
Indicators of Financial Instability

Anne Dyrberg, Financial Markets

INTRODUCTION

In its Monetary Review for the 2nd quarter of 2000 Danmarks Nationalbank introduced its annual report on financial stability in Denmark. Equivalent analyses are published by the central banks of several other countries, including the other countries in the Nordic region. The purpose of the analyses is not to monitor the exposures of the individual institutions, but to identify the risks currently faced by the financial sector.

The concrete analysis is based partly on a number of theories concerning the origin and course of financial crises. The theories are often based on actual financial crises and they are in that sense partial. However, certain common elements can be identified for many of the financial crises around the world. It therefore makes sense to derive indicators of "financial instability" on the basis of the general patterns.

To a high degree the general development in the economy determines the development in the financial sector. A decrease in credit quality and a slowdown in the economy will thus increase the risk of financial crisis. Loans granted when the economy is booming, in the expectation of continuing favourable development, can turn out to be problematic if the economy slows down. The consequences of a recession may be a decline in corporate earnings, bankruptcies, rising unemployment and falling property prices.

The article begins with a review of selected theoretical articles on financial instability. This review is not an exhaustive list of relevant theories, but rather a proposal of which theories might be a relevant foundation for analysis of trends in the financial sector. The second part of the article presents the indicators. In conclusion, a brief discussion of previous experience from financial crises is presented, including the banking crises in Sweden, Norway and Finland in the early 1990s (the Nordic banking crisis).

MICROECONOMIC THEORIES

Financial panic

A bank grants loans to and receives deposits from the general public. The deposits must be kept liquid, so that customers can feel convinced that they can withdraw their deposits as they require. Lending is less liquid or less negotiable, and therefore the bank must use other assets to ensure that it has the required liquidity to cover deposits and prevent a run on deposits, i.e. demand for substantial withdrawals all at the same time.

Should a large proportion of a bank's deposits be withdrawn within a brief period (a run on the bank), the bank may not be able to honour these demands. A liquidity crisis of this type would very quickly snowball and cause an otherwise sound bank to become insolvent. This is because the bank cannot immediately realise its illiquid assets, i.e. loans to households and companies, at nominal value. The bank can be forced to sell the illiquid assets at lower prices, and will thus suffer a considerable loss.

Several models¹ have been built up to formalise the aforementioned philosophy. Recent economic literature on financial crises expands this framework to include a small, open economy in which both domestic and foreign depositors might panic.² The theory can thus serve to indicate why foreign creditors withdrew their money from the Nordic countries in connection with the Nordic banking crisis in the early 1990s.

Asymmetric information

As stated, the banks build bridges between depositors requiring liquid deposits and borrowers requiring loans which are not unilaterally terminated by the bank.³ Asymmetric information can arise if one party in a contractual relationship does not have all the information on the other party and the latter's intentions necessary to be able to take the optimal decision. Asymmetric information can thus lead to an inoptimal allocation of resources, e.g. fewer people being offered loans compared to the optimum scenario, i.e. excessive credit rationing.⁴

¹ See e.g. Diamond and Dybvig (1983).

² See e.g. Chang and Velasco (1998) who seek to explain the crisis in Asia (1997-98) by extending the classical model of Diamond and Dybvig (1983).

³ The banks have considerable expertise of evaluating the quality of borrowers. This is because the banks have experience of collecting information on borrowers, favourable opportunities to monitor customer behaviour and personal knowledge of the customers. The banks can require collateral in order to further dampen the risks related to asymmetrical information.

⁴ In step herewith Guttentag and Herring (1984) show how financial crises can be characterised by a sharp increase in the degree of credit rationing.

Economic literature draws a distinction between two problems created by asymmetric information: *adverse selection* and *moral hazard*. Adverse selection can arise if the lender does not have sufficient information on the borrower *before* an agreement is concluded. The problem with adverse selection can be illustrated by the following example: a lender is approached by a number of borrowers with different investment projects. The lender finds it difficult to evaluate the risk entailed by the various investment projects. The problem is that the lender cannot distinguish outright between borrowers with respectively good and bad investment projects. The lender is therefore forced to demand an interest rate which on average covers the lender's risk premium. The average interest rate will be too high for some borrowers with good investment projects, so that some of the good investment projects are not started up. Borrowers with bad investment projects will find the interest rate acceptable and will still require financing. If the bad investment projects are successful, the borrowers make high profits, and if they are not, the bank suffers a loss. The bank knows this, so to protect itself against bad investment projects it will ration its credit granting. As the lender finds it difficult to distinguish between borrowers with good and bad investment projects, however, credit rationing will affect not only the bad, but also the good borrowers.

