Danmarks Nationalbank

Financial stability

2004

DANMARKS NATIONALBANK 2004

The small picture on the cover shows a section of the national coat of arms as redesigned in 2003 as the motif on the reverse of the 20-krone.

Danmarks Nationalbank
Havnegade 5
DK-1093 Copenhagen K
Telephone: +45 33 63 63 63
Telefax: +45 33 63 71 15
Web site: www.nationalbanken.dk

Please direct any enquiries concerning Financial stability to Danmarks Nationalbank, Financial Markets, by e-mail: kma@nationalbanken.dk.

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

Details may not add due to rounding.

This publication is based on information available up to 23 April 2004.

Print: Schultz Grafisk A/S
ISSN: 1602-057X
1602-0588 (online)

Contents

INTRODUCTION 9

REAL-ECONOMIC DEVELOPMENT
The international economy 11
The Danish economy 11

FINANCIAL STABILITY ANALYSIS

THE FINANCIAL SECTOR
Nordic groups and Danish banking institutions 17
Resilience of Nordic groups and Danish banking institutions 26
Mortgage credit 33
Pension companies 34

THE CORPORATE SECTOR AND THE HOUSEHOLDS
Corporate sector 41
Agriculture 49
Households 50

FINANCIAL MARKETS
Market trends 57
Market impacts on banks 60
Financial stability and volatility in the financial markets 61

ISSUES RELATED TO FINANCIAL STABILITY

BRANCHES OF FOREIGN CREDIT INSTITUTIONS 67

SYSTEMIC RISKS IN THE DANISH MARKET FOR UNCOLLATERALISED OVERNIGHT DEPOSITS
The uncollateralised overnight money market 77
Method and limitations 78
Results 81

MARKET-BASED RISK MEASURES FOR BANKS
Market-based analyses 85
Share-based risk measures 90

GLOSSARY OF FINANCIAL TERMS 97

Charts

Chart 1 GDP and employment in Denmark, Germany and the Euro area, 1991-2003 12
2 Private consumption and consumer confidence, 1990-2004 13
3 Solvency and core capital ratios for Nordic groups, category A, and Danish banking institutions in categories B and C, 1998-2003 19
4 Percentage change in number of branches, the Danish Financial Supervisory Authority's categories 1, 2 and 3, 2000-02 20
5 Corporate lending by Nordic groups, category A, and Danish banking institutions in categories B and C, 2001-04 20
6 Growth in lending and losses and provisions as a ratio of loans and guarantees, all banking institutions in Denmark, 1980-2003 22
7 Losses and provisions as a ratio of loans and guarantees for Nordic groups, category A, and Danish banking institutions in categories B and C, 1998-2003 25
8 Net fee and commission income as a ratio of total net interest, fee and commission income, categories A, B, and C, 1998-2003 26
9 Number of Nordic groups with a deficit on an increase in losses on loans and guarantees, 2002 and 2003 31
10 Number of Nordic groups with a solvency ratio below 8 on an increase in losses on loans and guarantees, 2002 and 2003 31
11 Number of banking institutions in categories B and C with a deficit on an increase in losses on loans and guarantees, 2002 and 2003 32
12 Number of banking institutions in categories B and C with a solvency ratio below 8 on an increase in losses on loans and guarantees, 2002 and 2003 32
13 Growth in lending by banking institutions and mortgage-credit institutes, 1988-2003 34

14 Development in the pension companies' investment asset structure, 1998-2003 36
15 Collective bonus potential and excess capital base of the individual pension companies after a "red" scenario, 2003 37
16 Incidence of compulsory liquidation in the corporate sector, 1995-2004 42
17 Return on assets for the 10 per cent least profitable companies in various sectors, 1995-2003 42
18 Solvency of the 10 per cent least solvent companies in various sectors, 1995-2003 43
19 Estimated failure rates of the 10 per cent weakest companies, 1995-2003 43
20 Dispersion of estimated failure rates, 1995-2003 46
21 Estimated failure rate, return on assets and solvency for companies subject to failure in the period prior to failure, median 46
22 Banking institutions' and mortgage-credit institutes' corporate lending by sector, end-2003 47
23 Sector breakdown of the banking institutions' loss ratio, 2000-03 48
24 Effect of an increase in interest expenditure in the 10 per cent of companies with the highest interest expenditure as a ratio of total assets, 2003 48
25 Indebtedness of full-time farms, 1990-2002 50
26 Registrations of late payments from credit providers and all creditors, 2002-04, index 51
27 The households' debt burden in the Nordic countries, 1995-2003 52
28 The households' interest burden in the Nordic countries, 1995-2003 53
29 Housing wealth as a ratio of the households' disposable income, end-2002 53
30 The households' debt to credit institutions as a ratio of housing wealth and disposable income, 2002-03 54
31 Dispersion of annual changes in macroeconomic variables, 1990-2003 55
32 Stock indices in the USA, the Euro area and Denmark, and implied volatility in the USA, 2000-04 58
33 10-year yields in the USA, Germany and Denmark, and implied volatility in the Euro area, 2000-04 59

34 Credit spreads for government and corporate bonds with low ratings, 2001-04 59
35 Trading volume on the Nordic stock exchanges, index, 2001-04 60
36 Stock-price development for Nordic groups, category A, and Danish banking institutions category B, 2000-04 61
37 Historical volatility of US stock and bond returns, 1995-2004 62
38 Estimates of foreign banks' shares of the banking sector in selected countries, 2001-02 69
39 Systemic effects on the 10 days with the highest turnover 82
40 Sensitivity to buffer size 83
41 Credit spreads for the Nordic groups, 2002-04 87
42 Development in share prices for Danish banking institutions, 2000-04 88
43 Average share-price gap for the Nordic groups, 1990-2004 89
44 Distance to default for the Nordic groups, 1999-2003 90
45 Buffers for the Nordic groups used in the risk measures distance to default and distance to insolvency as a ratio of assets, 2003 91
46 Distance to insolvency for the Nordic groups, 1999-2003 ... 94
47 Buffers for Nordic groups, 1999-2003 94
48 Volatility in share prices for the Nordic groups, 1999-2003 95

Tables

Table 1 Official forecasts for the Danish economy, 2004 and 2005 12
2 Overview of the categories applied 18
3 Number of banks with a negative result before tax, 2002-03 29
4 Calculated effects of the "red" risk scenario, 2003 36
5 Frequency of extreme returns, 1995-2004 63

Boxes

Box 1 Profits for Nordic groups, category A, and Danish banking institutions in categories B and C, 2002-03 21
2 Nykredit's aquisition of Totalkredit 23
3 New accounting rules for financial companies 23
4 Companies' estimated failure rates broken down by banks 24
5 Structure of fee and commission income in the Nordic groups, category A 27
6 The smallest banking institutions, the Danish Financial Supervisory Authority's category 4 28
7 Data and method for sensitivity and stress tests 29
8 Structural development 30
9 Insurance technical terms used 35
10 The pension companies' use of interest-rate derivatives ... 38
11 Failure-rate model 44
12 Characteristics of home financing in the Nordic countries .. 55
13 Examples of cross-border groups in the Nordic countries and the EU 68
14 Evolution of the framework for financial integration in the EU 70
15 The European Company 71
16 Branch structures and deposit guarantee schemes 75
17 Data for simulations 78
18 Treatment of branches of foreign institutions in the analysis 79
19 Results from other countries 80
20 Other central banks' use of market-based indicators 89
21 Share-based risk measures 92

Introduction

Danmarks Nationalbank publishes an annual report on financial stability in Denmark. The purpose is to assess whether the financial system is so robust that any problems in the financial sector do not spread and impede the functioning of the financial markets as efficient providers of capital for companies and households. The approach is to consider the general risks to the financial system rather than the situation of the individual financial institutions. That is the task of the Danish Financial Supervisory Authority. The two-part report first analyses the development in financial stability, with emphasis on the banking institutions. The second part of the report considers three current topics: branches of foreign credit institutions, systemic risks in the Danish market for uncollateralised overnight deposits, and market-based risk measures for banks.

The profits of the Nordic banking groups, including Danske Bank and Nordea, rose by 22 per cent in 2003, partly as a result of cost reductions. Losses and provisions vary across the groups, but increased on aggregate in 2003. The level is, however, still low. Capital adequacy remained unchanged in relation to 2002.

For the remaining Danish banking institutions, total profits increased by 84 per cent in 2003, primarily as a result of capital gains from the sale of Totalkredit to Nykredit. The costs of the Danish banking institutions rose, while losses and provisions were unchanged. Pronounced variations are seen between the institutions. Capital adequacy increased for the large banking institutions.

The overall assessment is that resilience remains unchanged for the Nordic groups, while the large capital gains have strengthened the resilience of the Danish banking institutions significantly compared to 2002.

Danish banking institutions can be expected to have significant released funds at their disposal in the coming years. There will be capital gains on the sale of Totalkredit to Nykredit, the new international accounting standards will entail lower provisions on a given loan portfolio, and new capital-adequacy rules (Basel II) are expected to imply a relatively large relaxation of the capital requirement. It is important that the banking institutions carefully consider how large a part of the funds released they need to apply as buffers.

The financial markets in Denmark more or less followed the international development in 2003. Stock prices rose significantly after having

fallen for several years, and interest rates remained low. The increased optimism led to higher bank earnings from stock-related trading and asset management. Pension companies in particular have benefited from the development in the financial markets, and at end-2003 only one company was in the "yellow light" according to the Danish Financial Supervisory Authority. At end-2002 two companies were in the "red light" and 11 in the "yellow light".

The estimated failure rates among companies in the various sectors, which are calculated using Danmarks Nationalbank's failure-rate model, did not increase in 2003. The reason may be that the companies have become better at adapting costs to the weak economic climate.

The households' debt burden is still increasing, but the ability to meet payments has improved owing to the low level of interest rates. Households in Denmark have a higher level of debt in relation to income than in the other Nordic countries, but on the other hand housing wealth as a ratio of income is higher in Denmark. However, the high level of indebtedness makes the households sensitive to e.g. social events such as unemployment and divorce.

The corporate sector and the households have benefited from the low level of interest rates in recent years. The international discussion on financial stability increasingly focuses on the sensitivity to rising interest rates.

The current EU regulation and structure for supervision and oversight of banks do not sufficiently envisage a situation where a bank has a branch which carries very significant weight in the banking sector in another EU member state. Within the EU it is necessary to create a framework for more binding cooperation between the authorities in the relevant countries.

Real-Economic Development

THE INTERNATIONAL ECONOMY

The euro area was characterised by sluggish growth in 2003. Outside the euro area, however, growth picked up in 2003 after weak development in 2001 and 2002. The upswing is clearly visible in e.g. the USA and many Asian countries, notably China. This is reflected in the international stock markets, where recent years' slowdown turned into a more positive trend at the beginning of 2003. The prices of a number of commodities have also increased significantly over the past year. In the bond markets the trend reversed in mid-2003, from falling to rising yields. Yields declined again from the end of 2003, but then increased rapidly from late March, and by mid-April bond yields were back at the level seen before the turn of the year.

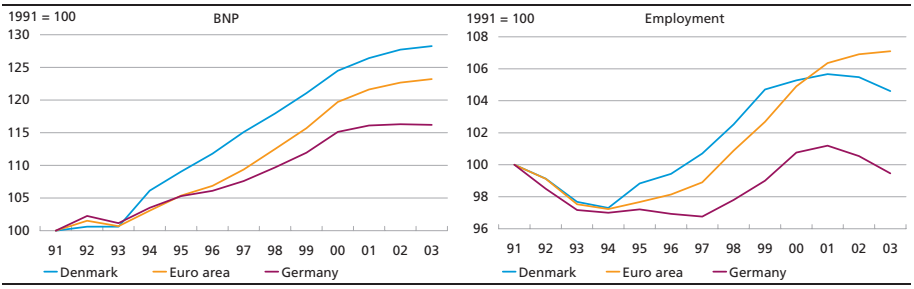
The upswing in the USA is driven by expansionary economic policy. This has led to considerable deterioration of the government budgets and a significant weakening of the dollar until February, followed by a slight strengthening. By mid-April the dollar had weakened by approximately 25 per cent vis-à-vis the euro since 2001. Several Asian countries, notably China and Japan, have intervened in the foreign-exchange markets to follow the US dollar. The euro has thus strengthened markedly, and this has exerted pressure on European exports.

THE DANISH ECONOMY

In Denmark, GDP increased by just under ½ per cent from 2002 to 2003. This is the weakest economic development since the zero growth in 1993. According to the latest national-accounts figures, growth was also modest in 2002. This confirms the slowdown in the labour market in the past two years, with lower employment and higher unemployment, cf. Chart 1, comparing the development in Denmark to that in Germany and the euro area.

The sluggish growth in the European economy affected Denmark via stagnating exports. However, domestic demand increased, particularly in the 2nd half of 2003 when private consumption alone rose by more than 2¼ per cent.

GDP AND EMPLOYMENT IN DENMARK, GERMANY AND THE EURO AREA, 1991-2003 Chart 1



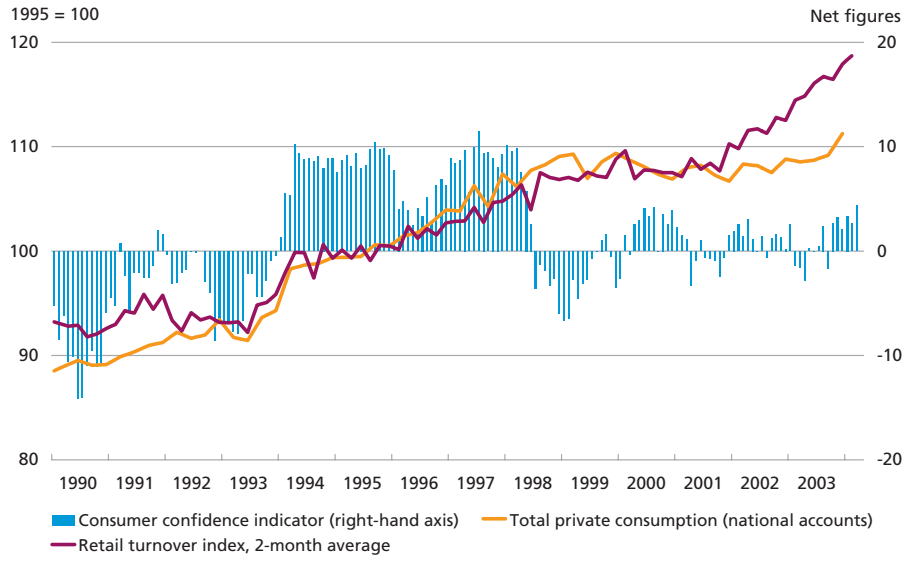
It is generally believed that the positive trend in domestic demand will continue in 2004, and according to the most recent forecasts GDP growth is expected to be around 2 per cent, cf. Table 1.

Private consumption increased significantly in the 2nd half of 2003 following 4-5 stagnant years, cf. Chart 2, and was thus the key positive factor contributing to overall economic activity. The estimated growth in consumption is around 3 per cent in 2004 and slightly lower in 2005, which is more or less in line with the growth in the households' disposable real income. Retail turnover increased considerably during 2003, and in the first two months of 2004 it was almost 4 per cent higher than in the same period of the preceding year. Car sales are also picking up after the trough in the spring of 2003. Consumption is stimulated by

OFFICIAL FORECASTS FOR THE DANISH ECONOMY, 2004 AND 2005 Table 1

	The Economic Council	The government	The Economic Council of the Labour Movement	EU
	Nov. 2003	Dec. 2003	Feb. 2004	Apr. 2004
	Percentage change over the preceding year			
2004				
GDP	2.2	2.1	1.8	2.1
Private consumption	3.0	3.0	2.8	3.4
Business investments	2.8	1.0	2.1	1.7
Exports	3.4	3.9	1.5	3.4
Hourly wages	3.7	3.7	3.9	3.5
Employment	0.6	0.3	-0.6	0.1
2005				
GDP	2.0	2.3	2.4	2.2
Private consumption	2.3	2.5	2.8	2.7
Business investments	2.2	3.1	3.8	3.6
Exports	4.1	4.6	4.4	4.1
Hourly wages	3.7	3.7	3.7	3.5
Employment	0.4	0.7	0.6	0.6

PRIVATE CONSUMPTION AND CONSUMER CONFIDENCE, 1990-2004 Chart 2



sizeable tax cuts in 2004, including the government's spring package, and by favourable financial conditions, in the form of a low level of interest rates and new mortgage-credit products with low payments in the first years. The increase in unemployment is, however, a risk factor pulling in the opposite direction. A high savings ratio in recent years is a good foundation for growth in consumption, but the savings ratio is scarcely likely to return to the level seen in the latter half of the 1990s.

Residential construction increased somewhat during 2003. Total construction activity has improved slightly over the past year, but not sufficiently to offset the downturn in 2001 and 2002. A large part of residential construction can be attributed to the package of housing measures adopted in 2002. The government's new fiscal-policy initiative will also contribute to stimulating residential construction. The housing market remains strong with no indications of falling turnover, cf. the figures from the Association of Danish Mortgage Banks. House prices accelerated in 2003 and are now again rising faster than the general level of prices. In view of the higher incomes, the low level of interest rates and the rising house prices, building new houses will continue to be attractive for a while yet.

Business investments declined slightly in 2003. The strongest decline was seen in construction investments, which fell considerably in 2002 and 2003 following a significant increase in the building stock in the preceding years. Investments in plant and equipment have remained at a high level after a strong increase for several years. Combined with the

weakening of the labour market, this points to substitution of machinery for labour in recent years. Business confidence indicators have developed positively over the past year, but are still generally at a low level, and in the latest forecasts total business investments are expected to grow only moderately in 2004.

Danish exports developed weakly in 2003 and were more or less unchanged compared to 2002; manufactured exports even fell. This is a clear indication that the international slowdown also hit Denmark. In addition, competitiveness deteriorated as a result of the significant weakening of the US dollar and higher wage increases than abroad. The latter were, however, to some extent offset by higher productivity increases in Denmark.

The labour market reacted relatively strongly to the modest growth in 2002 and 2003, and employment developed more weakly than in the euro area, cf. Chart 1. However, unemployment is still at a low level in an international perspective, and wage increases are still higher than abroad in spite of the rising unemployment. The decline in private employment shows that companies have adjusted costs to the lower growth in activity and the reduced competitiveness.

HICP inflation fell throughout 2003 from almost 3 per cent at the start of the year to less than 1 per cent in the first quarter of 2004, while euro area HICP was stable at around 2 per cent in the same period. The decrease in inflation is, *inter alia*, attributable to lower indirect taxes and lower price increases for energy and food. If the latter two categories are excluded, the increase in consumer prices still exceeds that of the euro area.

Even though exports weakened, recent figures show that the current-account surplus in 2003 was higher than ever. The surplus on the government budget balance was more or less maintained in 2003 in spite of the weak level of activity, and the private-sector savings surplus increased. Unemployment remains low, and the significant increases in property prices can be attributed to e.g. the households' disposable income and the development in interest rates. Overall, the imbalances in the Danish economy are thus moderate.

Financial stability analysis

The Financial Sector

The financial sector has remained relatively unaffected by the weak economic environment in Europe.

For the Nordic groups, including Danske Bank and Nordea, profits have increased, e.g. as a result of cost reductions. The level of losses and provisions has risen, but resilience remains unchanged.

The earnings of the Danish banking institutions have grown significantly, but losses and provisions have increased among the small institutions. A number of institutions had high growth in lending. The high level of activity in terms of arranging and converting mortgage-credit loans has contributed to significantly higher fee and commission income. The improved profits are, however, primarily attributable to capital gains on the sale of shareholdings in Totalkredit. The large Danish banking institutions have generally increased their capital adequacy. The significant capital gains have enhanced the resilience of the banking institutions.

The pressure on the pension companies has subsided as a result of the development in stock prices in 2003.

NORDIC GROUPS AND DANISH BANKING INSTITUTIONS

Unlike previously, the Nordic groups and Danish banking institutions are now divided into three categories, cf. Table 2: Nordic groups (category A), large Danish banking institutions (category B), and small Danish banking institutions (category C). The activities of Nordea and Danske Bank are only included in the Nordic groups category, i.e. category A. This new breakdown is to strengthen the analysis of the development in the financial sector at the Nordic level in view of the growing internationalisation, among other factors. In addition, the new breakdown provides for a higher degree of homogeneity in business areas between the institutions and groups comprised by the analysis.

Earnings and capital adequacy

The Danish banking institutions in categories B and C increased their total profits before tax by 84 per cent in 2003 over 2002, cf. Box 1. This is mainly attributable to capital gains on the sale of shareholdings in Totalkredit, cf. Box 2. Other contributing factors were higher income from fees, e.g. as a result of increased income from trading activities, as

OVERVIEW OF THE CATEGORIES APPLIED — Table 2

	Danmarks Nationalbank's categories			The Danish Financial Supervisory Authority's categories		
Categories	A	B	C	1	2	3
Handelsbanken	X					
Swedbank	X					
SEB	X					
DnB NOR	X					
Nordea	X			X		
Danske Bank	X			X		
Jyske Bank		X		X		
Sydbank		X		X		
Banking institutions with a working capital in the range kr. 3 billion to kr. 25 billion		X			X	
Banking institutions with a working capital in the range kr. 250 million to kr. 3 billion			X			X
Balance-sheet total at end-2003, kr. billion	7,307[1]	442	111	1,895	253	111
Total groups/banking institutions	6	19	74	4	17	74

Note: DnB NOR is the group resulting from the merger between Gjensidige NOR and Den norske Bank. Historical calculations for the Nordic groups are based on consolidation of the former independent institutions. All categories are excluding FIH.

[1] Of which the Danske Bank Group and the Nordea Bank Danmark Group account for 34 per cent.

well as fees and commission from the arrangement and conversion of mortgage-credit loans as a result of the historically low level of interest rates. Moreover, several Danish institutions had high growth in lending.

The profits of the Nordic groups, category A, also improved considerably with growth of 22 per cent. Exclusive of value adjustments of capital investments, the improvement was driven by cost reductions via staff cuts. One group in particular has reduced its staff by more than 10 per cent. Net interest income increased slightly.

Operating income over operating expenses has increased for all categories. For category A this is attributable to the cost reductions, while costs have remained unchanged for the institutions in categories B and C.

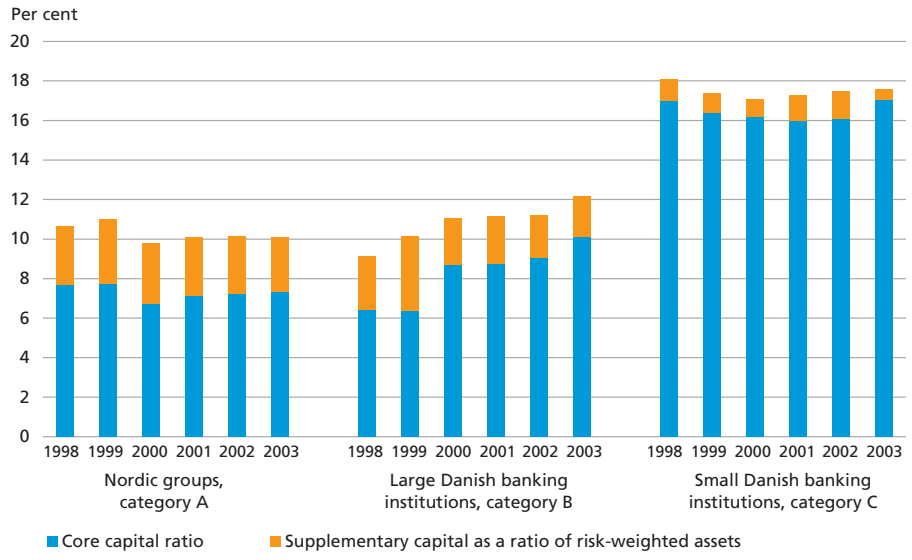
It is doubtful whether the factors contributing to the significant increase in profits in each of the three categories in 2003 will ensure continued growth in earnings in the coming years.

Chart 3 shows the development in the capital adequacy of the three categories. Category B has increased its core capital, which is consistent with the still sluggish economy.

Operational risks

The Danish banking institutions can be expected to have significant released funds at their disposal in the coming years. Firstly, there will be

SOLVENCY AND CORE CAPITAL RATIOS FOR NORDIC GROUPS, CATEGORY A, AND DANISH BANKING INSTITUTIONS IN CATEGORIES B AND C, 1998-2003 Chart 3



Note: The solvency ratio is the sum of the core capital ratio and the part of the supplementary capital that can be included in the solvency compilation as a percentage of the risk-weighted assets.
Source: Annual accounts and the Danish Financial Supervisory Authority.

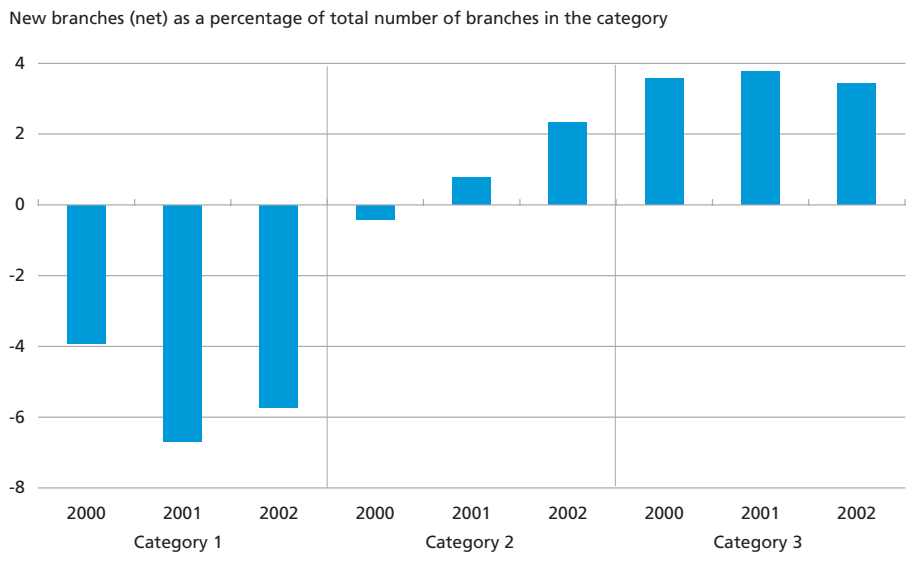
capital gains on the sale of Totalkredit to Nykredit. Secondly, adjusted valuation rules resulting from the introduction of the international accounting standards (IAS) from 1 January 2005, cf. Box 3, will entail lower provisions for losses on a given loan portfolio. Finally, the introduction of new capital-adequacy rules (Basel II) from 2007 will imply a relatively strong relaxation of the capital requirements for Danish banking institutions due to the structure of their exposures. It is important that the banking institutions carefully consider how large a proportion of the funds released they need to use as buffers.

In recent years the small banking institutions in particular have opened new branches, cf. Chart 4. This has intensified competition for customers.

Lending

Since mid-2002 the Nordic groups had a decline in loans to the Danish corporate sector, cf. Chart 5. The statement does not include any loans provided by the individual groups from abroad since these are not reported to Danish statistical authorities. The Danish banking institutions in category B have generally seen significantly higher growth in corporate lending than the other categories since the latter part of 2002. The institutions in category C have seen a little growth in lending in the period. The implied corporate lending margin for category B was more or

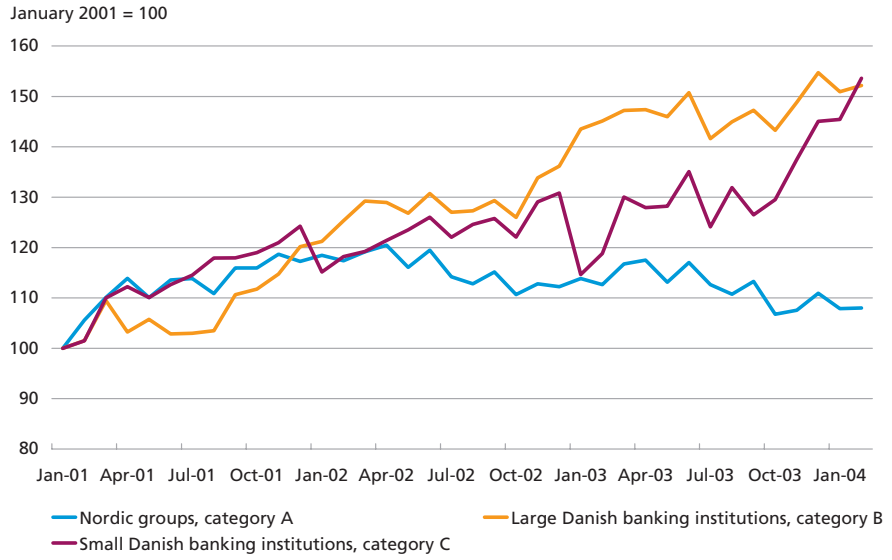
PERCENTAGE CHANGE IN NUMBER OF BRANCHES, THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S CATEGORIES 1, 2 AND 3, 2000-02 Chart 4



Source: The Danish Financial Supervisory Authority.

less constant throughout 2003, while the margin for category A declined slightly in the latter part of the year after having increased for a number of years.

