Banks, Credit and Business Cycles

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1. INTRODUCTION AND SUMMARY

There is a close relationship between business cycles and banking activities. For example, there is a clear tendency for decline or low growth in bank lending during an economic downturn. This reflects both credit demand and supply. Credit demand is weak during downturns due to weak development in consumption and investment. The supply of bank credit will also be lower during downturns, since it is harder for borrowers to service their debt obligations when the economic situation is unfavourable, unemployment is rising and firms are increasingly threatened by default. As a result, banks typically increase their interest margins and tighten their credit standards in a downturn to reduce the risk of increased losses on loans.

This article discusses the interaction between business cycles and banks. Furthermore, it considers the relationship between lending by banks and mortgage banks over business cycles. Part 1 of this Monetary Review contains an overview article with a non-technical summary of the most important findings and conclusions of the article.

The analysis shows that it has become more difficult for firms to obtain bank loans during the crisis, since banks have tightened their credit standards from a lenient pre-crisis level. Firms with sound finances have found it easier to obtain loans than firms with poor economic performance. Overall, only a limited share of firms have stated financial constraints as impediments to production in recent years, but the picture varies among industries. In the industrial sector, the number of firms stating financial constraints as impediments to production has been very low during the recent crisis. As a result, unemployment remains relatively low in Denmark. In the domestically oriented sectors – construction and service – a larger share of firms state financial constraints as impediments to production during the crisis. Still, a considerably larger share of firms in the domestically oriented sectors state sluggish demand as an impediment to production.

Experience shows that banks generally tend to tighten their credit conditions and reduce their lending exposure during economic down-

turns, but there is no doubt that the recent financial crisis has given rise to a considerable additional loss of output in the Danish economy. In addition to the negative impact on the real economy caused by lending restraint in a crisis-stricken banking sector, the financial crisis has also adversely affected the economy in more general terms. The growing perceived uncertainty about the future economy and the economic outlook for households and the corporate sector brought about by the financial crisis may have led to lower consumption and investment and thus to lower house prices, output and demand for credit. Furthermore, corporate confidence in the banking sector's willingness and ability to always meet the demand for credit and liquidity in an economic downturn may have weakened. This may have amplified consolidation and debt reduction by non-financial corporations and dampened demand for credit, investment activity and employment. Non-financial corporations show substantial savings surpluses, and the financial savings surpluses of Danish firms and households relative to the gross domestic product, GDP, have reached the highest levels since the start of the statistical series in the early 1970s. The savings surpluses are thus higher than during the deep recessions in the early 1980s and 1990s.

There are no indications that the banks' lending capacity has generally been an impediment to the development in lending. Moreover, the rise in mortgage lending indicates that the mortgage-credit sector was able to meet part of the corporate and household credit needs. Combined with considerable government intervention during the financial crisis, this contributed to the fact that, during the recent crisis, total lending by banks and mortgage banks did not decline substantially relative to GDP. Total credit remains high in a long-term perspective.

2. BUSINESS CYCLES, BANKS AND THE SUPPLY OF CREDIT

Banks play a key role in the economy as suppliers of credit. Funds from households and firms with savings surpluses are deposited and relent to households and firms with consumption and investment needs.

Due to the close relations between the banking sector and the real economy, bank lending has a very large cyclical element. Chart 2.1 shows real growth in bank lending since the early 1920s. The grey markings indicate periods of economic downturn.

As seen, there is a clear tendency for decline or low growth in bank lending during periods of economic downturn. This reflects both credit demand and supply.

Credit demand is normally weak during downturns due to weak development in consumption and investment in real capital.

REAL GROWTH IN DANISH BANK LENDING 1922-2012	Chart 2.1

Per cent, year-on-year
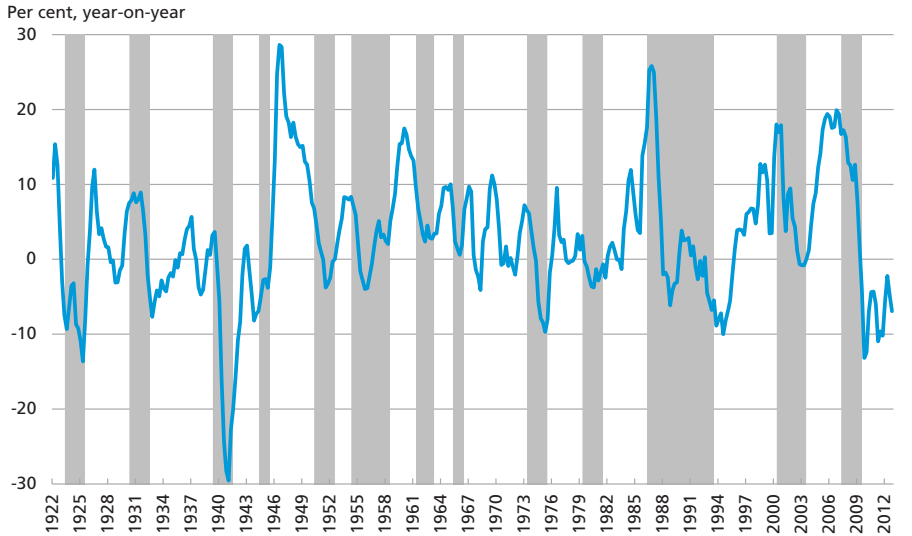
Note: Quarterly observations. The consumer price index is the deflator. The grey markings indicate periods of economic
        downturn, cf. Abildgren et al. (2011).

Source: Abildgren (2012a), Danmarks Nationalbank and Statistics Denmark.

Likewise, credit supply will usually be smaller during downturns. Experience shows that it is harder for borrowers to service their debt obligations when the economic situation is unfavourable, unemployment is rising and firms are increasingly threatened by default. As a result, banks typically increase their interest margins and tighten their credit standards (e.g. by enhancing collateral requirements) in a downturn to reduce the risk of increased losses on loans, cf. Chart 2.2.

Similar to losses, there is considerable cyclical variation in the banks' loan impairment charge ratios, cf. Chart 2.3. There is a tendency for loan impairment charge ratios to be relatively high in years of economic downturn, while they are relatively low in years of high economic growth. In good times, with low unemployment and increasing corporate growth, there will be relatively few cases of non-performance of loan contracts etc., resulting in low loan impairment charge ratios. Conversely, there will be a relatively high number of defaults in an economic downturn, entailing high loan impairment charge ratios.

The cyclical variation in the banks' loss and loan impairment charge ratios is reflected in their interest margins when the underlying trend is taken into account, cf. Chart 2.4. Consequently, interest margins tend to be relatively low in periods of economic upturn and relatively high in periods of economic downturn, cf. Abildgren (2012b) and Drejer et al. (2011). The banks' expected losses and thus their loan impairment charges

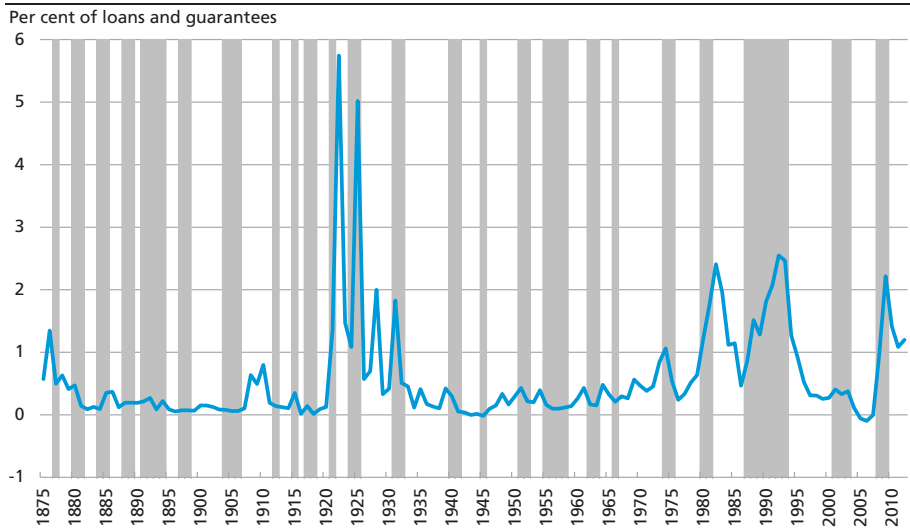DANISH BANKS' LOSSES ON LOANS AND GUARANTEES 1975-2011   Chart 2.2
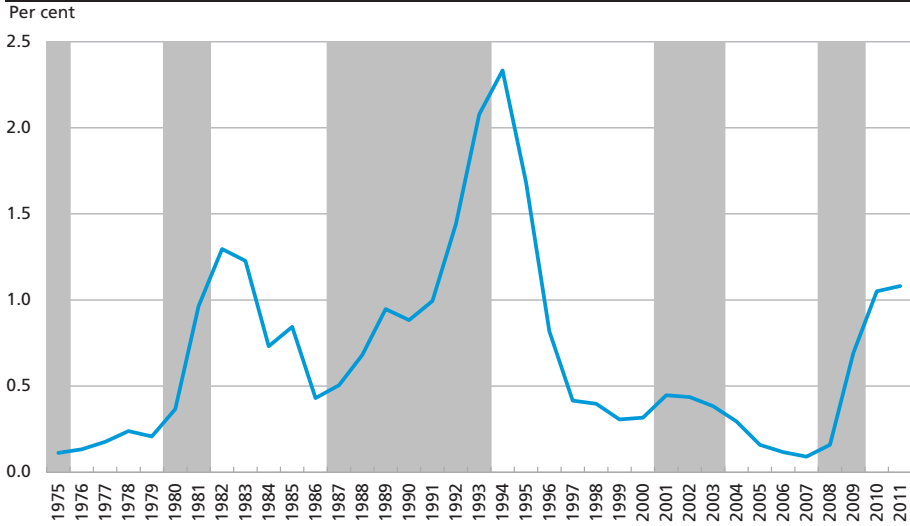
Per cent

Note: Annual observations. The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011).
Source: Danish Financial Supervisory Authority, Baldvinsson et al. (2005) and Busch-Nielsen et al. (1996).

BANKS' LOAN IMPAIRMENT CHARGES 1875-2012   Chart 2.3

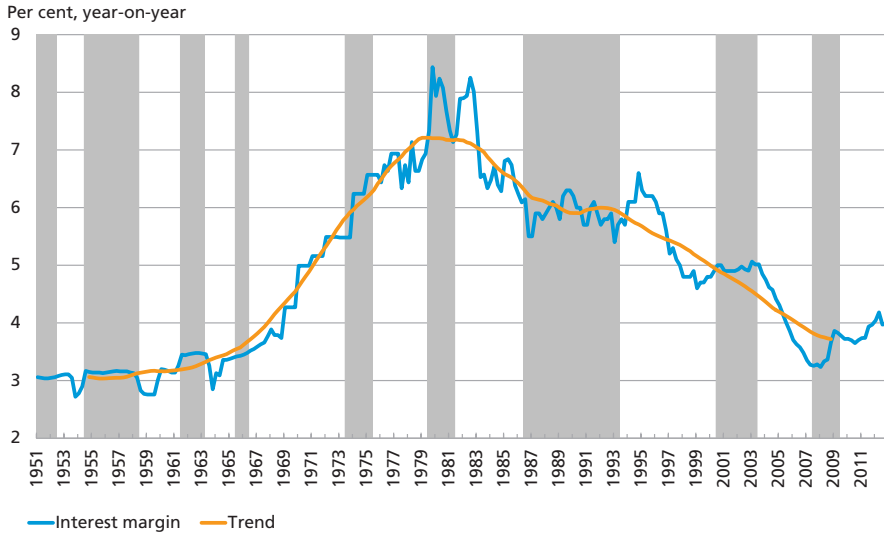Per cent of loans and guarantees

Note: Annual observations. The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011). Loan
        impairment charges are stated net of reversal of loan impairment charges previously made as income. Negative
        figures for loan impairment charges indicate that loan impairment charges previously made are reversed as
        income. A data break occurs in the series of loan impairment charges in 2005 when the accounting policies were
        changed.
Source: Abildgren et al. (2011) and the website of the Danish Financial Supervisory Authority.