The problem with adverse selection can be related to an external impact, e.g. a rising level of interest rates. If interest rates rise, the probability increases that borrowers with bad investment projects will still be willing to borrow. Lenders know this, however, so they will tend to grant fewer loans.

Moral hazard can arise if the borrower, *after* the contract is established, has an incentive not to behave as he was supposed to. The risk of moral hazard can arise if the borrower has nothing to lose by taking a higher risk. The distortion of the incentive structure (moral hazard) can be illustrated by the following example: assume that a lender grants a loan for an investment project with a low risk, and the borrower provides shares as collateral. In a situation with falling stock prices, the value of the borrower's shares will decrease, and the borrower will be tempted to use the loan for an investment which entails a risk because the borrower has nothing more to lose. If the investment is successful, it can cover both the financing costs and the loss on the shares. However, if it does badly, it will impose extra losses on the bank. The risk of moral hazard implies that lenders can decide to grant fewer loans (higher degree of credit rationing). In such cases, levels of lending and investment will be inoptimal.

According to the International Monetary Fund, IMF, (1998) the Nordic banking crisis was an example of how a negative shock can threaten the

stability of the financial system if the incentive structure is distorted.¹ There were market expectations that in the event of a banking crisis the investors would be bailed out by the public sector.

MACROECONOMIC THEORIES

Debt and price bubbles

Almost 70 years ago, Fisher (1933), discussed how the serious economic collapse and stock-exchange crisis on Wall Street in the 1920s were the result of inadequately functioning financial markets. A close correlation was perceived between high borrowing activity, price bubbles and cyclical reversals. Financial instability was related to a burst in asset price bubbles, e.g. stocks and properties, as a consequence of a reversal of the economic cycle. The process can begin with an external shock such as technological progress or a change in the institutional set-up, e.g. a legislative change. Subsequent growth in output and prices for real assets leads to euphoria, since households and companies expect further price increases. This increases the willingness to take on risks and leads to higher investment in real assets for borrowed funds. Debt accumulation can likewise be reinforced by the banks' lending policy, in particular rising prices for the assets provided as collateral. A self-fulfilling process has begun and is gradually reinforced by the rising asset prices, which further boost optimism and lead to inflation and greater indebtedness.

The above is defined as debt deflation: when borrowers are highly leveraged, a small shock (e.g. a drop in productivity) can trigger a series of bankruptcies, which generate a decrease in investment and demand. As the value of assets is eroded, the economic system becomes subject to pressure.

Some parts of the Nordic banking crisis in the early 1990s can be explained by this theory. In Norway, Sweden and Finland the financial sector was deregulated gradually during the 1980s, contributing to strong growth in lending². At the same time property prices rose strongly. As economic trends began to reverse, the Nordic banks suffered heavy losses.

In Norway and Sweden especially there was a close correlation between the losses and the development in property prices. In Norway,

¹ The IMF (1998) expresses it as follows: "The absence of strengthened prudential banking supervision in areas such as real estate and foreign currency lending coupled with expectations of government intervention in the event of a crisis and a booming macroeconomic environment removed incentives for the market to impose discipline on weak banks. At the same time, these conditions prompted many Nordic banks to increase their lending excessively, leading to a loss of efficiency in the allocation of capital. In all three countries, financial liberalization did not lead to an increase in savings as a result of financial deepening. Instead, borrowers responded to the lifting of credit rationing by incurring debt burdens that turned out to be clearly unsustainable. The resulting banking crises ...".

² In Norway the banks' lending rose by 20-30 per cent annually in 1984-86. In Sweden and Finland growth in lending peaked in 1988 at approximately 30 per cent, Ministry of Economic Affairs (1994).

property prices rose strongly up to 1987. Thereafter real prices for office premises dropped by more than half until 1991, while real prices for homes fell by approximately one quarter. In Sweden, property prices also rose strongly during the 1980s. For example, prices for business properties more than trebled between 1981 and 1989. The recession was accompanied by a strong decline in property prices, and it is estimated that in Sweden more than 60 per cent of the losses in 1991, and half of the losses in 1992, could be attributed to lending related to real property, although lending to small- and medium-sized enterprises also made a strong contribution to the losses, cf. the section below. In Finland prices for real property rose strongly in 1987-89. From 1990, real-property prices began to decline.

