The Role of Capital in Banks

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INTRODUCTION

Banks[1] play a distinct role in the economy. Unlike other business enterprises, they are therefore subject to extensive regulation, including capital requirements as an important element. Capital requirements relate to the size and composition of liable capital. The capital requirements for banks are based on international standards laid down by the Basel Committee[2]. In recent years the Basel Committee has been working on new capital-adequacy rules for banks[3]. The special role of capital in banks is explained in the following, including its significance to the banks' role as credit providers, and why special capital requirements for the banks are necessary. The expected implications of the new capital-adequacy rules to the banks are also considered.

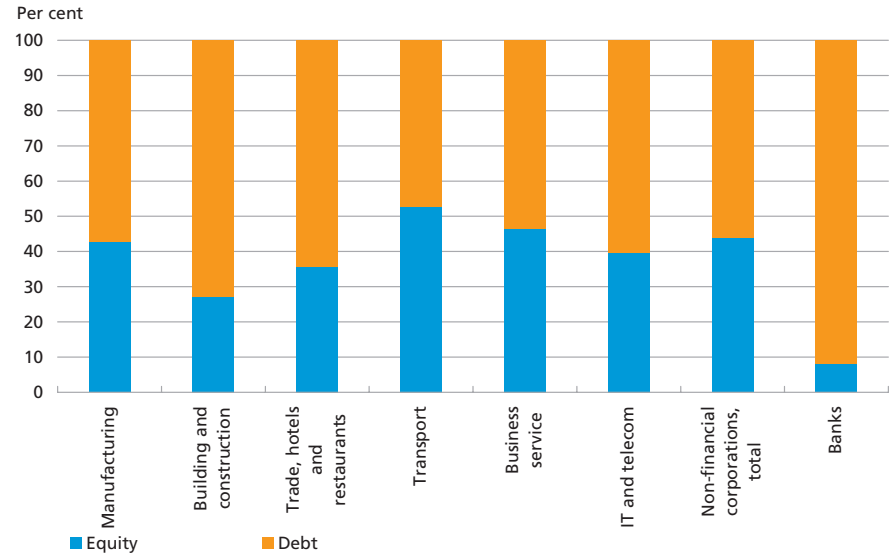
THE CAPITAL STRUCTURE OF BANKS AND THE ROLE OF CAPITAL

The capital structure of a business enterprise reflects the proportions of the enterprise's assets financed by own funds or external financing. Chart 1 shows the average capital structure in various sectors in Denmark. It illustrates that the equity ratio varies across sectors and that banks have a considerably lower equity ratio than non-financial corporations. The reason is that the principal function of banks is to receive deposits and relend, whereby the profit and the volume of business are related to both the size and the relative distribution of the balance-sheet items.

Chart 2 shows the banks' capital structure, and it can be seen that the composition of liabilities varies considerably between the three categories. The share of deposits relative to total liabilities is significantly higher for the smaller banks than for the large banking groups.[4]

1 This article deals with banks, but many of the issues herein apply to banking institutions in general.
2 The Basel Committee, whose secretariat is at the Bank for International Settlements, BIS, was set up in 1974 with the purpose of strengthening the stability of the international financial system.
3 See Borup and Lykke (2003).
4 The composition of the banks' capital is described in more detail in Bundgaard and Hyldahl (2002).