BANKS' INTEREST MARGINS 1951-2012   Chart 2.4

Per cent, year-on-year

Note: Quarterly observations. The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011).
         The interest margin is the difference between banks' average lending and deposit rates. The average interest
         rates used are weighted averages of interest rates on outstanding business including the sectors general gov-
         ernment, non-financial corporations and households. Wherever possible, adjustments are made for various data
         breaks. The trend is calculated as a 32-quarter centred moving average.
Source: Abildgren (2012b) and Danmarks Nationalbank.

can be seen as a cost related to loans and guarantees in line with staff
and IT costs, etc., which the banks need to recover by charging an ap-
propriate interest premium which is added to funding and administra-
tion costs, cf. Baltensperger (1980) and Andersen et al. (2001).

The strong cyclical variation is clearly reflected in the banks' annual
profits, cf. Chart 2.5, whereas it is not reflected in the banks' net bor-
rowing/net lending as stated in the national accounts. Net borrowing/net
lending is an expression of the banks' savings surpluses, i.e. gross savings
less investment in real capital. Market price gains/losses, loan impairment
charges and credit losses are not included in the calculation of net bor-
rowing/net lending. Consequently, unlike annual profits, net borrow-
ing/net lending was not negative in the early 1990s and in the period
2008-09. On the other hand, Chart 2.5 shows that net borrowing/net lend-
ing increases in periods of economic downturn. This reflects that banks
increase their interest margins, etc. during a downturn in order to gener-
ate earnings to cover their large loan impairment charges and losses.

The real price of bank equities is shown in Chart 2.6. There is a tendency
for the price to stagnate or fall during economic downturns when the
banks' future earnings prospects deteriorate. It should be noted that the
price drop was particularly pronounced in 2008-09, a period characterised
by the worst crisis in the Danish banking sector since the 1920s.

BANKS' ANNUAL PROFITS AND NET BORROWING/NET LENDING 1981-2011   Chart 2.5
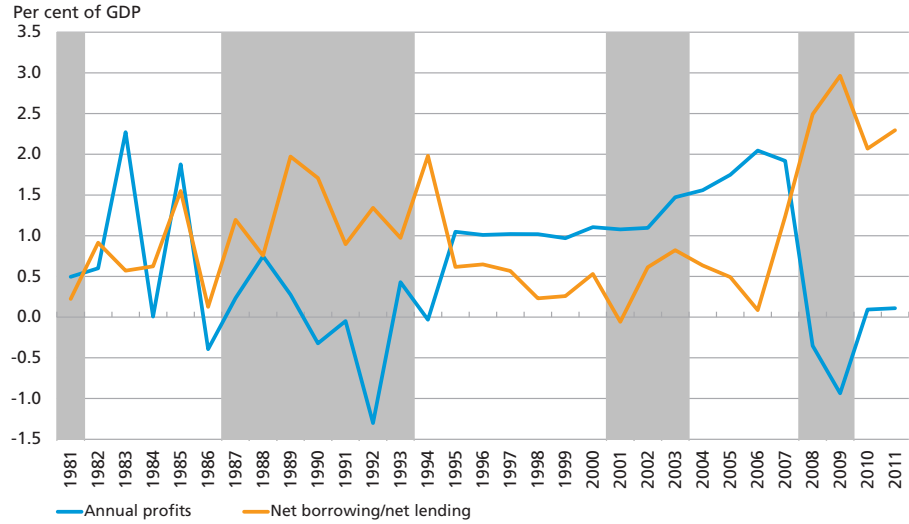
Per cent of GDP

Note: Annual observations. The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011).
         Banks' net borrowing/net lending is calculated as net borrowing/net lending for other monetary financial
         institutions (excluding Danmarks Nationalbank) less mortgage banks' annual profits.
Source: Statistics Denmark and Danish Financial Supervisory Authority.

REAL PRICE INDEX FOR BANK EQUITIES 1920-2012   Chart 2.6

1970 = 100
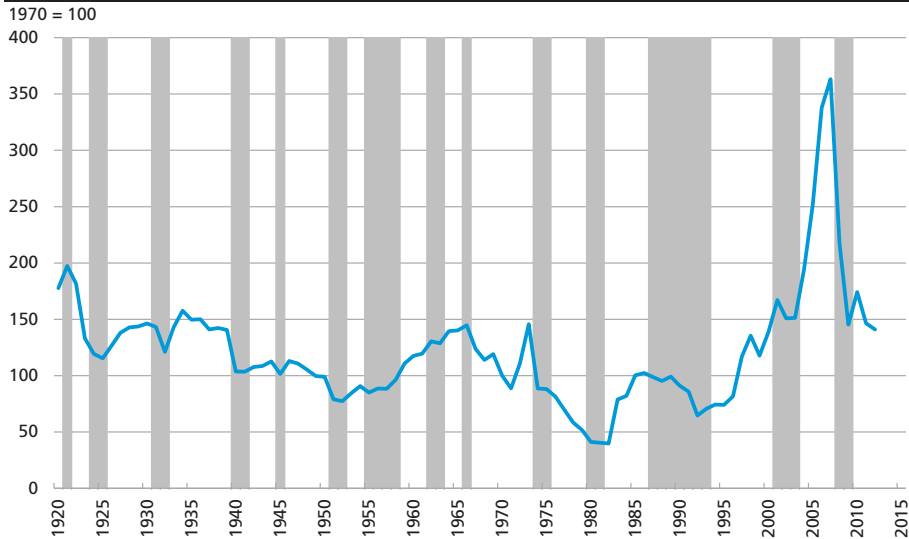
Note: Annual averages. The consumer price index is the deflator. The equity price index covers OMX Finans since 1996.
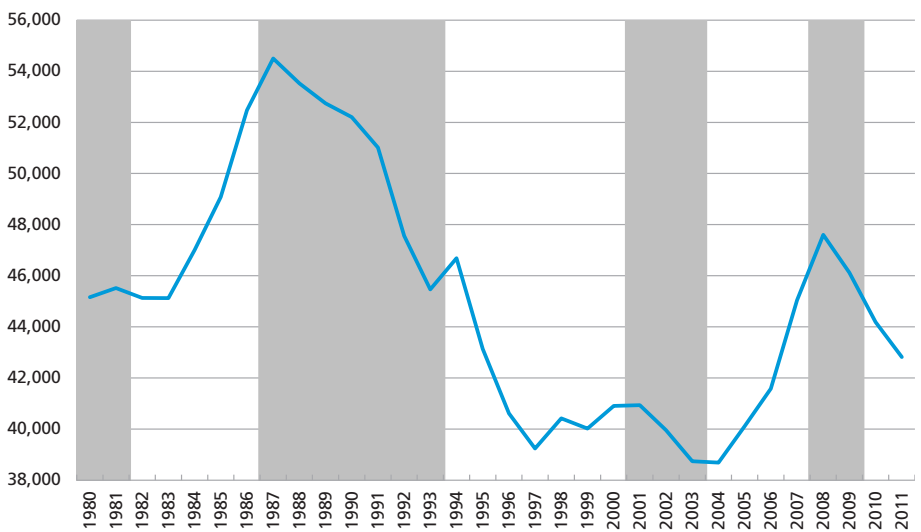   The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011).
Source: Statistics Denmark and Abildgren (2010).

Finally, Chart 2.7 illustrates that the number of employees in the banking sector is also characterised by very strong cyclical fluctuations. During the boom in the first half of the 1980s, the number of employees increased by more than 20 per cent. The cyclical reversal in 1987 and the banking crises until the mid-1990s shifted the focus back towards adjustment of costs and staff requirements. The number of employees fell from just under 55,000 in 1987 to around 40,000 in the second half of the 1990s. During the boom in 2005-07, the number of employees rose sharply once again before falling during the most recent economic downturn.

The tendency of banks to tighten their credit conditions and reduce their lending exposure during an economic downturn – and conversely to ease their credit conditions and increase their lending exposure during a boom – contributes, all else equal, to strengthening the cyclical fluctuations. In this connection, banking activities are said to have a procyclical effect. The procyclicality may even become particularly strong if credit standards are excessively eased during a lending boom in an overheated economy as seems to have been the case in Denmark prior to the financial crisis, according to indicators. This gave rise to additional tightening of credit standards during the crisis, and the tightening thus occurred at a fairly inconvenient time.

In the wake of the financial crisis, measures have been brought into focus that may reduce the procyclicality of the banking sector in future,

NUMBER OF EMPLOYEES IN BANKS 1980-2011   Chart 2.7

Note: Annual observations. The grey markings indicate periods of economic downturn, cf. Abildgren et al. (2011)
Source: Danish Financial Supervisory Authority.

including by introducing countercyclical capital buffers. Such buffers are expected to be implemented in Europe with the coming Capital Requirements Directive, cf. Harmsen (2010). The purpose of counter-cyclical capital buffers is that they should be built up in times of excessive credit growth and reduced in bad times in order to avoid any future need for the government to provide general subsidy schemes and capital injections to protect financial stability. The Committee on Systemically Important Financial Institutions in Denmark has also made recommendations on regulation of systemically important financial institutions, SIFIs. Among other things, the Committee has recommended a crisis management buffer comprising debt instruments of 5 per cent of risk-weighted assets that must be convertible into Tier 1 capital or written down if a SIFI is hit by crisis. Finally, the Systemic Risk Council has been set up with a view to preventing and reducing systemic financial risks.

3. LENDING SURVEYS AND CREDIT STANDARDS

In a number of countries, quarterly lending surveys are conducted, asking the banks' credit managers to assess changes in the credit supply and demand in the last quarter, as well as expected changes in the coming quarter. The potentially most valuable information contained in the lending surveys concerns the question whether, in the banks' assessment, a given development in lending is attributable to changes on the demand or supply side. This information cannot be drawn from the balance-sheet statistics for banks, since an observed loan portfolio is the realised result of credit supply and demand.

The first lending survey was conducted in 1967 (in 1964 on a trial basis) by the US Federal Reserve. Over the last decade or so, several other central banks have introduced similar surveys, including the European Central Bank in 2002[1] and the Bank of England in 2007, cf. Berg et al. (2005) and Driver (2007).

Danmarks Nationalbank introduced its quarterly lending survey in early 2009, cf. Jensen and Sass (2009) and Nielsen (2010). In the survey, the credit managers of a number of banks and mortgage banks are asked to assess changes in the credit supply and demand in the last quarter, as well as expected changes in the coming quarter, cf. Box 3.1.

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[1] The following 12 euro area member states have participated since end-2002: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

DANMARKS NATIONALBANK'S LENDING SURVEY	Box 3.1

Danmarks Nationalbank's lending survey was introduced in the 4th quarter of 2008. It is a qualitative survey in which the credit managers of a number of banks and mortgage banks assess changes in the supply of and demand for loans in the last quarter, as well as expected changes in the coming quarter.

The lending survey is conducted as a questionnaire survey among the 15 or so largest Danish banks (the Danish Financial Supervisory Authority's groups 1 and 2) and five largest mortgage banks. This population covers around 80 per cent of credit institutions' household and corporate loans.

The questionnaires are divided into three parts. The first part covers changes in the banks' credit policies. It discusses the factors contributing to the banks changing their credit policies and how they implemented the changes via their terms and conditions for loans. The second part of the questionnaires is about changes in the demand for loans from existing and new customers, respectively. The banks were asked to disregard seasonal fluctuations when answering the questions. The third part reviews changes in loan impairment charges and losses on outstanding loans.

For each question, there is a choice of five responses: "tightened/increased considerably", "tightened/increased somewhat", "unchanged", "eased/declined somewhat" and "eased/declined considerably". Developments in the current quarter and expectations for the coming quarter must be reported. Responses should always be based on an assessment of quarter-on-quarter changes, not on a long-term perspective.

To summarise the survey findings, the responses are quantified as net balances by assigning a value to each of the five options, i.e. "tightened considerably" = -100, "tightened somewhat" = -50, "unchanged" = 0, "eased somewhat" = +50 and "eased considerably" = +100. The net balance is achieved by weighting the value of the individual banks' responses by their respective shares of total lending. The scale runs from -100 to +100. A negative net balance concerning credit policies indicates that the banks generally tightened their credit policies, thus making it more difficult to obtain loans, while a positive net balance indicates an overall easing of credit policies.

The Danish lending survey was inspired by similar foreign surveys conducted by the Federal Reserve, the Bank of Japan, the European Central Bank, the Bank of England and Norges Bank, among others. However, the individual countries use a number of different methods to weight the individual banks' responses as total net balances. In Denmark, as mentioned above, the net balance is achieved by weighting the value of the individual banks' responses by their shares of total lending in the sample population. The ECB weights the results of the individual euro area member states by their shares of total lending in the euro area.[1] On the other hand, no weighting at the national level is used in the lending survey for the euro area.