Debt and companies' balance sheets

One branch of recent economic literature on financial crises focuses on the effects via companies' balance sheets.¹ It is assumed in the model that the companies' debt contracts are held in both domestic and foreign currency. Companies' debt burden in units of domestic currency thus increases if the domestic currency depreciates. There is no equivalent increase in the value of the companies' assets, which are denominated predominantly in domestic currency. Depreciation thus immediately causes the companies' balance sheet to deteriorate, and their net worth declines. This reduces the opportunity for effective provision of collateral, making it more difficult for companies to raise loans.

This mechanism corresponds to the course of the crisis in Asia (1997-98), but can also explain some elements of the Nordic banking crisis. The depreciation of the Norwegian krone in 1986, the Finnish markka in 1991 and 1993, and the Swedish krona in 1992 led to appreciation of the companies' foreign currency-denominated debt. In general terms, it became difficult for small and medium-sized enterprises to raise external financing, and the number of companies which went bankrupt rose to record-high levels in Finland, Sweden and Norway. The financial problems faced by the companies were reflected in a sharp increase in the proportion of non-performing bank loans.²

INDUSTRIAL-ECONOMIC APPROACH

Like the theory on debt and price bubbles, the starting point for the industrial-economic approach³ is a reduction of the barriers to access to

¹ See Krugman (1999).

² See IMF (1998) for further details.

³ See Davis (1995) for further details.

the market. Access barriers can be reduced as a consequence of technological progress, the emergence of new products, changes in borrower behaviour or liberalisation. This can have several immediately expansionary effects.

Firstly, reducing access barriers can lead to more competitive behaviour among market participants. This change in behaviour can take the form of a) higher growth in lending as larger loans to existing customers and loans to new customers not previously considered to be creditworthy; b) lower provisions and c) a smaller spread between deposit and lending rates.

Moreover, new market players may make short-sighted attempts to win larger market shares, leading to insufficient provision for a slowdown in the economy, etc. New participants have less information on borrowers than the more established participants, entailing excessive lending to bad customers, or herd-like behaviour with excessive leveraging of certain sectors.

This results in greater credit risk in the financial sector and often also a reduction of reported earnings. Moreover, the sector is more vulnerable to shocks and shifts in the economic activity.

INDICATORS OF FINANCIAL INSTABILITY

On the basis of the outlined theories the indicators of financial instability can be divided into four groups. These are: 1) indicators for the financial sector; 2) indicators for the non-financial sector; 3) macroeconomic indicators and 4) structural indicators.

Indicators for the financial sector

Analysis of the financial sector can include a number of quantitative indicators, including data from balance sheets and statements of income and the development in their structure.

The development in the financial institutions' capital adequacy can be illustrated by the solvency¹ and core-capital ratios². Previously, the Danish banks were subject to more restrictive capital-adequacy requirements than e.g. the other Nordic banks, so that the transition in 1991 to compiling solvency as a ratio of the risk-adjusted assets (BIS rules) entailed a relaxation of the Danish capital-adequacy requirements³. Danish banks

¹ In terms of definition the solvency ratio is equivalent to $(\text{the liable capital}) \cdot 100 / (\text{the risk-adjusted assets})$.

² The core capital ratio is calculated as core capital after deductions as a ratio of total risk-adjusted assets.

³ In Norway, the new rules entailed a tightening of the Norwegian capital-adequacy rules. In Sweden and Finland the new rules did not entail any significant changes. Ministry of Economic Affairs (1994).

thus exceeded the new capital-adequacy requirements. This helped the Danish banks to weather the Nordic banking crisis and be able to bear the considerable losses and provisions themselves, whereas Norway, Sweden and Finland experienced an actual systemic crisis for the banks, which received considerable public funds.

It is also important to monitor the development in the quality of the financial sector's assets. This analysis can include evaluation of indicators related to the non-financial sector¹, as well as indicators related to the financial sector.

