See www.finansraadet.dk under Banking system/Sumclearing.
[4] See *Working Paper 49/2007*, Torben Nielsen and Peter Restelli-Nielsen, Analysis of the pros and cons of introducing a central counterparty in the Danish securities market.
[5] See www.nationalbanken.dk under Rules/Memorandum of Understanding.
[6] See *Financial stability 2007*, Danmarks Nationalbank's Policy for Oversight of the Danish Financial Infrastructure.

# Measures to Enhance Stability

**Emergency communication system for business continuity in the financial sector**

In the spring of 2006, Danmarks Nationalbank and the Danish Financial Supervisory Authority, in collaboration with the Danish Bankers Association and the Association of Danish Mortgage Banks, established a working group to assess the need for operational contingency plans for selected parts of the financial sector. The working group has prepared a report describing critical business activities in the financial sector, as well as a discussion paper with recommendation of processes and lines of communication at sectoral and authority level in relation to financial sector continuity planning. The objective is to improve communication and thus the financial sector's opportunities to respond to a major operational disruption caused by e.g. an act of terrorism.

The report was submitted to the organisations for consultation on 27 June 2007 with two key recommendations: 1) to establish a plan for financial sector business continuity, and 2) to anchor the secretariat (Response Team) in Danmarks Nationalbank.

The Danish Bankers Association, the Association of Danish Mortgage Banks and Danmarks Nationalbank have jointly begun to implement the contingency plan. A coordination committee has been established, consisting of decision-makers from the respective organisations. Its mandate is to coordinate the exchange of information and knowledge as input to the sector's coordinated response to a potential operational disruption.

A Response Team, consisting of employees of Danmarks Nationalbank, has been established to undertake the current management of the contingency plan for the sector. The Team has two key functions:

1. A vigilance function
2. A function as secretariat to the coordination committee.

Within normal working hours, members of the Response Team are, as a main rule, physically present at Danmarks Nationalbank, but outside normal working hours, members are on call.

The implementation is expected to be finalised in the autumn of 2008.

**Covered bonds**

The legislation on covered bonds entered into force on 1 July 2007. It enables mortgage-credit institutes to continue to issue covered bonds as

previously. The good qualities of the Danish mortgage-credit system are thus retained. At the same time, the access to issue covered bonds has been extended to include Danish banks.

In connection with implementation of the legislation, Danmarks Nationalbank has expanded the range of bonds eligible as collateral for loans from Danmarks Nationalbank to include covered bonds issued by Danish credit institutions.

Covered bonds are a new and stable source of financing for the banks, which could contribute to enhancing financial stability.

**Adoption of changes to the Guarantee Fund for Depositors and Investors**

On 6 June 2007, the Folketing (Parliament) adopted legislative amendments providing for establishment of voluntary schemes for the winding up of an ailing banking institution.

On 13 June 2007, the Danish Bankers Association established a private contingency facility for winding-up of ailing banks, savings banks and cooperative banks. The objective is to contribute to the winding up – as an alternative to compulsory liquidation – of ailing banks, savings banks and cooperative banks by enabling another institution to take over the assets and liabilities of the ailing institution. The facility can contribute to this by supplying funds to or providing guarantees to the acquiring institution to cover the ailing institution's non-subordinate creditors.

# Issue related to financial stability

# Stress Test of the Financial System

*The purpose of Danmarks Nationalbank's stress test model is to assess the resilience of the financial system to extreme, but plausible shocks to the economy in general and to the financial sector in particular. At the same time, the model helps to identify weaknesses in the financial system in Denmark by illustrating how shocks to the economy spread through the financial system.*

*Danmarks Nationalbank's stress test model takes the individual bank as its point of departure, but allows for the fact that banks can influence each other. A 3-year scenario is set up for the macroeconomic and financial market developments that are consistent with a given level of stress from one or more economic risk factors. On the basis of this scenario, the model provides an estimate of the impact on the banks' Tier 1 capital and solvency. Three years' financial statements are projected and the consequences for the financial system assessed for each year. The assessments are solely based on the development in the banks' profits and solvency.*