The weightings of the individual response categories as net balances also vary. Data in the Danish lending survey are calculated in accordance with the Bank of England's method, weighting all five response options as net balances. The ECB's method, on the other hand, calculates net tightening, i.e. the share of banks that have tightened their credit policies less the share of banks that have eased their credit policies. Hence, in the ECB's method, no distinction is made between banks answering "considerably" or "somewhat".

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[1] Several of the euro area member states publish their own contributions to the bank lending survey for the euro area, including Germany (Deutsche Bundesbank, 2009) and Ireland (Kennedy, 2011).

The lending surveys in all countries are characterised by being based on responses from relatively few banks. The US lending survey is prepared on the basis of responses from around 60 banks, accounting for around 60 per cent of total lending by US banks. In total, there are around 8,000 banks in the USA. The ECB's lending survey data are retrieved from around 120 banks in the euro area, accounting for approximately 50 per cent of lending activities in the euro area. There are around 7,500 credit institutions in the euro area. The Danish survey includes the 15 or so largest banks and the five largest mortgage banks, covering a total of around 80 per cent of credit institutions' lending to households and the corporate sector. In 2011, there were a total of 113 banks and 8 mortgage banks in Denmark.

Danish lending survey is so new, however, that it cannot form the basis for a systematic statistical assessment of the development in credit standards over various parts of the business cycle. For the USA on the other hand, data covering several business cycles are available, so it is possible to disclose a number of "stylised facts" about the relationship between business cycles and credit standards, cf. Chart 3.1. In time, all other things being equal, the Danish survey is also expected to reflect those relationships.

Lown et al. (2000) find that US credit standards were tightened prior to most recessions. As mentioned in section 2, it is natural for banks to

US BANKS' NET TIGHTENING OF CREDIT STANDARDS   Chart 3.1
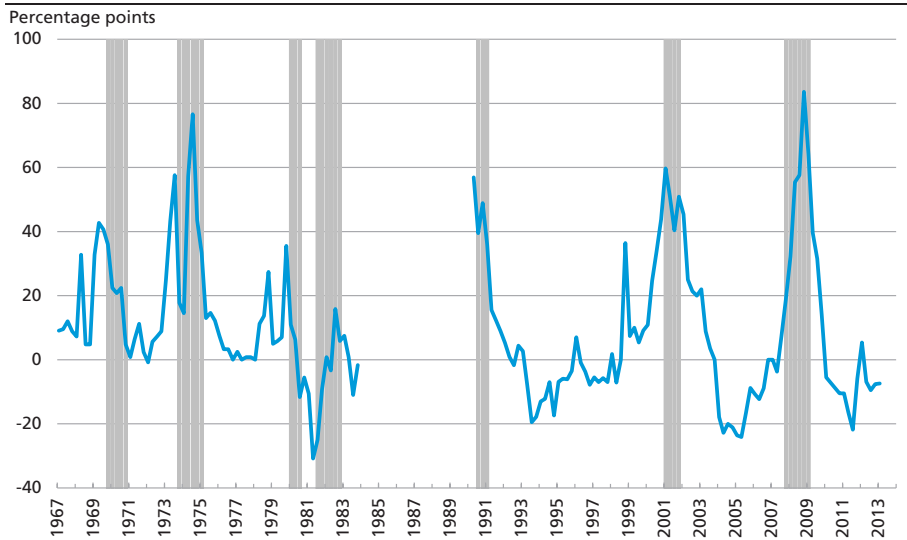
Note: Quarterly observations. Credit standards for lending to small and medium-sized enterprises. The grey markings indicate periods of economic downturn. The question of credit standards was not included in the US survey in the period 1984-1990.
Source: National Bureau of Economic Research and Federal Reserve Bank of St. Louis' FRED database.

tighten their credit standards in an economic downturn in order to re-duce the risk of losses on loans. Such tightening may be in the form of higher interest margins and fees and more stringent collateral require-ments.

According to Owens and Schreft (1991), the US surveys show that lend-ing policies have been tightened much more frequently than they have been eased, which does not seem plausible. Fluctuations in the survey are also more pronounced in periods of tightening than in periods of easing. Hence, the lending policies may seem more restrictive than is actually the case, so the response "unchanged" must at times imply ac-tual easing of credit standards.

Although Danmarks Nationalbank's lending survey is still relatively new, it has already played a central role in analyses and interpretations of credit trends in Denmark. This should be seen in the light of the fact that the survey was introduced in the wake of the collapse of the US investment bank Lehman Brothers in late 2008 and the resulting aggra-vation of the international and Danish financial crises.
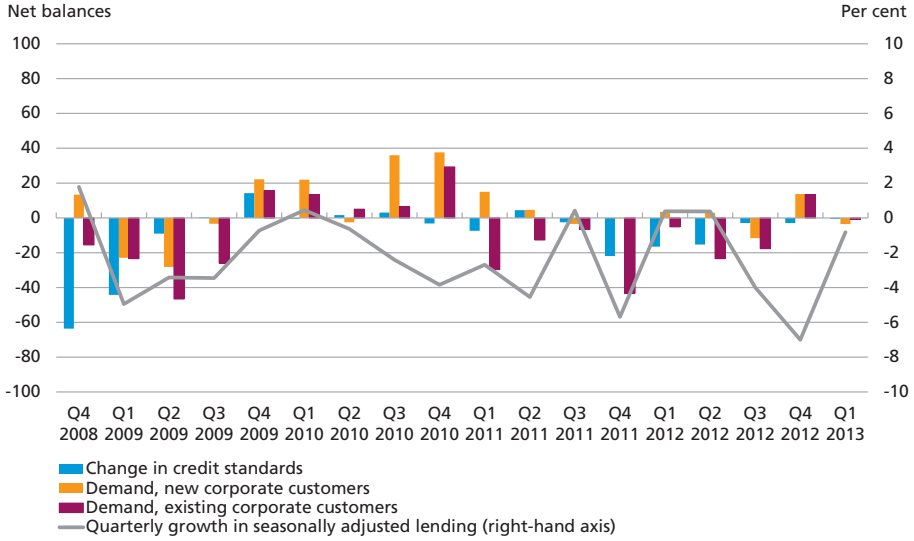
At the aggregate level, most quarters show a relatively close relation between Danish banks' assessment of changes in credit standards and demand for credit and the actual development in lending to corporate customers, cf. Chart 3.2. The relationship is not quite as clear for lending to households, cf. Chart 3.3.[1] During the financial crisis, the decline in lending to households has not been as strong as the decline in lending to corporate customers. One reason is that households have not been as hard hit, reflecting a considerably lower number of enforced sales and loan impairment charges in the mortgage credit sector compared with the early 1990s. This should be viewed in the light of the fact that de-spite an increase, unemployment remains at a relatively low level. Household finances have also benefited from the low level of both short-term and long-term mortgage interest rates calculated after tax, cf. Abildgren and Thomsen (2011).

Relatively speaking, there is also considerable variation in the demand for credit over time. On the other hand, banks primarily changed their credit standards immediately after the collapse of Lehmann Brothers in late 2008 and early 2009, and during the sovereign debt crisis in South-ern Europe in late 2011 and early 2012. In both cases, credit standards were substantially tightened.

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[1] In addition to real changes in the supply of credit, the development in total lending to corporate customers in particular is affected by the timing of loans transferred from banks under the Financial Stability Company to units without a banking licence. Another factor is the timing of realisation of losses. Furthermore, foreign banks in Denmark have transferred loans to Danish firms to the parent bank in their home country. Finally, the joint funding agreement between BRFkredit and several banks in 2012 contributed to a small decline in bank lending.

12

CHANGES IN DANISH BANKS' CREDIT STANDARDS AND DEMAND, AND
GROWTH IN LENDING TO CORPORATE CUSTOMERS   Chart 3.2

- Change in credit standards
- Demand, new corporate customers
- Demand, existing corporate customers
- Quarterly growth in seasonally adjusted lending (right-hand axis)

Note: Credit standards and demand are measured on a scale from -100 (tightened/declined considerably) to +100
        (eased/increased considerably).
Source: Danmarks Nationalbank.

CHANGES IN DANISH BANKS' CREDIT STANDARDS AND DEMAND, AND
GROWTH IN LENDING TO HOUSEHOLDS   Chart 3.3

- Change in credit standards
- Demand, new private customers
- Demand, existing private customers
- Quarterly growth in seasonally adjusted lending (right-hand axis)
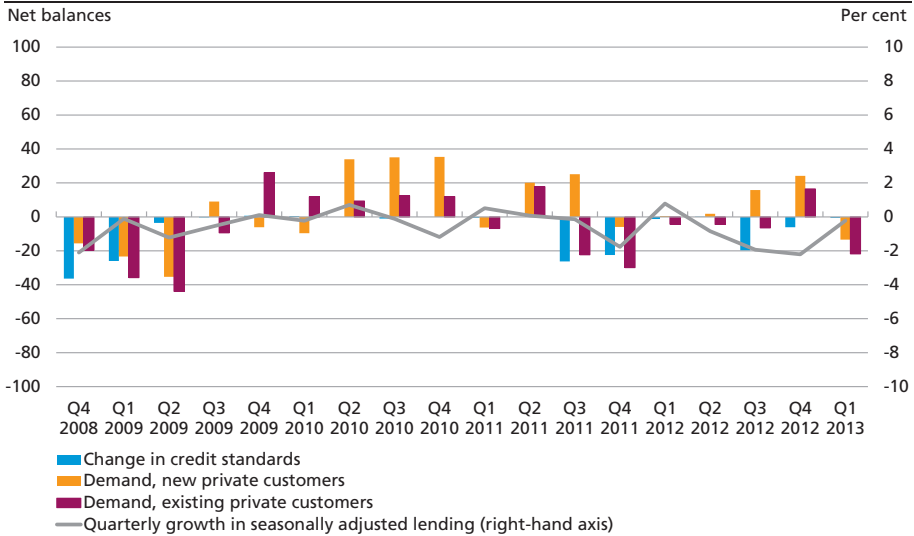
Note: Credit standards and demand are measured on a scale from -100 (tightened/declined considerably) to +100
        (eased/increased considerably).
Source: Danmarks Nationalbank.

4. CREDIT STANDARDS OF INDIVIDUAL BANKS DURING THE FINANCIAL CRISIS

This section discusses the credit standards of individual banks and the factors affecting them. The analyses are based on the banks' responses to Danmarks Nationalbank's lending survey and a number of other sources[1]. Due to considerable variation in the business models and balance-sheet structures between banks and mortgage banks, this analysis focuses on banks only. The population of banks included in Danmarks Nationalbank's lending survey varies slightly over time, as it consists of the banks in the Danish Financial Supervisory Authority's groups 1 and 2 at a given time.

Chart 4.1 shows the distribution of responses to the three key questions about credit standards included in the lending survey, i.e. changes in credit standards, prices and other terms and conditions (e.g. collateralisation). The chart is based on just over 200 observations relating to around 15 banks' lending survey responses over 15 quarters. As seen, the banks answered that they tightened their credit standards for lending to corporate customers somewhat or considerably in 22 per cent of the responses. The banks tightened their credit standards for lending to households slightly less, namely in 18 per cent of the responses.

According to the banks' responses, they generally tightened their prices more often than their credit standards, cf. Chart 4.1[2]. As prices are often regarded as an element of credit standards, at least by customers, a possible interpretation may be that prices are not given much weight in the banks' overall credit standard assessment.

Initially, the relationship between the banks' characteristics and changes in credit policies can be illustrated graphically. Charts 4.2-4.4 are based on all observations in the lending survey. Like Chart 4.1, the charts are divided into three groups, each representing an element of the banks' credit standards. First, the general credit standards are considered as the main issue of the lending survey. Then changes in prices and collateral requirements are considered specifically. In each of the groups, three bars represent three equal groups of observations based on the explanatory variable. Chart 4.2 thus shows the change in credit standards for three groups as distinguished by the quarterly growth in the banks' loan impairment charges. The bar "highest growth in loan

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[1] Data from the banks' regular reporting to Danmarks Nationalbank's balance-sheet, flow and interest-rate statistics and reporting to the Danish Supervisory Authority are used in addition to a number of cyclical indicators compiled by Statistics Denmark and Danmarks Nationalbank.

[2] In the survey, it is possible to answer that prices, collateral requirements and other terms and conditions have been changed without this necessarily being reflected in the general question regarding changes in credit standards.