The financial sector can face difficulties if a large proportion of lending is concentrated in certain sectors of the economy. In particular, vulnerability to a concentration of lending to e.g. the property sector has been seen. The quality of assets can also be assessed on the basis of the development in losses and provisions². An increase signals a deterioration in the financial sector's credit portfolio, and thereby in the financial institutions' payment flows, net revenue and solvency. The development in losses and provisions is irreversible in view of the condition of the financial systems, although there is a tendency for losses and provisions to be pro-cyclical.

The profitability of the financial sector's activities, e.g. measured by calculating returns on assets or equity capital³, must also be taken into consideration. Declining profitability can signal immediate problems in the financial sector, while a strong increase in profitability can be related to greater risk. A high return on equity can indicate both high profitability and a low degree of capitalisation. In order to achieve a clearer picture of the profitability of the financial sector it is also necessary to analyse the development in income and expenditure, e.g. by considering earnings per employee and the distribution of costs.

It is also important to monitor the development in the liquidity of the financial institutions. One measure is liquid assets as a ratio of total assets. In terms of liabilities, the indicators should cover funding sources, including interbank and central-bank credits. The indicators can distinguish between commitments to respectively domestic and foreign depositors, and indicate whether the commitments are denominated in domestic or foreign currency. Moreover, the development in indicators reflecting the maturity mismatch between assets and liabilities must be assessed.

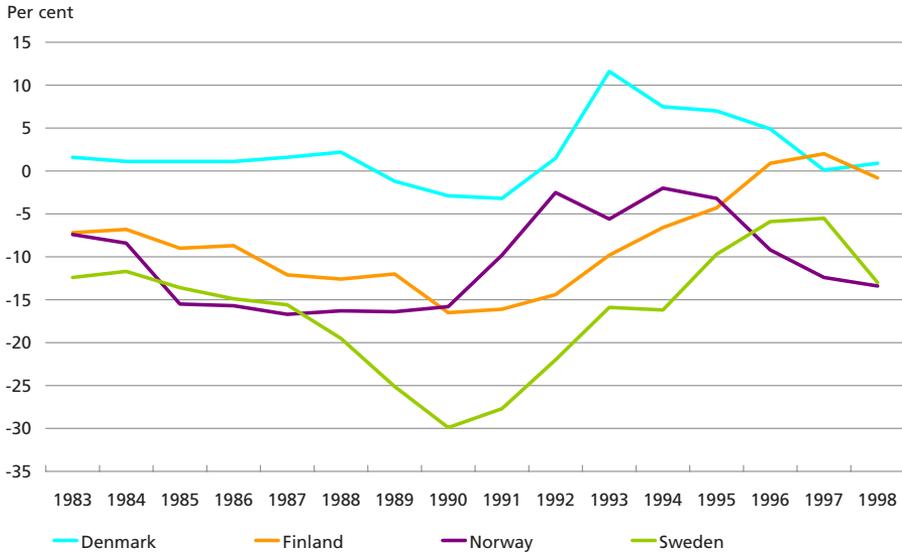
¹ See "Indicators for the non-financial sector".

² The value of losses and provisions as indicators declines if financial institutions tend to extend loans which would otherwise be classified as non-performing (called "evergreening" in the economic literature). Several observers of the Asian crisis, including Corsetti, Pesenti and Roubini (1998) point out that evergreening took place in the Asian countries, and that it exacerbated the problems.

³ Return on equity before tax can be calculated as the profit before tax as a percentage of average equity. Return on equity after tax can be calculated as the profit after tax as a percentage of average equity. The average equity can be calculated as a simple average of equity capital at the beginning and end of the year.

**BANKS' NET CLAIMS ON BANKS IN OTHER COUNTRIES
PER CENT OF BALANCE SHEET**

Chart 1



Note: Danish statistics until 1988 reflect that Danish banks were not permitted to hold net external debt.
Source: BIS and OECD.

Chart 1 presents the development in the Nordic banks' net claims on banks in other countries as a percentage of the balance sheet in 1983-98. The Chart shows how Swedish banks' net claims on banks in other countries as a percentage of the balance sheet developed from approximately -30 per cent in 1990 – at the start of the banking crisis – to approximately -10 per cent in 1995. In Norway and Finland the banks' net claims on banks in other countries as a percentage of the balance sheet developed from approximately -15 per cent in 1990 to approximately -4 per cent in 1995.

Credit risks are related to the individual banks' specific debtors, while market risks are related to the market in general. Although the credit risk has been the predominant reason for bank failures, market risks are also a potential source of financial instability. Market risks are e.g. affected by exchange-rate and interest-rate trends, movements in stock and commodities prices, and the use of financial instruments.