CORPORATE LENDING BY NORDIC GROUPS, CATEGORY A, AND DANISH BANKING INSITUTIONS IN CATEGORIES B AND C, 2001-04 Chart 5



Note: The statement only comprises activities entered to the bank, subsidiary bank or branch in Denmark.
Source: Danmarks Nationalbank.

PROFITS FOR NORDIC GROUPS, CATEGORY A, AND DANISH BANKING INSTITUTIONS IN CATEGORIES B AND C, 2002-03 Box 1

Nordic groups, category A

In 2003, the Nordic groups' profits totalled kr. 55.8 billion, equivalent to an increase of 22 per cent over 2002. Category A generated higher net income from fees and commission. Unlike in the preceding year, marginal growth was seen in fee income, *inter alia* from use of payment systems and to a lesser extent from securities trading for customers. The increase in value adjustments of capital investments primarily reflects a positive contribution from insurance activities which was not seen in 2002. On the expenditure side, operating expenses were reduced, typically via staff cuts. Overall losses and provisions rose in the period, but are still at a low level.

Danish banking institutions in categories B and C

In 2003, the profits of the Danish banking institutions in categories B and C totalled kr. 9.7 billion, an increase of 84 per cent over 2002. Exclusive of capital gains from the sale of Totalkredit, profits increased by approximately 35 per cent. On the revenue side, the banking institutions generated higher fee and commission income, which is attributable to increasing income from trading fees, as well as arrangement of mortgage-credit loans. In addition, new accounting rules that came into force on 1 January 2003 entail that the institutions' unquoted shares are to be stated at fair value, not cost price as previously. Finally, the income from value adjustment of shares rose. Operating costs increased overall. Losses and provisions remained unchanged in relation to 2002, but the development is not unequivocal.

PROFITS BEFORE TAX, 2002-03

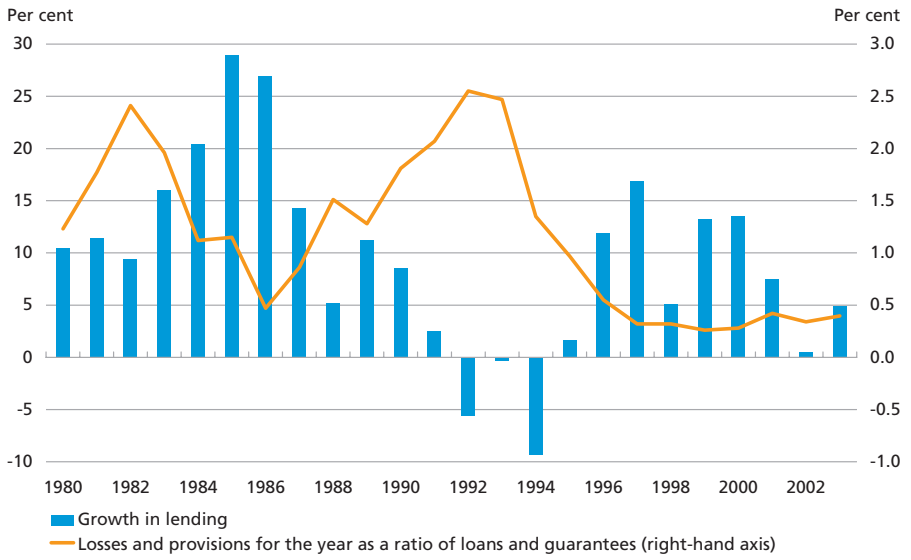
	Nordic groups, category A		Danish banking institutions in category B		Danish banking institutions in category C	
Kr. billion	2003	2002	2003	2002	2003	2002
Income						
Net interest income	99.4	98.1	10.8	10.0	4.0	4.4
Net fee and commission income	39.3	38.9	3.8	3.0	1.9	1.9
Value adjustment of securities, etc.	4.6	4.9	2.8[1]	0.5	1.8[1]	0.5
Value adjustment of capital investments	5.2	-1.2	0.4	0.5	0.4	0.3
Other ordinary income	6.2	5.9	0.9	0.4	0.1	0.1
Costs						
Operating expenses, etc.	91.0	92.9	10.1	9.1	4.4	4.5
Losses and provisions	8.3	6.6	1.9	1.9	0.8	0.7
Profit before tax	55.8	45.7	6.7	3.3	2.9	2.0

Note: Category A, which comprises group figures, includes a pro forma estimate for DnB NOR in both years. Categories B and C are based on institution data. For the Nordic groups, the accounts figures are converted into Danish kroner at the average exchange rates for the years.

Source: The Danish Financial Supervisory Authority and annual accounts.

[1] The increase is primarily attributable to capital gains from the sale of Totalkredit shares.

GROWTH IN LENDING AND LOSSES AND PROVISIONS AS A RATIO OF LOANS AND GUARANTEES, ALL BANKING INSTITUTIONS IN DENMARK, 1980-2003 Chart 6



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

There are significant underlying differences in total growth in lending among the individual institutions. In 2003, lending growth exceeded 15 per cent in one institution, and 10 per cent in six institutions in category B. In five category C institutions lending growth exceeded 15 per cent, and in 15 institutions it exceeded 10 per cent in 2003.[1] Six institutions saw lending growth exceeding 10 per cent in both 2002 and 2003. High growth in lending requires greater awareness of the development in credit quality.

Losses and provisions

Overall the losses and provisions of the Danish banking institutions are still very low, cf. Chart 6, but showed a slight increase in 2003. Usually losses and provisions lag behind the economic cycle. In periods of high growth lending increases and the credit quality often falls, leading to increased losses and provisions in subsequent periods. Overall, the high growth in lending in the late 1990s and the subsequent economic slow-down have not, however, led to any appreciable increase in the institutions' losses and provisions. The reason may be that the institutions' credit-risk management has generally become more efficient than in the early 1990s. In preparation for the new capital-adequacy rules (Basel II)

[1] The calculation is based on the 46 institutions included in the sensitivity and stress tests, cf. Box 7.

NYKREDIT'S ACQUISITION OF TOTALKREDIT Box 2

In November 2003, Nykredit acquired Totalkredit, which was formerly owned by 106 local and regional banking institutions. Nykredit estimates the total amount payable to the institutions at kr. 7.15 billion, equivalent to a "price"/book value of 2. In practice, payment is effected as a combination of cash payments and a conditional current payment over a number of years. The transaction also includes a strategic cooperation agreement, under which the banking institutions are to arrange mortgage-credit loans from both Totalkredit and Nykredit. In the first years, it is only possible to secede from the cooperation agreement against payment. The stock-exchange-listed banking institutions' estimates of the capital gain on the sale total kr. 3.4 billion, of which kr. 1.8 billion was recognised in 2003. The statement comprises approximately 75 per cent of Totalkredit's share capital.

several institutions have developed advanced risk-management models. Moreover, losses and provisions reflect compulsory liquidation and enforced sales, cf. the chapter on the corporate sector and the households. The companies may have become better at adapting to the economy in time and adjusting their costs.

NEW ACCOUNTING RULES FOR FINANCIAL COMPANIES Box 3

As of 1 January 2005, all publicly traded companies, including financial companies must apply the international accounting standards (IAS) to their consolidated accounts. This is a consequence of a regulation adopted by the Ecofin Council and the European Parliament in July 2002 which applies directly in the EU member states. The IAS are global accounting standards prepared by the International Accounting Standards Board (IASB) with a view to making accounts comparable across national borders. The IASB is an independent institution comprising international accounting experts. The IAS regulation is part of the EU's Financial Services Action Plan, creating the framework for the single financial market in the EU.

The Danish Financial Supervisory Authority has set up a committee of representatives of the financial sector, the Institute of State Authorized Public Accountants in Denmark, the Danish Financial Supervisory Authority and Danmarks Nationalbank. Among other things, the committee is to assess how valuation of loans under IAS is practically feasible, and how valuation of the banking institutions' lending and thus their level of provisions is affected by the transition to IAS. The result of the committee's work is not yet available. The provision practice applied so far is based on a prudential principle under which losses are recognised when they are imminent, and gains when they are realised. In practice this has meant that assets and commitments are often valued with a high level of conservatism. Under the IAS, losses are recognised when there is a clear indication of a decrease in value, which does not allow the same degree of conservatism. The transition to IAS is therefore expected to entail a significant fall in the level of provisions in Denmark.

The IAS regulation gives the individual EU member states an option to permit or require that other companies than publicly traded companies apply the IAS to their consolidated and/or annual accounts.

COMPANIES' ESTIMATED FAILURE RATES BROKEN DOWN BY BANKS Box 4

Based on Danmarks Nationalbank's failure-rate model, which is described in the chapter on the corporate sector and the households, calculations can be performed to indicate the credit risk in relation to the individual banking institutions' loans to the corporate sector. This is done by estimating the estimated failure rates for individual companies. The estimated failure rates for the individual banks' corporate exposures are then summed on the basis of the companies' information about their bankers.

A comparison of the estimated failure rates for the individual banks' corporate lending with selected key accounting ratios gives a picture of e.g. the extent to which the banking institutions are compensated for credit risk via their lending margins.

The analysis does not provide a comprehensive picture of the credit risk associated with the banking institutions' loans to the corporate sector. For instance, there is no information on the losses which the bank may sustain if a company fails, including e.g. the value of collateral. In addition, the failure-rate model estimates failure rates for only a section of the institutions' corporate exposures. These include public and private Danish limited liability companies, of which only approximately 60 per cent state their banker. Agriculture is not included. Finally, the companies may have other bankers that could incur losses in connection with financial difficulties in a company.

The Table below ranks the banking institutions by the weighted estimated failure rates for the companies stating the institutions in question as their bankers. The banking institutions have subsequently been grouped in 10 categories comprising an equal number of institutions. The average weighted estimated failure rate is compared with selected average key ratios for each group.

ESTIMATED FAILURE RATE FOR LOANS AND SELECTED KEY RATIOS

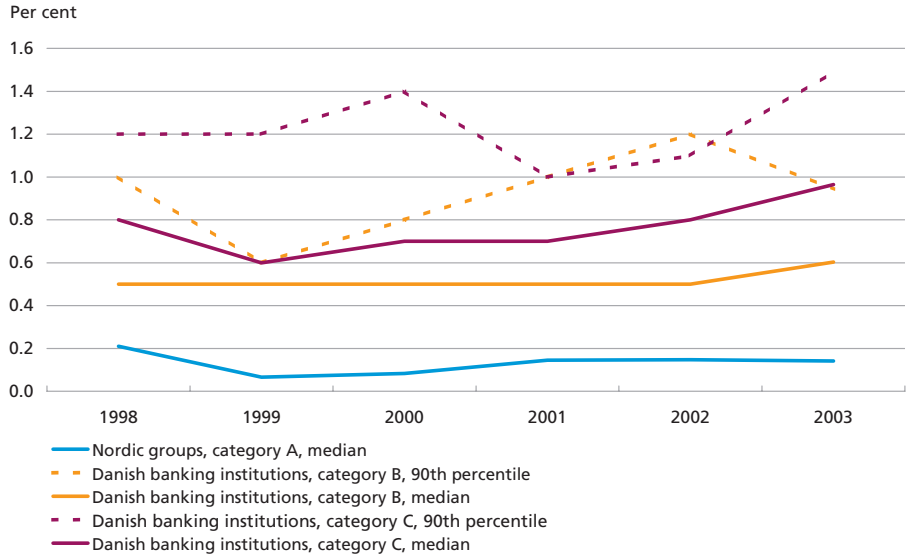
Category of banking institution	Estimated failure rate	Ratio of losses and provisions	Implied lending rate
1	0.7	0.4	4.6
2	1.0	0.7	7.4
3	1.1	0.7	7.5
4	1.1	0.7	6.8
5	1.2	0.9	6.1
6	1.2	0.7	7.1
7	1.4	1.0	7.7
8	1.7	0.9	6.6
9	1.9	0.9	8.7
10	2.4	1.1	8.0

Note: The estimated failure rate for the individual companies is weighted using the companies' total debt, although not all companies state the percentage of the debt which is bank debt. The implicit lending rate is based on the annual accounts. The statement comprises banks with more than 100 associated companies in KOB (formerly the Danish Business Information Bureau).

Source: The failure-rate model and the banking institutions' annual accounts.

The analysis shows that the weighted estimated failure rate for loans to the corporate sector in the 10 categories to some extent seems to be reflected in the ratios of losses and provisions, and that higher lending rates partially compensate for increased risk.

LOSSES AND PROVISIONS AS A RATIO OF LOANS AND GUARANTEES FOR NORDIC GROUPS, CATEGORY A, AND DANISH BANKING INSTITUTIONS IN CATEGORIES B AND C, 1998-2003 Chart 7



Note: The data base for the Danish banking institutions is 46 selected institutions in categories B and C, cf. Box 7.
Source: Annual accounts and the Danish Financial Supervisory Authority.

Chart 7 shows the development in losses and provisions in relation to loans and guarantees for the Nordic groups (category A) and the Danish banking institutions in categories B and C, respectively.

The ratio of losses and provisions has increased marginally in three of the Nordic groups. Two groups stand out with higher losses and provisions as a result of significant losses on marine fish farming in Norway.

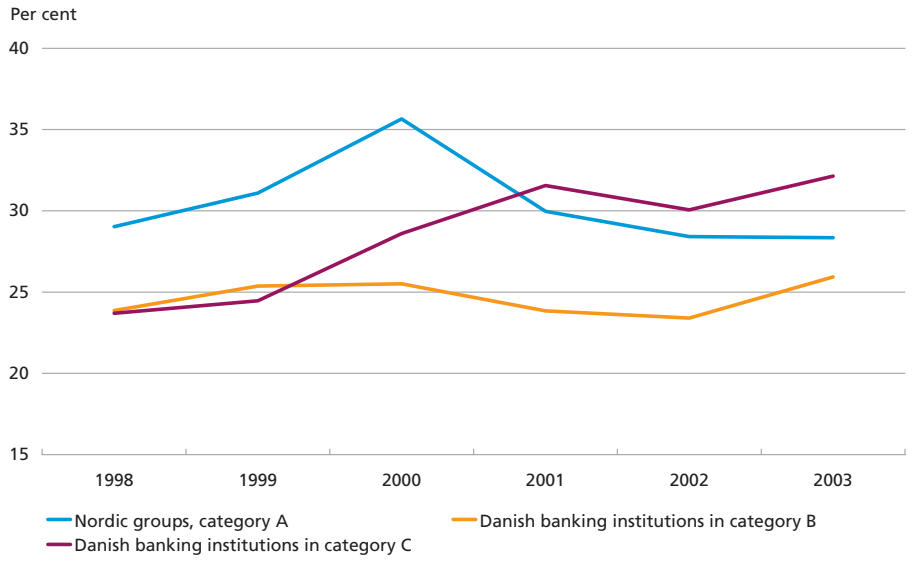
The Danish banking institutions' ratio of losses and provisions rose in 2003. Category C's total ratio of losses and provisions was the highest since the first half of the 1990s. In category B, a few banking institutions have reduced their losses and provisions after few but large losses in 2002.

Among the Danish banking institutions, the highest ratio of losses and provisions was 1.9 per cent of loans and guarantees in 2003, and almost one third of the institutions analysed had losses and provisions exceeding 1 per cent of their loans and guarantees[1]. For comparison, the highest ratio of losses and provisions in 2002 was 3.4 per cent. Eight of the institutions analysed had ratios of losses and provisions of 1 per cent or more in both 2002 and 2003.

The Danish Financial Supervisory Authority calculates the scope of the net provision exposures surrendered, i.e. exposures with booked provi-

[1] The calculation is based on the 46 institutions included in the sensitivity and stress tests, cf. Box 7.

NET FEE AND COMMISSION INCOME AS A RATIO OF TOTAL NET INTEREST, FEE AND COMMISSION INCOME, CATEGORIES A, B AND C, 1998-2003 Chart 8



Source: Annual accounts and the Danish Financial Supervisory Authority.

sions of a certain size that are fully or partially reversed by the surrendering banking institution in connection with the transfer of the exposure to another banking institution. As in previous years, the largest institutions have a net outflow of provision exposures, while the small and medium-sized institutions have a net inflow. The largest institutions' proportion of the provision exposures surrendered has, however, fallen marginally compared with 2002.

Fee and commission income

Fees and commission income accounts for an growing percentage of the Danish banking institutions' income, cf. Chart 8. The reason is partly that a low level of interest rates *per se* increases the percentage.

The opposite development is seen in the Nordic groups, where fee income peaked in 2000. Part of the explanation could be that the Nordic groups have been affected by the development in the stock markets since brokerage and custody commission has fallen, cf. Box 5.

RESILIENCE OF NORDIC GROUPS AND DANISH BANKING INSTITUTIONS

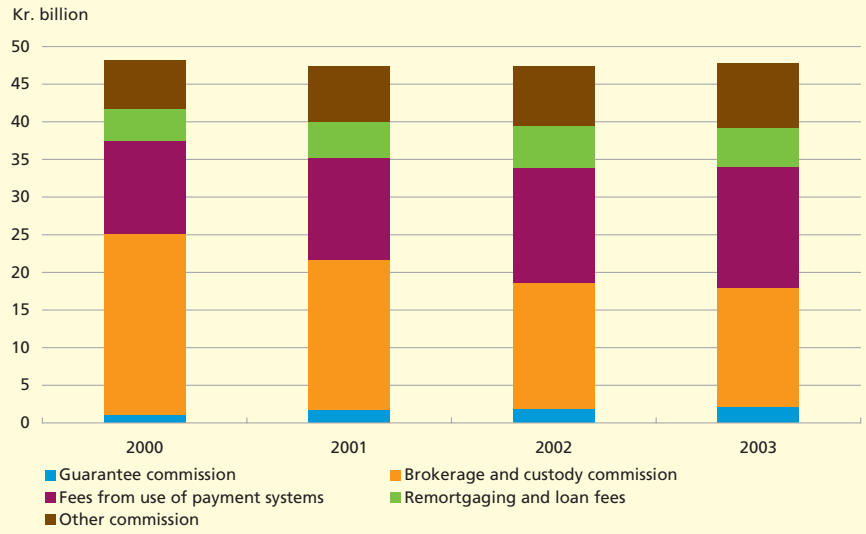
Stress and sensitivity tests may give an impression of the resilience of the Nordic groups and Danish banking institutions. Their resilience to higher losses and lower net income from fees is analysed in the following. The

STRUCTURE OF FEE AND COMMISSION INCOME IN THE NORDIC GROUPS, CATEGORY A

Box 5

The Chart below illustrates the fee and commission income of the Nordic groups by source. Brokerage and custody commission comprises the largest item of the Nordic groups' fee income. The item's size depends on the volume of trading in shares and bonds, among other things. For comparison, the small Danish banking institutions seem to be more dependent on the demand for mortgage-credit loans, i.e. remortgaging and loan fees. The decline in stock-market-related fee income in the Nordic groups is to some extent offset by higher income from the other fee items, notably use of payment systems and other commission.

STRUCTURE OF FEE AND COMMISSION INCOME IN THE NORDIC GROUPS, CATEGORY A, 2000-03



Source: Annual accounts.

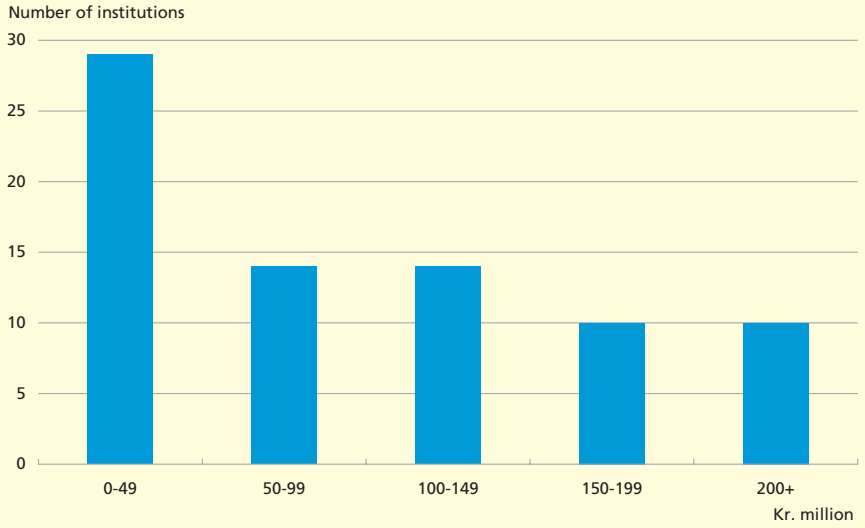
analysis of the Danish banking institutions also includes a scenario without the significant increases in value adjustments in 2003 in order to outline how e.g. the extraordinary capital gains from the sale of Totalkredit and the changed accounting rules for unquoted securities affect the profits for the year.

The tests are static and based on the banks' accounting items. This means that the banks' possible reactions to the analysed scenarios, e.g. if they raise their interest rates, are not comprised by the analysis. Such analyses are therefore not suited for assessing long-term resilience. The data and method used in the tests are described in detail in Box 7.

THE SMALLEST BANKING INSTITUTIONS, THE DANISH FINANCIAL SUPERVISORY AUTHORITY'S CATEGORY 4 Box 6

The banking institutions in the Danish Financial Supervisory Authority's category 4 have a working capital of less than kr. 250 million. Almost three quarters of these institutions have a working capital of less than kr. 125 million, and over a third have a working capital of less than kr. 50 million. This category comprises almost half the 180 banking institutions in Denmark, but their lending represents only 0.5 per cent of the total volume of loans. In addition to many small, local banking institutions and co-operative banks the category comprises a number of specialist banks, often with a narrow clientele, typically owned by larger financial groups. These differences should be kept in mind when interpreting the data.

CATEGORY 4 INSTITUTIONS BY SIZE, END-2003



Source: Danmarks Nationalbank.

Income and capital adequacy

Operating income over operating expenses was weaker in 2003 than the year before. This is partly attributable to exceptionally high income in individual institutions in 2002. The ratio of losses and provisions has been declining since 2001.

The banks in the Danish Financial Supervisory Authority's category 4 are extremely well capitalised. In 2002 the average solvency ratio was 28.2 per cent, against 17.4 per cent for the institutions in the Danish Financial Supervisory Authority's category 3.

Deposits and lending

The average growth in deposits has been increasing since 2001, while growth in lending has consistently been in the range of 10-12 per cent. These figures cover large variations between the individual institutions.

DATA AND METHOD FOR SENSITIVITY AND STRESS TESTS Box 7

The analyses comprise six Nordic groups and 46 Danish banking institutions, i.e. 17 large Danish banking institutions in category B and 29 small Danish banking institutions in category C.

The analysis is based on the accounting items as at 31 December 2002 and 2003. For each bank, the scenarios apply a shock to one or more accounting items, and the effects on the profits and solvency ratio are calculated. A shock may be an increase in losses by 1 percentage point in relation to the "losses and provisions" item for the individual bank. The analysis only deals with the direct effects of the shocks.

The sensitivity tests comprise only the banks' profits, while the stress tests are applied to both the profits viewed in isolation and the profits plus the part of the capital adequacy that exceeds the statutory solvency requirement.

Sensitivity analysis of Nordic groups and Danish banking institutions

In view of the significantly higher profits of the Danish banking institutions in categories B and C in 2003 it is not surprising that these categories are considerably more robust in the sensitivity analysis, cf. Table 3. This is primarily attributable to the large increase in value adjustments, cf. scenario 4. In all the sensitivity tests, all institutions meet the statutory solvency requirement in 2003, while one did not meet it in 2002.

NUMBER OF BANKS WITH A NEGATIVE RESULT BEFORE TAX, 2002-03 Table 3

	Category A		Category B		Category C	
Scenarios	2003	2002	2003	2002	2003	2002
Basis, ordinary operating result	0	0	0	1	0	1
Credit risks						
1 An increase in losses by 1 percentage point	2	1	1	6	0	3
2 An increase in losses by 2.25 percentage points	5	6	7	14	12	27
3 An increase in losses by 1 percentage point for private customers and 2.25 percentage points for corporate customers	4	6	6	13	0	15
4 Test 3 for value adjustments as in 2002	-	-	14	13	19	15
Other operational risks						
5 A decrease in net fee and commission income by 40 per cent	0	0	0	1	0	1
Combinations						
6 Tests 3 and 5 simultaneously	5	6	7	14	8	12
7 Tests 4 and 5 simultaneously	-	-	16	14	27	12

Note: Loans and guarantees to the public sector are not included on an increase in losses.
Source: Annual accounts and own calculations.

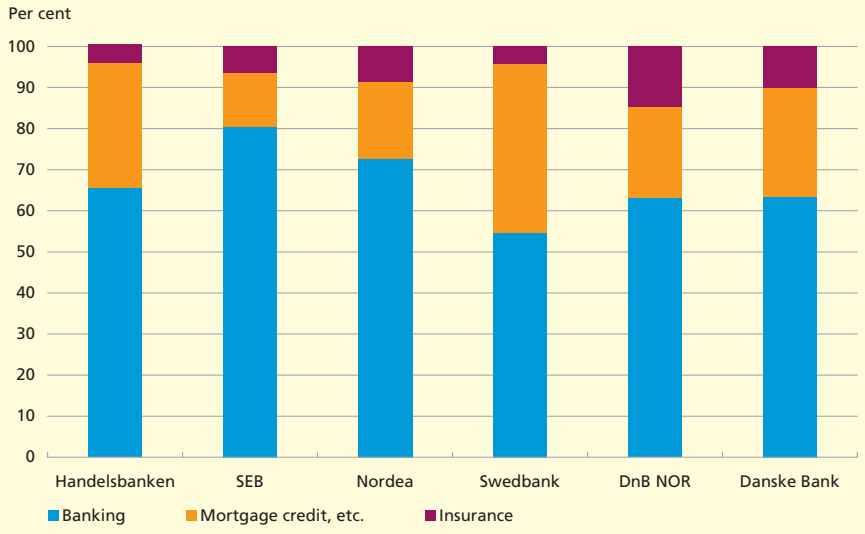
STRUCTURAL DEVELOPMENT Box 8

The structural changes seen in the Nordic markets in recent years continued in 2003. In February 2003 the Norwegian Ministry of Finance gave Den norske Bank permission to acquire Nordlandsbanken against the background of Nordlandsbanken's problems meeting the solvency requirements after considerable losses on the Finance-Credit Group.

Den norske Bank and Gjensidige NOR merged their two holding companies with accounting effect as from November 2003 and with Den norske Bank as the continuing company. The merger of the two operational subsidiary banks is pending the solution of a number of outstanding issues.

The structural development to some extent affects the composition of the individual groups' business areas (banking activities, mortgage-credit activities, etc. and insurance), as illustrated in the Chart below. The Chart should be interpreted with caution since several circumstances make uniform delimitations difficult.

BALANCE SHEETS OF THE NORDIC GROUPS, CATEGORY A, BY BUSINESS AREAS, END-2003



Note: The percentages are based on the annual accounts of the groups and subsidiaries with banking, mortgage-credit and/or insurance activities that are deemed to be part of the group's overall strategy. Different accounting principles in the various Nordic countries mean that comparison of the groups' percentages should be undertaken with caution. Mortgage credit etc., comprises mortgage-credit lending and housing loans. Insurance comprises both life and non-life insurance, calculated on the basis of the direct contribution to the group balance-sheet total or via the size of the life or non-life insurance company's balance-sheet total.