*The stress test model is developed on an ongoing basis. At present e.g. liquidity risk and operational risk are not explicitly modelled. The modelled outcomes are not a precise description of the consequences of a given development, but rather an estimate of the resilience of the financial sector to various types of economic and financial shocks.*

## MODEL ARCHITECTURE

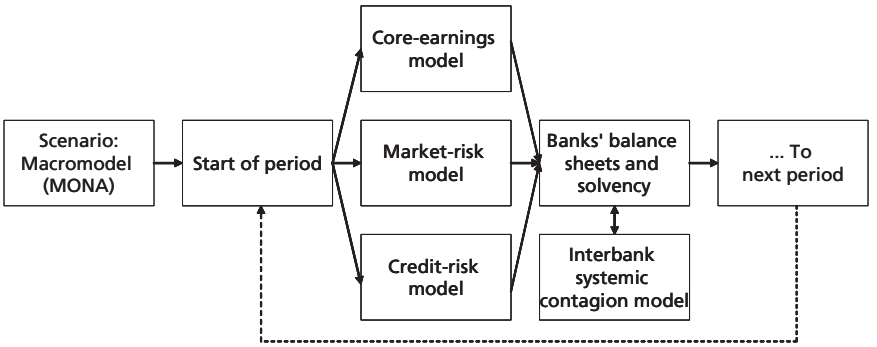
The model for macro stress testing is based on a number of submodels for bank earnings, market risk, credit risk and interbank systemic contagion risk, respectively. The model architecture is illustrated in Chart 48.

### Dynamics of the stress test model

The first step of the model is to set up a coherent scenario – i.e. a consistent development in macroeconomic and financial variables – that provides the desired level of stress. Danmarks Nationalbank's macroeconomic model, MONA, is used to project the economic development.

For each bank, the correlation is estimated between a number of risk factors and the bank's earnings, valuation changes and loan losses. This makes it possible to estimate the banks' annual profits in the scenarios analysed. The profits are used to project the balance-sheets, which are

STRESS TEST MODEL ARCHITECTURE Chart 48




used to assess whether the banks will be able to meet the statutory capital requirement. If all banks meet their capital requirements, the model progresses to the second year of the scenario, using the projected balance-sheets and stressed risk factors as input.

If, following update of the balance-sheets after a period, one or more banks can no longer meet the capital requirement, it is assumed that the bank(s) will close down. The stress test model then shifts to the inter-bank systemic contagion model, in which the losses of the closed bank(s) may spread through the financial system via interbank exposures. The banks' balance sheets are then updated to take into account any losses on the closed bank(s). If this leads to further closures, the procedure is repeated until no more banks are closed. The model then progresses to the next period. The stress test model operates with a 3-year horizon.

**Delineation of the model population**

The population of the stress test model is limited to banks in the Danish Financial Supervisory Authority's groups 1 and 2, i.e. the largest 16 banks in the Danish market in terms of working capital. The model is based on publicly available data.[1] With this delineation of the population, the model covers 93 per cent of the Danish banking market in terms of balance-sheet assets and 77 per cent of total bank lending in Denmark. It also ensures that a wide range of bank business strategies are represented.

At present the stress test model comprises only banks. Other financial institutions, such as mortgage-credit institutes and insurance companies, are disregarded. This potentially affects the models results due to cross-ownership within the Danish financial sector. For example, a bank that is

[1] An exception is the interbank systemic contagion model, which – besides balance-sheet data – is based on the banks' uncollateralised lending to each other.

a subsidiary of an insurance company may have a smaller capital buffer than other, comparable banks, because the buffer lies in the parent company, which is able to inject capital if required. The opposite may apply if banks have ownership of e.g. insurance companies.

## SUBMODELS OF THE STRESS TEST MODEL

The submodels for core earnings[1], market risk and credit risk each comprise one or more items in a bank's basic financial statements. The latter is illustrated in Chart 49. In combination, these submodels provide estimates of the banks' profits. The estimated model relations are based on data from the banks' financial statements for the period 1990-2006. The projections of balance-sheets totals and solvency are based on the estimated results and ad-hoc assumptions.