CHANGES IN CREDIT STANDARDS, PRICES AND COLLATERAL
REQUIREMENTS   Chart 4.1
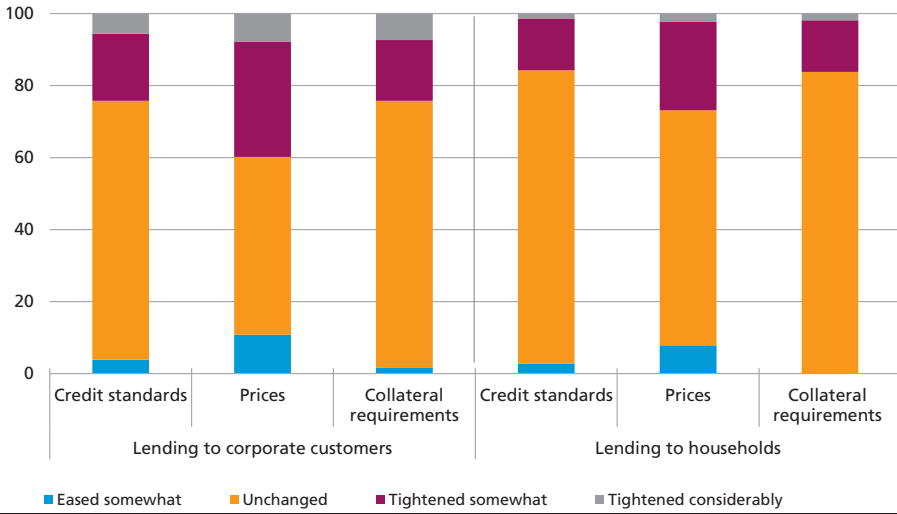
Note: The chart is based on individual banks' responses to Danmarks Nationalbank's lending survey over 15 quarters.
Source: Kuchler (2012).

CHANGES IN BANKS' CREDIT STANDARDS FOR LENDING TO CORPORATE
CUSTOMERS: BANKS GROUPED BY QUARTERLY GROWTH IN LOAN
IMPAIRMENT CHARGE RATIO   Chart 4.2

Note: The chart is based on all banks' responses to Danmarks Nationalbank's lending survey over 15 quarters. The
        breakdown is based on quarterly growth in loan impairment charges, ensuring that each group contains the
        same number of observations. For example, "highest growth in loan impairment charges" refers to that third of
        the observations in which banks saw the highest growth in loan impairment charges.
Source: Kuchler (2012).

CHANGES IN BANKS' CREDIT STANDARDS FOR LENDING TO CORPORATE
CUSTOMERS: BANKS GROUPED BY SOLVENCY RATIO   Chart 4.3

Note: The chart is based on all banks' responses to Danmarks Nationalbank's lending survey over 15 quarters. The
        breakdown is based on the banks' solvency ratio, ensuring that each group contains the same number of obser-
        vations. For example, "highest solvency ratio" refers to that third of the observations in which banks achieved
        the highest solvency ratio.
Source: Kuchler (2012).

impairment charges" contains that third of the observations in which
the banks saw the highest quarterly growth in loan impairment charges.
The bar "lowest growth in loan impairment charges" contains the obser-
vations with the lowest growth in loan impairment charges, and the bar
"medium growth in loan impairment charges" contains the remaining
third. The charts relate only to lending to corporate customers. Similar
charts concerning lending to households generally show the same, cf.
Kuchler (2012).

There is a certain relationship between changes in credit standards
and loan impairment charges, cf. Chart 4.2. The banks with the highest
growth in the loan impairment charge ratio over the previous quarter
had a more pronounced tendency to tighten their credit standards vis-à-
vis the corporate sector. At the same time, the least solvent banks tend-
ed to tighten their credit standards to a higher degree than other banks,
cf. Chart 4.3.

Chart 4.4 shows changes in the credit standards in groups based on the
change in the interest-rate spread relative to the money-market interest
rate that banks pay to borrow money from other monetary financial
institutions (MFIs). Changes in the inter-MFI interest-rate spread have a
fairly great impact on the banks' credit standards. Banks that have seen
an increase in the interest-rate spread have also tightened their credit

CHANGES IN BANKS' CREDIT STANDARDS FOR LENDING TO CORPORATE
CUSTOMERS: BANKS GROUPED BY CHANGES IN INTER-MFI INTEREST-RATE
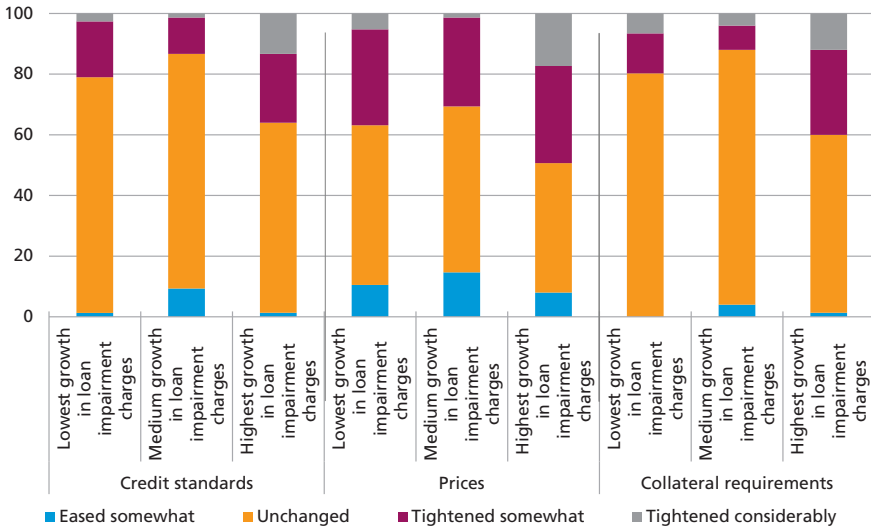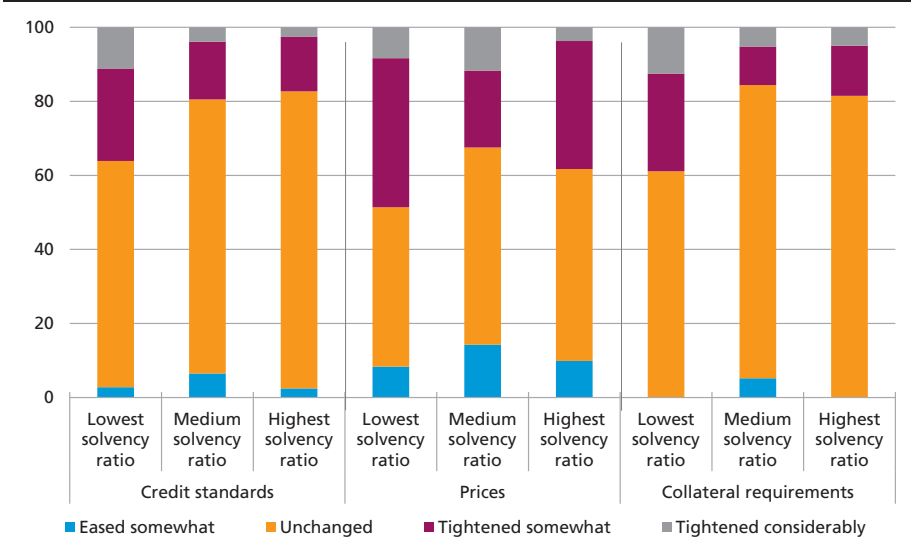SPREAD   Chart 4.4
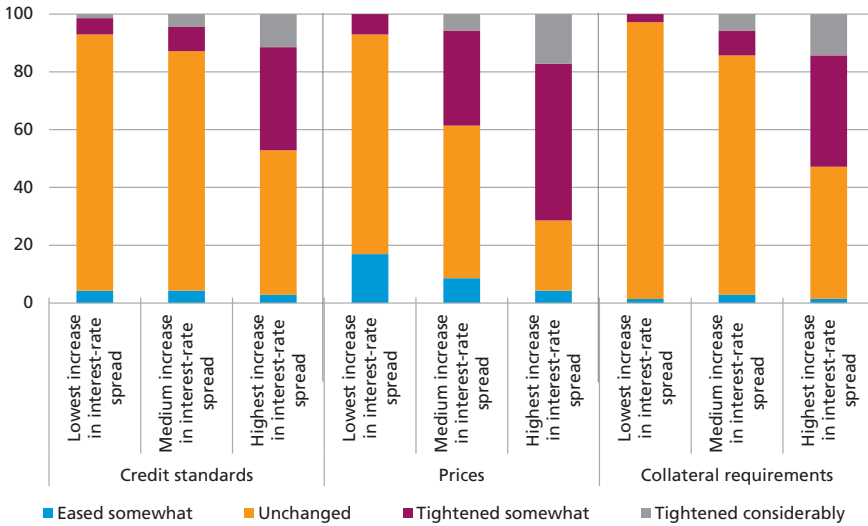
Note: The chart is based on all banks' responses to Danmarks Nationalbank's lending survey over 15 quarters. The
        breakdown is based on the quarterly growth in the individual banks' inter-MFI interest-rate spread, ensuring
        that each group contains the same number of observations. For example, "highest increase in interest-rate
        spread" refers to that third of the observations in which banks saw the largest increase in the inter-MFI interest
        rate. The inter-MFI interest-rate spread is defined as the average deposit rate from other MFIs less the current
        money-market interest rate. All deposits from MFIs (excluding central banks) are included.
Source: Kuchler (2012).

standards to a higher degree, cf. Chart 4.4. On the other hand, similar
charts show no clear relationship between credit standards and variables
describing the banks' pre-crisis characteristics (lending growth, size, ex-
posure to industries), cf. Kuchler (2012).

   The above graphical analyses of the relationship between bank-
specific variables and credit standards are partial. For example, the
banks with the highest growth in loan impairment charges may also
experience a higher increase in funding costs and thus be represented in
the lowest third measured by both dimensions. Cyclical elements may
also impact on the credit standards and are therefore important to in-
clude in the analysis. All other things being equal, economic slowdown
means that bank customers find it harder to service their debt obliga-
tions, which may cause the banks to tighten their credit standards. The
following therefore presents the results of an econometric analysis of
the relationship between bank characteristics and changes in credit
standards.

   A logistic regression model is used to investigate the bank-specific, cy-
clical variables that influence the banks' credit standards, cf. Box 4.1. The
model estimates the impact of the various factors on the probability of a

ECONOMETRIC MODEL OF DEVELOPMENTS IN BANKS' CREDIT STANDARDS	Box 4.1

The analysis of banks' credit standards is based on a logistic regression model estimating the impact of various bank-specific and cyclical factors on the probability of credit standards being tightened[1].

The logistic regression model is given as:

$$P\left(Tight_{it} = 1 \mid x_{it}, b_i, m_t\right) = f\left(\alpha + \beta x_{it} + \gamma b_i + \lambda m_t\right),$$ (4.1)

where $Tight_{it}$ indicates that bank i tightened its credit standards somewhat or considerably in quarter t, x_{it} is a vector with bank-specific time-varying explanatory variables (see Box 4.2), b_i is a vector with bank-specific characteristics before the crisis, and m_t is a vector with macroeconomic indicators. f is the logistic function given as:

$$f(z) = \frac{exp(z)}{1 + exp(z)}$$ (4.2)

The model is estimated separately for lending to households and the corporate sector. Due to a wish to examine the effect of variables not varying over time (or only varying slowly), dummy variables are not included for the individual banks (bank fixed effects). The calculation of standard errors takes into account that observations from a given bank over time can be correlated.

Based on the estimated coefficients, equation (1) can be used to estimate the probability that a specific bank tightens its credit standards in a specific quarter. The results of the analysis are presented as marginal effects of the explanatory variables on the probability of credit standards being tightened. The marginal effects are calculated for average values of the explanatory variables. A marginal effect of 0.10 can be interpreted to the effect that, all else equal, an increase of one unit in the explanatory variable means an increase in the probability of credit standards being tightened of 10 percentage points.