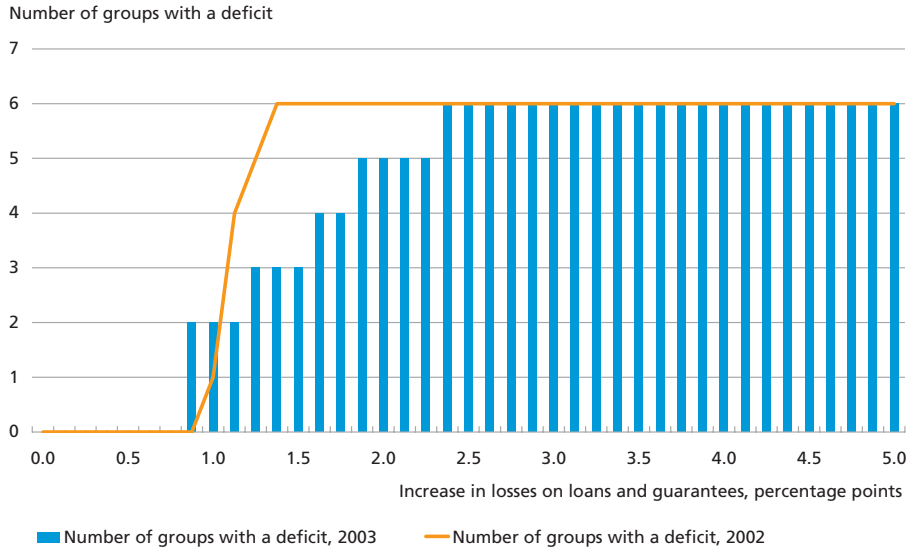
Source: Annual accounts.

In terms of profits, the Nordic groups have become less sensitive to higher losses. However, in the most stringent scenario two groups are below the statutory solvency requirement in 2003, against one in 2002.

Stress tests of the Nordic groups, category A

The stress tests for higher losses for the Nordic groups show that from an overall perspective the increased earnings in 2003 boosted resilience

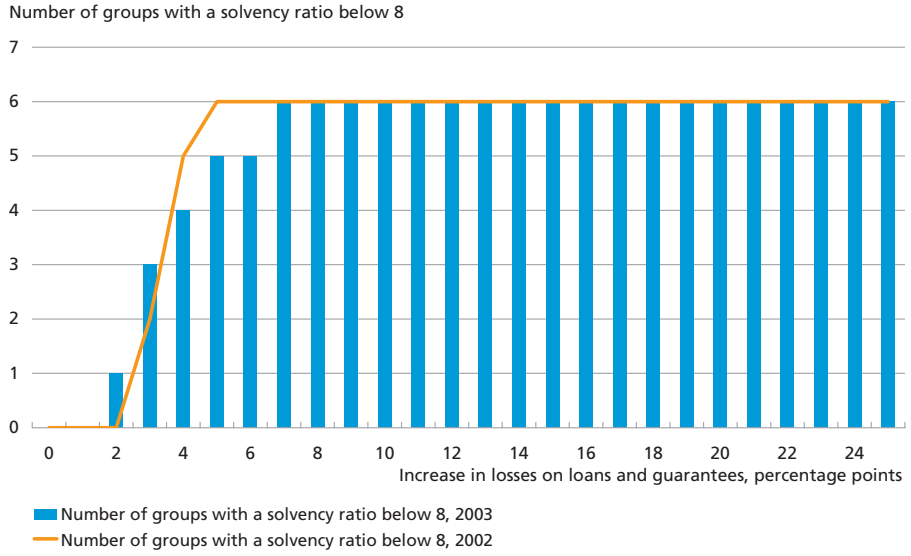
NUMBER OF NORDIC GROUPS WITH A DEFICIT ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2002 AND 2003 Chart 9



Note: In 2003, Gjensidige NOR is included in the calculations for Den norske Bank.
Source: Annual accounts and own calculations.

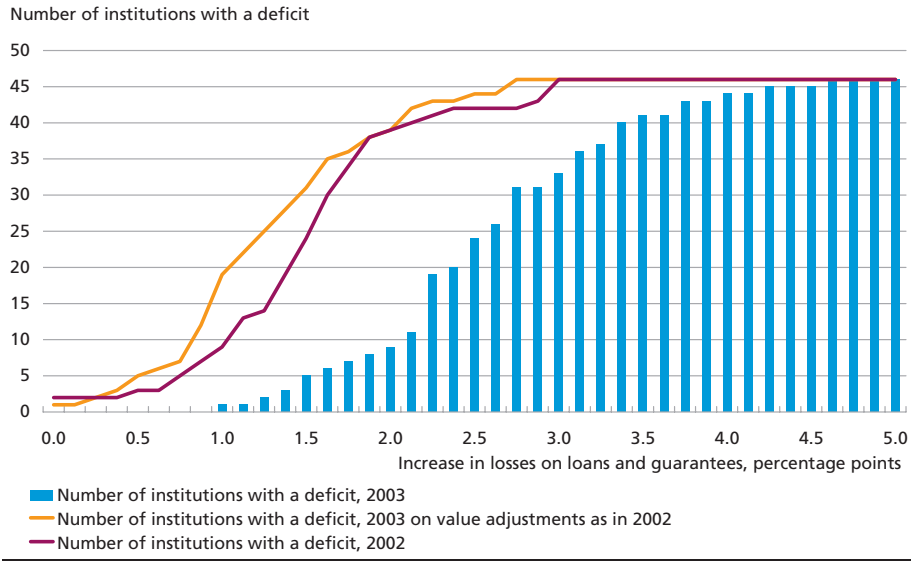
so that most groups can sustain higher losses without incurring a negative result, cf. Chart 9. As regards the size of the losses that can be sustained before the groups experience difficulties meeting the capital requirement, their resilience remains unchanged, cf. Chart 10.

NUMBER OF NORDIC GROUPS WITH A SOLVENCY RATIO BELOW 8 ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2002 AND 2003 Chart 10



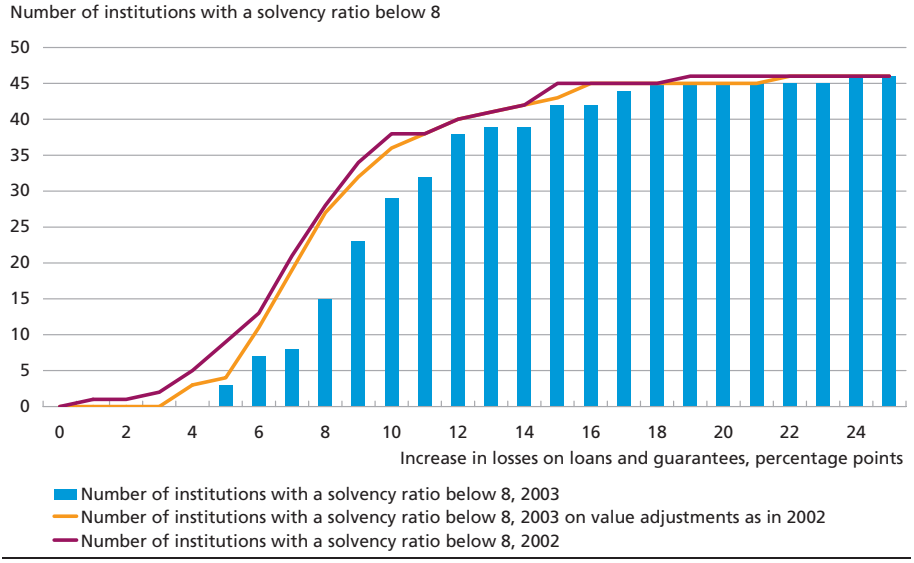
Note: In 2003, Gjensidige NOR is included in the calculations for Den norske Bank.
Source: Annual accounts and own calculations.

NUMBER OF BANKING INSTITUTIONS IN CATEGORIES B AND C WITH A DEFICIT ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2002 AND 2003 Chart 11



Source: Annual accounts and own calculations.

NUMBER OF BANKING INSTITUTIONS IN CATEGORIES B AND C WITH A SOLVENCY RATIO BELOW 8 ON AN INCREASE IN LOSSES ON LOANS AND GUARANTEES, 2002 AND 2003 Chart 12



Source: Annual accounts and own calculations.

Stress tests of Danish banking institutions, categories B and C

The banking institutions in categories B and C have enhanced their resilience considerably so that they can sustain higher losses without having deficits, cf. Chart 11. This is indicated by the bars having moved significantly rightwards compared with last year. Likewise, higher losses may be sustained before the institutions have problems meeting the capital requirement, cf. Chart 12. As previously stated, the banking institutions saw large increases in value adjustments in 2003. Exclusive of these adjustments, resilience in 2003, illustrated by the yellow curves, is closer to the 2002 level.

MORTGAGE CREDIT

The mortgage-credit institutes' total profit after tax was kr. 7 billion in 2003, equivalent to an increase by 43 per cent over 2002. The increase was driven by a very high level of gross new lending owing to the low interest rates and supported by the introduction of deferred-amortisation mortgage-credit loans as from 1 October 2003. As a result of the higher turnover, net income from fees more than doubled.

The resilience of the mortgage-credit sector is high. The sector as such was able to sustain losses of up to 2.7 per cent of the loan portfolio and still meet the regulatory capital requirement. Actual losses and write-downs amounted to 0.0 per cent of the loan portfolio in 2003.

Mutual guarantees between banking institutions and mortgage-credit institutes

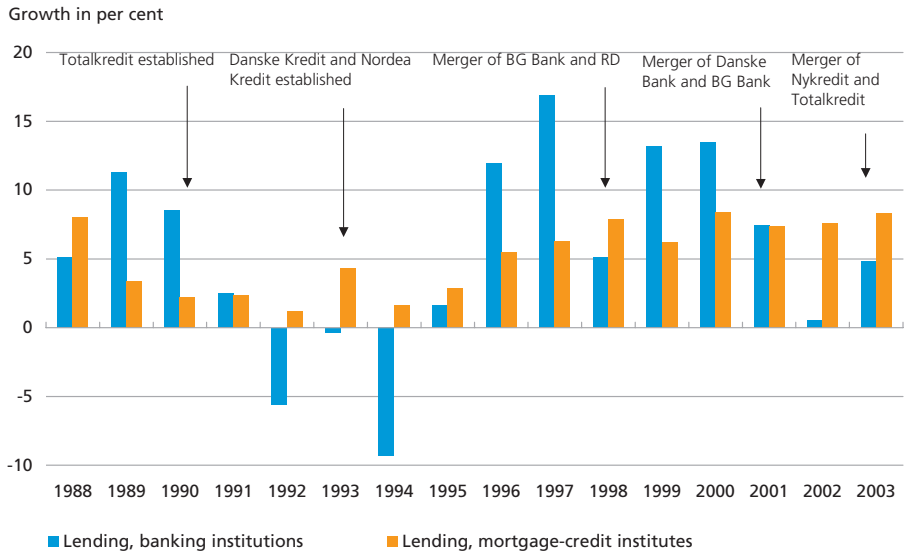
The degree of integration between Danish banking institutions and mortgage-credit institutes has accelerated since the early 1990s, and mortgage-credit products are now a regular product offered by most banking institutions. The annual growth in lending by mortgage-credit institutes and banking institutions over a number of years shows that growth in lending by mortgage-credit institutes is more stable over the economic cycle than growth in lending by banks, cf. Chart 13.

The banking institutions' sales of mortgage-credit products are in some cases linked to a guarantee vis-à-vis the mortgage-credit institute. The banking institution provides a guarantee for the "last-ranking" part of the mortgage-credit loan for a limited number of years against guarantee commission[1].

In practice, under the guarantee system the intermediary banking institution assumes most of the credit risk associated with the mortgage-

[1] For owner-occupied housing mortgaged at 80 per cent of the property value the banking institutions may e.g. guarantee the last-ranking 20 percentage points.

GROWTH IN LENDING BY BANKING INSTITUTIONS AND MORTGAGE-CREDIT INSTITUTES, 1988-2003 Chart 13



Note: The banking institutions comprised are those in the Danish Financial Supervisory Authority's categories 1-3, excluding FIH.
Source: The Danish Financial Supervisory Authority.

credit loan. The banking institutions' capital burden is thereby proportionate to the size of the guarantee under the current capital-adequacy rules and thus does not reflect that the guarantee covers the last-ranking element of the loan. Under the future capital-adequacy rules (Basel II) the distribution of the risk may, however, be taken into account.

PENSION COMPANIES

The pressure on the pension companies eased in 2003. The market development in 2003 with rising stock prices enhanced the solvency of the companies. In spite of market developments, the structure of the pension companies' investment assets was more or less unchanged at end-2003 compared with end-2002, cf. Chart 14.[1]

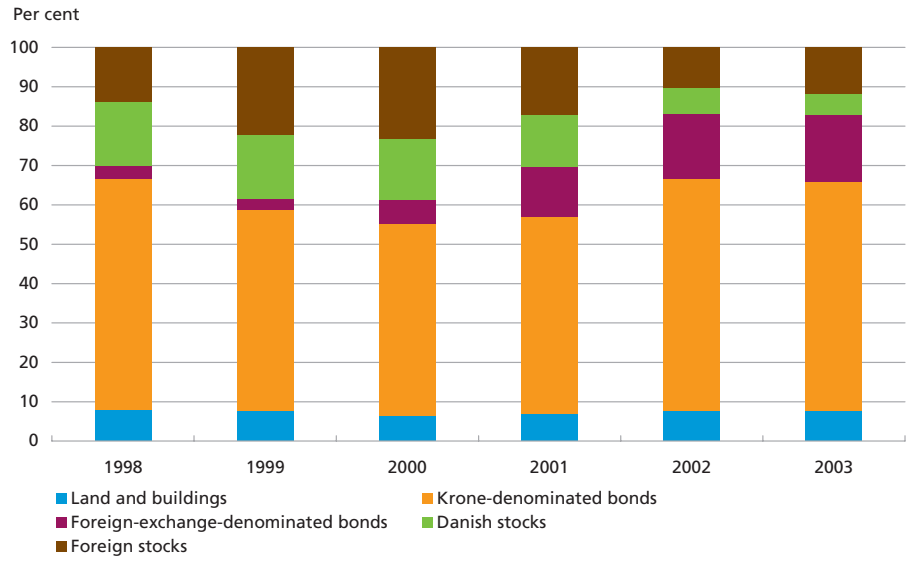
From the financial year 2003 onwards, life-insurance companies and pension funds, jointly referred to as pension companies, must publish their sensitivity to various risk scenarios in connection with their annual accounts. The sensitivity shows the overall impact of the risk scenarios in the Danish Financial Supervisory Authority's "red light" on the companies' financial buffers, cf. Box 9.

[1] The following review of the pension companies is based on annual accounts published before 23 April 2004.

INSURANCE TECHNICAL TERMS USED Box 9

- **Capital base**: The pension company's equity capital adjusted in accordance with rules laid down by the Danish Financial Supervisory Authority. For instance, special bonus provisions are added. The capital base must as a minimum correspond to the solvency margin. See also *buffers*.
- **Bonus potential related to benefits on premium-free policies**: The commitment to allocate bonus on premiums already paid into pension companies; a sub-item under life-insurance provisions. See also *buffers*.
- **Collective bonus potential**: Undistributed reserves that can be used to cover losses on assets. See also *buffers*.
- **Contribution principle**: Determines the framework for the distribution of the pension companies' profits and losses among the owners and policyholders so that owners and policyholders are allocated a reasonable proportion of the realised profits in relation to their contribution to generating the profits.
- **Risk scenarios**: Aimed to illustrate whether there is an appropriate relationship between investment risks, capital and commitments. The risk scenarios are popularly known as traffic lights, and the Danish Financial Supervisory Authority operates with a red and a yellow risk scenario. The **red risk scenario** assumes a change in interest rates by 0.7 percentage point in the direction entailing the highest losses; a fall in share prices by 12 per cent; a fall in property prices by 8 per cent; and losses in connection with credit, counterparty and exchange-rate risks. The **yellow risk scenario** assumes a change in interest rates by 1.0 percentage point in the direction entailing the highest losses; a fall in share prices by 30 per cent; a fall in property prices by 12 per cent; and losses in connection with credit, counterparty and exchange-rate risks. A company can be said to be in the **green light** if it can handle the effect of the yellow light within the solvency margin imposed by the authorities.
- **Solvency margin:** The statutory capital requirement of pension companies. The solvency margin is calculated on the basis of the life-insurance provisions subject to a number of minor additions.
- **Buffers**: The pension companies have three buffers against losses: the collective bonus potential, the bonus potential related to benefits on premium-free policies, and the capital base. The two first buffers belong to the policyholders, while the capital base comprising equity belongs to the owners of the company. In principle, the bonus potential related to benefits on premium-free policies cannot be regarded as an aggregate buffer for the entire company. The reason is that the bonus potential related to benefits on premium-free policies is linked to the individual policy and can only be used to cover negative results for policies within the same portfolio, i.e. with the same guaranteed rate of interest, cf. the decision of the Danish Financial Supervisory Authority of 2 September 2003, in which the rules were emphasised. In pension companies with different maximum technical rates (interest-rate guarantees) there will be considerable differences in the size of the bonus potential related to premium-free policy for the individual portfolios. In addition, the repurchase value of a policy sets a limit to the proportion of the bonus potential related to benefits on premium-free policies which can in fact be used as a buffer.

DEVELOPMENT IN THE PENSION COMPANIES' INVESTMENT ASSET STRUCTURE, 1998-2003 Chart 14



Note: Data for 2003 is estimates based on a number of published annual accounts. Other investment assets are not included.
Source: Annual accounts and the Danish Financial Supervisory Authority.

Table 4 shows that the pension companies' total sensitivity to market risk was kr. 37.6 billion at end-2003.[1] Of this total, the pension companies' owners were to cover a minimum of kr. 3.4 billion, while the policyholders' maximum would be kr. 34.2 billion. The distribution of the total

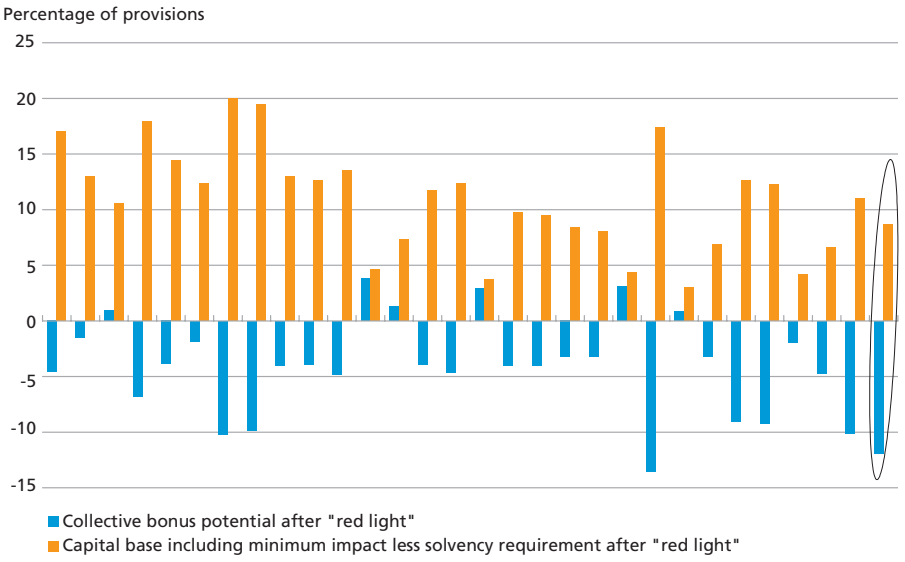
CALCULATED EFFECTS OF THE "RED" RISK SCENARIO, 2003 Table 4

Kr. billion	Maximum impact on policyholders' reserves	Minimum impact on capital base
Sensitivity to market risks		
Fall in interest rates by 0.7 percentage points	-16.9	1.5
Fall in stock prices by 12 per cent	-9.0	-3.4
Fall in property prices by 8 per cent	-3.7	-1.0
Credit and exchange-rate risk	-4.7	-0.6
Total market risk	-34.2	-3.4
The sector's aggregate buffers before "red light"		
Collective bonus potential	17.7	
Capital base in excess of solvency margin	41.8	
Bonus potential related to benefits on premium-free policies	65.8	

Note: Credit and exchange-rate risk comprises a change in exchange rates with a probability of 0.5 per cent on 10 days and losses on credit and counterparties of 8 per cent.
Source: Annual accounts.

[1] The scenario with falling interest rates involved the greatest losses to the sector as a whole.

COLLECTIVE BONUS POTENTIAL AND EXCESS CAPITAL BASE OF THE INDIVIDUAL PENSION COMPANIES AFTER A "RED" SCENARIO, 2003 Chart 15



Note: The solvency requirement after a "red light" is approximated as the solvency requirement before the "red light" less 3 per cent of the provisions. For comparability purposes, the bars in the Chart are standardised using the pension company's provisions. Each pair of bars represents a pension company.
Source: Annual accounts.

market risk between owners and policyholders in the various scenarios is based on the "contribution principle", cf. Box 9. Sensitivity has been calculated taking into account the companies' possible hedging of risks via financial derivatives, cf. Box 10.

The total market risk can be compared with the companies' financial buffers, which are shown in the lower part of Table 4. This gives an impression of the sector's total robustness.

The accounts for the individual pension companies show that no companies were in the "red light" at end-2003 and only one was in the "yellow light". At end-2002 two companies were in the "red light" while 11 companies were in the "yellow light".

For the individual pension companies, Chart 15 shows the effect on the financial buffers of a fall in interest rates by 0.7 percentage point, a fall in share prices by 12 per cent, a fall in property prices by 8 per cent, and losses in connection with credit, counterparty and exchange-rate risks, hereinafter referred to as the "red" scenario. The Chart does not include bonus potential related to benefits on premium-free policies since the application of these as buffers is subject to certain limitations, cf. Box 9. It is therefore not possible for external readers of the accounts to assess the "buffer value" of the bonus potential related to benefits on premium-free policies.

THE PENSION COMPANIES' USE OF INTEREST-RATE DERIVATIVES Box 10

The pension sector has been severely affected by the fall in interest rates in recent years, which has increased the focus on the interaction between the interest-rate sensitivity of the pension companies' assets and commitments. Many pension companies have fully or partly hedged their interest-rate risk via financial derivatives. The financial derivatives most commonly used by pension companies are CMS floors (Constant Maturity Swap floors) and swaptions, but a number of pension companies also use interest-rate swaps. These instruments enable the pension companies to minimise the disparity between the interest-rate sensitivity of the assets and commitments.

An interest-rate swap is an agreement between two parties to receive (pay) a fixed rate of interest in a given period against paying (receiving) a variable rate of interest in the same period. The pension companies can use interest-rate swaps to hedge the risk that interest rates fall below the yield level that the pension companies have guaranteed the policyholders.

A swaption is an option for a swap, e.g. an interest-rate swap. The buyer of a swaption has the right, but not the obligation, to enter into an interest-rate swap on predetermined conditions. If the pension company thus wishes to hedge the risk that the market interest rate falls below the level for the guaranteed yield, the pension company may enter into a swaption under which the pension company receives a fixed rate of interest and pays a variable rate from an agreed point in the future if the interest rate falls below this level.

A CMS floor provides a floor for the interest rate and comprises a series of interest-rate options expiring at fixed intervals.

The price depends on the level of interest rates, maturity, liquidity and credit risk and the uncertainty at the time of the transaction. For instance, it would be relatively expensive for the pension company to hedge if market interest rates are close to the level against which the pension company wishes to hedge.

49 pension companies of a total 71 used hedging instruments at end-2002. The Table below illustrates the effect of various changes in interest rates in per cent of the pension sector's aggregate balance-sheet total, which was kr. 945.5 billion at end-2002. It can be seen that the financial derivatives contribute to reducing the net impact of various changes in interest rates on the pension sectors' balance-sheet total significantly.

VALUE ADJUSTMENTS ON CHANGES IN INTEREST RATES, END-2002, KR. BILLION

Change in interest rates	Provisions	Bonds	Financial derivatives	Net impact
-1 percentage point	66.6	26.7	25.1	- 14.8
-0.7 percentage point	42.2	18.8	13.8	- 9.6
0,7 percentage point	- 22.3	- 19.0	- 6.8	- 4.5
1 percentage point	- 48.0	- 27.2	- 9.9	10.9

Note: The Table shows the sector as a whole.
Source: The Danish Financial Supervisory Authority.

Chart 15 illustrates that for the vast majority of the companies the collective bonus potential would not be sufficient to cover the policyholders' maximum losses in the "red" scenario at end-2003 since the blue bars are mainly negative. In these companies the bonus potential related to benefits on premium-free policies and the capital base, respectively, had to act as buffers for the remainder of the loss in the "red" scenario in accordance with the contribution principle. The yellow bars in the figures illustrate the individual pension company's excess capital base after a minimum impact on the capital base in the "red" scenario. In only one company, as indicated in the Chart, the excess capital base would not be sufficient to cover this loss[1]. In other words, practically all pension companies would be able to handle the market effect in the "red" scenario at end-2003, even without including the bonus potential related to benefits on premium-free policies as a buffer.

[1] A detailed review of the company's annual accounts shows that according to the company itself it is comfortably in the "green light". The bonus potential related to benefits on premium-free policies is therefore a sufficient buffer for the company to be able to handle the market effect of a "red" scenario.

The Corporate Sector and the Households

The estimated failure rates for all sectors were almost unchanged in 2003 compared to 2002 which may reflect the ability of Danish companies to adjust their costs to the weak economic environment.

The households have become more exposed to rising interest rates and declining income, as indebtedness has risen more than income and the households' indebtedness at adjustable interest rates accounts for a larger share. However, the households' ability to meet payments has improved as a result of the low interest rates. Seen in a Nordic perspective, Danish households' indebtedness over income is high due to e.g. a higher ratio of housing wealth to income in Denmark than in the other Nordic countries.

The corporate sector and the households have benefited from the low level of interest rates but are at the same time sensitive to rising interest rates.

CORPORATE SECTOR

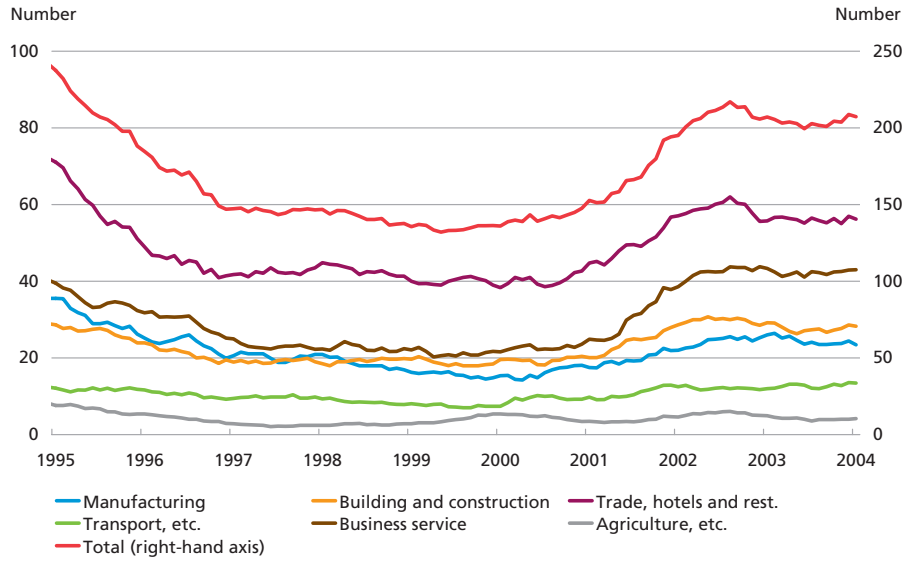
Since mid-2002, the number of compulsory liquidations in the Danish corporate sector has stabilised at a higher level than in the period 1997-2001, cf. Chart 16. Despite almost zero growth in 2003 the number of compulsory liquidations is largely unchanged compared to 2002. It is assessed that Danish companies have been able to adjust their costs.