CAPITAL STRUCTURE OF DANISH BUSINESS ENTERPRISES BY SECTOR Chart 1



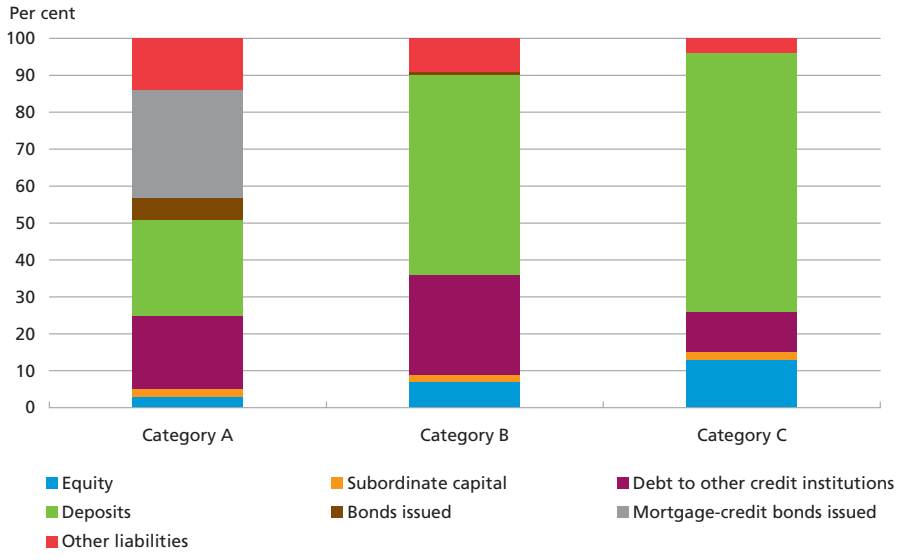
Note: A weighted average of the capital structure is applied. The calculations exclude business enterprises with a balance-sheet total of less than kr. 50,000. Core capital is applied as a measure of the banks' own funds.
Source: KOB and the banks' annual accounts.

The essential function of banks is to receive deposits and grant loans. Deposits can normally be withdrawn without notice or at short notice, while loans generally have considerably longer maturities. The banks run the risk of the borrowers being unable to service the loans (credit risk), while, in principle, the depositors run the risk of the bank failing before the deposits have been withdrawn. However, the latter risk is sought limited by several means, such as public supervision of the banks, deposit insurance schemes and a requirement for the banks' equity ratio to be higher than a specified limit. The banks' earnings consist of interest payments on loans[1] less interest payments on deposits, etc. and costs. Equity capital is subject to residual remuneration and therefore bears the business risk e.g. in case of falling earnings. In the longer term the remuneration should therefore exceed the remuneration on short-term risk-free financial assets and will normally increase as the equity ratio decreases.

The banks achieve economies of scale from analysing and collecting information concerning the credit risk on borrowers. Furthermore, the banks spread their risk by lending to a wide range of borrowers, which reduces the risk on total lending compared to a scenario where the depositors themselves have to invest in the business enterprises. Since the

[1] With a view to simplification, the return on the securities portfolio, fees, etc. are not considered.

CAPITAL STRUCTURE OF DANISH BANKS Chart 2



Note: Category A comprises banking groups with mortgage-credit and banking activities on their balance sheets; category B comprises large Danish banks; category C comprises smaller Danish banks, cf. Danmarks Nationalbank, *Financial stability* 2003, p. 92.

Source Annual accounts.

banks receive deposits from many different individuals, the risk on this source of financing is limited. Furthermore, since the depositors are covered by a deposit insurance scheme[1], the rate of interest that they accept on their deposits is low and does not exceed the risk-free interest rate, i.e. the rate of interest on investment in a short-term, risk-free financial asset. As appears from Box 1 below, the creditors in non-financial corporations will demand an interest premium if the debt relative to the total balance sheet becomes too high. This is not the case for the banks' private depositors. As a result of the deposit insurance, and since it is extremely difficult for the individual depositor to assess the business risk on the banks, the rate of interest on deposits is largely independent of the bank's debt relative to its total balance sheet.

In the USA the banks' equity capital as a ratio of the balance sheet has decreased since the first banks were established in the 1860s, from more than 50 per cent to around 5 per cent before the introduction of the risk-based capital requirements in 1990, see Berger et al. (1995). The strongest drops in the equity ratio were seen in connection with regulatory measures, e.g. during the economic crisis in the 1930s when a deposit insurance scheme and other measures were implemented due to

[1] In Denmark the Guarantee Fund for Depositors and Investors was established in 1987. The Fund covers deposits up to kr. 300,000.