[1]   The econometric analysis is amplified in Kuchler (2012), which also presents additional findings.

bank tightening its credit standards. In addition to the bank-specific variables mentioned above, i.e. variables varying over time as well as variables describing the bank's pre-crisis characteristics, cyclical variables are also included, cf. Box 4.2. Quarterly growth in the seasonally adjusted GDP and change in the money-market interest rate are included as general economic indicators. The purpose of the money-market interest rate is also to adjust for the general interest-rate level to ensure that the effect of the bank-specific inter-MFI interest rate spread is estimated as the extra effect in addition to the effect of the general interest-rate level. As a more specific indicator of the risk on lending to corporate customers, quarterly growth in the number of defaults (seasonally adjusted) is included in the model of credit standards for lending to corpor-

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CENTRAL VARIABLES INCLUDED IN THE ANALYSIS   Box 4.2

The econometric analysis includes a series of characteristics of each bank and a number of economic indicators:

Dependent variables:
- Indicator[1] for tightening of credit standards for lending to the corporate sector (households)
- Indicator[1] for tightening of prices for lending to the corporate sector (households)
- Indicator[1] for tightening of collateral requirements for lending to the corporate sector (households)

Bank-specific variables:
- Change in percentage points in share of loans in accounts for which interest accrual has been suspended
- Change in percentage points in excess capital adequacy (capital need – solvency ratio)
- Change in percentage points in inter-MFI interest-rate spread (the bank's interest rate on loans from monetary financial institutions (excluding central banks) less the money-market interest rate)
- Average annual lending growth 2005-07 in per cent p.a.
- Total lending, kr. billion at end-2007 (logarithmically transformed)
- Lending by sector, percentage points at end-2007 (share of total lending made up of lending to building and construction, real property, agriculture and households, respectively)

Cyclical indicators:
- Quarterly growth in per cent in seasonally adjusted GDP
- Quarterly growth in percentage points in the money-market interest rate
- Quarterly growth in per cent in the number of defaults (seasonally adjusted)
- Quarterly growth in per cent in the number of enforced sales

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[1] Indicator variables (dummy variables) have the value 1, if the condition is met, and otherwise 0.

---

ate customers. Similarly, growth in the number of enforced sales is included in the model of lending to households.

The results of the econometric analysis are presented in Table 4.1. These results confirm several of the relationships indicated by the above charts. The inter-MFI interest-rate spread significantly affects the bank's credit standards. The bank's excess capital adequacy also affects credit standards, but the effect becomes insignificant when adjusted for the macroeconomic (cyclical) situation.

Generally, the bank's pre-crisis characteristics (at end-2007) do not affect credit standards during and after the crisis. The banks' lending growth, size and exposure to industries before the financial crisis do not contribute significantly to explaining the bank's credit standards. It

LOGISTIC REGRESSION MODEL OF CREDIT STANDARDS TIGHTENING			Table 4.1	
Dependent variables	Lending to the corporate sector		Lending to households	
Independent variables	(1)	(2)	(3)	(4)
Bank-specific variables				
Change in accounts for which interest accrual has been suspended	3.686	1.554	1.456	0.837
Change in excess capital adequacy ...	*-3.607	-3.322	*-0.985	-0.731
Change in inter-MFI interest-rate spread	***0.425	**0.223	***0.190	0.052
Time-invariant bank-specific variables				
Annual lending growth, 2005-07[1]		-0.003		0.002
Log (total lending, 2007)		-0.006		0.011
Lending by industry (end-2007):				
-Building and construction		1.193		
-Real property		-0.163		
-Agriculture		-1.095		
-Households				0.002
Economic indicators				
Growth in GDP		***-0.111		***-0.059
Change in money-market interest rate		**0.091		0.013
Growth in defaults		***0.009		
Growth in enforced sales				0.002
Number of observations	209	209	194	194

Note: Marginal effects of logistic regression. Significance test is based on robust standard errors. Significance of coeffi-
cient estimates: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Kuchler (2012).
[1] The variable refers to lending to the sector in question. For example, "annual lending growth, 2005-2007" is annual
growth in lending to the corporate sector in models (1) and (2) and annual growth in lending to households in models
(3) and (4).

should be noted, however, that three banks originally included in the lending survey were excluded from the survey in the course of 2009 and 2010 as they were no longer independent firms. Those banks were generally characterised by relatively high lending growth before the crisis and high exposure to real property. The banks are only included in the analysis in the periods during which they report to the lending survey. This entails a risk of underestimation of the effect of strong lending growth and exposure to real property.

As expected, macroeconomic developments affect the banks' credit standards. GDP growth is thus significant in the models of credit standards for lending to households and the corporate sector. All else equal, an increase in quarterly GDP growth of 1 percentage point reduces the probability of credit standards for lending to the corporate sector being tightened by 11 percentage points and by 6 percentage points for lending to households.

LOGISTIC REGRESSION MODEL OF PRICE AND COLLATERAL REQUIREMENTS
TIGHTENING   Table 4.2

Sector	Corporate sector		Households	
Dependent variable: Tightening of	Prices	Collateral	Prices	Collateral
Independent variables	(1)	(2)	(3)	(4)
Bank-specific variables				
Change in accounts for which interest accrual has been suspended	2.041	-0.522	3.948	0.050
Change in excess capital adequacy ...	1.349	*-1.867	0.499	-0.094
Change in inter-MFI interest-rate spread	***0.507	***0.269	***0.349	0.097
Time-invariant bank-specific variables				
Annual lending growth, 2005-2007[1]	0.009	***0.009	-0.007	*-0.006
Log (total lending, 2007)	*-0.103	**-0.059	-0.005	-0.015
Lending by sector/industry (2007):				
-Building and construction	-1.498	-0.418		
-Real property	-1.780	***-1.868		
-Agriculture	-1.625	***-1.335		
-Households			***0.974	0.003
Cyclical indicators				
Growth in GDP	***-0.252	***-0.080	***-0.143	***-0.058
Change in money-market interest rate	0.112	0.019	0.080	0.018
Growth in defaults	*0.016	***0.012		
Growth in enforced sales			0.001	0.000
Number of observations	209	209	194	194

Note: Marginal effects of logistic regression. Significance test is based on robust standard errors. The dependent
         variable in models (1) and (3) is a dummy variable for tightening of prices, and in models (2) and (4) a dummy
         variable for tightening of collateral requirements. Significance of coefficient estimates: *** $p<0.01$, ** $p<0.05$,
         * $p<0.1$.
Source: Kuchler (2012).
[1] The variable refers to lending to the sector in question. For example, "annual lending growth, 2005-2007" is annual
     growth in lending to the corporate sector in models (1) and (2) and annual growth in lending to households in models
     (3) and (4).

Growth in the number of defaults also significantly affects credit standards for lending to corporate customers, while growth in the number of enforced sales is not significant in the model of lending to households.

Table 4.2 shows similar results for two more specific dependent variables, namely tightening of prices and collateral requirements. Macroeconomic developments also have a major impact on whether these terms are tightened, as the figures for growth in GDP and in the number of defaults are significant in the models. While the inter-MFI interest-rate spread has a relatively great impact on the price of loans, it affects the banks' collateral requirements to a lesser extent.

Overall, the analysis shows that primarily cyclical developments and thus developments in the customers' credit standing have affected de-

velopments in the banks' credit standards in recent years. The individual bank's own "market-related credit standing" – measured by its money-market borrowing rate less the average money-market interest rate – has also had some impact. It reflects the individual bank's funding conditions compared with conditions for the banking sector as a whole. Since the analysis controls for the individual bank's solvency situation and the general macroeconomic development, the market-related credit standing reflects the market assessment of the quality of the individual bank's loan portfolio compared with the banking sector as a whole and the specific cyclical developments within the bank's customer segments. Hence, the market-related credit standing primarily reflects the quality of the loan portfolio.

Contrary to expectations, other bank-specific conditions such as the banks' solvency situation have not had any substantial effect when controlling for the business cycle. This should no doubt be viewed in the context of comprehensive government intervention during the financial crisis which, e.g. via Bank Rescue Package 2, enabled government capital injections into banks.

5. SUPPLY AND DEMAND FACTORS CONTRIBUTING TO BANK LENDING GROWTH DURING THE FINANCIAL CRISIS

The potentially most valuable information contained in the lending surveys is related to the question of whether a given development in lending is attributable to changes on the demand or supply side. Lacroix et al. (2010) quantify, on the basis of lending surveys, the respective contributions of supply and demand effects to French banks' lending growth during the financial crisis. They find that the fall in lending to corporate customers in France from 2008 was initially triggered by a tightening of credit standards and subsequently by reduced demand. Del Giovane et al. (2011) use Italian data at bank level to construct a similar decomposition and also find that supply factors had a particular impact during the financial crisis.

Although only a short time series is available for the Danish lending survey so far, it may be interesting to similarly decompose lending developments in Denmark during the financial crisis. This makes it possible to analyse the contributions of demand and supply factors to the credit development during the crisis as seen from the banking sector's point of view.

The analysis in this section is based on the individual banks' responses to Danmarks Nationalbank's lending survey. This has the advantage that demand and supply factors can be linked more directly to the relevant

MODELS OF BANK LENDING GROWTH						Table 5.1
Dependent variable: Growth in lending to	Households			Corporate sector		
	(1)	(2)	(3)	(4)	(5)	(6)
Growth in lending (t-1)	-0.058	-0.058	-0.058	0.014	0.008	0.009
Demand						
Declined	-1.312	-1.074	-1.153	**-2.607	*-2.351	-2.143
Increased	-0.820	-0.867	-0.808	-0.973	-0.954	-0.960
Credit standards						
Tightening of credit standards	0.721			**-3.261		
Tightening of prices		-1.397			-1.141	
Tightening of collateral require-ments		0.446			-1.143	
Factors contributing to tightening						
Funding costs			-2.514			-2.148
Competitive pressure			**6.988			-0.403
Risk assessment			-0.499			-1.531
Risk appetite			-3.701			-0.012
Number of observations	196	196	196	196	196	196

Note: Coefficient estimates from fixed effects panel data estimation. Dependent variable: Quarterly growth in season-ally adjusted lending to households (models 1-3) and the corporate sector (models 4-6), respectively. Observa-tions from the 4th quarter of 2008 are excluded due to insufficient variation. Significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Source: Kuchler (2012).

measures of lending growth. In addition, the use of microdata allows the use of panel data methods that are less sensitive to unobserved characteristics of individual banks, which might otherwise affect the estimated contributions of supply and demand factors.

Table 5.1 presents a number of estimations of a model of bank lending growth as described in more detail in Box 5.1. Lending to corporate customers has the expected signs, although, due to the relatively low number of observations, several estimations are unable to establish statistically significant relationships. Growth in lending to corporate customers can be explained by a combination of supply and demand factors. For banks reporting declining corporate demand in the lending survey, growth in lending to corporate customers has been 2-2.5 per cent lower on average than for other banks. This result is not statistically significant in all models, however.

Table 5.1 also illustrates that lending growth for banks tightening their credit standards for lending to corporate customers is around 3 percentage points lower than for other banks. Coefficient estimates for the other supply variables generally have the expected signs. The most important result of the models applying other supply variables is that when funding costs or constraints due to the bank's balance-sheet structure are cited as the reason for tightening, lending growth is reduced by

ECONOMETRIC MODEL OF THE EFFECT OF SUPPLY AND DEMAND	
FACTORS ON LENDING GROWTH	Box 5.1

The analysis in this section focuses on the effect of changes in credit standards and demand for loans from the individual bank. We use a fixed effects panel data model. The model utilises the fact that the same bank is observed in several consecutive quarters:

$$y_{it} = \alpha_i + y_{it-1} + \beta D_{it} + \gamma CS_{it} + \varepsilon_{it} \ , \qquad (5.1)$$

where y_{it} is bank i''s seasonally adjusted lending growth in quarter t, D_{it} is a vector with dummy variables for changes in credit demand, CS_{it} is a dummy variable indicating whether the bank tightened its credit standards in the course of the quarter, and α_i is a bank-specific effect. Including the bank-specific term in the model ensures that characteristics of the individual bank that are constant over time do not affect results. The models do not include explanatory variables other than changes in credit standards and demand, the reason being that other explanatory variables may be related to both supply and demand factors, thus making a simple interpretation difficult.

For lending to the corporate sector where the empirical justification of the model seems to be the strongest, lending growth is subsequently decomposed into contributions from supply and demand factors using the model. This decomposition is made by setting up two alternative (counterfactual) scenarios. The first scenario assumes that demand remains unchanged throughout the period, while credit standards vary in accordance with the lending survey responses. The second scenario assumes that credit standards remain unchanged throughout the period, while demand varies in accordance with the lending survey responses. The estimated lending growth in each of the two scenarios is then compared with the estimated lending growth in the actual scenario, from which an estimate of the effect of demand and supply factors, respectively, can be derived.