Development in the companies' key figures

In 2003, the average return on assets for the Danish corporate sector was almost unchanged from 2002. This overall picture of the earnings capacity conceals significant differences in and between the individual sectors. The average return on assets in the building and construction sector and in the sector for transport, etc. decreased during 2003, whereas it continues to increase in the IT and telecom sector as well as in trade, hotels and restaurants. Chart 17 shows the 10 per cent least profitable companies in each sector. The trend is unchanged from previous years.

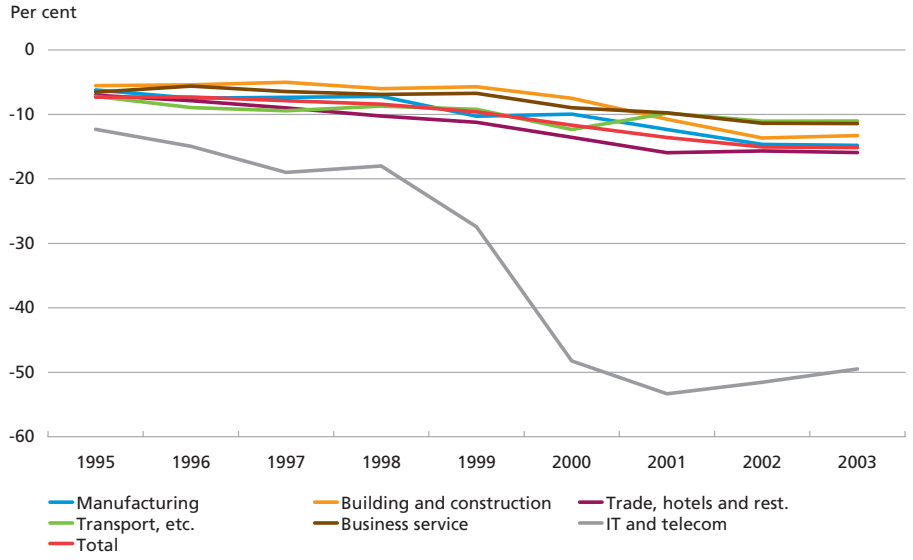
Generally, the companies' ability to resist losses, measured as the average solvency, was reduced in 2003 over 2002. However, the solvency ratio for the 10 per cent least solvent companies in each sector has been almost unchanged, cf. Chart 18. The IT and telecom sector and trade, hotels and restaurants still stand out as the solvency of more than one out of 10 companies in these sectors was negative in 2003.

INCIDENCE OF COMPULSORY LIQUIDATION IN THE CORPORATE SECTOR, 1995-2004 — Chart 16



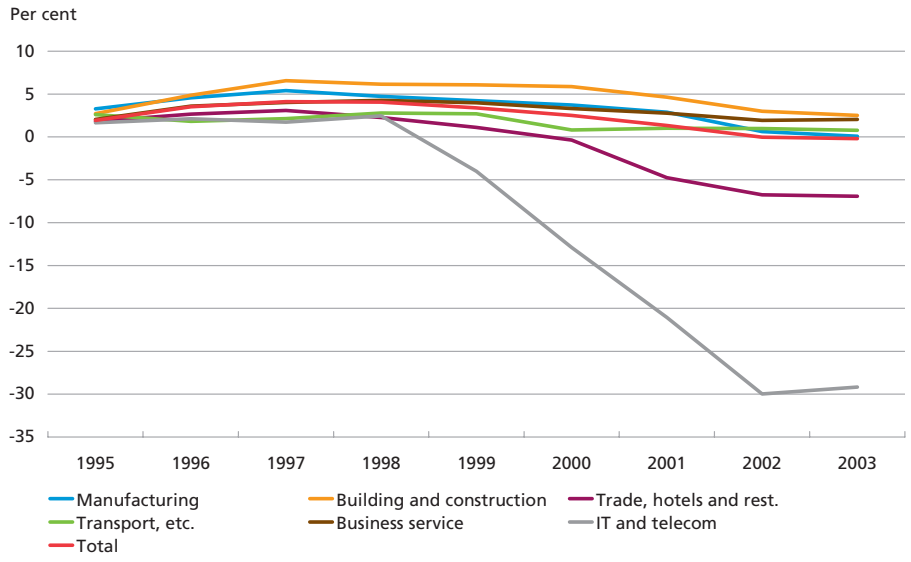
Note: The Chart shows monthly observations for the number of compulsory liquidations calculated as a 12-month moving average. The IT and telecom sector cannot be shown as a separate sector. The sectoral breakdown in the Chart is not identical to that in the analyses later in the chapter, which are based on KOB (KOB was previously known as the Danish Business Information Bureau).
Source: Statistics Denmark.

RETURN ON ASSETS FOR THE 10 PER CENT LEAST PROFITABLE COMPANIES IN VARIOUS SECTORS, 1995-2003 — Chart 17



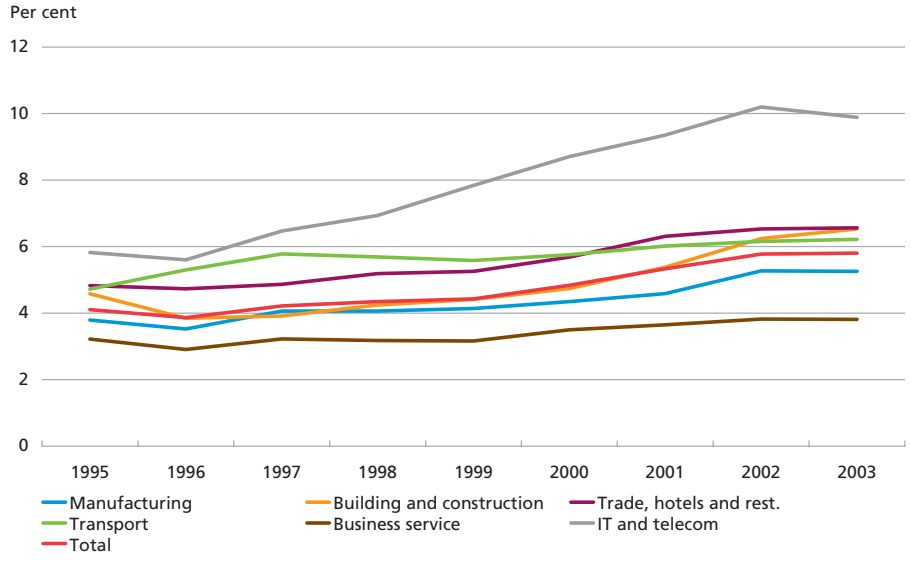
Note: The return on assets is defined as the primary operating result as a ratio of total assets. 2003 comprises accounts presented in 2003, and accounts presented in the 3rd or 4th quarters of 2002 for companies that have not yet registered their accounts for 2003. Total comprises all public and private limited liability companies, i.e. the sectors stated as well as public and private limited liability companies with the sector code "unknown" which often indicates new companies.
Source: KOB.

SOLVENCY OF THE 10 PER CENT LEAST SOLVENT COMPANIES IN VARIOUS SECTORS, 1995-2003 Chart 18



Note: Solvency is defined as equity capital as a ratio of total liabilities. 2003 comprises accounts presented in 2003, and accounts presented in the 3rd or 4th quarters of 2002 for companies that have not yet registered their accounts for 2003. Total comprises all public and private limited liability companies, i.e. the sectors stated as well as public and private limited liability companies with the sector code "unknown" which often indicates new companies.
Source: KOB.

ESTIMATED FAILURE RATES OF THE 10 PER CENT WEAKEST COMPANIES, 1995-2003 Chart 19



Note: The Chart shows the 90th percentile. 2003 comprises accounts presented in 2003, and accounts presented in the 3rd or 4th quarters of 2002 for the companies that have not yet registered their accounts for 2003.
Source: Own calculations.

Estimated failure rates by sector

Financial stability 2003 introduced a failure-rate model estimated on the basis of Danish public and private limited liability companies' annual accounts collectively. Failure-rate models are now estimated by sector, cf. Box 11. In general, the sector models and the overall model in *Financial stability 2003* indicate the same pattern. The IT and telecom sector still accounts for the highest estimated failure rate, cf. Chart 19 illustrating the estimated failure rates for the 10 per cent weakest companies in each sector. The ranking of other sectors has changed but the sectors manufacturing and business service, etc. still account for the lowest estimated failure rates.

The estimated failure rates of the weakest companies were generally unchanged in 2003 over 2002, cf. Chart 19.

FAILURE-RATE MODEL[1] Box 11

Based on a company's accounts Danmarks Nationalbank's failure-rate model can be used to estimate the probability of the company failing within the next few years. The estimated failure rate can be seen as a weighted index of key figures, etc. The model is estimated in the period 1995-99 and thus does not cover a full economic cycle. This may affect the level of estimated failure rates.

Compared to the failure-rate model presented in *Financial stability 2003,* minor adjustments have been made. The model is now estimated independently for each sector while the previous model did not consider sector variations. The explanatory variables have been adjusted slightly.

Variables

The models still include nine explanatory variables, i.e. five quantitative variables and four dummy variables. The sign in parenthesis indicates the influence on the estimated failure rate.

- Reduction of the capital base (+). The dummy variable is set at 1 if the company repeats the deficit for the year, whereby the company's equity capital falls below the required capital.
- Size (-). Logarithm for total assets.
- Solvency (-). Equity capital as a ratio of total assets.
- Auditors' comment (+). The dummy variable is set at 1 if the auditors' comment in the accounts is critical.
- Form of ownership (+). The dummy variable equals 1 if the company is a private limited liability company.
- The company's return on assets adjusted for sector (-). The company's return on assets relative to the median return for the sector.
- Age (+). The dummy variable equals 1 if the company is less than 5 years old.
- Reduced liquidity (+). The short-term debt as a ratio of the primary operating result.
- Debt ratio (+). Short-term debt as a ratio of total assets.

[1] For a more detailed review of the failure-rate model see Morten Lykke, Kenneth Juhl Pedersen and Heidi Mølgaard Vinther, *A Failure-Rate Model for the Danish Corporate Sector*, Danmarks Nationalbank's working paper series no. 16.

CONTINUED Box 11

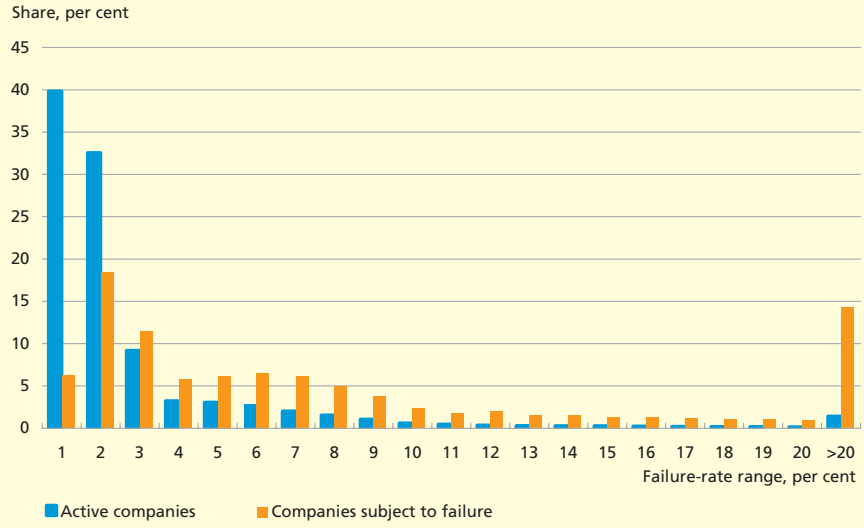
Sector models

Independent sector models provide for structural differences between the sectors. This is reflected in the varying significance of the individual variables in the specific sector models. The IT and telecom sector differs considerably as the return on assets adjusted for sector and solvency is not significant in this sector model. One explanation may be that the investors in the IT and telecom sector in the estimated period 1995-99 had supernormal expectations of future earnings.

Estimated failure rates

The distribution of estimated failure rates in the general model indicates when probability of failure is relatively high or low, cf. the Chart below. 50 per cent of the active companies have an estimated failure rate below 1.2 per cent, while 50 per cent of the companies subject to failure have a failure rate below 5.3 per cent.

DISTRIBUTION OF COMPANIES' ESTIMATED FAILURE RATES

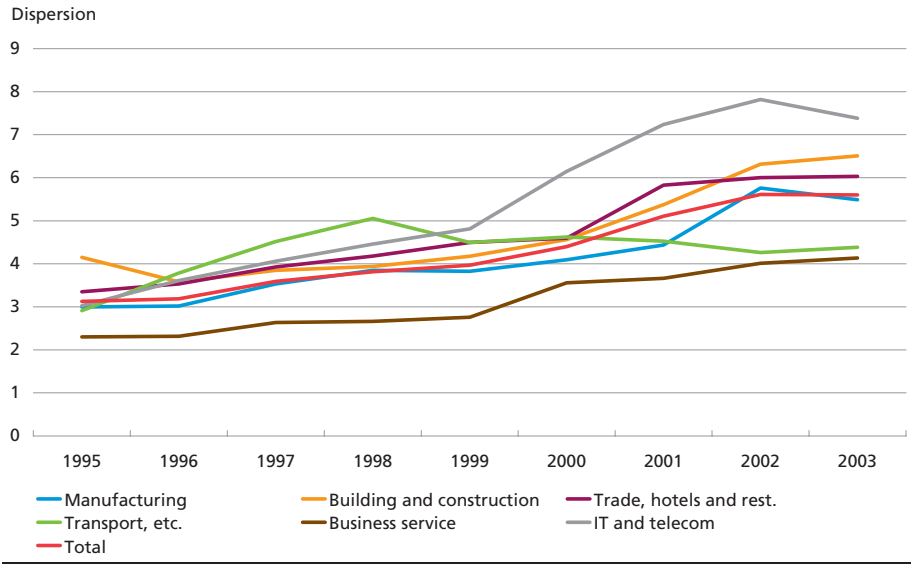


Note: The value "1" on the x-axis indicates that the companies within this range have an estimated failure rate of above 0 and below or equal to 1 per cent. ">20" indicates all estimated failure rates above 20 per cent. The estimated failure rate for companies subject to compulsory liquidation is based on the latest accounts before compulsory liquidation.
Source: Own calculations.

The dispersion of estimated failure rates can be used as an indication of the uncertainty concerning lending to the corporate sector. The higher the dispersion the greater the uncertainty. The dispersion of estimated failure rates stabilised in several sectors in 2003 after a rising trend for several years, cf. Chart 20.

The development of the estimated failure rate in the years prior to compulsory liquidation shows that the estimated failure rate changes

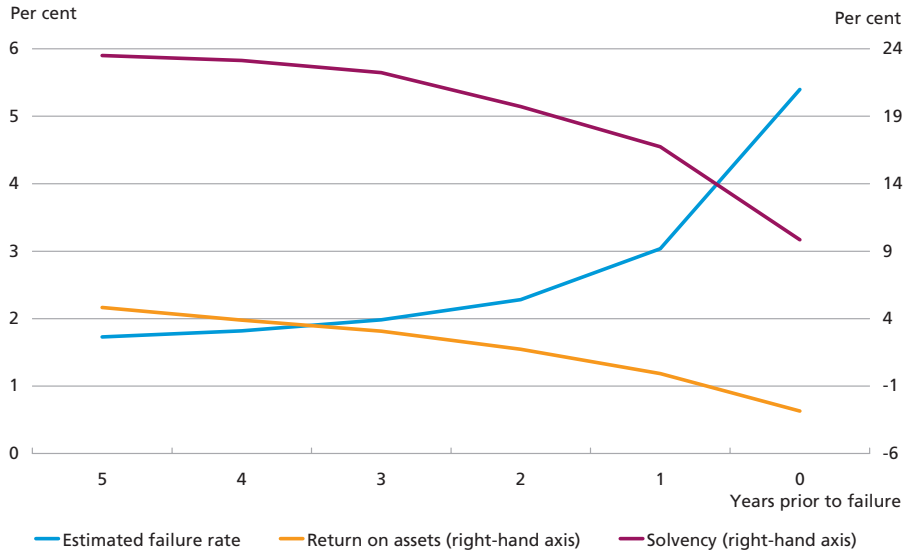
DISPERSION OF ESTIMATED FAILURE RATES, 1995-2003 Chart 20



Note: The dispersion is measured in terms of the standard deviation. 2003 comprises accounts presented in 2003, and accounts presented in the 3rd or 4th quarters of 2002 for companies that have not yet registered their accounts for 2003.
Source: Own calculations.

considerably only in the last years before compulsory liquidation, cf. Chart 21. The same tendency applies to the key figures return on assets and solvency.

ESTIMATED FAILURE RATE, RETURN ON ASSETS AND SOLVENCY FOR COMPANIES SUBJECT TO FAILURE IN THE PERIOD PRIOR TO FAILURE, MEDIAN Chart 21



Source: Own calculations.

Companies' borrowing

Danish companies' borrowing from domestic credit institutions increased by 5 per cent in 2003 following very weak growth in borrowing in 2002. The historically low interest rates in the 1st half of 2003 in particular resulted in growing interest in mortgage-credit loans. Danish mortgage-credit institutes' corporate lending thus increased by almost 10 per cent in 2003.

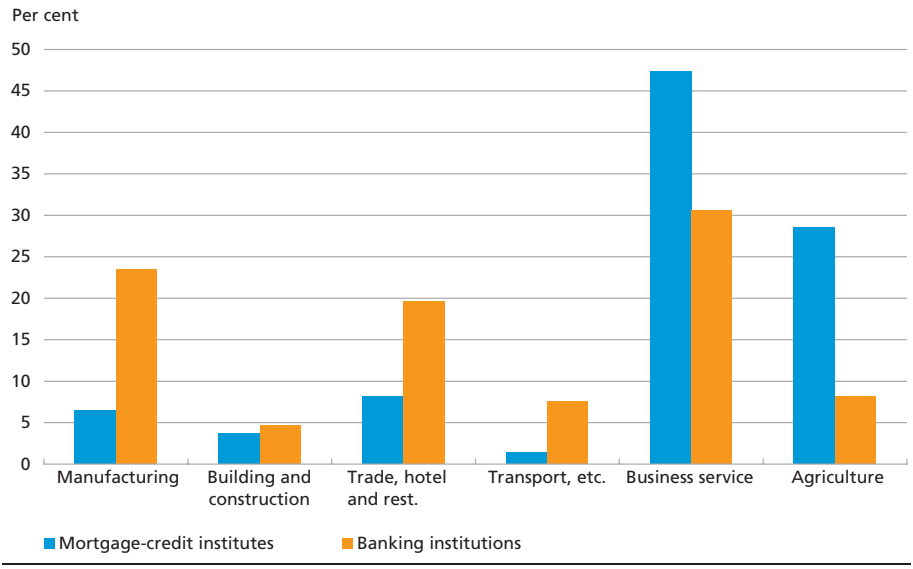
The distribution by sector of lending by banking institutions and mortgage-credit institutes shows that business service accounts for the largest share, cf. Chart 22. In 2003, this sector also showed the highest solvency (measured as the sector's median solvency) and the lowest estimated failure rate.

The banking institutions' losses as a ratio of loans and guarantees to the corporate sector decreased in 2003 compared to 2002. However, the loss ratios for the trade, hotels and restaurants sector and for the transport and agriculture sectors increased, cf. Chart 23.

Interest-rate sensitivity

The companies have benefited from the present low interest rates. In 2003 the average interest rate for banking institutions' outstanding corporate loans was 5.4 per cent.

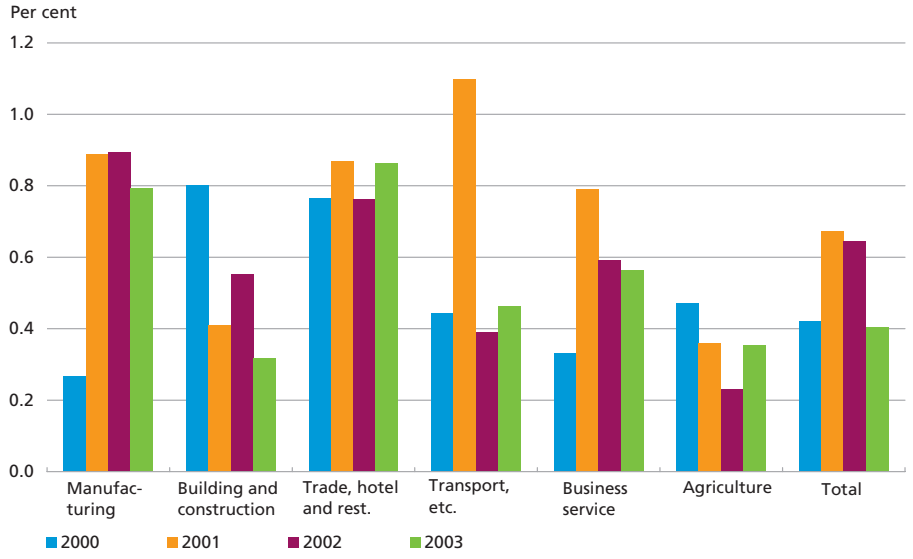
BANKING INSTITUTIONS' AND MORTGAGE-CREDIT INSTITUTES' CORPORATE LENDING BY SECTOR, END-2003 Chart 22



Note: Lending is calculated as lending by sector as a ratio of total corporate lending by banking institutions and mortgage-credit institutes, respectively. The calculation is based on the institutions reporting in full to the MFI balance-sheet statistics. The IT and telecom sector cannot be shown as a separate sector.

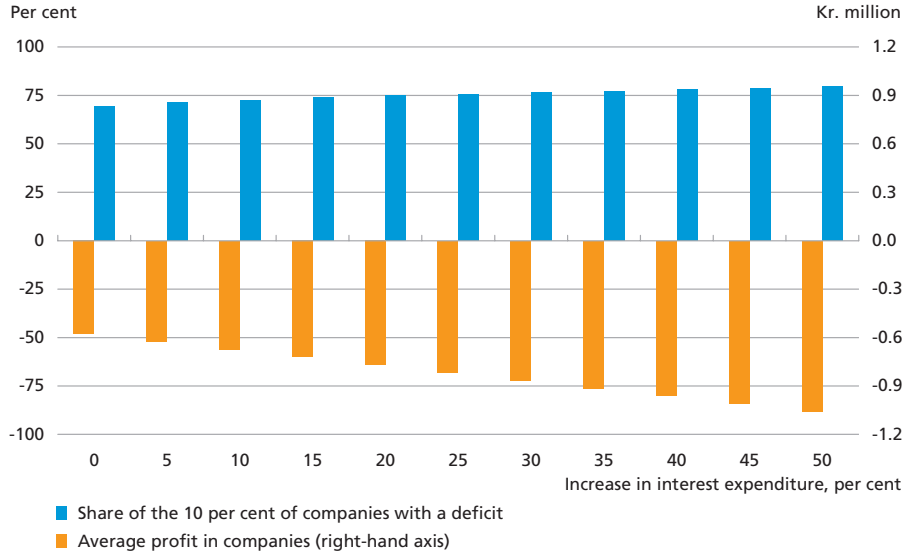
Source: Danmarks Nationalbank.

SECTOR BREAKDOWN OF THE BANKING INSTITUTIONS' LOSS RATIO, 2000-03 Chart 23



Note: The Chart shows the banking institutions' losses in a number of sectors as a ratio of loans and guarantees to the individual sector. The development in provisions is not taken into account. The "Total" item covers total losses on corporate exposures. IT and telecom cannot be shown as a separate sector. The Danish Financial Supervisory Authority's figures for 2003 are preliminary.
Source: The Danish Financial Supervisory Authority.

EFFECT OF AN INCREASE IN INTEREST EXPENDITURE IN THE 10 PER CENT OF COMPANIES WITH THE HIGHEST INTEREST EXPENDITURE AS A RATIO OF TOTAL ASSETS, 2003 Chart 24



Note: 2003 comprises accounts presented in 2003, and accounts presented in the 3rd or 4th quarters of 2002 for companies that have not yet registered their accounts for 2003.
Source: Own calculations.

In the 10 per cent of the companies with the highest interest expenditure relative to total assets, interest expenditure as a ratio of total assets accounts for approximately 25 per cent. The approximately 6,000 companies in question have a deficit of just over kr. 0.5 million on average. An increase in interest expenditure by 25 per cent implies an increase from 70 per cent to 77 per cent in the share of companies with a deficit, cf. Chart 24. The average deficit increases to just over kr. 0.8 million.

AGRICULTURE

Lending by banking institutions and mortgage-credit institutes to the agricultural sector accounts for approximately 20 per cent of total domestic corporate lending, of which the mortgage-credit institutes' share exceeds 80 per cent. The small institutions account for the relatively largest share of the banking institutions' lending to the agricultural sector.

Development in earnings and capital

Agriculture's accounts for 2003 will not be available until the autumn of 2004.

In 2002 agriculture's earnings fell considerably after two very good years. The agricultural sector's operating result decreased by kr. 253,000 to kr. 111,000 per full-time farm, primarily as a result of lower pork and grain prices. The Danish Agricultural Advisory Centre expects a further decrease in the agricultural sector's operating result in 2003 and a slight improvement in 2004.

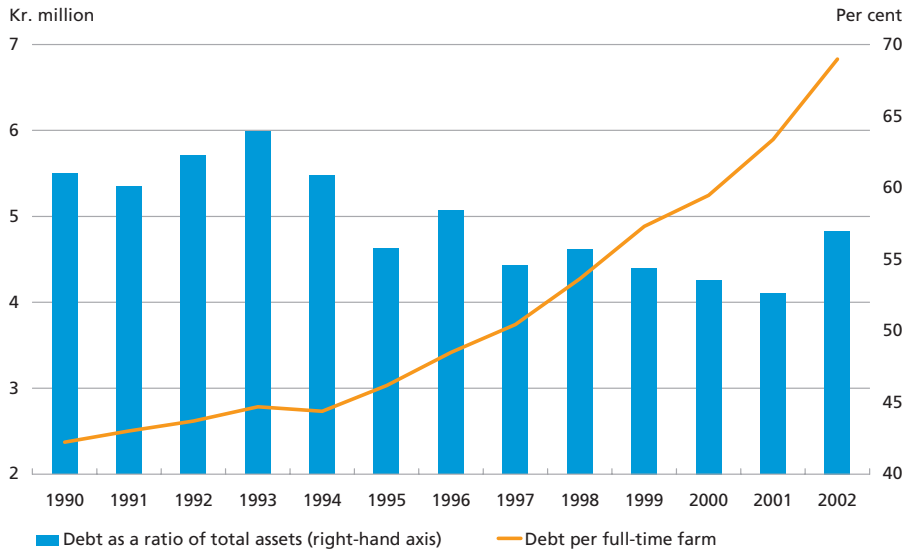
Despite the lower operating result, investments continue to be significant. An important explanation of the high investment level is the agricultural sector's structural adjustment towards larger farms. The high investment level combined with the low operating result led to a significant financing requirement in 2002. Investments generated from operations accounted for only 27 per cent of the total financing requirement, the lowest level in 10 years.

The agricultural sector's net interest expenditure increased further in 2002 to more than 80 per cent of the operating result before interest, which is in line with the level in 1998 and 1999, the last years also with low pork prices.

Despite the declining interest rates in recent years interest expenditure has risen, reflecting the agricultural sector's growing debt. The debt-to-assets ratio rose to 57 per cent in 2002 – the highest level in 7 years, cf. Chart 25.

The agricultural sector's expected weak earnings in 2003, which are expected to improve only gradually in 2004, together with the growing

INDEBTEDNESS OF FULL-TIME FARMS, 1990-2002 Chart 25



Note: The operating results of full-time farms include mixed farms.
Source: Danish Research Institute of Food Economics.

debt indicate that the situation of the weakest members of the sector is tightening.