THEORY OF CAPITAL STRUCTURE AND BANKS Box 1

The basis for determining the optimum capital structure is the Modigliani-Miller theory[1], according to which the value of a company, in a perfect world without taxes, is independent of financing. The underlying assumption is that in a perfect world the investors can compose their own personal gearing, i.e. "home-made leverage". It is therefore not possible for companies to add value via the capital stucture. This result changes significantly when corporate taxes are introduced, as the value of the company increases with growing indebtedness owing to the tax deductibility of interest payments but not of the remuneration on the equity capital. In practice, however, the rate of interest for loans rises when indebtedness becomes so high that the contributors of external financing begin to demand a risk premium on further lending to the company. It is difficult to assess whether the conventional theory of capital structure can be used to determine the optimum capital structure and thus the optimum excess capital reserves for banks.[2]

Banks differ from other companies in that they are permitted to receive deposits from the general public. Furthermore, the individual bank has unique information on its borrowers. The value of a bank being part of the financial infrastructure where the term "bank" is well-known by the general public is called "franchise value". Banks create franchise value on the assets side since they can obtain a positive net present value[3] on loans, and on the liabilities side since they are permitted to receive deposits, where the financing costs largely correspond to the risk-free interest rate. This means that increased indebtedness, and thus a higher financial risk, does not lead to higher financing costs in the form of a higher deposit interest rate because private investors do not react to the bank's level of risk. The reason is partly that private depositors are covered by a deposit insurance scheme, partly that the depositors do not have sufficient knowledge to assess a bank's level of risk. These factors have two opposite effects. The wish to protect the irrecoverable franchise value calls for large excess capital reserves. The possibility of raising credits at the risk-free rate of interest and investing in projects with a positive net present value calls for the highest possible gearing and thus the lowest possible excess capital reserves.

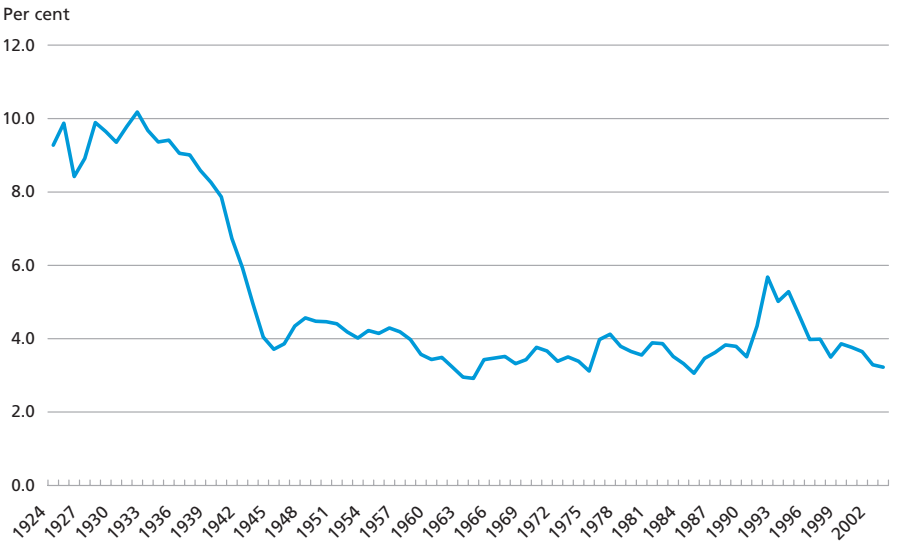
[1] Cf. Modigliani, F. & M.H. Miller, 1958, The Cost of Capital, Corporation Finance and the Theory of Investment, *The American Economic Review*, Vol. XLVIII, No. 3 and Modigliani, F. & M.H. Miller, 1960, Corporate Income Taxes and the Cost of Capital: A Correction, *The American Economic Review*, Vol. LIII, No. 3.

[2] Merton Miller answers the question himself in the article "Do the M&M propositions apply to banks?" since the abstract of the article is merely "yes and no", cf. Miller (1995).