The estimated contributions from supply and demand factors do not necessarily add up to the actual development in lending for several reasons. Firstly, the individual bank's lending growth may be driven by factors other than changes in supply and demand that are sufficiently significant to be mentioned in the lending survey. Secondly, the model used assumes that the estimated coefficients do not vary over time. Hence, there is a difference between actual lending growth in individual periods and the growth estimated in the model.

Some time is likely to elapse from a bank decides to change its credit standards until the change has been implemented. Consequently, models of lending growth in various specifications are also estimated which allow for some delay from the bank tightens its credit standards until this is reflected in lending. The results are not clear, and there is generally no effect of previous tightening of credit standards, cf. Kuchler (2012). Presumably, part of the explanation is that a sufficiently long time series of lending surveys is not yet available for that type of analysis to provide reliable results.

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[1] An indicator of easing of credit standards is not included as few banks have eased their credit standards over individual quarters in the course of the period the lending survey has been conducted.

approximately 2 percentage points, although the reduction is not statistically significant.

It is more difficult to interpret the results for lending to households, and no clear relationship is seen between supply and demand factors and lending growth. This should be interpreted in light of the fact that the corporate sector has been harder hit by the recent crisis than the household sector. A clear relationship is seen between tightening due to funding costs and lower lending growth, but the result is not statistically significant. Furthermore, banks tightening their credit standards due to competitive pressure tend to show higher lending growth. A possible explanation of the latter may be that in such cases a bank tightens its credit standards less than its competitors, thus gaining market shares despite the tightening.

The results in Table 5.1 can be used to decompose total lending growth into supply and demand factors, cf. Chart 5.1. As seen, both supply and demand factors affect banks' credit standards. Bank lending growth is very much driven by demand factors. Credit standards had a particular impact after the collapse of Lehman Brothers and during the flare-up of the debt crisis in Southern Europe in late 2011 and early 2012.

CONTRIBUTIONS FROM NEGATIVE DEMAND SHOCKS AND TIGHTENING OF
CREDIT STANDARDS TO QUARTERLY GROWTH IN LENDING TO THE
CORPORATE SECTOR   Chart 5.1
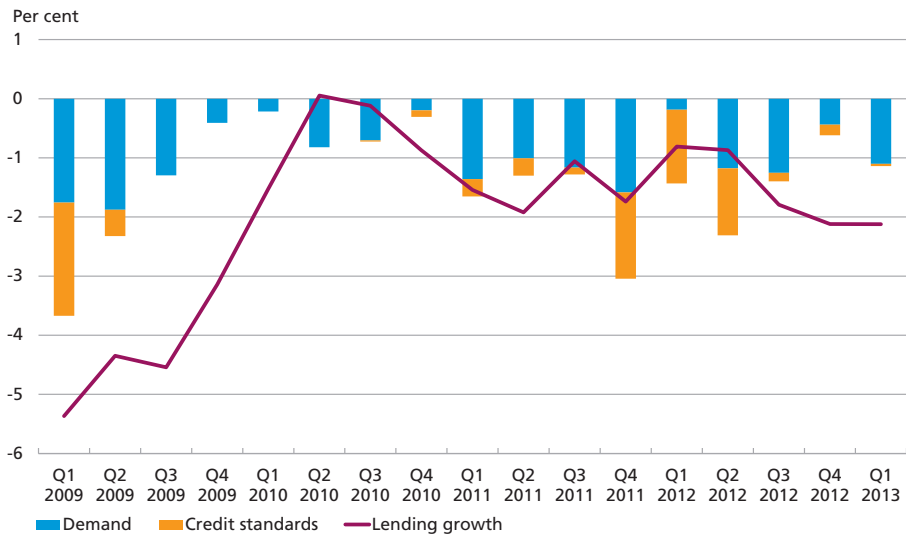
Note: The contributions are calculated as the difference between the fitted values from model 4 in Table 5.1 and fitted values calculated by setting the variables expressing lower demand and tightening of credit standards, respectively, to 0. The results are weighted on the basis of the individual banks' volume of lending to the corporate sector. Lending growth is calculated on the basis of the banks participating in Danmarks Nationalbank's lending survey, adjusted for banks that are excluded from the population, and shown as a 4-quarter moving average due to considerable volatility and seasonal effects.
Source: Updated version of chart in Kuchler (2012).

The model fails to explain the fall in lending in recent quarters, the reason being that relatively few banks stated changes in credit standards and demand in the last two quarters.

6. QUESTIONNAIRE STATISTICS ON FIRMS' PERCEIVED FUNDING CONDITIONS DURING THE FINANCIAL CRISIS

Danmarks Nationalbank's lending surveys give an impression of the conditions for household and corporate access to bank credit as seen from the banks' point of view, cf. sections 4 and 5.

Questionnaire surveys on firms' perceived conditions for access to bank credit are also conducted at regular intervals, cf. Table 6.1. The results of different surveys may vary, depending on the corporate population and the specific wording of the questions.

Statistics Denmark's confidence indicators are based on questionnaires completed by firms in the trade, building and construction and service sectors. The advantage of the surveys concerning the industrial and building and construction sectors is that they are available for the last 10 years, thus covering different periods of the business cycle.

On average, only a limited share of firms, around 10 per cent, have stated financial constraints as impediments to production in recent years according to Statistics Denmark's confidence indicators, but the picture varies between industries, cf. Chart 6.1.

In the industrial sector, the number of firms stating financial constraints as impediments to production according to the confidence indicators has been very low during the recent crisis. As a result, unemployment remains relatively low in Denmark compared with other countries. The confidence indicator for industry covers firms with minimum 20 employees, such firms accounting for 85 per cent of total employment in the industrial sector.

In the domestically oriented sectors – construction and service – a higher share of firms have stated financial constraints as impediments to production during the crisis. Still, considerably larger shares of firms in the domestically oriented sectors have stated sluggish demand as an impediment to production.

For construction and service, the confidence indicators also cover small firms with as few as 5-10 employees. If small firms have generally tended, to a higher degree than large firms, to be subject to financial constraints during the crisis, this may affect structural developments in the economy, but the effect cannot be unambiguously determined as positive or negative. A number of studies find that the innovative return on research and development, in terms of e.g. the number of patents per

OFFICIAL QUESTIONNAIRE SURVEYS ON FIRMS' PERCEIVED FUNDING
CONDITIONS   Table 6.1

| Statistics	Period	Population of firms	Sample size	Design of questions, etc.
Statistics Denmark's confidence indicator for the industrial sector	Since 2003	Firms with minimum 20 employees	Around 500. The individual firms' responses are included with a weighting corresponding to the number of employees.	Firms are asked to state whether they have experienced constraints or impediments to production and, if so, the causes thereof. "Financial constraints" is one cause, and it is possible to state more than one cause of impediments to production.
Statistics Denmark's confidence indicator for building and construction	Since 2003	Firms with minimum 5 employees	Around 850. The individual firms' responses are included with a weighting corresponding to the number of employees.	Firms are asked to state whether they have experienced constraints or impediments to production and, if so, the causes thereof. "Financial constraints" is one cause, and it is possible to state more than one cause of impediments to production.
Statistics Denmark's confidence indicator for the service sector	Since 2011	Firms with minimum 10 employees	Around 3,600. The individual firms' responses are included with a weighting corresponding to the number of employees.	Firms are asked to state whether they have experienced constraints or impediments to production and, if so, the causes thereof. "Financial constraints" is one cause, and it is possible to state more than one cause of impediments to production.
Statistics Denmark's survey of small and medium-sized enterprises' access to funding (part of a major European survey coordinated by Eurostat)	2007 and 2009/10[1]	Firms with 5-249 employees in 2005 and 5 or more employees in 2009	2,265. The firms' responses are included with a weighting based on turnover and number of firms in the industry.	Detailed survey of a series of aspects concerning the firms' funding, including whether the firms' applications for bank loans were fully or partially rejected.
The European Commission and the ECB's "Survey on the Access to Finance of Small and Medium-sized Enterprises" (SAFE)	2009 and 2011	Firms with 1-249 employees.	The survey comprises around 500 Danish firms. The firms' responses are weighted so as to be representative of the population.	Detailed survey of a series of aspects concerning the firms' funding, including whether the firms' applications for bank loans were fully or partially rejected.

[1] The responses concerning 2007 were retrieved in connection with the responses for 2009/10. The years 2009/10 concern the period April 2009 - March 2010.

Danish krone spent, is higher in small firms than in large ones, cf. Andersen and Spange (2012). In spite of this, most studies find that large firms invest relatively more in research and development than small ones.

Statistics Denmark has also conducted a separate, detailed survey of small and medium-sized enterprises' access to funding during the finan-

SHARE OF FIRMS WITH IMPEDIMENTS TO PRODUCTION DUE TO FINANCIAL
CONSTRAINTS ACCORDING TO STATISTICS DENMARK'S CONFIDENCE
INDICATORS   Chart 6.1

Per cent
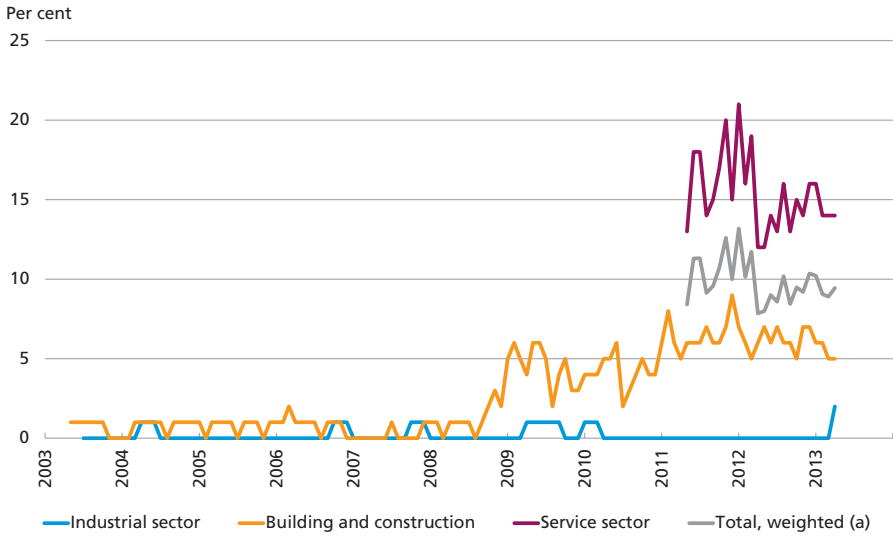
(a):   Weighting of the indicators for the industrial, building and construction and service sectors based on employ-
        ment in the respective sectors.
Note: The questionnaires were redesigned in the 1st and 2nd quarters of 2013, contributing to a fall in the "no con-
        straints" responses in favour of responses stating constraints.
Source: Calculated on the basis of Statistics Denmark's confidence indicators.

cial crisis as part of a major European survey coordinated by Eurostat.
The survey concerns 2007 and 2009/10, and unlike the confidence indi-
cators, it focuses on small and medium-sized enterprises. Hence, the
population comprises firms with as few as 5 employees – including in the
industrial sector.

According to this survey, the share of small and medium-sized enter-
prises whose applications for bank loans were rejected increased from 3
per cent in 2007 before the financial crisis really erupted to 20 per cent
in 2009/10. The share of small and medium-sized enterprises whose ap-
plications for bank loans were only partially accepted, increased from 5
to 24 per cent during the same period, cf. Table 6.2.

Notably, Table 6.2 also shows that the share of firms whose appli-
cations for bank loans were rejected during the financial crisis was lower
for the building and construction sector than for the industrial sector.
The survey thus provides a different picture of firms' perceived access to
credit in the various industries, compared with the confidence indicators.
This may be attributable to the weighting of the firms' responses in all
the surveys according to number of employees or turnover combined
with the fact that large firms with minimum 250 employees are only
included in the confidence indicator for the industrial sector. A low

OUTCOME OF SMALL AND MEDIUM-SIZED ENTERPRISES' APPLICATIONS FOR
BANK LOANS   Table 6.2

Percentage of firms applying for bank funding	2007	2009/10
Loan application not accepted:		
Industrial sector	3	19
Building and construction	3	17
Trade and transport, etc.	3	23
Information, communication and knowledge services	1	25
Other industries	6	25
Total	3	20
Loan application partially accepted		
Industrial sector	8	30
Building and construction	3	22
Trade and transport, etc.	4	21
Information, communication and knowledge services	0	18
Other industries	16	27
Total	5	24
Memo:		
Share of all firms applying for loan funding	19	24
Share of all firms applying for bank loans	14	17

Note: Bank loans do not include access to overdrafts. Loan funding includes bank loans (excluding overdrafts), loans
        from mortgage banks and loan funding from owners/directors.
Source: Calculated on the basis of Statistics Denmark's survey of small and medium-sized enterprises' access to funding,
        cf. Statistics Denmark (2010).

weighted share of financially constrained firms in the confidence indi-
cator for the industrial sector may therefore mask the fact that firms
with minimum 250 employees, which account for the greater part of
employment in the Danish industrial sector, are not subject to any major
financial constraints.[1]

In relation to Table 6.2, it should also be noted that only around 20-25
per cent of firms applied for loans from banks or other funding sources
in both 2007 and 2010. This reflects that e.g. mortgage credit is an im-
portant funding source for Danish firms and also that Danish firms use
retained earnings as a primary source of funding, cf. Petersen and Ris-
bjerg (2009).