HOUSEHOLDS

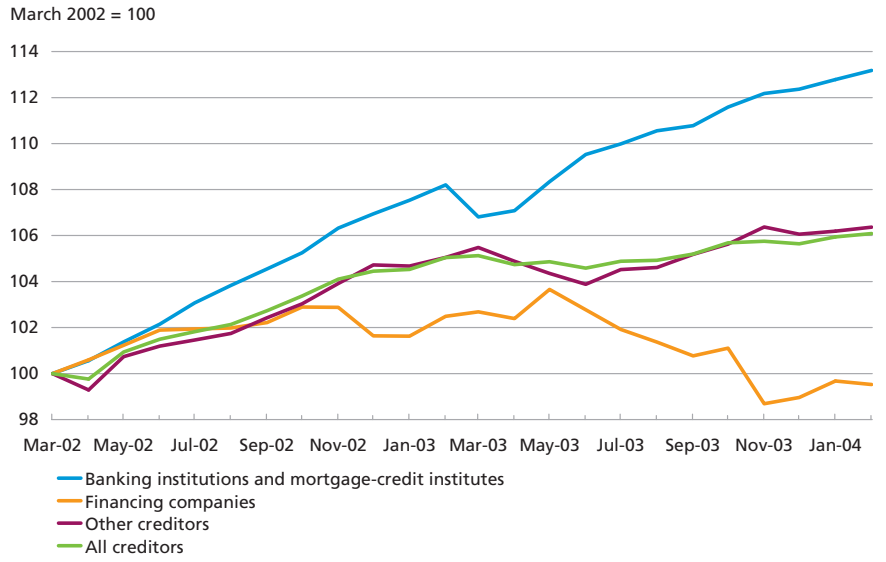
In 2003, the households' indebtedness increased more than their disposable income, but their ability to meet payments improved, due to the low interest rates.

The number of enforced sales of owner-occupied homes is still low, and the arrears ratio of the mortgage-credit institutes is historically low. The development at the beginning of 2004 shows no signs of change. Since 1998 the number of RKI registrations has been rising, however, without reaching the peak of 1993. In 2003, the number of RKI registrations stabilised around 330,000.

The banking institutions and mortgage-credit institutes may solely register a debtor with RKI based on a decision by a third party, typically a court order, which is why some time may pass between the time of non-performance and the time of registration. Financing companies, on the other hand, may register a default on the basis of a simple debtor's declaration[1]. Thus, the time of registration might be closer to the actual cyclical situation for financing companies than for banking institutions

[1] If a company wishes to register a debtor with RKI, the company must have submitted three reminders in writing and in the last reminder warned the debtor of debt collection and RKI registration. The minimum amount is kr. 200, and there must be no dispute.

REGISTRATIONS OF LATE PAYMENTS FROM CREDIT PROVIDERS AND ALL CREDITORS, 2002-04, INDEX Chart 26



Note: As per February 2004 the banking institutions and the mortgage-credit institutes, and the financing companies have made 58,567 and 64,159 registrations, respectively. This is equivalent to 18 and 19 per cent of the total number of RKI registrations, respectively. The Chart shows registrations for both the households and the corporate sector. The households account for approximately 97 per cent of the total registrations. The average number of registrations per person is 2.

Source: RKI Kredit Information.

and mortgage-credit institutes. The development in RKI registrations for financing companies, cf. Chart 26, thus supports the presumption of a slight improvement in the financially weakest households' current ability to meet payments. However, in general the average amount per registration increased throughout 2003.

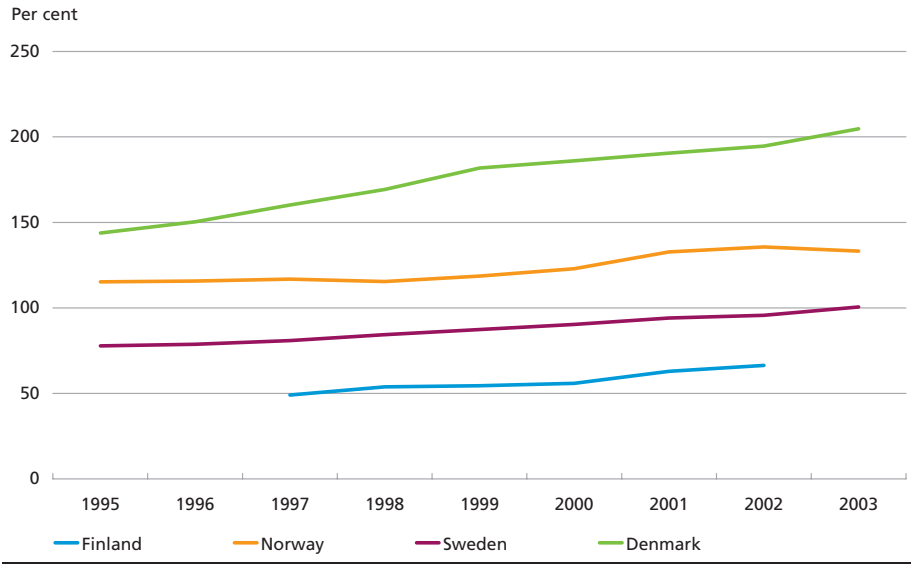
Households' borrowing

In recent years, the households have used the rising house prices to raise mortgage-credit loans to the detriment of borrowing from the banking institutions. In 2003, borrowing by the households from the banking institutions increased again.

The households' interest payments decreased in 2003 as a result of the low level of interest rates and a shift towards loans with a shorter fixed-interest period. As of 1 October 2003 it became possible to obtain mortgage-credit loans with deferred amortisation for up to 10 years. In the 4th quarter of 2003 and 1st quarter of 2004 deferred-amortisation loans for owner-occupied homes and summer cottages were granted for an amount of kr. 86 billion in total or 55 per cent of gross new lending. The mortgage-credit institutes' lending to households has grown by more than the average increase in house prices[1] since 2001, indicating a higher

[1] Cash price index for one-family houses.

THE HOUSEHOLDS' DEBT BURDEN IN THE NORDIC COUNTRIES, 1995-2003 Chart 27



Note: The debt burden is defined as the households' debt to credit institutions as a ratio of disposable income.
Source: Finlands Bank, Norges Bank, Sveriges Riksbank, Eurostat, Ministry of Finance and Danmarks Nationalbank.

loan-to-value ratio for owner-occupied housing. A description of the development in owner-occupied housing prices in Denmark is available in The Development in Cash Prices of Owner-Occupied Housing, Danmarks Nationalbank, *Monetary Review*, 1st Quarter, 2004.

Danish households' indebtedness seen in a Nordic perspective

Seen in a Nordic perspective, Danish households have the highest indebtedness relative to disposable income[1], cf. Chart 27. Thus, the Danish households appear more vulnerable to e.g. social events, such as unemployment and divorce, than the households in the other Nordic countries.

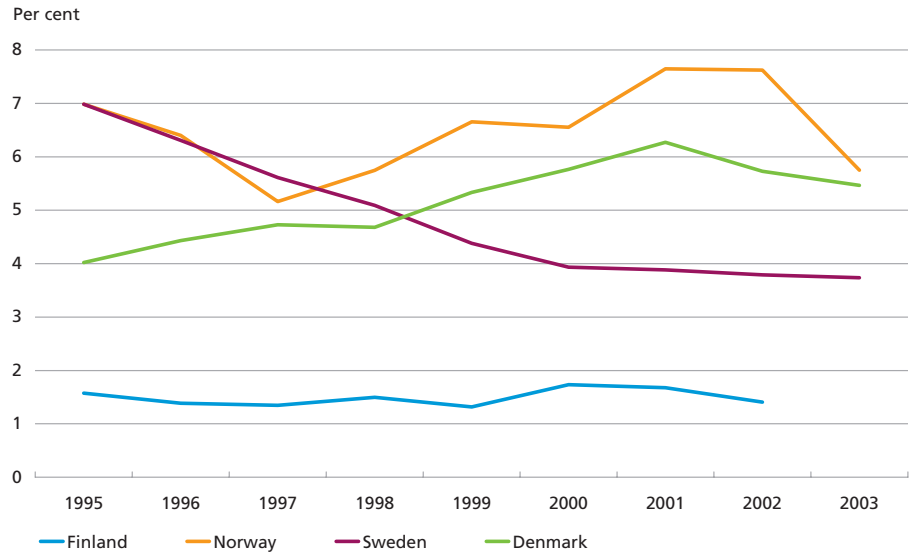
The tax deductibility of interest payments does not as such explain the higher indebtedness in Denmark, as the interest deductibility is almost identical in the Nordic countries. The higher indebtedness of Danish households can be attributed to other factors. For instance, Danish households' interest burden[2] is not proportionally higher than in the other Nordic countries, cf. Chart 28.

Housing wealth

In Denmark 53 per cent of the households live in owner-occupied homes, while the share in Finland, Norway and Sweden is 64 per cent, 77

[1] The debt burden is defined as the households' debt to credit institutions as a percentage of disposable income. Disposable income here is income after tax and depreciation.
[2] The interest burden is defined as the households' net interest expenditure after tax as a ratio of disposable income.

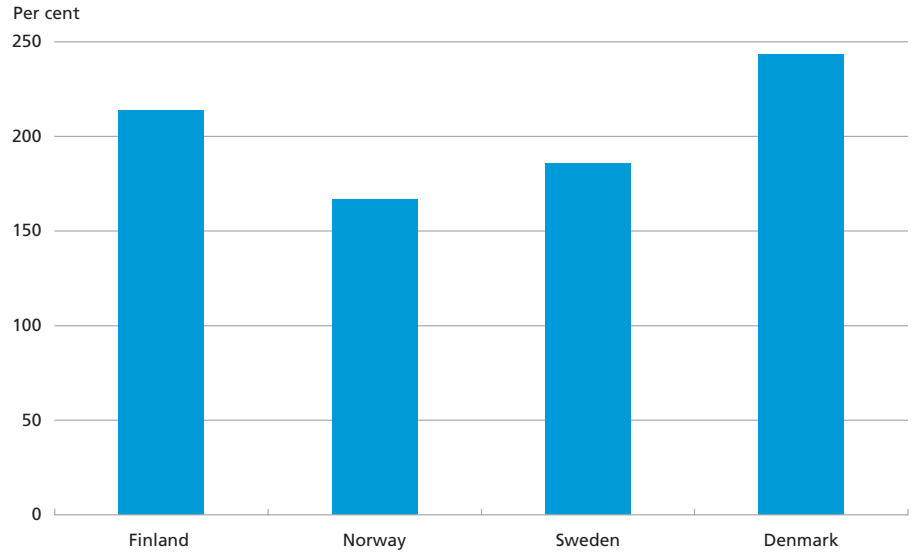
THE HOUSEHOLDS' INTEREST BURDEN IN THE NORDIC COUNTRIES, 1995-2003 Chart 28



Note: The interest burden is defined as net interest expenditure after tax as a ratio of disposable income.
Source: Finlands Bank, Norges Bank, Sveriges Riksbank, Eurostat, Ministry of Finance and Danmarks Nationalbank.

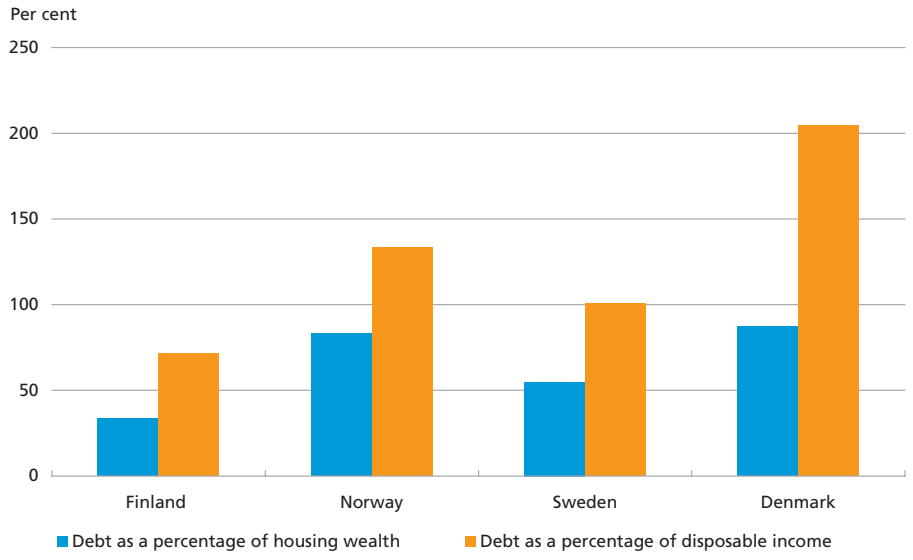
per cent and 66 per cent, respectively. The housing wealth relative to the households' disposable income is, however, relatively large in Denmark, cf. Chart 29. *Other things being equal*, this supports a higher level of indebtedness as more collateral can be provided when borrowing.

HOUSING WEALTH AS A RATIO OF THE HOUSEHOLDS' DISPOSABLE INCOME, END-2002 Chart 29



Source: Finlands Bank, Statistics Finland, Norges Bank, Sveriges Riksbank, Statistics Denmark and Danmarks Nationalbank.

THE HOUSEHOLDS' DEBT TO CREDIT INSTITUTIONS AS A RATIO OF HOUSING WEALTH AND DISPOSABLE INCOME, 2002-03 Chart 30



Note: Due to a slight time lag in the compilation of the calculated figures the results are not directly comparable in terms of time.

Source: Finlands Bank, Statistics Finland, Norges Bank, Statistics Norway, Sveriges Riksbank, Eurostat, Ministry of Finance, Statistics Denmark and Danmarks Nationalbank.

In terms of debt to credit institutions in relation to the collateral to be provided, expressed as debt as a percentage of housing wealth, Danish households thus differ less from the other Nordic households, cf. Chart 30.

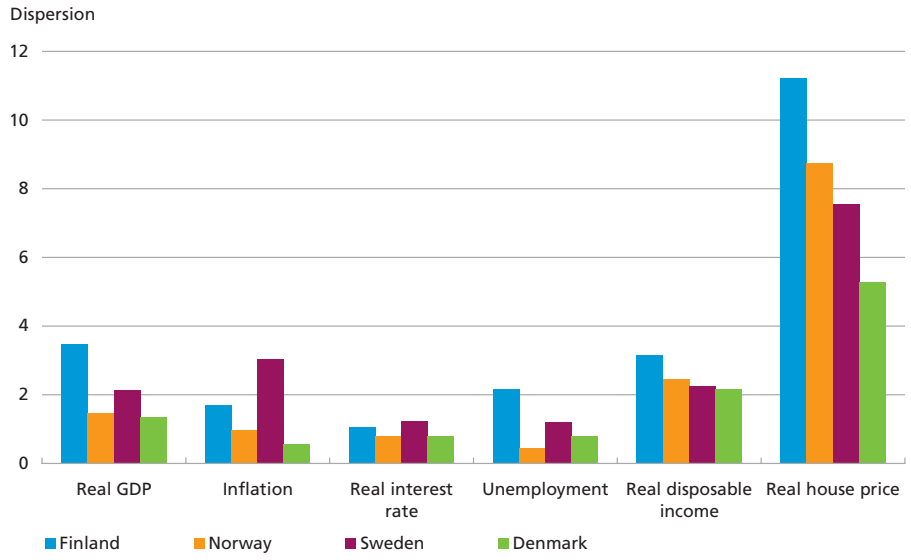
The macroeconomic environment

Expectations of continued stable macroeconomic development may affect the households' propensity to invest, leading to higher borrowing. Several macroeconomic variables have developed more steadily in Denmark than in other Nordic countries in the period from 1990, cf. Chart 31. See also Volatility in Inflation and Economic Activity in the Nordic Countries, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2003.

Home financing

In Denmark fixed-rate convertible mortgage-credit loans with a maturity and an initial fixation period of 30 years are still the most common form of home financing. The Danish mortgage-credit system makes it possible for homeowners to borrow at market interest rates. In Finland and Norway housing is typically financed through the banking institution at an adjustable interest rate. In Sweden the households mostly raise housing loans in "bostadsinstitutter" (building societies) as serial loans that are typically amortised over 30-60 years. Home financing in the Nordic countries is outlined in Box 12.

DISPERSION OF ANNUAL CHANGES IN MACROECONOMIC VARIABLES, 1990-2003 Chart 31



Note: Real disposable income only covers the period 1990-2002.
Source: Statistics Finland, Statistics Norway, Statistics Sweden, Eurostat, OECD and Statistics Denmark.

CHARACTERISTICS OF HOME FINANCING IN THE NORDIC COUNTRIES Box 12

	Finland	Norway	Sweden	Denmark
Home financing typically takes place	Bank	Bank	Building society	Mortgage-credit institute
Maturity, years	17-18	25	40-60	30
Fixed-rate loans, per cent	10	20	66*	64
Adjustable-rate loans, per cent	90	80	33	36**
Fixed-interest period, fixed rate		< 5 years	5-10 yrs., ≤ 5 years	30 years
Fixed-interest period, adjustable rate	≤ 1 year	< 1 year	< 1 year	1-3 years
Maximum loan-to-value ratio in mortgage-credit institute	60		80	80

Note: * Half of the loans characterised as fixed-rate loans have an fixed-interest period of up to 5 years.
** The adjustable-rate loans are loans with a fixed-interest period of up to 10 years, but typically 1-3 years.
Source: Finlands Bank, Norges Bank, Sveriges Riksbank and Danmarks Nationalbank.

Financial Markets

After several years' slowdown in the financial markets, stock prices rose markedly during 2003 against the background of growing confidence in an economic upswing, particularly in the USA. Increasing optimism among the investors reduced the uncertainty concerning the future course of stock prices. By contrast, long-term yields were characterised by fluctuations.

The positive development in the financial markets in 2003 increased the banks' earnings from stock-related trading and asset management. The number of initial public offerings and mergers and acquisitions is low, thus the earnings from investment banking continue to be limited.

An analysis of the returns on stocks and bonds shows that the share of extreme returns has increased in recent years. This may be of significance to the risk management of financial institutions.

MARKET TRENDS

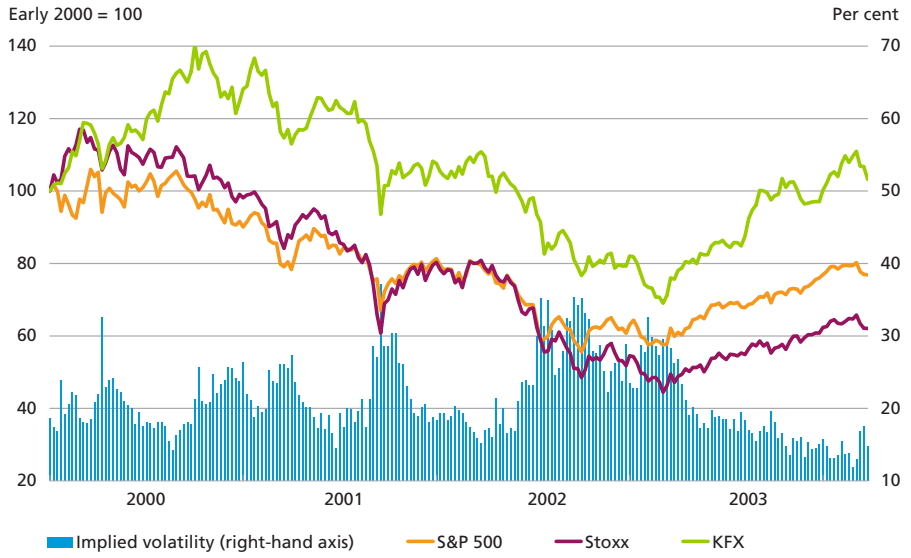
Globally, stock prices rose considerably during 2003, reversing the negative trend since 2000. The stock markets in the USA, the euro area and Denmark increased by 39 per cent, 38 per cent and 33 per cent, respectively, from the beginning of April 2003 to the beginning of April 2004, cf. Chart 32. The strong increase in the Danish KFX index was driven by the A.P. Møller-Mærsk share, which has risen markedly following the merger between D/S 1912 and D/S Svendborg, among other things due to the large number of foreign investors buying shares in the merged company. In general, the shipping industry has benefited from growing trade and rising freight rates.

The overall increase in stock prices took place against the background of growing financial-market confidence in an economic upswing. The more optimistic economic outlook was mainly due to favourable data releases from the USA.

The increased optimism among market participants reduced the uncertainty concerning the future stock-price development, which was reflected in declining implied stock-price volatility, cf. Chart 32. Implied volatility is derived from option prices and indicates the cost to stock investors of hedging against fluctuating – especially falling – stock prices.

The development in long-term bond yields was characterised by strong fluctuations in 2003, especially in the USA, cf. Chart 33. During the 1st

STOCK INDICES IN THE USA, THE EURO AREA AND DENMARK, AND IMPLIED VOLATILITY IN THE USA, 2000-04 Chart 32



Note: S&P 500 and KFX are US and Danish stock indices, respectively, and Stoxx is a stock index for the euro area. Implied volatility is derived from the price of a put option on S&P 500. Implied volatility is calculated as the annualised standard deviation of the option.
Source: Bloomberg and Ecowin.

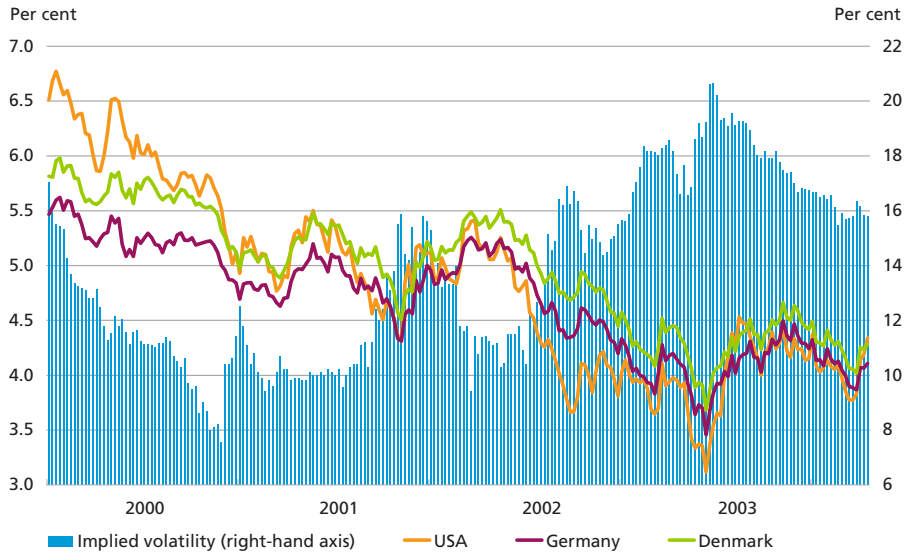
half of the year yields dropped to a very low level, but from June they rose considerably within a few months. Long-term yields decreased again during the first months of 2004, but increased in April following the release of favourable key indicators for the US economy. European government-bond yields fluctuated less strongly than US yields, but recent years have generally seen a high degree of co-variation between the different national financial markets.

The strong increase in yields over the summer was supported by a number of special factors, besides the increased optimism among investors concerning an economic upswing and thus expectations of higher short-term yields or higher inflation rates. One factor was the large government issues due to deteriorated government budgets. Risk-management mechanisms also played an important role. Financial institutions' hedging of the interest-rate sensitivity of portfolios of callable US mortgage-credit bonds thus boosted the rise in US yields. The rise in yields made investors sell from their portfolios of US government bonds, which are typically used for hedging[1]. This affected the European yield curve.

The implied volatility of long-term yields fell against the background of decreasing uncertainty among investors concerning the future inter-

[1] See BIS, *Quarterly Review* (September 2003) for a detailed description.

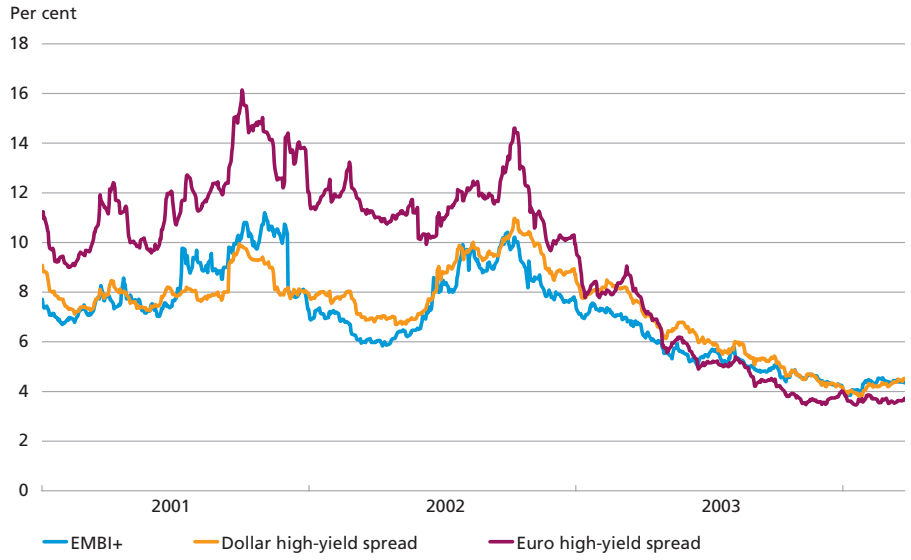
10-YEAR YIELDS IN THE USA, GERMANY AND DENMARK, AND IMPLIED VOLATILITY IN THE EURO AREA, 2000-04 Chart 33



Note: Implied volatility for a 3-month euro swaption where the fixed leg is a 10-year yield.
Source: Bloomberg and Ecowin.

est-rate development, and fewer investors chose to hedge against falling interest rates, cf. Chart 33.

CREDIT SPREADS FOR GOVERNMENT AND CORPORATE BONDS WITH LOW RATINGS, 2001-04 Chart 34



Note: EMBI+, Emerging Market Bond Index+, is a broad interest-rate index for emerging market economies. The index comprises a number of dollar-denominated interest-rate instruments, and at end-2003 it covered 19 countries. Yield spreads for "high-yield" dollar- and euro-denominated corporate bonds are option-adjusted yield spreads for indices of corporate bonds with low credit ratings for the USA and the euro area, respectively, vis-à-vis government bonds.
Source: JP Morgan Chase and Bloomberg (Merrill Lynch).

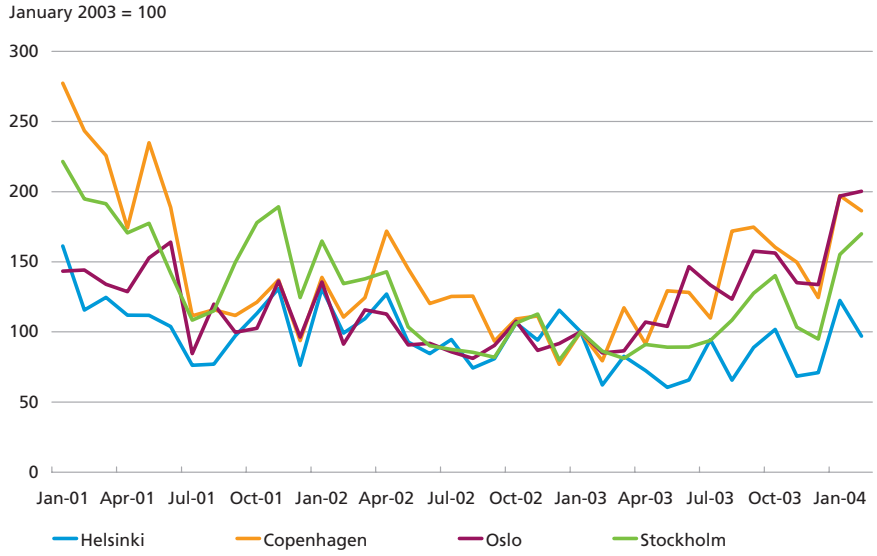
The very low yields on highly-rated government bonds made more investors invest in low-rated bonds in their pursuit of higher returns. The increased demand reduced credit spreads for low-rated government and corporate bonds (high-yield bonds) vis-à-vis highly-rated government bonds, cf. Chart 34.

MARKET IMPACTS ON BANKS

The general development in stock and bond markets has a direct impact on the banks' earnings via value adjustment of their portfolios of bonds and stocks and an indirect impact via their earnings in business areas such as asset management, investment banking and securities settlement. In addition, the general development in the financial markets affects the banks' costs of raising capital.