[3] Banks have unique information on the borrowers regarding e.g. payment patterns, etc., which the borrowers cannot transfer when they change banks. This information is valuable to the individual bank.

the large number of bank failures. The equity ratio in the banks declined from approximately 15 per cent in 1930 to approximately 6 per cent at the beginning of the 1940s. The extensive regulation limited the risks which the banks could assume, leading to a reduction of the stock market's "demands" as to the size of the banks' capital. The explanation of the decrease in the equity ratio until 1990 is that the banks' aforementioned advantages have been reduced over time as the borrowers themselves have been enabled to raise capital in the financial markets. The banks have therefore reduced their capital costs by lowering the equity ratio to keep their competitive edge. Most Danish business enterprises

SHARE CAPITAL AND SUBORDINATE CAPITAL AS A PERCENTAGE OF THE BALANCE SHEET OF DANISH BANKS 1924-2003 Chart 3



Note: Book value of the share capital plus subordinate capital as a ratio of the balance-sheet total. A more accurate measure is obtained by applying the market value of the share capital.
Source: Danmarks Nationalbank, *Report and Accounts* 1924 - 1985, The Danish Financial Supervisory Authority.

are too small to profit from raising capital in the financial markets themselves. On the other hand, the Danish mortgage-credit system provides an opportunity for business enterprises and private individuals to borrow on market terms against real property as collateral. Chart 3 shows the course of Danish banks' liable capital (share capital and subordinate capital) relative to the balance sheet since 1924.[1]

The Chart shows that the share capital relative to the balance sheet decreased from around 10 per cent at the beginning of the 1930s to 4 per cent at the beginning of the 1940s. The decrease can be attributed to strong balance-sheet growth, especially until 1943, while the share capital was almost constant[2]. Since then, the ratio has been almost constant until today, with the exception of a hike in 1975 when the new Commercial Banks and Savings Banks Act made it possible to include, to a certain extent, subordinate loan capital in the calculation of the minimum capital requirement. The increase at the beginning of the 1990s is primarily due to the decline in the total balance sheet (the de-

[1] Savings banks, which played an important historical role as capital providers in Denmark, have been excluded due to the special financing conditions for the savings banks for a large part of the period.

[2] This can be attributed to the abundance of money in connection with World War II where deposits in Danish commercial banks and savings banks rose from kr. 4.6 billion at end-1939 to kr. 9.7 billion in mid-1945, while loans declined from kr. 4.1 billion to kr. 3.3 billion in the same period, cf. *Dansk Pengehistorie (Danish monetary history)* 1914-1960, p. 244.

nominator in the calculation of the ratio) in the Danish banking sector in connection with poor years for the banks. Disregarding these periods, the stability of this ratio since World War II is remarkable. Corresponding stability is observed in the USA, among other countries.

The role of capital in banks

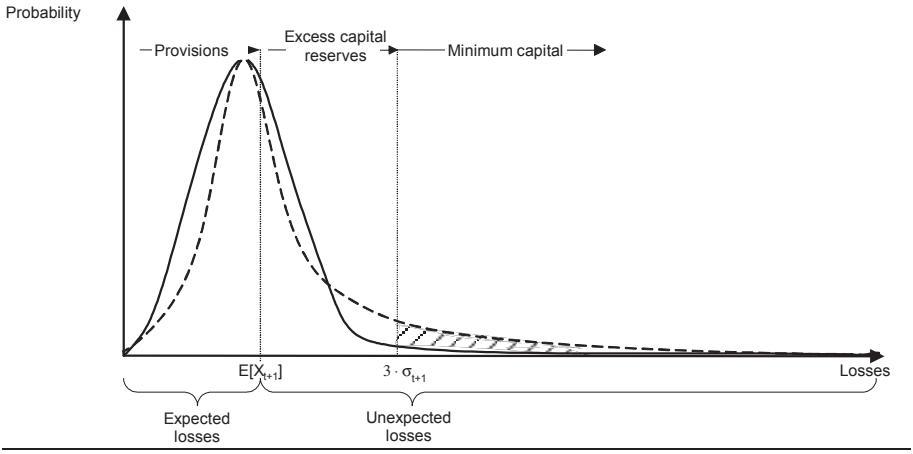
The conventional role of capital is to ensure the survival of business enterprises when they encounter unexpected losses. The banks are subject to a special minimum capital requirement of 8 per cent of the risk-weighted assets, imposed by the authorities. If the banks' liable capital falls below 8 per cent, the authorities will step in and close the bank down or encourage another bank to acquire it, should it prove impossible to restore the capital. The banks' capital reserves in excess of the 8 per cent and their current earnings ensure their independence and survival in case of unexpected losses. This general problem is illustrated in Chart 4 with an assumed distribution of losses on a bank's exposures. The distribution of losses shows the probability of losses of a given size.