As seen from Table 6.3, Statistics Denmark's survey of small and medi-
um-sized enterprises' funding access shows that the rejection rate for
loan applications from firms with 100-249 employees tended to be lower
than the rejection rate for firms with less than 100 employees. On the

[1] In 2009, firms with more than 100 employees accounted for more than 60 per cent of employment in
     the industrial sector, although such firms constituted only 3 per cent of the total number of industrial
     firms.

OUTCOME OF SMALL AND MEDIUM-SIZED ENTERPRISES' LOAN APPLICATIONS
BY SIZE OF THE ENTERPRISE   Table 6.3

Per cent of firms applying for loan funding	2007	2009/10
Loan application not accepted:		
5-9 full-time employees	4	21
10-49 full-time employees	3	24
50-99 full-time employees	8	24
100-249 full-time employees	2	13
Total	4	23
Loan application partially accepted		
5-9 full-time employees	13	25
10-49 full-time employees	6	23
50-99 full-time employees	5	28
100-249 full-time employees	8	22
Total	6	24

Note: Loan funding includes bank loans (excluding overdrafts), loans from mortgage banks and loan funding from
        owners/directors.
Source: Calculated on the basis of Statistics Denmark's survey of small and medium-sized enterprises' access to funding,
        cf. Statistics Denmark (2010).

other hand, there are no substantial differences in the rejection rates
according to firm size when only considering firms with less than 100
employees. It should be noted, however, that among the smallest firms
with 5-9 employees, the share of firms whose loan applications were
fully rejected was lower than for firms with 10-99 employees.

The European Commission in collaboration with the ECB also con-
ducted surveys of credit access for the member states' small and medi-
um-sized enterprises in 2009 and 2011, including Danish enterprises. The
European Commission's surveys include the very smallest enterprises
with as little as 1 employee.

According to these surveys, 6 per cent of the small and medium-sized
enterprises' applications for bank overdraft facilities were rejected in
2011, cf. Table 6.4. 18 per cent of applications for bank loans were re-
jected in 2011 against 26 per cent in 2009.

OUTCOME OF SMALL AND MEDIUM-SIZED ENTERPRISES' APPLICATIONS FOR
BANK FUNDING   Table 6.4

Per cent of firms applying for bank funding	2009	2011
Loan application not accepted:		
On application for overdrafts and similar facilities	...	6
On application for loans or renewal of loans	26	18
Loan application partially accepted		
(1-75 per cent of the amount applied for):		
On application for overdrafts and similar facilities	...	15
On application for loans or renewal of loans	...	6

Source: The European Commission and the ECB's "Survey on the Access to Finance of Small and Medium-sized Enter-
         prises" (SAFE).

7. ANALYSIS OF INDIVIDUAL FIRMS' PERCEIVED ACCESS TO BANK LOANS BEFORE AND DURING THE CRISIS

There may be several reasons why a firm's application for a bank loan is rejected. Ministry of Economic and Business Affairs (2011) presented a summary analysis of small and medium-sized enterprises' access to funding in 2009/10 based on firm-level survey data, cf. Statistics Denmark (2010). The analysis compares the outcome of firms' applications for loans from banks and mortgage banks with firms' financial results. It shows that the firms whose credit applications were accepted in full in 2009/10 were characterised by higher profit ratios, higher solvency ratios, higher returns on equity and lower leverage than the firms which obtained only part of the credit they applied for or whose loan applications were rejected.

Abildgren, Drejer and Kuchler (2012) present a more detailed analysis of the outcome of firms' applications for bank loans in 2009/10 and the creditworthiness of the firms applying for loans based on a data set containing the data used by Ministry of Economic and Business Affairs (2011). The analysis also incorporates the firms' responses to the outcome of their loan applications in 2007, thereby making it possible to illustrate the banks' rejection rates both before and during the crisis. Finally, the analysis includes information on the firms' bankers. The data basis behind the analysis is described in more detail in Box 7.1. It should be noted that the information on the outcome of firms' loan applications in 2007 was collected via a firm-level questionnaire in 2010. The firms' answers regarding 2007 should therefore be interpreted with some caution.

The analysis is based on answers from around 2,000 firms with 5-249 employees in 2005 and with 5 or more employees in 2009. The firms are divided into five main groups:

- Firms whose applications for bank loans were accepted in full.
- Firms whose applications for bank loans were partially accepted.
- Firms whose applications for bank loans were not accepted.
- Firms that have applied for debt funding other than bank loans, i.e. loans from mortgage banks and loan funding from owners/directors.
- Firms that have not applied for loan funding. Firms that have not applied for loan funding use equity funding or other forms of funding, e.g. overdrafts, trade credits, leasing, factoring, etc.

Chart 7.1 shows the percentage distribution of the firms on the five categories. As seen, the majority of the firms did not apply for any loan funding in 2007 or 2009/10. It can also be seen that around 10 per cent

DATA BASIS BEHIND THE MICRODATA ANALYSIS OF FIRMS' PERCEIVED ACCESS TO BANK LOANS BEFORE AND DURING THE FINANCIAL CRISIS	Box 7.1

The data set behind the analysis in Abildgren, Drejer and Kuchler (2012) is arrived at by linking firm-level information from five different data sources.

Questionnaire survey of firms' funding conditions

The responses in Statistics Denmark's survey of small and medium-sized enterprises' access to funding in 2007 and 2009/10 are at the core of the data basis, cf. Statistics Denmark (2010). The survey comprises 2,265 firms with 5-249 employees in 2005 and 5 or more employees in 2009. It is a detailed survey of a series of aspects concerning the firms' funding, including whether the firms' applications for bank loans were fully or partially rejected. The responses concerning 2007 were retrieved in connection with the responses for 2009/10. The years 2009/10 concern the period April 2009 - March 2010.

Accounts statistics

Employment data from Statistics Denmark are available for practically all firms (around 2,240) included in the questionnaire survey of firms' funding conditions. For the majority of the firms participating in the questionnaire survey of firms' funding conditions, certain accounts data are also available from Statistics Denmark's accounts statistics (including on turnover, ordinary profits before funding and extraordinary assets, equity and total assets/liabilities). This applies to around 2,000 firms for which accounting information is retrieved from the registers of the Danish tax authority (SKAT). They are firms with annual turnover of kr. 0.5-100 million and sole proprietors with annual turnover of kr. 0.3-25 million, which are required to report accounting information to SKAT's registers. For some of the firms it is also possible to obtain accounting information from Statistics Denmark's accounts statistics, including on short-term debt, total debt, interest costs and liquid assets. This applies to around 1,000 firms for which the information was obtained via questionnaires.

Statistics on firms

For around 1,000 firms it is possible to obtain information on the export share of turnover based on Statistics Denmark's statistics on firms.
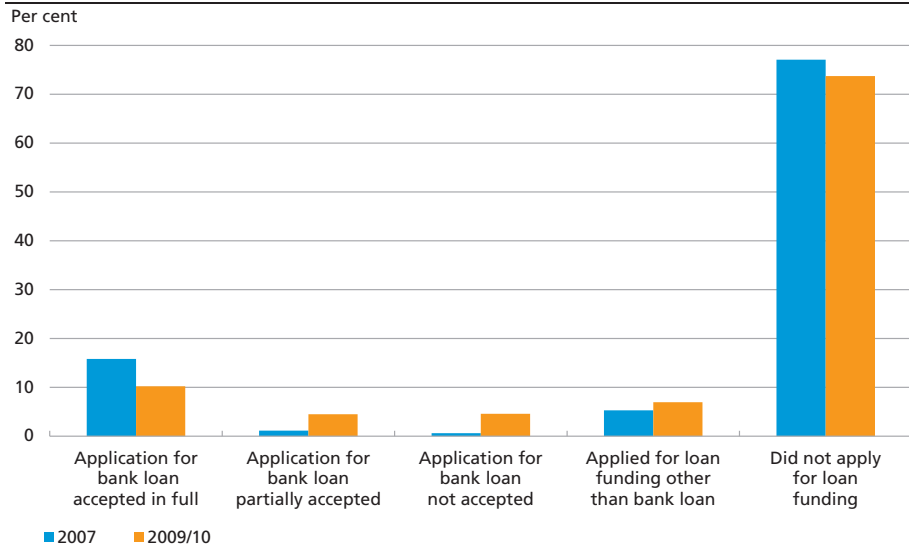
Firms' principal bankers

For 60-65 per cent of the firms that have applied for a bank loan according to the questionnaire survey, information collected by Experian A/S is available about the individual firms' principal bankers. The firms for which such information is available are all public or private limited liability companies. No information is available about the bankers of sole proprietors.

Banks' key financial ratios

Information on a number of key financial ratios is available for all the banks stated as the firms' principal bankers. The information is published on the website of the Danish Financial Supervisory Authority.

FIRMS' APPLICATIONS FOR BANK LOANS IN 2007 AND 2009/10
– MEDIAN OF SOLVENCY RATIO YEAR BEFORE APPLICATION   Chart 7.2
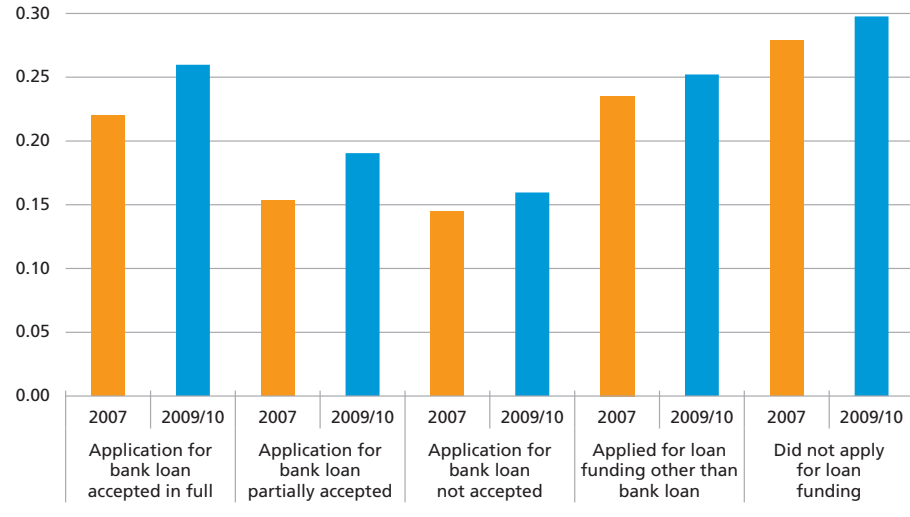
Note: Bank loans do not include access to overdrafts. Other loan funding includes loans from mortgage banks and loan
        funding from owners/directors. Firms that have not applied for loan funding use equity funding or other forms
        of funding, e.g. overdrafts, trade credits, leasing, factoring, etc.
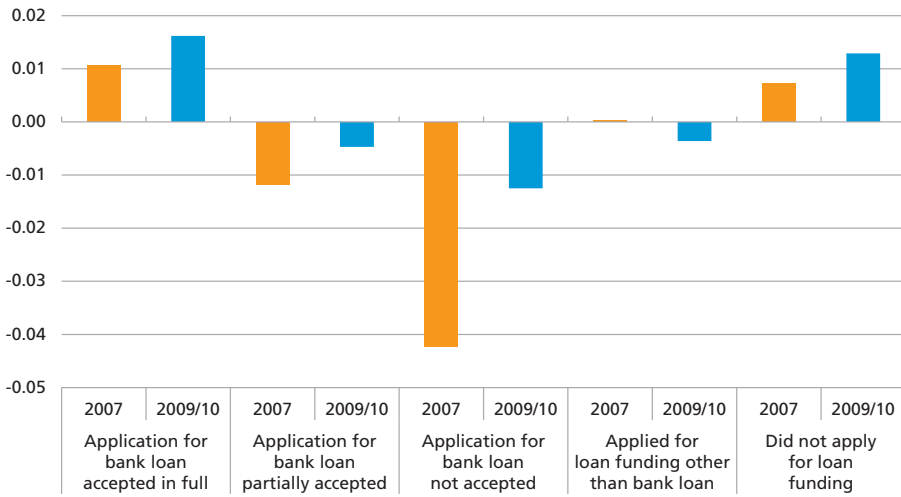Source: Abildgren, Drejer and Kuchler (2012).