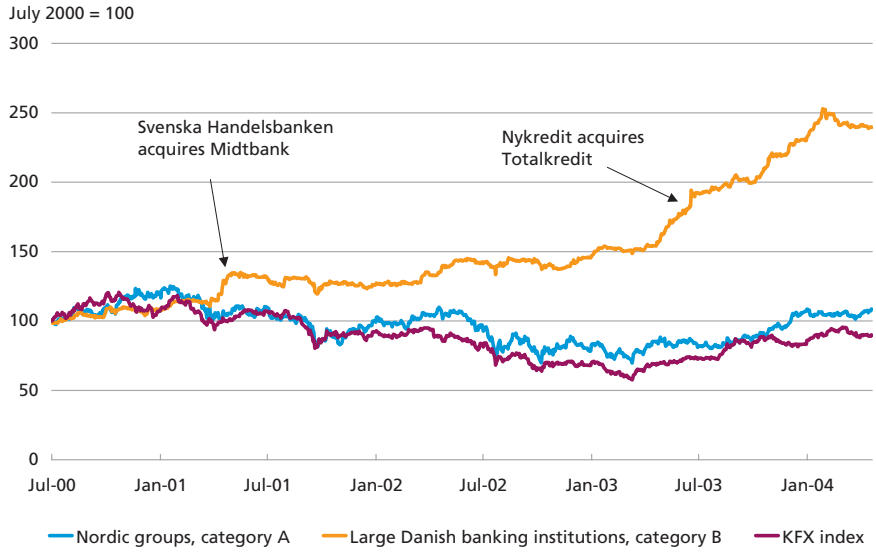
The positive trends in the financial markets during 2003 led to higher fee income from stock-related trade and asset management following the decline in 2002. Prices in the leading stock indices on the Nordic stock exchanges increased, as did the trading volume, cf. Chart 35. However, the number of new companies on the Nordic stock exchanges has not risen, and the merger and acquisition activity is low. Thus, the banks' earnings from investment banking are still limited.

TRADING VOLUME ON THE NORDIC STOCK EXCHANGES, INDEX, 2001-04 Chart 35



Source: The Copenhagen Stock Exchange et al., *The Nordic Securities Market*, monthly statistics.

STOCK-PRICE DEVELOPMENT FOR NORDIC GROUPS, CATEGORY A, AND DANISH BANKING INSTITUTIONS, CATEGORY B, 2000-04 Chart 36



Note: The index is based on total market capitalisation denominated in Danish kroner.
Source: Bloomberg.

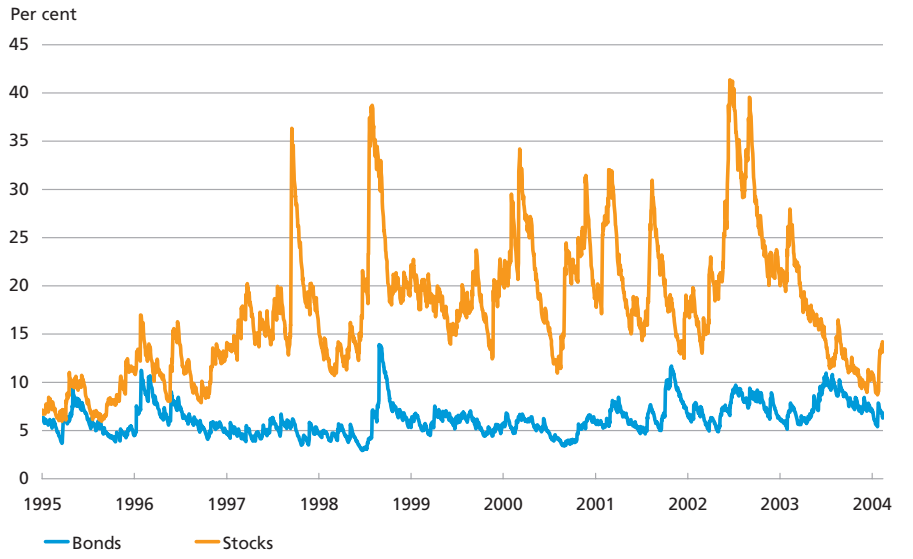
Stock prices for the largest Danish banking institutions in category B have risen considerably in recent years, cf. Chart 36. This may be due to the mergers and merger expectations, which typically cause stock prices to increase.

FINANCIAL STABILITY AND VOLATILITY IN THE FINANCIAL MARKETS

The risk management aimed at reducing the volatility of the financial institutions' individual results may sometimes amplify the overall volatility in the financial markets. Investors' hedging of the risk of callable mortgage-credit bonds may for instance create self-reinforcing interest-rate dynamics. Fluctuating stock and bond prices impact on the financial institutions' earnings and thus directly on financial stability. Chart 37 shows the volatility in the US stock and bond markets during the past nine years. Stock prices are typically much more volatile than bond prices. In recent years, the volatility of stock prices has been relatively high although it has decreased over the past year.

Both the implied and the historical volatility may describe the uncertainty that existed and exists in the financial markets. However, experience shows that financial stability is affected by extreme shifts in volatility rather than by the level of volatility. Financial crises are thus often

HISTORICAL VOLATILITY OF US STOCK AND BOND RETURNS, 1995-2004 Chart 37



Note: Historical annualised volatility derived from an exponentially weighted moving average (EWMA) on the last 30 trading days. A decay factor of 0.94 was used, which means that historical observations have a weight close to zero. The calculation of stock volatility is based on the S&P 500 index. The calculation of bond volatility is based on an index of 7-10-year bonds.
Source: Ecowin and own calculations.

characterised by very large shifts in volatility. Cases in point are the collapse of the stock markets in October 1987 (known as "Black Monday") and the credit crisis in 1998[1].

Table 5 shows the frequency of extreme shifts in stock and bond returns during the past nine years. The extreme returns have been divided into negative (-) and positive (+) returns. The frequency is calculated as the share of trading days with returns (numerically) higher than 2.6 times the standard deviation of the total sample. Under the assumption of normally distributed returns, the probability of such an event is less than 1 per cent.

As appears from the Table, there have been more extreme stock and bond returns than can be expected under the assumption of normally distributed returns. The share of extreme negative and positive returns is generally higher than 1 per cent. This may have an impact on the risk management of financial institutions. For instance, today many financial institutions use Value-at-Risk (VaR) models for risk management, in which extreme fluctuations are often assumed to occur very rarely. Table 5 shows that VaR calculations should not stand alone in risk assessments.

[1] See IMF, *Global Financial Stability Report 2003,* Chapter 3, for a detailed description.

FREQUENCY OF EXTREME RETURNS, 1995-2004 Table 5

Per cent	1995-1999 -	1995-1999 +	2000-2004 -	2000-2004 +	1995-2004 -	1995-2004 +
Stock returns						
S&P 500	0.5	0.6	1.4	2.3	0.9	1.3
Stoxx	0.9	0.3	2.4	2.0	1.6	1.1
KFX	0.8	0.4	2.1	1.4	1.4	0.9
Bond returns						
USA	0.9	0.7	1.9	0.9	1.3	0.8
Euro area	1.1	0.7	1.3	0.8	1.2	0.8
Denmark	1.9	0.7	0.9	0.7	1.4	0.7

Note: The calculations are based on daily returns in the period from 2 January 1995 to 27 February 2004. The calculation of bond returns for the USA and the euro area is based on indices of 7-10-year bonds, and the calculation of bond returns for Denmark is based on an index of 5-10-year bonds. The frequency is calculated as the share of trading days with returns (numerically) higher than 2.6 times the standard deviation of the total sample.
Source: Ecowin and own calculations.

Extreme price fluctuations have become much more frequent in the stock market. The share of extreme stock returns is thus several times higher for the period 2000-04 than for the period 1995-99. This applies to both negative and positive returns. The bond markets have seen more negative than positive returns throughout the period.

Issues related to financial stability

Branches of Foreign Credit Institutions

General economic integration and the creation of the single market are cornerstones of European cooperation. Harmonised regulation of financial companies and common standards have paved the way for the single market for financial services. As a result, cross-border banking activities in the EU have expanded.

The possibility of creating a European Company in the EU as from October 2004 will facilitate mergers across national borders. Hereafter it is expected to become more common for banks to have branches than subsidiaries in other countries. As the first bank, Nordea has announced its intentions of becoming a European Company in 2005, with its registered office in Sweden and branches in the other Nordic countries, including Denmark. Foreign branches, in particular branches that are very large and thus systemic in the host country, present new challenges to the authorities responsible for financial stability.

The existing EU regulation and structure of supervision and oversight do not sufficiently allow for systemic foreign branches. There will be a need for increased binding cooperation between authorities. This issue should be put on the European agenda.

Status of financial integration

Since the end of the 1990s credit institutions in the EU have increasingly engaged in cross-border activity. This trend is driven by intensified competition between the different financial sectors and the utilisation of synergies in the development of various financial products. The development should be seen in the light of further consolidation in the domestic markets being a limited possibility.

The form of cross-border establishments, i.e. branches or subsidiaries, does not show an unambiguous pattern across EU member states. In general, cross-border establishment of branches is the most frequent form, but the units are often very small. Measured in terms of asset size, however, subsidiary establishments dominate. At present, statistics on the frequency of transformation from subsidiaries into branches are not available.

The Nordic countries have seen a number of cross-border mergers. Several of the groups in category A have thus become pan-Nordic with considerable market shares in several countries, cf. Box 13. Financial integration of the credit-institution sector is more advanced in the Nor-

dic countries than in the rest of the EU, but cross-border activity is also found in other parts of the EU and will expand as a consequence of the enlargement by 10 new countries.

In several accession countries cross-border activities of credit institutions domiciled in the EU already account for a considerable part of the

EXAMPLES OF CROSS-BORDER GROUPS IN THE NORDIC COUNTRIES AND THE EU — Box 13

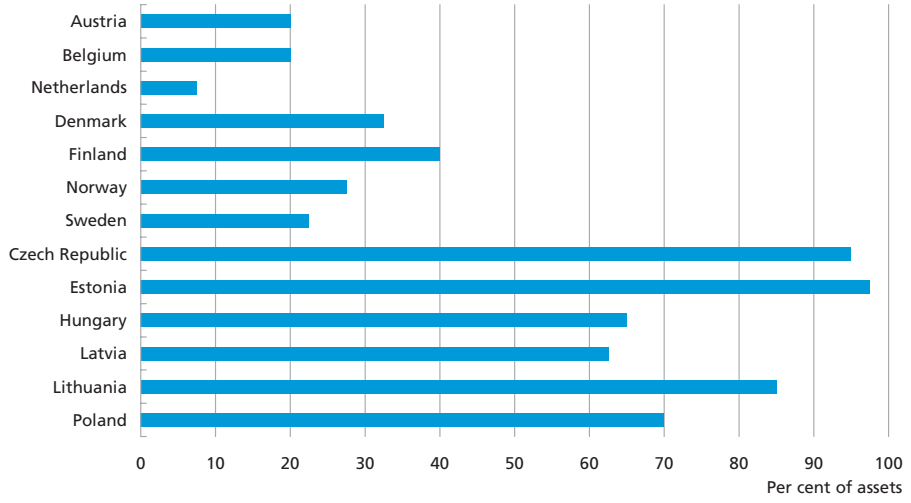
The structural development in the Nordic credit-institution sector provides several examples of cross-border acquisitions with subsequent creation of a branch structure.

- In 1997, Swedish Nordbanken and Finnish Merita formed a group. Subsequently, Danish Unidanmark was included in the group in 2000. In the same year Norwegian Christiania Bank was acquired. In 2001, the name of the group was changed into Nordea. So far, the banking part of Nordea has been a subsidiary structure, with a parent bank resident in Finland and subsidiaries in Denmark, Norway and Sweden. In 2003, Nordea announced its intentions of transforming the group into a European Company with its registered office in Sweden and subsidiaries in Denmark, Finland and Norway in 2005 and subsequently transforming the subsidiaries into branches. Nordea has considerable market shares in each of the Nordic countries.
- Danske Bank acquired Swedish Östgöta Enskilda Banken in 1997 and Norwegian Fokus Bank in 1999. In 1998, Östgöta Enskilda Banken was transformed into a branch of Danske Bank whereas Fokus Bank is still licensed separately in Norway as a subsidiary of Danske Bank. Besides the considerable market share in Denmark, Danske Bank has thus achieved quite significant market shares in Norway and Sweden.
- Svenska Handelsbanken acquired Midtbank in 2001. Midtbank was subsequently transformed into a branch of Handelsbanken in 2002. Besides considerable market shares in Sweden and Finland, Handelsbanken thus has a quite significant market share in Denmark.

Similarly, other EU member states have seen examples of cross-border groups. So far, these groups mainly conduct cross-border business in the form of subsidiaries.

- German Hypovereinsbank's acquisition of Austrian Bank Austria in 2001. In addition, Hypovereinsbank has large market shares in Poland, Hungary and the Czech Republic.
- Austrian Erste Bank has a large market share in the Czech Republic.
- Belgian KBC has large market shares in the Czech Republic, Poland and Hungary.
- Belgian Fortis and Dexia have handsome market shares in Luxembourg, and Fortis has a decent market share in the Netherlands.
- German Commerzbank has handsome market shares in the Czech Republic, Poland and Hungary.
- Dutch ABN Amro and ING both have considerable market shares in EU member states other than the Netherlands. For instance, ING has a considerable market share in Belgium and a handsome market share in Poland while ABN Amro conducts business in the Czech Republic.

ESTIMATES OF FOREIGN BANKS' SHARES OF THE BANKING SECTOR IN SELECTED COUNTRIES, 2001-02 Chart 38



Note: For the accession countries the estimates are based on the shares of assets belonging to banks with foreign majority shareholders. The latest observations are for 2001. For the other countries the shares are calculated as foreign branches' and subsidiaries' shares of the total banking-sector assets. The latest observations are for 2002. Data for Finland are based on estimates.
Source: ECB, the European Commission and national central banks.

financial systems, cf. Chart 38. This applies in particular to the Baltic states where the markets are widely dominated by Nordic credit institutions.

EU regulation and EU authority responsibilities

Financial integration is part of the process towards the creation of a single market for financial services in the EU. EU legislation has contributed to harmonising the basis for conducting financial business and has removed national barriers to the establishment of cross-border financial activities. Thus, financial enterprises from other EU member states are not discriminated in the national markets. This development was initiated in the early history of the EEC/EU and is still one of the cornerstones of European cooperation, cf. Box 14.

The majority of regulatory measures in the EU have aimed at "removing" national borders for the conduct of financial business. Supervision of financial companies, however, is a national matter. A bank has only one home country – which is where the bank is licensed. Other countries in which the bank conducts business, either through a branch or via cross-border activities, are host countries. A subsidiary's home country is the country where it is resident and independently licensed.

EVOLUTION OF THE FRAMEWORK FOR FINANCIAL INTEGRATION IN THE EU Box 14

- Actual integration commenced already in 1977 with the implementation of the first banking directive permitting the establishment of branches in other member states, primarily under home-country supervision.
- This was followed by the second banking directive in 1989, which enabled banks to pursue business in other member states based on their home-country licence merely by informing the host country of their presence in the form of a branch or cross-border activities (the single-licence principle, European passport).
- Deregulation of financial transactions at the end of the 1980s meant a great advance towards an integrated banking market in the EU.
- The introduction of Economic and Monetary Union (EMU) and the single currency in 1999 increased focus on the status of financial integration, as integration of the financial markets is required in order to attain the full benefits of the euro.
- In that connection, the European Commission launched the Financial Services Action Plan aiming at further developing financial regulation and harmonisation. The plan includes legislation, regulation and supervision and must be implemented by the end of 2005. An important step in the practical implementation of the financial integration was the adoption in 2001 of the regulation on the European Company, permitting mergers across national borders, cf. Box 15.

The member states are obliged to recognise that the licensing rules applying in a bank's home country also constitute sufficient provisions permitting the bank to offer its services in other EU/EEA countries.

Home-country supervision means that the principal supervision of a bank's activities, including supervision of its financial soundness, is the responsibility of the authority in the country where the bank is licensed. However, supervision of the branch's liquidity is the responsibility of the host country. This means that the host country's liquidity provisions apply to branches of foreign banking institutions. The precise implications of the host country's responsibility to supervise liquidity are not clear, however, as a branch's liquidity in practice depends on the bank's global liquidity. Liquidity rules have not been harmonised at EU level, and these rules may vary considerably across member states.

Any central-bank responsibility for an EU branch is not regulated by the EU. The central bank in the host country retains full responsibility for measures taken as part of its monetary policy. However, such measures may not lead to discrimination or restrictive treatment of banks licensed in another member state.

Transformation into branches

A group with cross-border activity in the form of subsidiary banks is subject to its home country's (supervision, company, etc.) legislation applying to the parent company and the group as a whole. At the same time,

THE EUROPEAN COMPANY Box 15

The European Company (SE) has been adopted in the form of a regulation[1], and the effects of the new legislation are thus expected to be the same in all EU member states. A European Company can be created in four ways: by merger, by formation of a holding company, by formation of a joint subsidiary or by transformation of an existing national company. Formation by merger and formation of a holding company are available only to EU companies whose registered offices are located in different member states. The registered office of an SE must be designated in its articles of association and must be the place where it has its central administration, i.e. its true centre of operations. However, the registered office can be transferred according to specific procedures. Presentation of annual accounts, winding-up, insolvency and suspension of payments are in large measure to be governed by national law in the country where the company has its registered office.

The European Company does not affect the supervisory regulation of financial companies. However, it will in future be technically far simpler to merge across national borders and transfer the registered office, and more financial groups are therefore expected to transform into European Companies. A member state (including the supervisory authority in that member state) can only oppose a merger of companies into a European Company or a change of the registered office under the articles if public interest weighs heavily in favour.

[1] EC 2157/2001 of 8 October 2001.

the individual subsidiaries are subject to regulation in the countries where they are resident and independently licensed. By contrast, as mentioned above, a group with branches is primarily regulated in its home country, and supervision is conducted from the home country.

Transformation from a group structure with subsidiaries into a branch structure may thus reduce the complexity of the group's administration, which is a consequence of, inter alia, being subject to various countries' sets of rules. Such simplification may enhance business flexibility. For example, the allocation of capital and risks in the bank does not have to allow for exposure limits or capital requirements for each branch, as is the case for subsidiaries. Only the bank as a whole must comply with the rules. There are also administrative advantages. For instance, it is easier to integrate branches fully into the bank's systems, e.g. risk-management systems and IT platforms, as, unlike subsidiaries, branches are not required to be able to operate independently of the remaining group. Finally, there is no requirement of external accounts for branches, and supervisory reporting is on a much smaller scale.

In future, it will be much simpler[1] to transform a group with subsidiaries into a bank with branches. As from October 2004 it will be possible

[1] By way of universal succession.

to create a European Company, "Societas Europaea"(SE), in all sectors, cf. Box 15. A European Company is a company subject to independent legislation so that companies founded in different member states can merge or form a holding company or a joint subsidiary. Legal and practical problems due to different legal systems are thus avoided.

Transformation into a branch must still be approved by the supervisory authorities. The considerations applying to the granting of such approvals will be similar to the considerations applying to the granting of licences to conduct banking activities, i.e. transformation into branches may not prejudice the interests of depositors. A precondition is that the continuing bank's liquidity and solvency are sound, and that the bank is equal to the task in terms of management and operation. In addition, supervision of the continuing bank must be feasible. In case of cross-border mergers, this approval will be granted by the supervisory authority in the home country, and the approval procedure as a whole is subject to EU law.

Large branches and financial stability

Where a bank has foreign branches that are as large as or larger than the home-country entity, or the branch in the host country is large enough to be of systemic importance, the home and host countries have a common interest in ensuring financial stability in the countries concerned. A case in point will be Nordea when it transforms into a branch structure with a registered office in Sweden and branches in Denmark, Finland and Norway.

As regards financial stability, the main difference between branches and subsidiaries is that branches are not legal entities. Branches are an integrated part of the parent company, and the financing of branch activities and cash flows from branches are inseparable from the parent company's total financing and liquidity flows. Unlike subsidiaries, branches thus cannot experience liquidity problems – except very temporarily – or problems complying with statutory solvency requirements. Such problems are reflected solely in the overall picture of the group or parent company.

Thus, it is not possible to assess a branch's financial soundness and resilience separately or take action against a branch to protect the financial system from any contagion arising from solvency or liquidity problems of the parent company.

On the other hand, a branch will interact with the general economy of the host country in the same way as other banks. If a branch's activities and related risks are substantial to the host country's economy, the bank will have an impact on financial stability in the host country.

The legal structure in itself does not influence a credit institution's access to national payment systems. In other words, a branch, on equal terms with other banks, may be a central participant in the individual host countries' payment systems. The risk of problems spreading via the national payment systems is thus the same for branches and other banks.

A general tightening of a bank's extension of credit – for instance, if the supervisory authority in the home country has instructed the group to reduce risks – may affect the total credit supply in the host countries via the bank's branches. In particular, tightening of credit extension to the corporate sector and other banking institutions with relatively large credits may cause problems refinancing terminated exposures. It may be difficult for the rest of the financial system to absorb large exposures involving a substantial capital burden and great demands of credit-rating capacity. In the short term, borrowers may have problems finding alternative sources of credit at no considerable cost, which may influence the extension of credit in society as a whole and thus the macro economy

In principle, the host-country authorities have no knowledge of the risks related to a branch's activities. For supervisory purposes, the bank reports in full to the home-country authority. In addition, branches, unlike subsidiaries, do not prepare separate annual reports, and the consolidated accounts of financial groups do not necessarily provide information that permits external assessment of activities and risks at branch level. Local branch risks cannot always be separated from the overall risk picture of the bank, and reporting to the public is not required unless such risks are relevant or material to the bank as a whole.

A comprehensive picture of the risks in the host country therefore requires knowledge of both specific risks related to the activities of a systemically important branch in the host country and the bank's global risks.

The bank's statistical reporting does not necessarily provide a comprehensive picture of the activities in the individual countries either. If specific activities are all booked in one country, the statistical information may show strange shifts that do not indicate underlying changes in the customers' business. Consequently, the statistics do not provide the intended information. However, this problem may also arise in a group structure with subsidiaries.

The host-country authorities have no insight into a group's risk situation, whether or not the group's activities in the host country may influence financial stability. Furthermore, the host-country authorities do not have access to instruments that can directly contribute to restoring confidence in a bank with a branch in the host country. In other words,

a host country cannot on its own prevent or limit the social costs of a crisis in a bank that has a systemically important branch in the host country.

Cooperation between home-country and host-country authorities

When one of the largest financial institutions in a country becomes a branch of a foreign credit institution, it presents new challenges, mainly to the supervisory authority. Furthermore, deposit guarantee schemes are fundamentally national and may thus be difficult to adapt to comprehensive cross-border activities, cf. Box 16. Finally, the role of central banks is closely related to national supervisory issues.

Cooperation between home-country and host-country supervisory authorities is based on the principle of home-country supervision. The home-country supervisory authority alone is responsible for solvency supervision.

However, a prerequisite is that home-country supervision of branches in the host country is conducted in cooperation with the host-country supervisory authorities, which have more profound knowledge of the local markets.

In 2000, the Nordic supervisory authorities concluded a general Memorandum of Understanding (MoU) on multilateral cooperation. This MoU concerns the establishment of branches, exchange of information on branches, on-site inspection, free exchange of services and acquisition/supervision of subsidiaries. In addition, MoUs have been concluded in relation to specific Nordic banking groups/conglomerates.

If large branches are capable of influencing financial stability in the host country, more binding cooperation between home-country and host-country authorities than already envisaged should be incorporated in EU legislation. The home-country supervisory authority should have an interest in cooperating with the host-country supervisory authorities in order to gain insight into activities in the host countries and benefit from expertise on local conditions. This provides for the best possible overall risk assessment of the bank. Similarly, the host-country supervisory authorities should seek cooperation in order to gain insight into the management of risks, not only in the specific branches, but also in the bank as a whole. In general, home-country and host-country authorities thus have a clear common interest, but there is no framework for binding cooperation as such. EU regulation, and consequent distribution of responsibilities, does not sufficiently allow for large branches.

This problem will be aggravated in the event of a crisis in a bank with systemically important branches in other countries as crisis management and resolution may vary across countries. Reconstruction and winding-

BRANCH STRUCTURES AND DEPOSIT GUARANTEE SCHEMES Box 16

A banking institution domiciled in Denmark must participate in the Danish deposit guarantee scheme. A branch of a foreign bank domiciled in the EU/EEA will be covered by the deposit guarantee scheme in the bank's home country. The branch may choose to purchase supplementary deposit cover under the Danish deposit guarantee scheme if the home-country guarantee is lower than the Danish scheme (topping up).

The general framework for deposit guarantee schemes in the EU member states is based on the directive on deposit guarantee schemes of 1994. The directive contains a set of minimum requirements, e.g. all credit institutions must be part of a deposit guarantee scheme and of a minimum guarantee for the cover of the schemes. In addition, the directive sets up a framework for the use of topping up.

The deposit guarantee schemes are fundamentally national and may thus be difficult to adapt to comprehensive cross-border activities. This is reflected in e.g. the differences in amounts and types of deposits covered by the various schemes. Furthermore, the cover criteria of the schemes, their financing models and capital levels, as well as their general institutional set-ups may vary. Examples:

- The Nordic deposit guarantee schemes cover different amounts and different types of deposit. For instance, the Danish deposit guarantee fund covers up to kr. 300,000 for ordinary deposits whereas special types of deposits are fully covered. The Swedish deposit guarantee covers up to 250,000 Swedish kronor whereas the Norwegian deposit guarantee covers up to 2,000,000 Norwegian kroner.
- The Danish deposit guarantee fund is membership-based and financed by the banking institutions' current payments and mutual warranties of the fund's minimum capital. In Sweden, the deposit guarantee scheme is a public institution located with the Swedish financial supervisory authority. On withdrawal from the Danish scheme a banking institution's contributions (payments and warranties) are repaid. The schemes in Finland, Norway and Sweden are financed like insurance schemes, i.e. by the payment of current premiums. Likewise, premiums paid are not repaid if an institution withdraws from the scheme.
- The deposit guarantee schemes cover in different situations. In Sweden, the scheme covers only in cases of compulsory winding-up whereas the Danish and Norwegian schemes can also pay compensation in cases of serious and persistent payment problems.

up procedures provided by EU legislation are based on the principles of mutual recognition and home-country control. In the event of problems in a bank with branches in other EU member states, winding-up of branches will primarily be subject to rules and procedures of the home country. The home-country authorities have full responsibility for crisis management also in the host country.

In June 2003, the Nordic central banks concluded a MoU on crisis management for Nordic groups/conglomerates with subsidiaries in several Nordic countries.[1] This MoU does not apply to cooperation concerning

[1] www.nationalbanken.dk.

branches. At present, there is no legal basis for central-bank cooperation on crisis management. It is crucial to the host countries that any formal framework for actual central-bank cooperation entails full and equal access to information on both the branch's and the bank's global financial position and risks. To this end host-country and home-country supervisory authorities have to engage in binding cooperation. The home country should not have an information advantage. Furthermore, cooperation should be based on mutuality while location of home and host countries should not be determinant.

Systemic Risks in the Danish Market for Uncollateralised Overnight Deposits

This chapter analyses systemic risks in the market for uncollateralised overnight deposits. For this purpose, systemic risk is defined as the risk that difficulties experienced by one institution may trigger a chain reaction resulting in other institutions also experiencing problems. Such contagion may threaten financial stability. Specifically, the consequences if a major market participant unexpectedly has difficulties meeting its obligations in the money market are simulated. The analyses operate with two distinct scenarios. The first one analyses the effect on the other institutions' capital buffers; the second one the effect on their liquidity buffers.

The simulations show that the effect on the capital buffers is the greater of the two. On three of the ten days analysed, other institutions are subsequently affected. In the liquidity buffer scenario, only one institution is affected on one day.

Overall the systemic risks are deemed to be limited. However, it cannot be ruled out that unexpected difficulties experienced by individual participants may have systemic effects.

THE UNCOLLATERALISED OVERNIGHT MONEY MARKET

The Danish money market is the market for loan agreements and interest-rate derivatives in kroner with a maturity of up to one year between credit institutions. The money market, also known as the interbank market, is mainly used to exchange krone liquidity and to manage short-term interest-rate positions. Consequently, exposures are established between the institutions.