The bank makes provisions corresponding to the expected value of the losses, stated as E[X]. With a given degree of probability, e.g. 99 per cent, the excess capital reserves should cover the unexpected losses, provided that these follow the assumed distribution. In practice, the losses will probably follow another distribution, as indicated by the broken curve. Banks hold capital in excess of the minimum capital requirement to ensure that unexpected losses do not lead to non-compliance with the minimum capital requirement, in which case the shareholders would have to transfer control of the bank to the authorities.

Another purpose of the excess capital reserves is to avoid excessive financing costs for other financing options than deposits. For example, a bank would have to pay a high rate of interest on loans from other banks or bonds issued by the bank if the bank's excess capital reserves are found to be insufficient. The large banks wish to keep their good ratings and therefore have considerable market-determined excess capital reserves, cf. Jackson et al. (2002). The rating agencies make demands regarding the banks' excess capital reserves as a condition for a high rating. Furthermore, sufficient excess capital reserves enable the bank to enter into large exposures without having to raise new capital.[1] Finally, a bank's reputation will suffer if the bank finds it difficult to meet the authorities' capital requirements, e.g. in connection with large losses on a loan exposure.

[1] This is termed the "pecking order" theory of capital structure, cf. Myers (1984). However, in terms of corporate governance the shareholders will lose the control tool they have vis-à-vis the bank's management in that the exposures are subject to assessment by the financial markets when the latter are used as a source of financing.

THE ROLE OF CAPITAL IN BANKS Chart 4



Note: The unbroken curve shows the assumed distribution of losses, while the broken curve illustrates an actual distribution of losses. E[X_{t+1}] and σ_{t+1} are the mean value and standard deviation, respectively.
Source: Own calculations.

The purpose of capital requirements

The purpose of the minimum capital requirements imposed by the authorities is to prevent a bank's financial problems from spreading and threatening financial stability. This could happen if an event in a bank leads to considerable financial losses and/or loss of confidence in other parts of the financial system. The ultimate consequence would be that the banks no longer function as efficient providers of credit to business enterprises and households. Loss of confidence in the banking sector would mean that the banks would be unable to attract sufficient deposits as a source of financing or to attract capital from investors, including interbank loans. Minimum capital requirements are to prevent the value of assets in a failing bank from dropping below the value of the depositors' claims. The aim is to ensure that the bank can be reconstructed or wound up in a relatively orderly fashion, whereby exposures can be settled without the counterparties suffering losses.[1]

The capital requirement is determined with a view to ensuring confidence in the banks without jeopardising the banks' role as providers of capital. The minimum capital requirement of 8 per cent of the risk-weighted assets is an international compromise between these two considerations.

[1] See e.g. Systemic Risks in the Danish Market for Uncollateralised Overnight Deposits in Danmarks Nationalbank, *Financial stability* 2004.