### Core-earnings model

The core-earnings model is used to estimate the banks' core earnings in the scenario. Net interest income, net fee income and costs are modelled explicitly, while the minor items under "Other" are assumed to constitute the same share of the Tier 1 capital in each year of the scenario.[2]

The banks' net interest income, net fee income and costs are modelled separately. For each of the three items it is estimated how the general development in the item is influenced by the development in the risk factors. In order to project the general development, the development in the risk factors is entered into the estimated relations. The projected developments are adjusted for each bank in order to obtain a bank-specific development.

The relations of the core earnings model are described in more detail in Box 9.

### Market-risk model

The market-risk model provides an estimate of bank revenue and losses resulting from changes in asset values due to changing market conditions. Market risk comprises interest-rate, equity market, foreign-exchange and commodity risks. For the banks in the model population, the foreign-exchange and commodity risks are so small that they have been assumed to be zero. The market-risk model therefore operates only with interest-rate and equity market risks.

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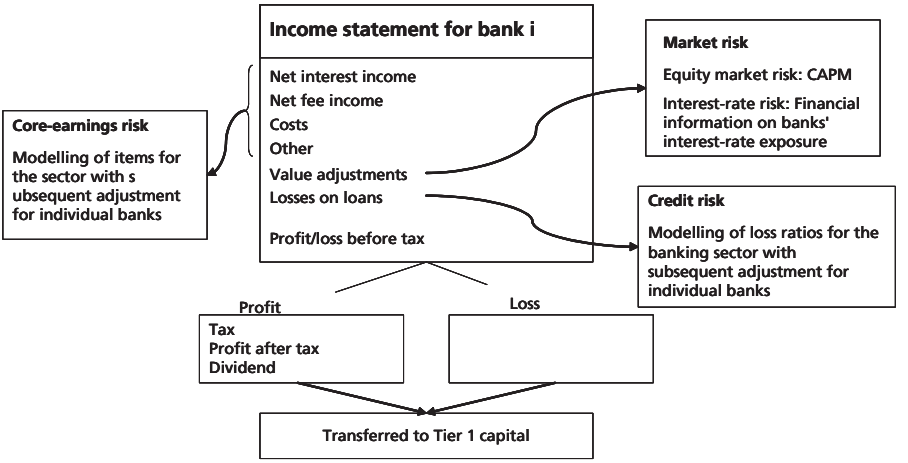
1 In this context, core earnings are defined as earnings not stemming from valuation changes and loans losses.

2 "Other" comprises the items income from ordinary activities, depreciation on assets, value adjustments in respect of participating interests and other operating costs.

A BANK'S BASIC FINANCIAL STATEMENTS Chart 49




*Interest-rate risk* is the risk that the value of a portfolio of interest-bearing assets changes as a result of changes in interest rates. In the stress test model, the portfolio of interest-bearing assets is measured as the banks' bond portfolios. The risk on a bank's bond portfolio is stated using the interest-rate risk measure published in the bank's financial statements. The model thus allows different degrees of interest-rate risk for the various banks. It is assumed that the individual bank's measure remains unchanged throughout the scenario. Based on the banks' Tier 1 capital and the projected change in interest rates, the interest-rate risk measure expresses the effect of the banks' interest-rate risk.

*Equity market risk* is the risk that the value of a bank's equity portfolio changes due to price fluctuations in the market. For each bank, it is estimated how the value of the equity portfolio co-varies with the development in the market. Thus, the model allows banks to have different risk profiles on their equity portfolios. To project the effect of the banks' equity market risk, the development in the equity market and in interest rates is entered into the estimated relations.

The relations of the market-risk model are described in more detail in Box 10.

**Credit-risk model**

Credit risk is the risk of losses because borrowers or other counterparties default on their obligations to the bank. Credit risk is typically the greatest risk factor for retail banks. The credit-risk model models the banks' credit losses on loans to 10 sectors.