Overnight loans account for around two thirds of the liquidity exchanges in the money market. The turnover comprises uncollateralised deposits, repos and foreign-exchange swaps.

At end-2003, Danmarks Nationalbank's monetary-policy counterparties comprised 117 credit institutions. In the period 22 September 2003 to 18 March 2004 approximately half of them had at least one uncollateralised overnight transaction with a counterparty. On average, the total market for uncollateralised overnight deposits among the monetary-policy

counterparties is approximately kr. 9 billion per banking day. The market is relatively concentrated with the six largest institutions accounting for around two thirds of the turnover.

METHOD AND LIMITATIONS

The basic purpose of the analysis below is to examine whether unexpected events in one institution trigger a chain reaction leading to problems for other institutions and thus threatening financial stability. Only uncollateralised overnight deposits among Danish institutions with a current account at Danmarks Nationalbank are considered (i.e. Danmarks Nationalbank's monetary-policy counterparties). Box 17 describes the data.

The analysis is based on an extreme scenario assuming that the institution with the largest gross deposits of uncollateralised overnight deposits unexpectedly ceases to meet its obligations on a given day. This is assumed to lead to direct losses for the institutions that have provided uncollateralised loans to the institution in question. Some of the other institutions may thus experience problems if the amounts are sufficiently large. This can trigger a chain reaction whereby several other institutions may have problems meeting their obligations.

DATA FOR SIMULATIONS — Box 17

The data for the main part of the analysis is a calculation of the turnover in uncollateralised overnight deposits in the period 22 September 2003 to 18 March 2004. The starting point for the calculations are payments made via Danmarks Nationalbank's payment system, Kronos. The underlying intuition is relatively simple. For instance, if on Monday bank A grants an overnight loan of kr. 100 million to bank B, the transaction will entail a payment of kr. 100 million from bank A's to bank B's current account at Danmarks Nationalbank on the same day. When the loan is repaid with interest the following day (Tuesday), a payment of kr. 100 million plus interest from bank B's current account to bank A's current account occurs. A search algorithm thus runs through payments between current accounts and – on the basis of a number of assumptions regarding interest and amounts – identifies uncollateralised overnight deposits. In this way a matrix can be set up, by means of which the counterparties' mutual exposures can be calculated. This enables calculation of any systemic effects for this market segment.

To check the positions calculated, they have been compared with reports from a questionnaire survey for selected banks. This random sampling confirms that it is possible to identify uncollateralised overnight deposits via the method described.

Note: This method is inspired by an analysis of the systemic risks in the US interbank market, see Craig Furfine: Interbank Exposures: Quantifying the Risk of Contagion, *Journal of money, credit and banking,* Vol. 35, No. 1, February 2003. An equivalent analysis method is used by Stephen Millard and Marco Polenghi from the Bank of England in The relationship between the overnight interbank unsecured loan market and the CHAPS Sterling system, Bank of England *Quarterly Bulletin*: Spring 2004

TREATMENT OF BRANCHES OF FOREIGN INSTITUTIONS IN THE ANALYSIS Box 18

For two reasons, branches of foreign institutions are not included in the analyses at present. Firstly, in a Danish context they are too small in relation to the parent group. Secondly, it is difficult to distinguish between liquidity and capital in the branch and group, respectively. As described in the chapter on branches of foreign credit institutions, the development indicates that foreign branches will gain increasing importance in the individual countries.

Initially it is assumed that the institutions lose their entire exposure. Subsequently the sensitivity is analysed if a given proportion of the exposure is recovered[1].

It is important to realise that uncollateralised overnight deposits only account for a part of the transactions among these institutions. The analysis in this chapter therefore gives only a partial picture of the systemic relations.

Analyses of this type are typically based on problems in the institution with the largest gross deposits. However, it should be noted that the institution with the largest gross deposits is not necessarily the one that could generate the greatest systemic effects.

There are almost 190 banking institutions and mortgage-credit institutions in Denmark, of which approximately 70 do not hold current accounts at Danmarks Nationalbank. The latter are typically small institutions that effect payments, etc. via correspondent agreements with other institutions. The analysis in this chapter only comprises institutions with a current account at Danmarks Nationalbank, which suggests that any systemic effects are underestimated if a bank acting as a correspondent bank ceases to meet its obligations.

The simulations cover two different scenarios. The first one takes into account the institutions' capital in excess of the statutory 8-per-cent solvency ratio or 4-per-cent core capital[2]. The second scenario considers the institutions' access to liquidity in a situation where their loans are not repaid. The detailed assumptions underlying the two scenarios are described below. In general the scenarios are simplified. The analyses do not take into account the fact that the situation described may occur over some time and thus offer an opportunity to react. The results should therefore be interpreted with caution.

[1] In reality the exact loss is not known until some time later. Studies involving US banks show that the percentage recovered varies between 40 and 95 per cent. See Craig Furfine, Interbank Exposures: Quantifying the Risk of Contagion. *Journal of Money, Credit and Banking*, Vol. 35, No. 1, February 2003.

[2] I.e. either the part of the core capital exceeding the statutory 4 per cent or the part of the liable capital exceeding the statutory 8 per cent (both in relation to risk-weighted assets).

RESULTS FROM OTHER COUNTRIES Box 19

Analyses of systemic risks based on estimation of the banks' bilateral exposures have also been performed in other countries.

On the basis of transactions in the US payment system, Fedwire, Craig Furfine estimates the systemic risks in the US inter-bank market attributable to uncollateralised overnight deposits. The method applied in the analysis resembles the one used by Danmarks Nationalbank in this analysis. For instance, an attempt is made to quantify the effect if the institution with the largest deposits fails. Furfine's analysis shows that if 60 per cent of the exposures are ultimately lost (i.e. a recovery rate of 40 per cent), two to six banks are subsequently affected to a degree that entails a risk that they will also fail. The institutions experiencing difficulties are typically relatively small, but in a few cases banks with balance-sheet totals of approximately USD 30 billion will also suffer serious problems.

Via a questionnaire survey, Sveriges Riksbank has looked into the systemic effects between the four largest banks. Unlike Furfine's analysis and the analysis in this chapter, Sveriges Riksbank has data from only few reporting dates at its disposal. The result of the simulations shows that even on the assumption that the full exposure is lost, no banks lose their entire core capital on the days under review, and thus they do not subsequently experience difficulties. If, however, the analysis parameter is the access to liquidity, the survey shows a risk on the days in question that several of the other participants will incur liquidity problems.

Source: Craig Furfine: Interbank Exposures: Quantifying the Risk of Contagion, *Journal of money, credit and banking,* Vol. 35, No. 1, February 2003. Sveriges Riksbank, *Financial Stability Report* 1, 2003

Scenario 1 – capital buffer

This scenario considers the exposure in relation to an estimate of the institutions' capital in excess of either the statutory 8-per-cent solvency ratio or the 4-per-cent core capital requirement relative to risk-weighted assets. The amount in question comprises the institution's excess capital reserves and revenues in the current year.

The simulations thus assume that an institution will subsequently experience problems if the total capital buffer is less than the institution's exposure vis-à-vis the institution not meeting its obligations. It is also assumed that the institutions are unable to change the composition of their risk-weighted assets in the short term.

Scenario 2 – liquidity buffer

The second scenario analyses the institutions' access to liquidity in relation to their bilateral exposures. If a given institution cannot meet its obligations, institutions with claims on the institution in question will not receive the liquidity they expect. If these institutions cannot raise sufficient alternative liquidity, a chain reaction may be triggered. At present no analyses have been made to disclose the extent to which this may disrupt the general settlement of payments.

It is assumed that the immediate liquidity buffer is the institutions' maximum intraday access to current-account overdrafts against pledging collateral to Danmarks Nationalbank[1]. Thus other options to raise liquidity, including any drawing facilities at other institutions, are disregarded. It is assumed that the problems experienced by the largest participant occur in the morning, before the payment systems open. Consequently, access to liquidity once the payment systems open constitutes the maximum liquidity buffer[2].

RESULTS

For analysis purposes the 10 days with the highest turnover in uncollateralised overnight deposits, in the period 22 September 2003 to 18 March 2004, have been selected. On these 10 days, an average of 20 institutions had at least one uncollateralised overnight money-market loan. The average turnover per day was approximately kr. 16.5 billion. The highest turnover was kr. 18.7 billion.

Chart 39 shows the number of institutions that lose more than their capital buffer or liquidity buffer on these days if the institution with the largest deposits unexpectedly experiences problems meeting its obligations. In the current capital situation, this would on average entail that less than one institution would subsequently experience problems. On the day with the largest effects, four institutions are affected, while no effect is registered on seven days. There is no systematic picture of the institutions which are typically hit. As regards liquidity, the effect is less pronounced. Only one institution has insufficient liquidity during these 10 days.

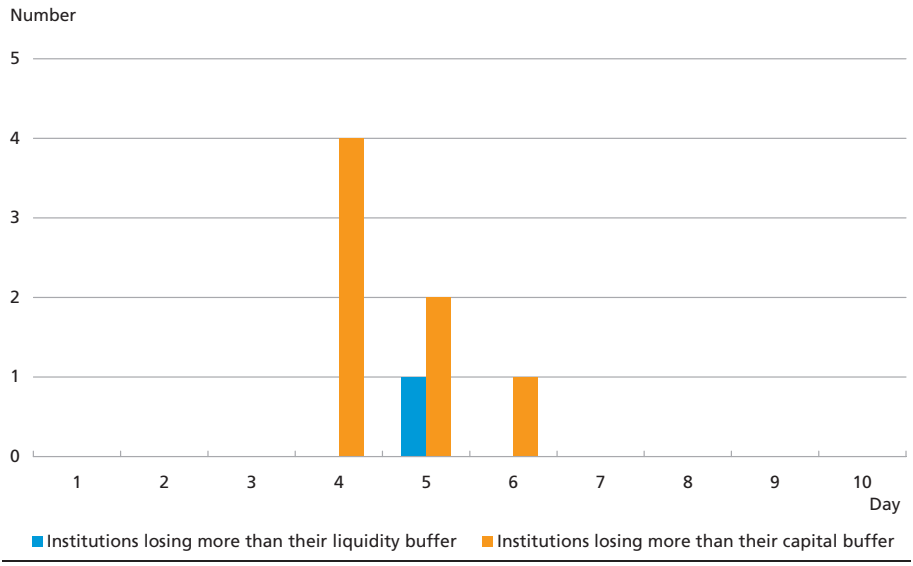
The number of links in the chain may vary. If an institution's problems in meeting its obligations entail direct problems for other participants, and the effects subsequently cease, this is an effect of the "first order". If the problems experienced by the institutions affected in the first instance lead to difficulties for other institutions, this is an effect of the "second order", etc. On the day when four institutions are affected, a capital-buffer effect of the second order is seen. On the other two days when effects are registered they are only of the first order. Since only one institution is affected in terms of liquidity, these effects are by definition of the first order.

---

1 The maximum intraday overdraft access is determined by the current-account balance, the pledgeable value of certificates of deposit, approved bonds pledged to Danmarks Nationalbank, and utilisation of the automatic collateralisation agreement.

2 In addition, repayment of uncollateralised overnight money-market loans typically takes place from the morning, when the payment systems open, which makes it plausible to operate with liquidity access at this time.

SYSTEMIC EFFECTS ON THE 10 DAYS WITH THE HIGHEST TURNOVER Chart 39



Note: Day 1 is the day in the period which saw the largest turnover. Day 2 saw the second largest, etc.
Source: Danmarks Nationalbank.

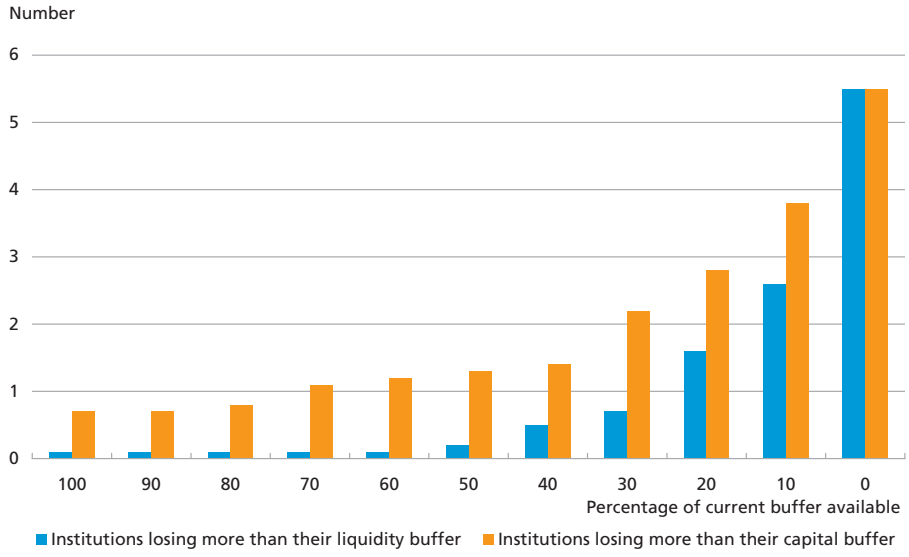
As mentioned, the simulations are based on the period's 10 days with the largest turnover in uncollateralised overnight deposits. To get an idea of whether the results are representative, additional simulations have been performed for 10 days with turnover close to the average turnover in the period. On these days the number of institutions with insufficient capital buffers is reduced to one institution on one day. At the same time, the liquidity buffer proves to be sufficient to prevent any systemic effect.

To assess the sensitivity of the results, it is assumed that the institutions' current capital and liquidity buffers are reduced. This naturally entails that other institutions subsequently experience difficulties. Chart 40 shows that if the capital buffer is reduced to 70 per cent of its current value, an average of just over one institution per day will experience difficulties. In terms of liquidity, the current liquidity must be reduced to 20 per cent before more than one institution a day finds itself in difficulties.

If it is assumed that the institutions do not lose their full exposure, but only part of it, the effects are correspondingly lower[1]. Simulations show that if institutions recover just 25 per cent of their exposures, the current capital buffers will not entail systemic effects on the days analysed.

[1] This is only relevant for the simulations of the capital buffer, since the recovery percentage is calculated with a time lag. For liquidity, the problem occurs immediately, and consequently there is no point in looking at recovery.

SENSITIVITY TO BUFFER SIZE — Chart 40



Note: Average per day for the 10 banking days in the period which saw the largest turnover.
Source: Danmarks Nationalbank.

Market-Based Risk Measures for Banks

The purpose of market-based risk measures is to take advantage of the information on e.g. the investors' expectations for the future contained in bond and share prices. This information may supplement the accounts-based analysis of the banks in the chapter on the financial sector. Market-based risk measures are founded on a number of assumptions as to the efficiency of the financial markets and as to whether the assets are sufficiently liquid for the price development to reflect information about the level of risk. In addition, market-based indicators are influenced by general trends in the financial markets.

When market-based analyses are used to assess the banks' risks, it is important to consider the specific regulation applying to banks. This chapter introduces a share-based risk measure, distance to insolvency, that takes into account the significance of the capital-adequacy regulation of banks. The distance to insolvency for the Nordic banking groups shows a strengthening during 2003, as a result of the generally calmer financial markets after the end of the war in Iraq, among other factors.

MARKET-BASED ANALYSES

The price development of financial assets issued by banks may provide information on how financial markets assess risk in banks. This information may be summarised in market-based risk measures, supplementing accounts-based analyses.[1] Market-based indicators have a number of advantages in that they may be forward-looking, they reflect the expectations of a wide range of investors, and data is available with a high frequency. However, the use of market-based indicators assumes a liquid market for financial assets issued by the banks, which is only the case for the largest Danish banks. Furthermore, the prices are influenced by factors that are not specific to the individual bank, but result from a general trend in e.g. the stock market. Finally, shares or bonds issued by a bank may be priced on the basis of other considerations than expected return and risk.

[1] See also financial stability reports from the European Central Bank (ECB), the Bank of England, Sveriges Riksbank, etc.

The most frequently used market-based risk measures are founded on bond or share prices. Furthermore, the price of hedging credit risk on assets issued by banks, i.e. the price of credit default swaps (CDS),[1] may be used. CDS are not frequently used in Denmark.

Bond-based risk measures

The large banking institutions issue bonds as supplementary financing to e.g. deposits. Contrary to depositors, bank-bond investors are not protected by deposit insurance. Bonds may be issued as subordinate debt that may be included in a bank's capital base within certain limits. The credit spread on bonds issued as subordinate debt, i.e. the difference between the yield demanded by investors if they are to invest in the bank's bonds and a risk-free yield such as the government-bond yield, is an indicator of how the investors assess the risk for the bank in question.

Chart 41 illustrates the credit spread for euro-denominated bonds issued by the Nordic groups, category A, relative to a benchmark euro government bond since January 2002. The groups' issues in euro were chosen to eliminate the effect of exchange-rate fluctuations. Furthermore, these issues are large and relatively liquid.

In 2003, the credit spread declined for all Nordic groups as a result of the general development in the financial markets. An analysis performed by the ECB shows that bond-based risk measures are robust indicators until six months before the bank experiences problems, e.g. a downrating.[2]

Bond-based indicators have certain weaknesses as risk measures for banks. Since maturity, etc. may vary considerably, bonds issued by the banks are not homogenous and thus difficult to compare. When credit spread is used as a forward-looking risk measure, bonds should furthermore be traded regularly.

Share-based risk measures

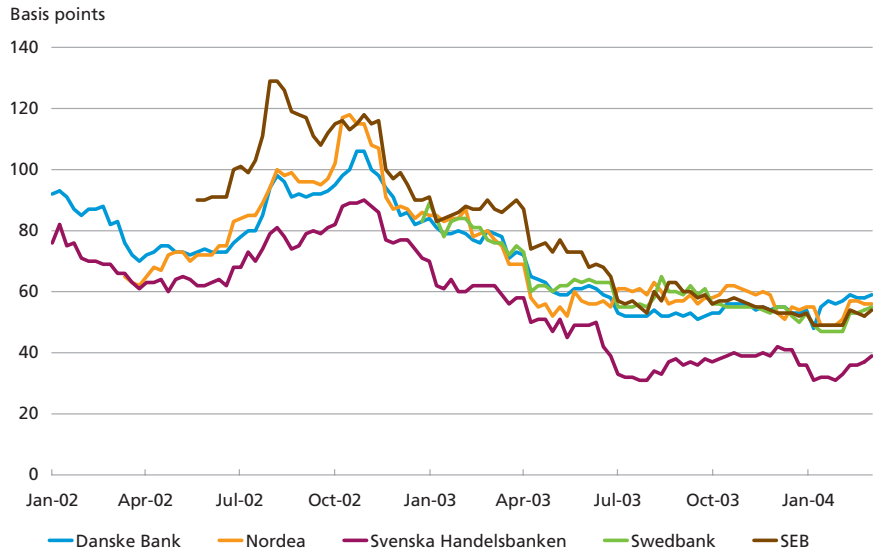
Equity owners, i.e. shareholders, rank last among the creditors in the event of default and thus bear the greatest credit risk. The ECB's analysis

---

1 In a credit default swap (CDS) on e.g. bonds issued by a bank the seller of the CDS accepts to compensate the buyer of the CDS in case the bank defaults on the bond. In return for assuming the credit risk on the bank, the seller receives a stipulated premium from the buyer of the CDS. The premium reflects the seller's perceived credit risk on the bank in question, i.e. the probability that the bank goes into liquidation during the term of the CDS as perceived by the seller. See Suzanne Hyldahl, Credit Derivatives – Possible Implications for Financial Stability, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2001.

2 See Groop, Reint, Jukka Vesala and Giuseppe Vulpes, Equity and bond market signals as leading indicators of bank fragility, the European Central Bank, *Working Paper*, No. 150, June 2002.

CREDIT SPREADS FOR THE NORDIC GROUPS, 2002-04 Chart 41



Note: The Chart shows the credit spread to a euro-denominated benchmark bond for bonds included as subordinate debt. Since the bonds have different terms to maturity, issue dates, etc., the credit spreads of the different groups are not immediately comparable.
Source: Bloomberg.

shows that share-based risk measures are robust indicators 1½-½ year prior to a bank encountering problems.

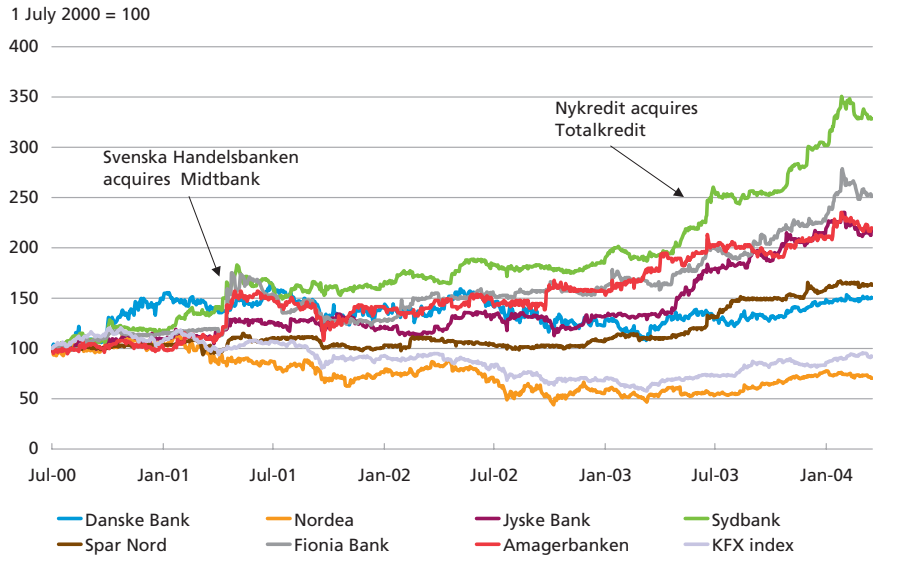
In the following three types of share-based risk measures are considered: share-price gap, distance to default, and distance to insolvency. The advantage of share-based risk measures is that a share is by definition a stake in the company's equity capital. Share-based risk measures thus avoid the comparability problems of bond-based measures. The limited liability of the shareholders means that they cannot lose more than the capital invested while the gain is in principle unlimited. This asymmetric return profile means that the shareholders have an option-like properties, i.e. a share can be seen as an option on the company's assets.[1]

Like bond-based measures, share-based measures are subject to the requirement that the shares must be liquid and thus frequently traded. This is only the case for the shares of the major Danish banks.

Chart 42 shows that the pattern of share prices varies relatively strongly between the banks in the period under review, 2000-04. This does not necessarily mean considerable variations in performance between the Danish banks in the period, but rather that the shares of

[1] Merton, R, An analytical derivation of the cost of loan guarantees and deposit insurance: An application of modern option pricing theory, *Journal of Banking and Finance* 1, 1977.

DEVELOPMENT IN SHARE PRICES FOR DANISH BANKING INSTITUTIONS, 2000-04 Chart 42



Source: Bloomberg.

the medium-sized banks in particular were influenced by expectations of acquisitions, etc. The assumptions for application of share-based risk measures are thus presumably only met for the major Danish banks.

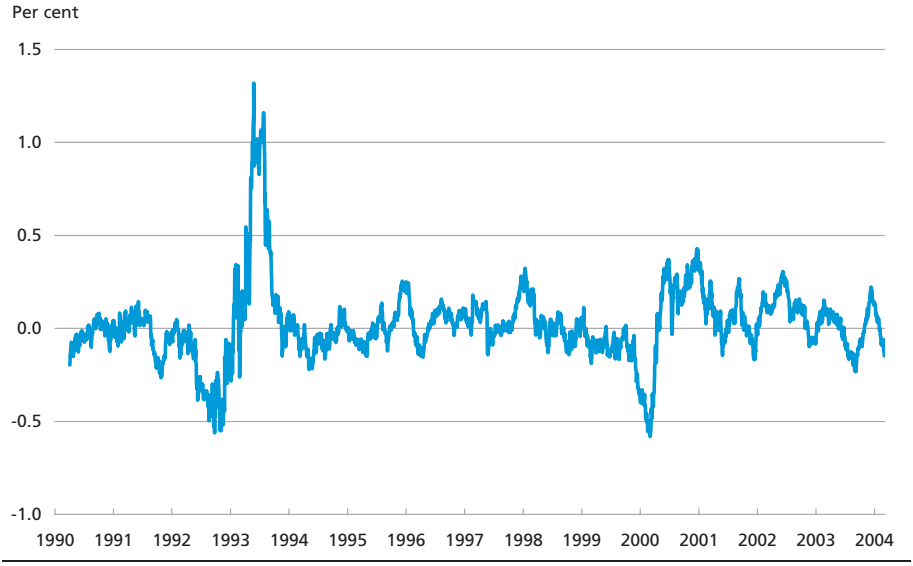
The difference between the development in the banks' share prices and the development in the leading share index, the share price gap, provides a measure of how the banks perform in relation to the country's stock-exchange-listed companies in general.[1] A positive gap indicates that the bank share outperforms the general stock market and a negative gap indicates the opposite.

The share price gap for the Nordic groups, category A, since 1990 is shown in Chart 43. The significant differences at the beginning of the 1990s are attributable to the effect of the banking crisis in the other Nordic countries. Furthermore, a major correction appears around 2000. In the long term, the course of bank shares will only in special cases deviate from the general stock-market trends resulting from real-economic development. Share-price-gap fluctuations reflect short-term trends as well as any economic shocks that affect banks differently from other companies.

The banking crisis in the other Nordic countries resulted in significant fluctuations in the share-price gap while only a few small banks in Denmark were affected.

[1] However, the leading share index should be adjusted for the bank shares included in the index. This is not the case in the analysis below.

AVERAGE SHARE-PRICE GAP FOR THE NORDIC GROUPS, 1990-2004 Chart 43



Note: 3-month simple moving average of the difference in growth rates between the share prices of the Nordic groups and the total share indices in the countries in question. The share-price gap includes Danske Bank and SEB from 1990, while the other banks are not included until later.
Source: Bloomberg and own calculations.

OTHER CENTRAL BANKS' USE OF MARKET-BASED INDICATORS Box 20

A number of central banks, including the ECB, use market-based indicators when analysing financial stability. With share-based indicators it is possible to weigh together the patterns for banks across the member states in order to get a picture of the general soundness of the EU banking sector.[1]

Sveriges Riksbank has analysed the Swedish banking crisis in the early 1990s using market-based indicators.[2] It finds that the bond-based risk measures are less suitable indicators since the credit spread on the banks' bonds in the period seems to reflect the general level of interest rates and the macroeconomic climate rather than circumstances specific to individual banks. The share-based measures are better at indicating problems at an early stage, *inter alia* as a result of the high liquidity of the shares in the largest Swedish banks. Sveriges Riksbank's results show that a share-based measure captures the problems in the Swedish banking sector several years before the banks asked for support from the Swedish government. In addition, the measure is found to distinguish between banks that were subsequently liquidated and banks that survived the crisis.

The Bank of England applies all three types of market-based risk measures: credit spreads, share-based risk measures and credit default swaps. For the large British banks, the liquidity in the underlying securities is sufficient for all three measures to be applicable as indicators.

1 See ECB, *Financial Stability Review,* 2003.
2 Persson, Mattias and Martin Blåvarg, 2003. The use of market indicators in financial stability analysis, *Penning- och valutapolitik* 2/2003, Sveriges Riksbank.