The banks' capital and the business cycle

Banks normally experience strong growth in lending during booms, whereas credit expansion is tightened during recessions, as the value of any collateral provided for the loan (real property, machinery, etc.) decreases.[1] It is difficult to assess the significance of capital requirements. A theoretical argument is that capital requirements increase the banks' risk-taking, cf. Genotte & Pyle (1991), since the financing costs on deposits do not rise when risk-taking increases. In practice, the value of the licence to operate as a bank is often so great that the shareholders do not wish to assume excessive risks, cf. Box 1. The requirements imposed on the banks under the upcoming Basel II Accord will probably reinforce the banks' procyclical effects since the capital requirements are based on the rating of the borrowing business enterprise. Ratings are improved in good times, but reduced in hard times. The banks' own internal ratings of business enterprises probably react much more quickly to a business enterprise's difficulties in servicing its debt than the external ratings by rating agencies. This is supported by the results of Karacadag & Taylor (2000), which show that the banks' internal ratings of business enterprises are considerably more procyclical than the ratings by external rating agencies. Procyclicality is a two-edged sword in relation to financial stability. On the one hand an important safety consideration for the banks is to react to a deterioration in credit and to make sufficient provisions in a downturn. On the other hand this may contribute to amplifying the cyclical fluctuations since credit is tightened when business enterprises are under pressure.

DETERMINATION OF EXCESS CAPITAL RESERVES

Chart 5 shows the excess capital reserves of Danske Bank and Svenska Handelsbanken in the period 1992-2003. The Chart shows a decline since the mid-1990s when economic growth gained momentum following the period of low growth at the beginning of the 1990s.

None of the two banks received government subsidies[2] during the period, so the excess capital reserves reflect the capital structure deemed most appropriate by the two banks, i.e. the composition of external financing and capital in excess of the capital requirement, which is deemed to maximise the value of the bank for its owners.

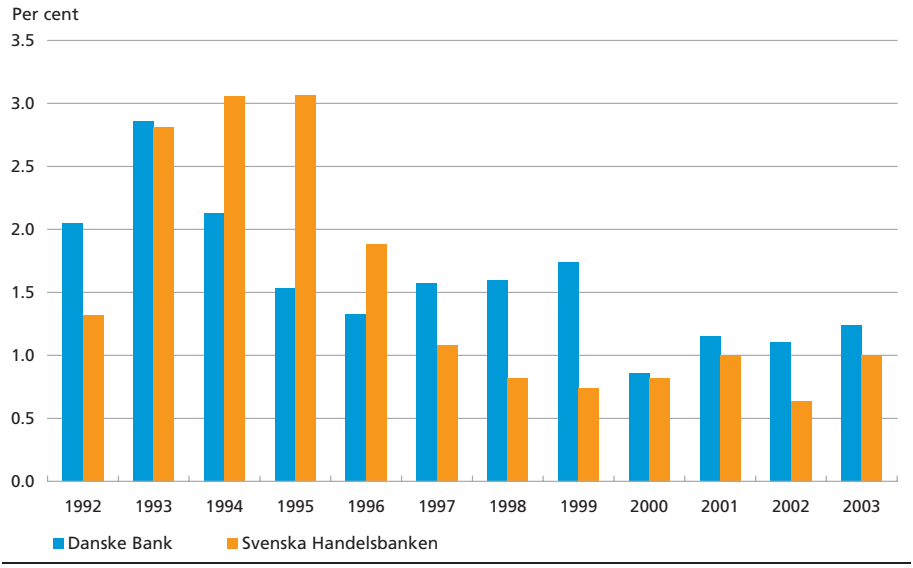
The so-called financial-distress costs are an important reason why business enterprises hold a certain equity capital. For banks, a major cost

[1] See Andersen et al. (1999).

[2] A number of Swedish banks received government subsidies or were taken over by the Swedish state at the beginning of the 1990s in connection with the crisis in the Swedish banking sector.

EXCESS CAPITAL RESERVES FOR DANSKE BANK AND SVENSKA HANDELSBANKEN

Chart 5



Note: Capital in excess of the capital requirement as a percentage of the balance sheet. Danske Bank has been chosen because it is the largest bank in Denmark. Svenska Handelsbanken has been chosen because it is a large Swedish bank which endured the Swedish banking crisis at the beginning of the 1990s without receiving government funds. The figures should be interpreted with caution since they are sensitive to the effects of mergers, etc. during the period.