Indicators for the financial sector are summarised in Box 1.

Indicators for the non-financial sector

The largest proportion of the financial sector's risks are related to lending to the non-financial sector since transactions with the other private industries and the households are the basis for the sector's activities.

INDICATORS FOR THE FINANCIAL SECTOR

Box 1

An analysis of financial stability can include the following indicators:

- Capital adequacy (e.g. solvency and core-capital ratio).
- Asset quality (e.g. concentration of credit in certain sectors and losses and provisions).
- Profitability (e.g. yields on assets and return on equity).
- Earnings and expenditure (e.g. earnings per employee and distribution of expenditure).
- Liquidity reserves (e.g. the bank's funding, including development in interbank credits and credit extension by the central bank and maturity mismatch between assets and liabilities).
- Market risk (e.g. development in exchange rates and interest rates, stock and commodities prices and use of financial instruments).

Especially the development in the Danish business sector affects the Danish financial sector, as the majority of lending from Danish banks is granted to companies in Denmark. However, this is not just a question of the development in an average company, as an apparently positive trend based on an averaged evaluation can conceal that the development of several companies has been positive or negative. The development in the poorest-performing companies measured by a given key indicator must therefore also be analysed, just as it is relevant to divide up the analysis by sector (manufacturing industry, building and construction, IT, etc.).

Lending by the financial sector to the average household is limited in scale compared to the banks' total lending, so the absolute risk of loss is small. In a situation where many households are affected simultaneously, the banks will face an increased risk of considerable losses.

A key element of assessment of the development in the non-financial sector is the development in the debt. A higher debt ratio entails that companies and households can find it more difficult to repay debt to the financial sector. It is relevant to analyse both the development in the absolute debt and the debt as a ratio of asset values. Moreover, the breakdown of the debt on respectively domestic and foreign currency can be analysed. Another key parameter is the maturity distribution of the debt. A switch from long-term to short-term debt may be a sign of greater vulnerability.

The development in the liquidity of both households and companies can give an early indication of a change in ability to pay. The starting point for companies is the most recent development in results. A measure of liquidity is liquid funds as a ratio of short-term debt. It is more difficult to find an indicator of the liquidity situation of the households.

Consumer credit to the households is one possible indicator, since an increase in consumer credit can be due to a lack of liquidity because the households cannot obtain credit from the banks on normal terms.

Companies' earnings capability can be illustrated by the yield ratio¹ and the development in solvency². The former indicator reflects the result as a ratio of the applied resources, while the latter expresses the company's ability to generate satisfactory earnings over time, as rising profits are normally reflected in expansion of equity capital. Household incomes can be assessed by analysing the development in disposable incomes as a ratio of GDP. The development in incomes can also be analysed by dividing households' income into sub-elements, e.g. income sources and net worth. It can also be interesting to consider the development in employment.

Earnings must be in reasonable proportion to the interest burden on companies and households, so that the latter can always service their debt. Analysis of the development in the non-financial sector can therefore present indicators of the interest burden. An indicator of the interest burden on companies is e.g. interest expenditure as a ratio of primary operating profit, while the development in the interest burden on households can be calculated as interest costs as a ratio of disposable income. In connection with analysis of the interest burden it is relevant to consider the development in interest-rate levels. If interest rates fall, the interest burden on households and companies will decline, all other things being equal.

The price development for real assets can also be part of the analysis of the non-financial sector. Examples are the development in prices for commodities, stocks and property. Property prices are of special significance for the Danish households, since housing is by far the largest single item of the households' net worth. Besides property prices the development in the property market is reflected in the number of enforced sales and the mortgage ratio³. Development in stock prices does not have the same relevance to the real economy in Denmark as e.g. in the USA. Falling stock prices thus do not have any strong impact on the net assets of Danish households.

Box 2 presents indicators based on the non-financial sector.

Macroeconomic indicators

The financial system is dependent on economic activity, but the financial institutions also influence macroeconomic development. An analysis of

¹ The yield ratio can be calculated as the profit for the year before financial items as a ratio of assets.

² Solvency can be calculated as equity capital as a ratio of the balance sheet.

³ The mortgage ratio can be defined as lending in mortgage-credit bonds as a ratio of property value.