## RELATIONS OF THE EARNINGS MODEL — Box 9

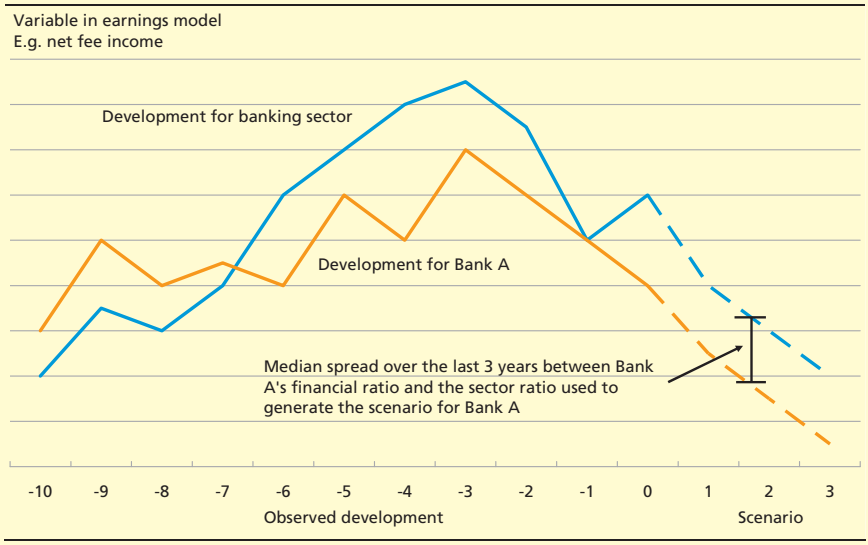
In the core earnings model, the development in the income-statement items is determined in two steps. Net interest income is broken down into eight items that are treated separately.[1] Each income-statement item is normalised by an appropriate balance-sheet item.[2] The first step is to estimate how the development in the macroeconomic variables affects the implied interest rates, net fee income and costs for the banking sector. The second step is to estimate how the development in these items for the individual banks relates to the overall sector development.

*Step 1*: For each of the ten dependent variables, a median value is calculated for each year in the estimation period. This results in a time series for each variable. An error-correction model is set up for each variable with a set of macrovariables as exogenous variables. The interest-rate relations are estimated using SUR (Seemingly Unrelated Regression). Net fee income and costs are estimated using OLS (Ordinary Least Squares). The variables are projected by inserting the projected macrovariables into the estimated relations.

*Step 2*: For each variable, a calculation is performed for each bank of the median spread over the last three years to the variable for the sector overall. In the projections, it is assumed that for each bank the spread to the variable in relation to the sector overall corresponds to the median spread over the most recent three years of the estimation period.

Projections are made by projecting the development in the sector conditionally on the macrodevelopment in the scenario and individually adjusting the development for each bank. This is illustrated in the chart below.

### PROJECTION IN THE EARNINGS MODEL




[1] Net interest income comprises four income items (receivables, lending, bonds and other) and four expense items (central banks and other financial institutions, deposits, subordinated debt and other).

[2] For example, interest income from bonds is normalised by the bond portfolio. Other interest income and expenses, net fee income and costs are normalised by equity. The normalised values are calculated as the profit/loss on the item in question in the year t divided by the average of the portfolios at the beginning and end of the year t. Conversely, projections are based solely on the portfolios at the beginning of the year.

RELATIONS OF THE MARKET-RISK MODEL Box 10

The market-risk model comprises two submodels for interest-rate and equity market risk, respectively.

Determination of the effect on the bank's profit of the *interest-rate risk* in the scenarios is based on the interest-rate risk measure in the most recent financial statements, given by:

$$\text{Interest-rate risk}_i = \left.\frac{\Delta \text{Value}_i\,(\text{Bonds})/\Delta R_f}{\text{Tier 1 capital}_i}\right|_{\Delta R_f = 100\,\text{bp}} \quad (1)$$

where $R_f$ is the risk-free interest rate (here an average bond yield is applied). In the scenario projection, it is assumed that the valuation change of bank i's bond portfolio in the year t in the financial statements is given as:

$$\Delta \text{Value}_i\,(\text{Bonds}) = \text{Interest-rate risk}_i \cdot \text{Core capital}_{i,t} \cdot \Delta R_{f,t} \quad (2)$$

where the Tier 1 capital is taken from the bank's balance sheet and the change in interest rates from the macroeconomic projection. In other words, it is assumed that the interest-rate risk is independent of time (the bank adjusts the interest-rate risk so that it is the same from year to year) and changes in interest rates (no convexity on the bank's bond portfolio).