Source: Annual accounts and own calculations.

of financial distress is that the value of loans, which constitute the most important part of a bank's assets, is typically lower in a default situation than in a situation where the bank is a "going concern". The explanation is that the bank's aforementioned private information on the borrowers cannot be immediately transferred to other banks, as it is built up over the period during which the bank has had the relevant borrowers as customers. A risk premium would be required for another bank to take over the loan since this bank would not know the borrowers.[1]

As appears from Chart 2, the size of the bank influences the capital structure since large banks usually have smaller excess capital reserves than small banks. The traditional explanation is the "too-big-to-fail" argument, i.e. that a government guarantee is implied since failure of large banks would have incalculable consequences for society. However, there is no empirical evidence to support this hypothesis. An alternative explanation in the literature is that excess capital reserves are an alternative to advanced risk management. It is cheaper for small banks to hold relatively large excess capital reserves than to invest in and main-

[1] This is called a "lemon effect", cf. Akerlof (1970), who in 2001 received the Nobel Prize for economics for this theory.

tain advanced risk-management models. An important economic explanation is that small banks' loan and deposit portfolios are less diversified than those of large banks since small banks are typically exposed to the local community in which they operate. Finally, the pressure from the shareholders is often more limited in small banks due to e.g. a high degree of local ownership of the shares.

Alfon et al. (2004) carried out a quantitative and qualitative study of the factors determining the excess capital reserves in selected banks in the UK. One result is that if the authorities raise the capital requirement, the banks seem to augment their capital, although not by quite as much as the increase in the capital requirement. Thus, the excess capital reserves tend to decrease when the authorities impose higher capital requirements.

The significance of new capital-adequacy rules

In view of the extensive treatment of the new capital-adequacy rules in a large number of articles[1], only the significance of the new rules to the banks' capital is described here. The new capital requirements concerning the banks' credit risks are based on ratings of the borrowers in the form of external ratings or the banks' own rating models. This will probably reduce the problem that the individual bank's private information on its borrowers cannot be transferred to other banks. A rating means that the value of this information is known to a certain extent, so it becomes easier to sell the bank's loan portfolio to another bank in the event of difficulties.

It is difficult to determine the implications of the new capital-adequacy rules for the extent of the banks' lending and risks. The train of thought in Diamond & Rajan (2000) is that the increased use of ratings in connection with the new capital-adequacy rules may reduce the advantages of bank-based financing compared with direct market-based financing. The reason is that a number of business enterprises are given ratings, which enables them to raise capital in the financial markets themselves or to raise capital via *Asset-Backed Securities*[2]. This could lead to a reduction of the banks' excess capital reserves in order for the banks to remain competitive. On the other hand, ratings-based capital requirements will make the capital requirements considerably more risk-sensitive, whereby the banks are expected to have larger excess capital reserves to avoid the costs of raising capital in bad times, cf. Jokivuolle and Peura (2001).

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1 See e.g. Borup and Lykke (2003).

2 Such as bonds issued against specified assets as collateral, see Plesner, Søren, 2002, Asset securitisation – new division of tasks in financial intermediation (in Danish). *Finans/Invest* 5/02.

In connection with the implementation of the new capital-adequacy rules a number of banks have improved their risk management and invested in advanced risk management models. This will not necessarily mean that the banks will assume less risk, but may instead enable the banks to reduce their excess capital reserves and lend to higher-risk borrowers, cf. Cebenoyan and Strahan (2001). As opposed to Jokivuolle and Peura, Cebenoyan and Strahan find that the new capital-adequacy rules will lead to increased credit rather than reduced risk in the banking sector. Kupiec (2001) states that the parameters in capital-adequacy rules may create a so-called clientele effect where banks using the standardised approach will lend to higher-risk borrowers, while banks using the advanced approaches will lend to lower-risk borrowers.[1] Thus, the theoretical literature provides no unequivocal indication of the future path of excess capital reserves.

[1] The reason is that the standardised approach incorporates a ceiling on the credit-risk weight for calculation of the capital requirement, whereas this is not the case in the advanced approaches.

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