INDICATORS FOR THE NON-FINANCIAL SECTOR

Box 2

Relevant indicators for assessment of the non-financial sector in relation to financial stability:

- Debt/assets (e.g. absolute size of the debt, debt as a ratio of equity, development in the distribution of long-term and short-term debt, gearing).
- Liquidity (e.g. companies' liquid assets as a proportion of short-term debt and households' use of consumer credit).
- Income (e.g. companies' returns and solvency and the development in households' disposable income and in employment).
- Interest burden (e.g. companies' interest costs as a ratio of primary operating profits, households' interest costs as a ratio of disposable income and development in the level of interest rates).
- Development in commodities prices (e.g. oil price trends).
- Development in stock prices (e.g. the KFX index).
- The property market (e.g. fluctuations in property prices for the business sector, changes in cash prices for one-family homes, development in the number of bankruptcies and in the mortgage ratio).

the financial sector must therefore also include an assessment of the macroeconomic environment.

A low or falling growth rate will often diminish the ability of households and companies to repay loans, thereby increasing the credit risk. This is especially the case if lending by financial institutions is concentrated on individual sectors. A slowdown in these sectors will diminish the quality of the financial institutions' portfolios and profit margins to a higher degree than indicated by the aggregated growth figures.

Other shocks to which the financial system is exposed are sudden shifts in inflation and interest-rate levels. Changing inflation rates can make it more difficult to perform correct assessments of credit and market risks, and interest-rate increases can lead to a higher proportion of non-performing loans. As stated elsewhere in this article, it is also important to monitor the development in the asset markets. It is relevant to assess whether there are bubbles in the Danish asset market and to evaluate the development in other markets with which the Danish market is correlated.

The theories also point to the importance of analysing the development in external debt and the structure and maturity of capital flows. It is also relevant to consider the development in exchange rates.

Box 3 presents a summary of relevant indicators.

Structural indicators

The industrial-economic approach emphasises the significance of reducing access barriers to the market. Structural indicators include new mar-

With regard to financial stability it is relevant to consider macroeconomic indicators such as:

- Economic growth (e.g. aggregated growth rates and possible crises in certain sectors).
- Inflation (e.g. shift in inflation level).
- Development in interest rates (e.g. the development in the level of interest rates in general and development in real interest rates).
- Development in stock prices (e.g. assessment of whether there are bubbles in the Danish stock market, and assessment of the stock markets with which the Danish market is correlated).
- Balance of payments (e.g. external debt and the composition and maturity of capital flows).
- Development in exchange rates.

ket players, e.g. branches of foreign banks; technological progress such as Internet banking; change in borrower behaviour, e.g. use of the Internet; and the strategies of market participants, e.g. herd-like behaviour.

The increase in the number of foreign and domestic Internet banks in recent years has affected the terms of competition on the Danish financial market. For a transition period as the existing banks establish Internet banks, while the remainder of their group structures have not yet been adjusted, the banks are subject to considerable uncertainty and a high cost level. The banks' Internet strategy can fail if profits are not generated in due course. The operational risk can also be amplified, e.g. by the integration of Internet banking with the banks' other technical systems. Credit risks can also be affected, since it is easier for the banks to expand in a larger geographical territory if they offer Internet banking. This trend makes high demands of the banks' information levels, e.g. concerning the credit standing of potential customers from new geographical areas. On the other hand, expansion will entail diversification of the credit risk. The overall effect is thus unclear. In the longer term, the banks' liquidity risk can perhaps also be affected by the rapid information flows via the Internet.

EXPERIENCE FROM FINANCIAL CRISES

Financial crises are never identical. Nonetheless, experience shows that there are certain recurring elements. Davis (1999) thus identifies selected episodes of financial instability from 1970-98 and categorises them according to some very general causes, i.e. problems with the lending

portfolio and unrest on financial markets. It is debatable whether this breakdown is actually worthwhile, but the main conclusion is that problems in the banking sector are predominantly due to loan losses, and that unrest on the financial markets affecting a wider circle of financial institutions has become a more important source of instability.

The majority of the crises in the banking sector are related to losses on domestic lending. The exceptions are Latin America in 1982 and Asia in 1997-98. In these regions there were losses on short-term foreign financing in particular, besides losses on domestic lending. Foreign financing also played a role in connection with the Nordic banking crisis, cf. the earlier discussion. In the light of an increasing number of cross-border mergers and acquisitions within the banking sector, especially in Scandinavia, it is likely that the risk pattern will change.