To determine the effect of the banks' *equity market risk* in the scenarios, CAPM (Capital Asset Pricing Model) is applied, which is a model for pricing individual assets or portfolios. CAPM specifies the following relation between risk and expected return:

$$E(R_{i,t}) = E(R_{f,t}) + \beta_i \cdot (R_{m,t} - R_{f,t}) \quad (3)$$

where $R_{i,t}$ is the return on bank i's portfolio in the period t, $R_{f,t}$ is the risk-free interest rate in the year t, $R_{m,t}$ is the market return in the period t, and E is the expectations operator. $\beta_i$ is thus an expression of the covariation of bank i's portfolio with the non-diversifiable market risk. In order to determine the banks' $\beta$s, the following equation is estimated:

$$(R_i - R_f)_t = \beta_i \cdot (R_m - R_f)_t + \varepsilon_{i,t} \quad (4)$$

Equation (4) is estimated separately for each bank in the population using OLS. The change in the value of bank i's equity portfolio in the financial statements for the year t is projected as

$$\Delta \text{Value}_{i,t}(\text{Equities}) = \text{Equities}_{i,t} \cdot (R_{f,t} + \beta_i \cdot (R_{m,t} - R_{f,t})) \quad (5)$$

where $\text{equities}_{i,t}$ is bank i's equity portfolio in the period t. The relative change in the value of bank i's equity portfolio is thus a function of the projected interest rate and market development and the risk profile on bank i's portfolio.

The loss ratios for the various sectors are treated separately, i.e. different loss ratios are stated for each sector. To determine a bank's losses on loans, its exposure to each sector is multiplied by the projected loss ratio for that sector. This method assumes identical loss ratios in given sectors

for all banks in the population. That is, credit quality is assumed to be the same for all banks lending to a given sector.

The relations of the credit-risk model are described in more detail in Box 11.

**The banks' financial results**

Combined, the estimates from the core earnings model, the market-risk model and the credit-risk model make up the point estimates on a bank's profit/loss before tax. It is assumed that a bank making a profit pays 25 per cent in tax and distributes 50 per cent of the profit after tax as dividend. The rest of the profit for the year after tax is transferred to the bank's Tier 1 capital.

A bank making a loss is assumed to pay neither tax nor dividend. The loss is offset directly against the bank's Tier 1 capital.

**Balance sheets and solvency**

The banks' balance sheets are updated on the basis of a simple rule of thumb. It is assumed that each bank has targets for gearing, risk profile and portfolio composition and that these targets are met in the banks' most recent financial statements.

This means that a bank that makes a profit and meets its portfolio targets has the same portfolio structure, gearing and risk on the portfolio as it had the year before and in the baseline year (i.e. balance-sheet items

RELATIONS OF THE CREDIT-RISK MODEL — Box 11

In the credit-risk model, loss ratios are estimated for 10 sectors. The loss ratios in each of the 10 sectors are assumed to have the following functional form:[1]

$$\text{Loss ratio}_t(\text{sector i}) = \frac{1}{1+\exp(\beta \cdot x_t)} \quad (1)$$

which can be rewritten as

$$\log\left(\frac{1-\text{Loss ratio}_t(\text{sector i})}{\text{Loss ratio}_t(\text{sector i})}\right) = \beta \cdot x_t \quad (2)$$

where $x_t$ is a vector of explanatory variables and $\beta$ is the vector of parameters to be estimated. Equation (2) is estimated using SUR with a set of macroeconomic variables as explanatory variables.

In the projection, loss ratios are determined as the projected macrovariables multiplied by the parameter estimates and inserted into equation (1). To determine the banks' losses on loans, the projected loss ratios are multiplied by the banks' exposures to each of the 10 sectors.[2]

[1] The logistic form ensures that loss ratios are always in the range 0-100 per cent.
[2] It is assumed that there are no losses on loans to the public sector, which is not one of the 10 sectors.

are scaled by the same factor as the Tier 1 capital). Thus, the solvency ratio also remains unchanged.