SHARE-BASED RISK MEASURES

Distance to default

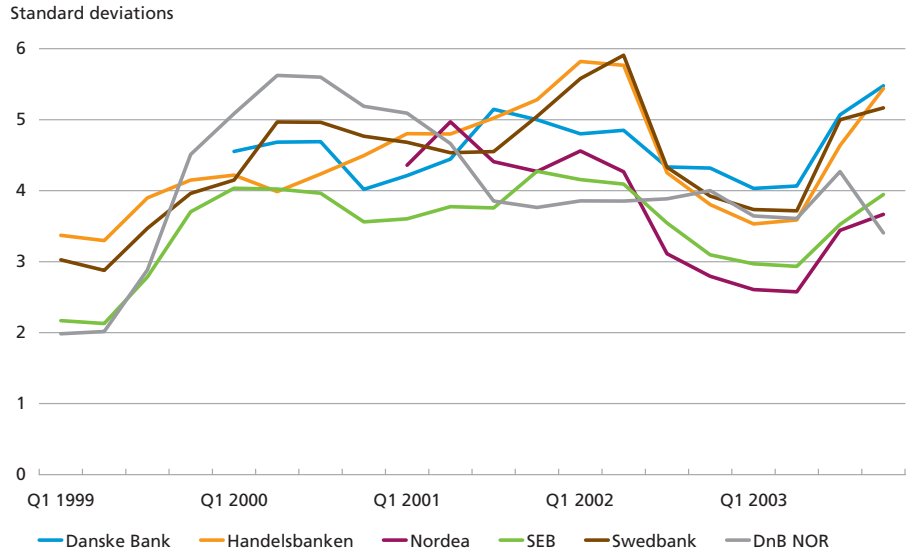
Distance to default measures the probability that the market value of the assets becomes lower than the value of the debt. Especially for banks, it is difficult to determine the "true" value of the assets that mainly comprise loans of which only the bank itself has information. The value of the assets is therefore determined on the basis of the liabilities. The value of the bank's debt appears from the bank's accounts and the value of the equity capital can be calculated from the share price, cf. Box 21.

Chart 44 shows the calculated distance to default for the Nordic groups.

Distance to insolvency

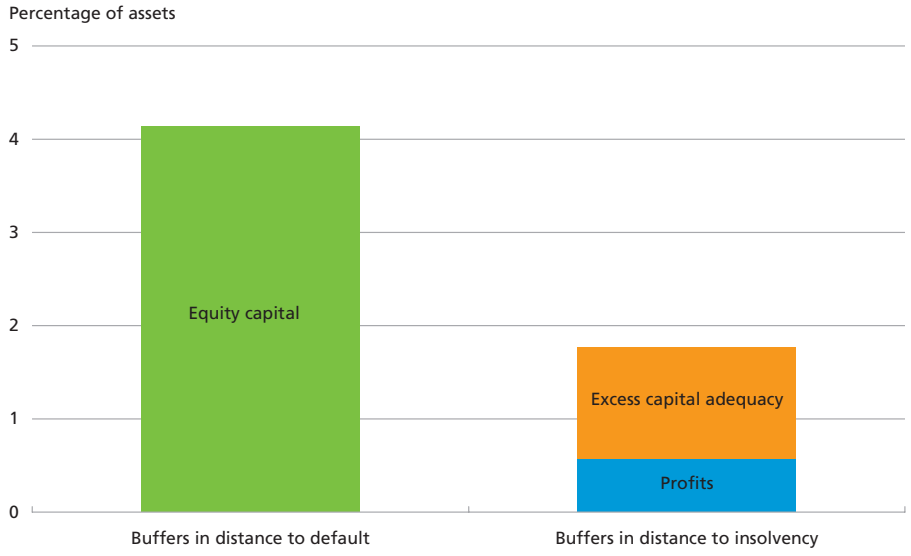
The distance to default assumes that the bank's total equity capital can be used as a buffer. The distance-to-insolvency risk measure is based on the amount of losses on assets a bank can sustain without falling below the statutory capital-adequacy requirement. Banks must have a solvency ratio of at least 8 per cent and a core capital ratio of at least 50 per cent of the regulatory capital. If the capital base falls below the capital-adequacy requirement, the bank risks losing its licence to operate as a bank. The share of the capital in excess of the statutory requirement –

DISTANCE TO DEFAULT FOR THE NORDIC GROUPS, 1999-2003 Chart 44



Note: The distance-to-default risk measure includes the banks' equity capital as a buffer.
Source: Own calculations.

BUFFERS FOR THE NORDIC GROUPS USED IN THE RISK MEASURES DISTANCE TO DEFAULT AND DISTANCE TO INSOLVENCY AS A RATIO OF ASSETS, 2003 Chart 45



Note: Equity capital as a ratio of assets illustrates the size of the buffer in the distance-to-default risk measure. The sum of the profit for the year as a ratio of assets and the part of the capital base exceeding the statutory capital-adequacy requirement (the excess capital) as a ratio of assets illustrates the size of the buffer in the distance-to-insolvency risk measure. The difference between the two bars in the Chart thus illustrates the difference in the size of the maximum loss as a percentage of assets which the buffers for each of the two risk measures can absorb. The buffers have been viewed in relation to the assets without taking risk weights into account.
Source: Annual reports.

together with current earnings – thus make up the bank's buffer against losses and thus ensure the bank's ongoing independent operation. The difference between the buffers of the two measures is illustrated in Chart 45.

The distance to insolvency views the market value of and risk on the assets, calculated as described in Box 21, in relation to the bank's buffer in the form of excess capital and current earnings stated at book value[1]. The distance to insolvency thus illustrates the market's assessment of the probability that the bank observes the capital requirement. The distance to insolvency is measured as the number of standard deviations on the assets' market value which the bank's buffer can absorb.

The distance to insolvency illustrates the bank's ability to resist losses and thus comprises only some of the factors which may affect a bank's ability to continue operating independently. In reality banks take account of many other risk factors and provisions which are important in

[1] As a consequence of the normal-distribution assumption in the Black and Scholes model, a distance to insolvency of e.g. three standard deviations is equal to a probability of only 0.13 per cent that the bank will not meet the capital-adequacy requirement. A large distance to insolvency is thus an indication that the market finds it relatively unlikely that losses on assets will lead to solvency problems.

terms of continued independent operations. Examples include banks' financial risks and liquidity risks. The choice of share-based risk measure is therefore based on the circumstances which the stock market is expected to react to.

Distance to insolvency for Nordic groups

The development in the Nordic groups' estimated distance to insolvency is illustrated in Chart 46.

If the model's underlying assumptions hold true, the distance to insolvency can be seen as a Value-at-Risk measure where a distance to insolvency of 3 corresponds to a probability of only 0.13 per cent that losses will exceed the buffer. There has been a tendency for the distance to insolvency to decline since the end of 2001. The reason is the increased stock-market volatility since 11 September 2001. All other things being equal, greater volatility will increase the probability that the market value of the assets falls below the debt. The increase in the latter part of the period is a result of the reduced uncertainty in the stock markets after the end of the war in Iraq. The course of the distance to insolvency seems to reflect negative expectations of the banks after 11 September 2001, but more positive expectations after the end of the war in Iraq. The dispersion between the institutions' distance to insolvency seems to have increased, particularly since 2001. To the extent that the banks' distances to insolvency develop along the same lines, this will reflect the general market development, while relative shifts in the banks' distances to insolvency indicate the relative assessments of the banks.

SHARE-BASED RISK MEASURES — Box 21

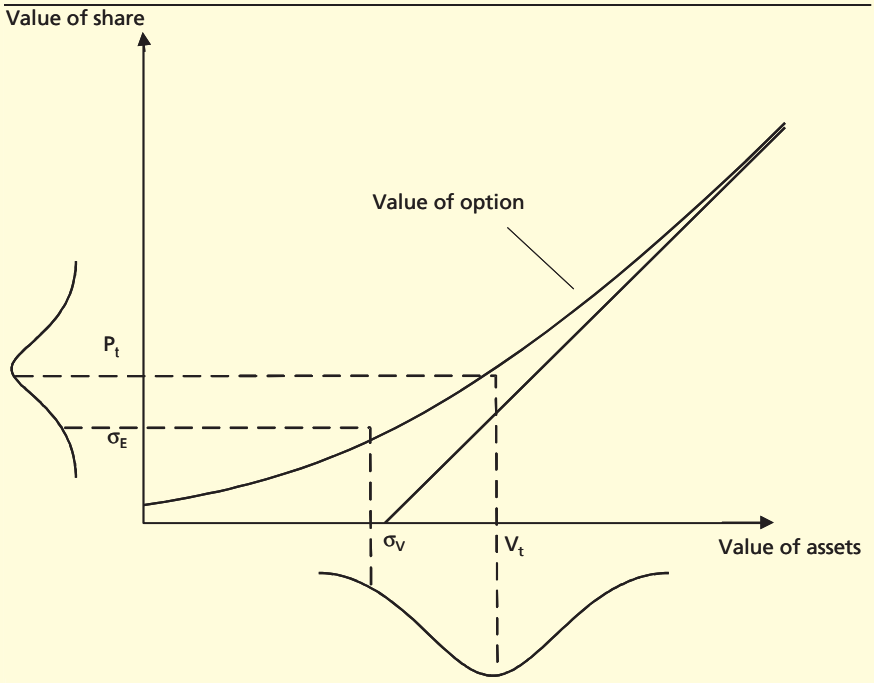
Share prices are used to determine the unknown market value of the assets. The return profile on shares is asymmetrical since the capital invested constitutes the lower limit on losses while there is no ceiling on gains. In theory this means that when the value of the equity approaches zero, and the shareholders have thus lost nearly all of the capital invested, the shareholders have an incentive to induce the company to make risky investments. If the investments pay off, the shareholders receive part of the gain, but if the investments do not pay off, the shareholders lose only the capital invested. A share can thus be seen as a call option on the assets of a company.[1] Under certain stringent conditions, share prices can be determined using the Black and Scholes[2] model for pricing of options. The price of this "option" is equal to the share price, and using the share price and its volatility it is thus possible to "reverse" the Black and Scholes model and determine the market value and volatility of the assets. This is illustrated in the Chart below.

[1] Merton, R, An analytical derivation of the cost of loan guarantees and deposit insurance: An application of modern option pricing theory, *Journal of Banking and Finance* 1, 1977.

[2] Black and Scholes, The Pricing of Options and Corporate Liabilities, *Journal of Political Economy 3*, 1973.

CONTINUED Box 21

RELATIONSHIP BETWEEN OPTION PRICE AND THE VALUE OF THE UNDERLYING ASSET

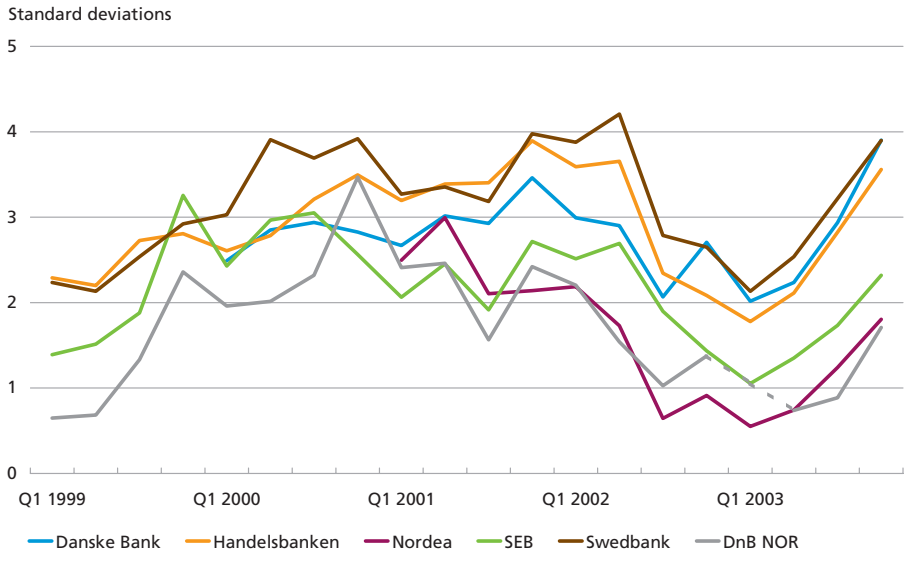


The Chart shows the relationship between the market value of the assets and the value of the option, i.e. the share price. The Chart illustrates how the share price, P_t, and the related risk, measured as the standard deviation, σ_E, stated on the Y axis of the diagram, are converted into a market value for the assets, V_t, and the related risk, σ_v, stated on the X axis. As the graph shows, the value of the option, i.e. the share, lies above the 45-degree line. In addition, it is more than zero although the value of the assets is lower than the value of the debt. The reason is the option-like properties of a share. There is still a chance that the market value of the assets may increase sufficiently for the share to have a positive value at the time when the debt matures.

The Black and Scholes model is based on a number of assumptions about the statistic properties of share prices. In practice these are hardly ever met in full. Moreover, the model's results are sensitive to the way in which volatility, etc. is calculated. The results should therefore be interpreted with caution.

The development in distance to insolvency is determined by the buffer and the volatility in share prices. The buffers of the Nordic groups are illustrated in Chart 47, while the development in volatility is shown in Chart 48.

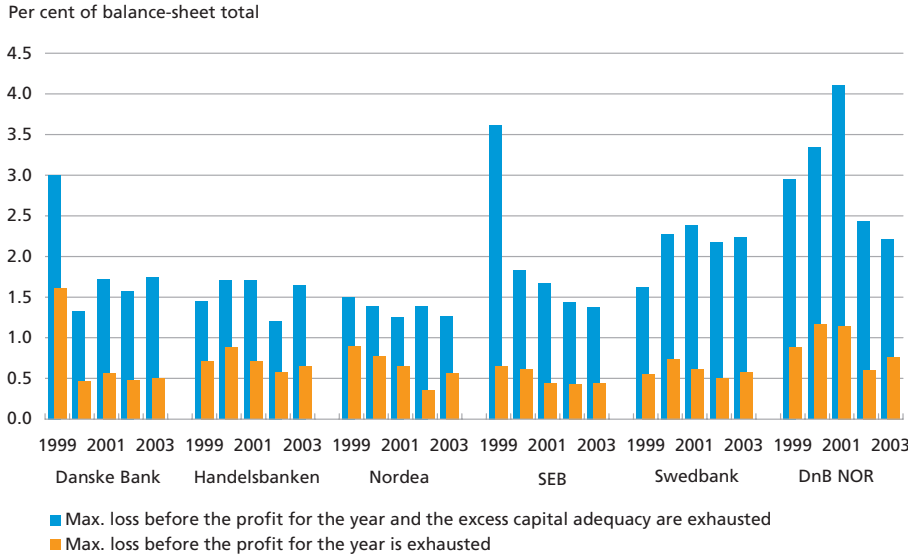
DISTANCE TO INSOLVENCY FOR THE NORDIC GROUPS, 1999-2003 Chart 46



Note: The distance to insolvency for the 1st quarter of 2003 is not stated for Den norske Bank since it was affected significantly by the merger with Gjensidige NOR.
Source: Own calculations.

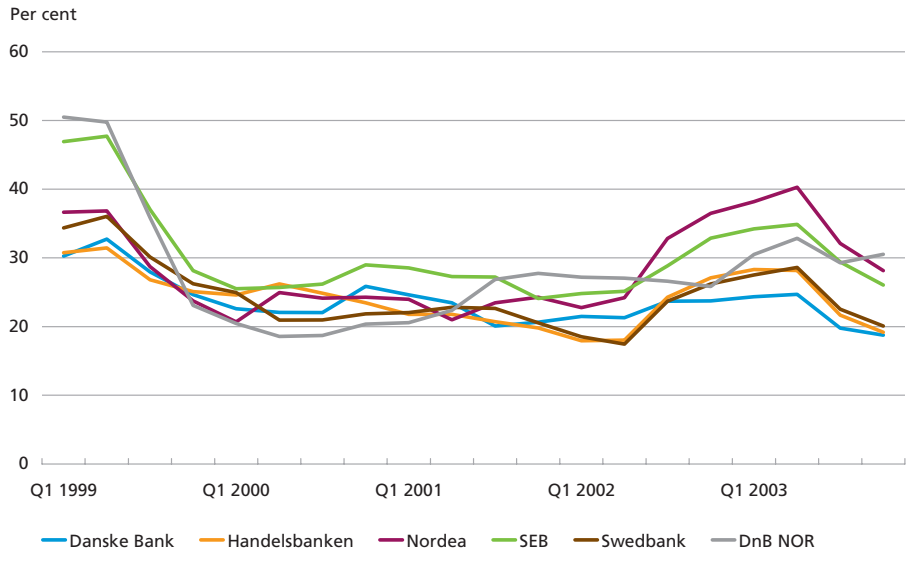
Volatility in share prices for the Nordic groups increased concurrently with the war in Iraq, but has now returned to the pre-war level. However, the dispersion between the groups seems to have increased.

BUFFERS FOR NORDIC GROUPS, 1999-2003 Chart 47



Source: Annual reports.

VOLATILITY IN SHARE PRICES FOR THE NORDIC GROUPS, 1999-2003 Chart 48



Note: The volatility is calculated as the standard deviation to the latest 50 weekly changes in the logarithm for the share price, converted into full-year figures.
Source: Bloomberg and own calculations.

A comparison of the distance to insolvency for the Nordic groups, Chart 46, with the distance to default, Chart 44, shows that the distance to insolvency is generally a little lower than the distance to default. This reflects the fact that the distance-to-default measure includes the entire equity capital as a buffer.

Glossary of Financial Terms

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

Basel II. Description of the *Basel Committee's* forthcoming standards for new capital-adequacy rules expected to come into force at end-2006.

BIS stands for Bank for International Settlements, which serves as banker to the central banks.

Bonus. Generic term covering the amounts allocated by pension companies to policy-holders in addition to what is originally guaranteed (see *Guaranteed interest rate*).

Bonus potential related to benefits on premium-free policies is the commitment to allocate *Bonus* on premiums already paid into pension companies, and is a sub-item under *Life-insurance provisions*. Bonus potential related to benefits on premium-free policies is linked to the individual policy and may be used to cover losses on assets in policies within the same portfolio, i.e. with the same *Guaranteed interest rate*.

Bonus potential related to future premiums is the commitment to allocate *Bonus* on premiums that are agreed but not yet due, in pension companies, and is a sub-item under *Life-insurance provisions*.

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

Capital adequacy. See *Solvency ratio*.

Capital base. The capital that a pension company may use to cover its *Solvency margin*. The capital base comprises the pension company's equity capital less certain deductions, e.g. subsidiary insurance companies' solvency margin, and certain additional items, e.g. special bonus provisions.

Capital requirement. See *Solvency requirement* for credit institutions and *Solvency margin* for pension companies.

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

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

CD. See *Certificate of Deposit.*

Certificate of Deposit is a short-term negotiable certificate which is mainly traded between banking institutions. Abbreviated to CD.

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

CLS is the abbreviation for Continuous Linked Settlement, which is an international currency-settlement system.

Collective bonus potential in pension companies is the undistributed reserves that can be used to allocate bonus in addition to the bonus amounts accrued to the *Life-insurance provisions*. May be used to cover losses on assets. See also *Bonus potential related to benefits on premium-free policies.*

Commercial Paper is a short-term debt instrument (zero-coupon paper) with a maturity of up to one year. Abbreviated to CP.

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

Contribution principle. Determines the framework for the distribution of the pension companies' profits and losses among the owners and policyholders so that owners and policyholders are allocated a reasonable proportion of the realised profits in relation to their contribution to generating the profits.

Core capital in credit institutions comprises paid-up share or guarantee capital, premium on *Issue* and general reserves, adjusted for e.g. own shares and current deficit for the year. Furthermore, *Hybrid core capital* may be included.

Corrective account. An account to which the banking institutions' ongoing losses and *Provisions* are booked.

CP. See *Commercial Paper*.

Credit risk. The risk of suffering a loss should the counterparty or debtor default on its payment obligations. See also *Market risk*.

Credit-risk-transfer instrument is an instrument that enables credit institutions to reduce the *credit risk* in relation to e.g. specific sectors.

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

Deposit Guarantee Fund. The guarantee fund for depositors and investors is a private, self-governing fund established by law. 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 Deposit Guarantee Fund.

Deposit margin (implied). The difference between the banking institutions' deposit interest rate and a reference interest rate, e.g. a 3-month uncollateralised interbank interest rate. The deposit interest rate is calculated implicitly by measuring the interest costs for the period as a ratio of average outstanding deposits.

Derivative. See *Financial derivative*.

Distance to default. The distance-to-default risk measure illustrates the probability of a company failure, i.e. that the market value of its assets becomes lower than the value of its debt. The distance is measured by the number of *Standard deviations*. See also *Distance to insolvency*.

Distance to insolvency. The risk measure distance to insolvency shows the probability that a banking institution keeps within the statutory solvency requirement, i.e. that a fall in the assets' market value does not imply that the banking institution does not meet the statutory *Solvency requirement.* The distance is measured by the number of *Standard deviations*. See also *Distance to default*.

Duration. The price sensitivity of an outstanding amount or *Portfolio* to (small) interest-rate fluctuations. The higher the duration, the greater the price sensitivity.

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

Equity capital is the owners' share of the company's capital, including share capital and accumulated profits.

Equity reserves is a key indicator expressing the extent to which the pension companies' adjusted equity capital (equity capital plus subordinate loan capital) exceeds the statutory minimum requirement measured as a ratio of *Life-insurance provisions* in a pension company. Equity reserves and *Bonus reserves* together contribute to evaluation of a company's ability to pay a bonus and its financial strength, i.e. the company's resilience to fluctuating returns and unforeseen insurance and financial risks.

Estimated failure rate for companies in this publication is estimated in a failure-rate model based on key accounting ratios. The estimated failure rate indicates the probability that a company is compulsorily liquidated within the next few years.

Exchange-rate risk is the risk of losses due to exchange-rate fluctuations. See also *Market risk*.

Fair value states an estimate of the proceeds from transfer of an asset to a buyer on market terms. The fair value of a liability is an estimate of the set-off of the liability on market terms.

Fee and commission income comprises *inter alia* brokerage and custody commission, guarantee commission, fees for use of payment systems and remortgaging fees, as well as ordinary loan fees.

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

Floating interest rate. An interest rate which is floating during the maturity of the loan, e.g. that is agreed to float in step with another interest rate.

Gearing (financial). External financing as a ratio of equity.

Going concern is a description of a company that is expected to continue its activities.

Guaranteed benefits are payment obligations guaranteed to the policyholders in a pension company. See also *Guaranteed interest rate* and *Life-insurance provisions*.

Guaranteed interest rate, also called the maximum technical interest rate, is 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 may be included in the banking institutions' *Liable capital*. Hybrid core capital has characteristics resembling a debt instrument, but is subject to stricter rules, *inter alia* no fixed maturity and no interest on debt if the banking institution has no free reserves. Hybrid core capital can amount to maximum 15 per cent of the *Core capital*.

IAS. 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. It follows that this type of volatility can not be directly observed.

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

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

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

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

Interest-rate risk. The risk that interest-rate fluctuations generate losses. See also *Market risk.*

Internal interest rate. See *Yield to maturity*.

Investment banking. Activities related to analysis of and trading in securities and financial consulting services in connection with e.g. stock *Issues*, public offerings and mergers and acquisitions.

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

KFX. Stock index consisting of the 20 most traded and liquid Danish shares listed on the Copenhagen Stock Exchange. The composition of the index is revised twice a year.

Lending margin (implied). The difference between the banking institutions' lending interest rate and a reference interest rate, e.g. a 3-month uncollateralised money-market interest rate. The lending interest rate is calculated implicitly as the interest income of the period as a ratio of average outstanding loans.

Liable capital. Credit institutions' capital base required for compliance with the statutory *Solvency requirement*. Liable capital comprises *Core capital* and *Supplementary capital*, and the latter may not exceed half of the liable capital. Liable capital is adjusted for e.g. capital elements in other credit institutions.

Life-insurance provisions are measured by the actuaries appointed by the pension companies. Life-insurance provisions are divided into three sub-categories: *Guaranteed benefits*, *Bonus potential related to future premiums,* and *Bonus potential related to benefits on premium-free policies*. See also *Insurance provisions* and *Collective bonus potential.*

Liquidity is a measure of negotiability. Liquid securities are often characterised by a large circulating volume, high turnover and a narrow spread between bid and ask prices. See also *Liquidity premium.*

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

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

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

Maximum technical interest rate. See *Guaranteed interest rate.*

Median. The numerical value dividing data into two equal shares of which one half is below and the other is above the median. Corresponds to the 50th *Percentile*.

Operating income over operating expenses is a key performance indicator to express banking institutions' earnings capability. The measure is calculated as *ordinary profit* over *Ordinary costs*.

Operational risk. The risk of losses due to insufficient or unsuccessful internal procedures, human or system errors, or external events.

Option. A *Financial derivative* granting the owner (buyer) the right, but not the obligation, to buy or sell an underlying instrument (e.g. a product, a security or a currency) at an agreed price (strike price) at an agreed future time. The seller of an option is obliged to recognise the owner's right.

Ordinary costs of banks include personnel and administrative costs, depreciation and amortisation, and losses and provisions.

Ordinary profit of banks comprises e.g. net interest income, net fee and commission income, value adjustments, and the result of capital investments in associated and affiliated companies.

Par. A price of 100 per cent of a paper's nominal value.

Percentile is the numerical value indicating the share of the observations below that value. For example the 10th percentile for the *Return on assets* is the point below which exactly 10 per cent of the companies with the lowest returns on assets lie.

Portfolio. A holding of assets.

Profitability. See *Return on equity*.

Provisions. For loans on which a loss is expected, the banking institution must write down the loan and book the amount under losses and provisions. There are two types of provision: A provisions are for losses with a probable risk, and B provisions for losses that are deemed inevitable, but the size of the loss cannot be fully estimated. Provisions are gathered in the *Correction account*.

Rating. An assessment of *Credit standing* given by rating agencies such as Fitch, Standard & Poor's, and Moody's. Rating is typically used in connection with securities issue, and accounts for the probability of default and the size of the loss.

Red and yellow light. The Danish Financial Supervisory Authority's description of risk scenarios for pension companies aimed to illustrate whether the company's chosen relationship between investment risk, capital and commitments is appropriate. Each risk scenario is used to test the pension companies' ability to sustain losses due to interest-rate change, fall in share and property prices, etc. The pension companies must publish their sensitivity to the red risk scenario.

Return on assets describes a company's ability to achieve a return on invested capital. It is calculated as the company's profit as a ratio of its assets.

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

Risk-weighted items. The risk-weighted assets and off-balance-sheet items, i.e. items subject to *Credit risk*, share risk, *Interest-rate risk*, *Exchange-rate risk*, commodity risk, etc. See also *Solvency requirement*.

RTGS system is a real-time gross settlement system in which payments are settled individually, immediately, and finally to the participants' accounts.

S&P 500. US abbreviation of Standard & Poor's 500 Stock Index. It consists of the 500 most traded US stocks and is e.g. used as an underlying index for stock futures and stock *Options*.

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

Solvency is an expression of a company's ability to sustain losses, i.e. the part of the company's assets that can be lost before the losses affect its borrowed capital. Calculated as the ratio of equity capital to assets.

Solvency margin. The statutory capital requirement of pension companies. The solvency margin is calculated on the basis of the *Life-insurance provisions* subject to a number of minor additions. See also *Capital base*.

Solvency ratio is a key indicator for credit institutions, defined as *Liable capital* as a ratio of *Risk-weighted items*. See also *Solvency requirement*.

Solvency requirement. The statutory solvency requirement imposed on credit institutions. For a credit institution *Liable capital* must account for at least 8 per cent of the credit institution's *Risk-weighted items*. See also *Solvency ratio*.

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

Subordinate capital is external financing that in the event of the borrower's compulsory liquidation is not repaid until after other debt has been settled. Subordinate debt, subject to certain requirements, may be included in the credit institutions' *Supplementary capital*. See also *Liable capital.*

Supplementary capital. Capital deposits in credit institutions offered as *Liable capital* that meets certain requirements (no default sanctions for the creditor, an option to defer interest payments and to write down the principal) as well as revaluation reserves.

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

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

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

Term structure of interest rates is the relationship between securities' yields and maturity. 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.

Value-at-Risk (VaR). A model to measure *Market risk*. For a given *Portfolio* and within a fixed time horizon the model calculates the maximum loss that may arise with a given probability, based on experience.

VaR. See *Value-at-Risk*.

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

Working capital comprises deposits, issued bonds, *Subordinate capital* and *Equity capital*. See also *Category 1, 2, 3 or 4 banking institution*.

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

Zero-coupon yield. The *Yield to maturity* on a zero-coupon paper, i.e. a paper with no ongoing accrual of interest, and where the redemption payment falls due when the loan matures. The borrowing costs for a zero-coupon paper are solely the capital loss on issue.