In rough terms, it is possible to distinguish between two types of crisis in the financial markets leading to financial instability. The delineation of the two types depends especially on the length of the crisis. One originates from extreme market volatility in the wake of a sudden shift of expectations. In this type of crisis, especially investors who have taken geared positions are affected. The second type of financial crisis involves a protracted decline in liquidity and issues. This affects not only the institutions which depend on frequent market trading, i.e. hedge funds, but also institutions, including banks, with an ongoing need to obtain financing in the market. Moreover, the banks will be affected to the extent

RELEVANT INDICATORS OF FINANCIAL VULNERABILITY IN CONNECTION WITH THE NORDIC BANKING CRISIS 1990-92

Box 4

Davis (1999) identified the following indicators of financial instability in connection with the Nordic banking crisis in 1990-92:

Up to the crisis:

- Debt accumulation
- Asset price boom
- Concentration of risk
- Regime shift
- New entry of intermediaries
- Monetary tightening
- Declining capital adequacy in financial institutions

Repercussions of the crisis:

- Increased credit rationing
 - Liquidity failure
 - Bank runs
 - Action by the authorities
 - Severe macroeconomic impact
-

that they have financed more speculative institutional investors. Some of these historical examples were concentrated on specific markets. The episode with Russia and the LTCM hedge fund in 1998 illustrates, however, how quickly such crises can spread.

The Nordic banking crisis in 1990-92

Viewed from a Danish perspective, it is especially interesting to consider the Nordic banking crisis. Indicators relevant to the Nordic banking crisis are shown in Box 4.

The indicators are a sub-quantity of the indicators of financial instability above. It will be obvious in particular to consider these indicators while analysing the development in the financial stability in Denmark.

BIBLIOGRAPHY

Baldvinsson, C., F. Brokhattingen, K. Busck-Nielsen and F. N. Rasmussen, *Danish Banking*, Forlaget Thomson, 2000.

Chang, R. and A. Velasco, *Financial Crisis in Emerging Markets: A Canonical Model*, Working Paper, Federal Reserve Bank of Atlanta, July 1998.

Corsetti, G., P. Pesenti and N. Roubini, *Paper Tigers? A Model of the Asian Crisis*, <http://www.nyu.edu/~nroubini/asis/AsiaHomepage.html>, 1998.

Davis, E. P., *Debt Financial Fragility and Systemic Risk*, Oxford University Press, 1995.

Davis, E. P., *Financial Data Needs for Macroprudential Surveillance – What are the Key Indicators of Risks to Domestic Financial Stability?*, Handbooks in Central Banking, Lecture Series no. 2, Centre for Central Banking Studies, Bank of England, 1999.

Diamond, D. W. and P. H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, *Journal of Political Economy*, vol. 91, pp. 401-419, 1983.

Dyrberg, A., *Tigers in Trouble - Theories on the economic collapse after the crisis in Asia 1997 – 98*, thesis, University of Copenhagen, 2000.

Fisher, I., *The Debt-Deflation Theory and Great Depressions*, *Econometrica*, 1, pp. 337-57, 1933.

Freixas, X. and J. Rochet, *Microeconomics of Banking*, The MIT Press, Cambridge, 1997.

Guttentag, J. M. and R. J. Herring, Credit Rationing and Financial Disorder, *Journal of Finance*, 39, pp. 1359-82, 1984.

IMF, *Macprudential Indicators of Financial System Soundness*, IMF Occasional Paper No. 192, 2000.

IMF, *The Nordic Banking Crises. Pitfalls in Financial Liberalization?*, Occasional Paper no. 161, 1998.

Krugman, P., *Balance sheets, the transfer problem, and financial crisis*, <http://www.nyu.edu/~nroubini/asis/AsiaHomepage.html>, 1999.

Mishkin, F. S., *Asymmetric Information and Financial Crisis: A Historical Perspective*, in R. G. Hubbard (ed), *Financial Markets and Financial Crises*, University of Chicago Press, 1991.

Mishkin, F. S., *Financial Stability and the Macroeconomy*, Central Bank of Iceland, Working Papers, No. 9, 2000.

Ministry of Economic Affairs, *Den danske pengeinstitutsektor*, October 1994.