For banks reporting losses, the Tier 1 capital is reduced by the loss for the year. The decrease in Tier 1 capital is matched by an equivalent fall in assets. At the same time, it is assumed that downward adjustment of the banks' exposures is sluggish so that it is not possible to gear down activities. This means that assets yielding losses are reduced while assets not yielding losses remain unchanged. The assets are reduced so as to reflect the relative sizes in the baseline year as well as possible. The solvency ratio therefore declines for loss-making banks. Banks that do not meet their portfolio targets do not begin to gear any profits until these targets are, once again, met.

After each update of the banks' balance sheets it is checked that the banks still meet their capital requirements.[1] Where this is not the case, it is assumed that the bank in question closes and that its remaining assets lose 10 per cent of their value.[2] Thus, any bank not meeting its capital requirement is automatically insolvent in the sense that it imposes losses on its creditors. It is assumed that the banks in the model population are each other's lowest-ranking creditors and thereby bear the first losses.

**Interbank systemic contagion model**

How severely the liquidation of a bank affects other banks within the system depends on their interbank exposures. The total interbank exposures from the banks' financial statements are combined with data for uncollateralised day-to-day lending to estimate each bank's relative exposure to the other banks. If a bank becomes insolvent, the loss is distributed on the other banks on the basis of their relative exposures.

**Next period …**

In the subsequent period, the projected balance-sheets and the projected macrovariables for the subsequent period are the point of departure for assessing the banks' profits/losses. This procedure continues until the end of the third year in the scenario.

Against that background it is possible to apply dynamic effects to assess the exposure of the banks to various stress scenarios.

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[1] The capital requirement indicates how large a share of a bank's risk-weighted assets its capital base must constitute. The bank's core capital must make up at least half of its capital base. The model checks that the core capital ratio is more than half of the capital requirement (not less than 4 per cent).

[2] Christopher James, The Losses Realized in Bank Failures, *Journal of Finance 46*, 1991, estimates the direct costs in connection with the closure of a bank at 10 per cent of its assets.

# Glossary

**ABCP** (Asset-Backed Commercial Paper). A short-term debt certificate against safe assets as collateral. An ABCP typically has a high rating because of the safe value of the collateral.

**ABS** (Asset-Backed Securities). Securities against underlying assets as collateral.

**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.

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

**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**. Under Basel II, a credit institution must assess its capital need, i.e. capital adequacy in relation to its risks The capital need is expressed as a percentage of *risk-weighted items*. See also *solvency requirement*.

**Capital requirement**. See *solvency requirement*.

**CDO** (Collateralised Debt Obligation). A structured bond. Other credit bonds, including other CDOs, are included in a portfolio of assets pledged as collateral for a CDO.

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

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

**Core capital**. In credit institutions, this comprises paid-up share, cooperative or guarantee capital, additional paid-in capital and reserves, adjusted for e.g. intangible assets. Furthermore, *hybrid core capital* may be included.

**Cost ratio**. A banking institution's costs (excluding losses and write-downs on loans) as a ratio of income.

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

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

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

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

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

**Estimated failure rate** for companies is in this publication 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.

**EURIBOR**. The Euro Interbank Offered Rate is a reference interest rate for liquidity offered on an uncollateralised basis in the euro area *interbank market* to banking institutions with a high *credit standing*.

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

**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.

**Group 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.

**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.

**Hybrid core capital**. Capital that may, under certain conditions, be included in the banking institutions' *core capital*. Hybrid core capital is loan capital subject to 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*.

**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.

**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-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.*

**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.

**Liquidity risk**. The risk of not being able to procure the necessary financing (at a reasonable price) as existing obligations mature or new business opportunities arise.

**Market risk**. The risk that fluctuations in market prices (interest or exchange rates or equity prices) will result in losses.

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

**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.

**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.

**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*.

**SIV** (Structured Investment Vehicle). A geared investment unit investing in high rated ABS and CDO tranches, partly financed by issuing *ABCP*.

**Solvency 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* or *capital need* if higher than 8 per cent. In a pension company, the solvency requirement is calculated on the basis of life-insurance provisions with a number of minor additions. See also *solvency ratio*.

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

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

**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.

**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.

**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 issuance 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 *group 1, 2, 3 or 4 banking institution*.

**Write-down on loans**. For loans on which a loss is expected (i.e. there is 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.