The fact that the solvency ratio for the median firm in all groups of firms
in 2009/10 was higher than in 2007 should be viewed in the light of the
general tendency towards consolidation in the business sector during
the crisis, cf. Brandt et al. (2012).

DEFINITION OF KEY FINANCIAL RATIOS, ETC.   Table 7.1

Key financial ratio	Description
Solvency ratio	Equity as a ratio of total liabilities at the end of the year.
Profit ratio	Result before financial and extraordinary items as a ratio of turnover.
Short-term debt ratio	Short-term debt as a ratio of total assets at the end of the year.
Liquidity ratio (narrow)	Cash and deposits, etc. as a ratio of total assets at the end of the year.
Liquidity ratio (broad)	Securities, equity investments and cash and deposits as a ratio of total assets at the end of the year.
Implied interest costs on gross debt	Interest costs etc. relative to total gross debt at the end of the year.
Number of employees	Number of full-time employees.
Export share	Export turnover in per cent of total turnover.
Memo:	
Median	The middle observation in a series of numbers arranged according to size.

FIRMS' APPLICATIONS FOR BANK LOANS IN 2007 AND 2009/10
- MEDIAN OF CHANGE IN SOLVENCY RATIO 2 YEARS PRIOR TO APPLICATION   Chart 7.3

	2007	2009/10	2007	2009/10	2007	2009/10	2007	2009/10	2007	2009/10
	Application for bank loan accepted in full		Application for bank loan partially accepted		Application for bank loan not accepted		Applied for loan funding other than bank loan		Did not apply for loan funding	

Note: Bank loans do not include access to overdrafts. Other loan funding includes loans from mortgage banks and loan
         funding from owners/directors. Firms that have not applied for loan funding use equity funding or other forms
         of funding, e.g. overdrafts, trade credits, leasing, factoring, etc.
Source: Abildgren, Drejer and Kuchler (2012).

Moreover, it can be said that the median change in the firms' solvency
ratios over the period 2006-08 was negative in the groups of firms whose
applications for bank loans were fully or partially rejected in 2009/10, cf.
Chart 7.3. Conversely, the median change in the firms' solvency ratios in
the period 2006-08 was positive in the group of firms whose applications
for bank loans in 2009/10 were accepted in full in 2009/10.

   Chart 7.4 examines the outcome of the firms' applications for bank
loans broken down by their solvency ratios. The chart clearly shows that

OUTCOME OF FIRMS' APPLICATIONS FOR BANK LOANS - BROKEN DOWN
BY SOLVENCY RATIO   Chart 7.4

Note: Bank loans do not include access to overdrafts.
Source: Abildgren, Drejer and Kuchler (2012).

FIRMS' APPLICATIONS FOR BANK LOANS IN 2007 AND 2009/10
- MEDIAN OF PROFIT RATIO YEAR BEFORE APPLICATION   Chart 7.5
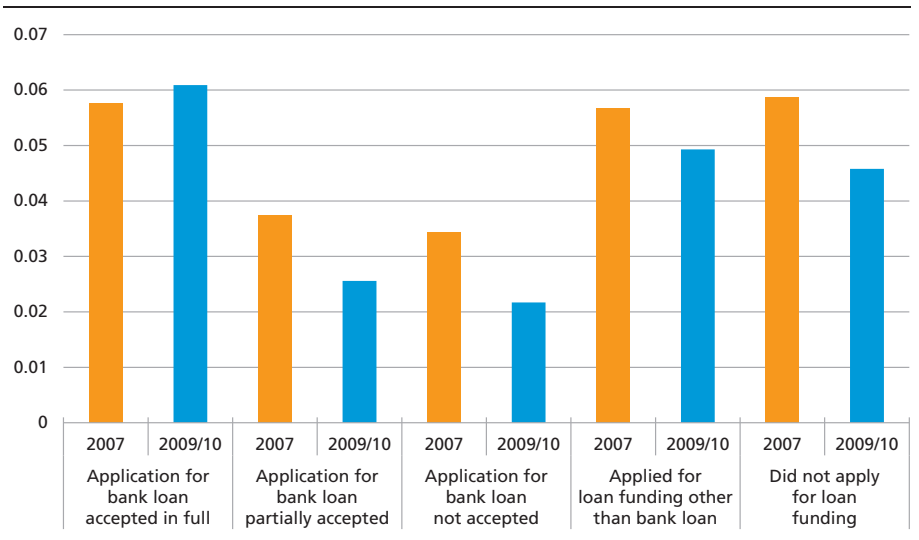
Note: Bank loans do not include access to overdrafts. Other loan funding includes loans from mortgage banks and loan
        funding from owners/directors. Firms that have not applied for loan funding use equity funding or other forms
        of funding, e.g. overdrafts, trade credits, leasing, factoring, etc.
Source: Abildgren, Drejer and Kuchler (2012).

the most solvent firms in 2009/10 had higher acceptance rates than firms
with low solvency ratios.

The rejection rates were considerably higher in 2009/10 than in 2007,
reflecting the business cycle. In 2007, firms found themselves at the end
of a boom with the expectation of a "soft landing", while 2009/10 rep-
resented the bottom of the deepest recession since World War II. The
rise in rejection rates from 2007 to 2009/10 is consistent with the fact
that, according to Danmarks Nationalbank's lending survey, banks tight-
ened their credit standards during the financial crisis.

The above analysis points to a relationship between the firms' solvency
ratios and the outcome of the banks' consideration of loan applications
during the crisis. A similar impression is obtained when considering the
firms' profit ratios. The median of the firms' profit ratios in 2008 was
lower in those groups of firms whose applications for bank loans were
fully or partially rejected in 2009/10 than in the group of firms whose
applications for bank loans were accepted in full or which did not apply
for bank loans, cf. Chart 7.5. It is also evident from Chart 7.6 that the
acceptance rates for firms with high profit ratios were higher than for
firms with low profit ratios.

Furthermore, it is seen, measured by the median, that the groups of
firms whose applications for bank loans were fully or partially rejected

OUTCOME OF FIRMS' APPLICATIONS FOR BANK LOANS - BROKEN DOWN
BY PROFIT RATIO   Chart 7.6
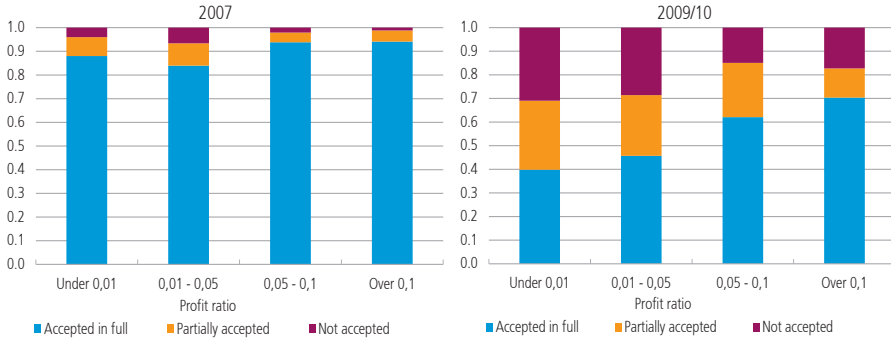
Note: Bank loans do not include access to overdrafts.
Source: Abildgren, Drejer and Kuchler (2012).

in 2009/10 were characterised by a higher short-term debt ratio and a lower liquidity ratio than the other groups, cf. Abildgren, Drejer and Kuchler (2012). Moreover, the median of implied interest costs on gross debt in the groups of firms whose applications for bank loans were fully rejected in 2009/10 was higher than in the other groups of firms. This also suggests that firms whose applications for bank loans were rejected were characterised by a lower credit standing than other firms.

The median of corporate employment in the various groups does not suggest any systematic relationship between firm size and the outcome of an application for a bank loan in 2007 or 2009/10. This is supported by Chart 7.7, which shows the outcome of firms' applications for bank loans broken down by the number of employees. It is worth noting, however,

OUTCOME OF FIRMS' APPLICATIONS FOR BANK LOANS - BROKEN DOWN
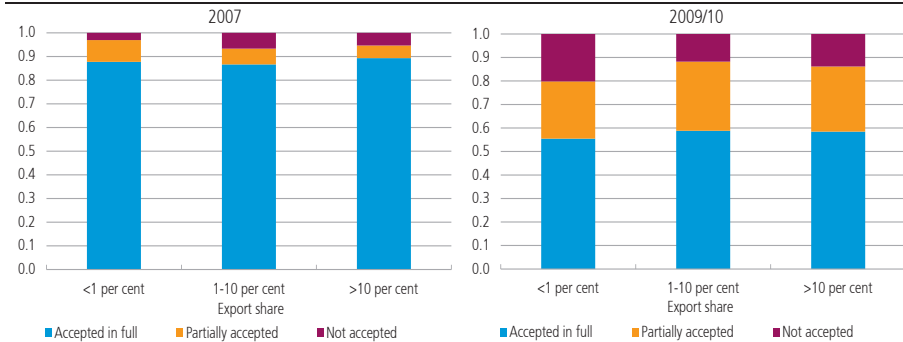BY NUMBER OF EMPLOYEES   Chart 7.7
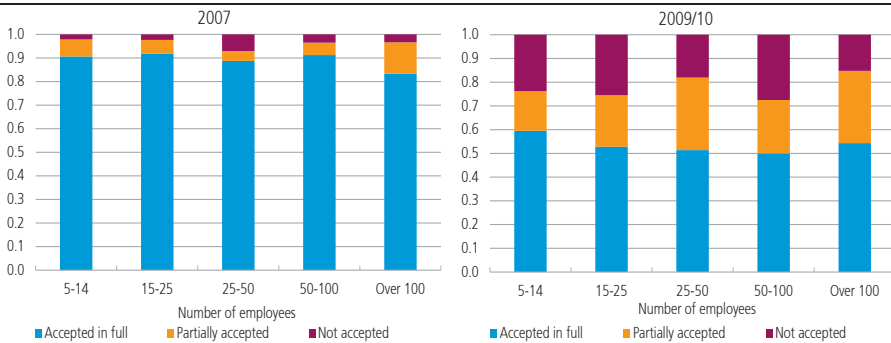
Note: Bank loans do not include access to overdrafts.
Source: Abildgren, Drejer and Kuchler (2012).

OUTCOME OF FIRMS' APPLICATIONS FOR BANK LOANS - BROKEN DOWN
BY EXPORT SHARE   Chart 7.8

Note: Bank loans do not include access to overdrafts.
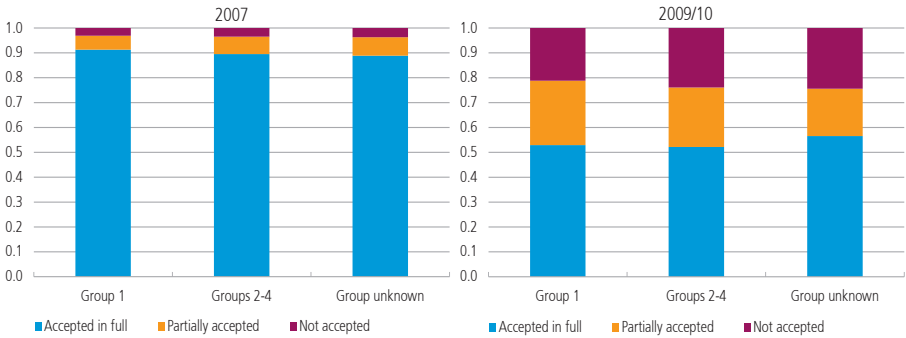Source: Abildgren, Drejer and Kuchler (2012).

that the smallest firms with 5-14 employees experienced the highest
acceptance rates during the financial crisis in 2009/10. Although it should
be kept in mind that questionnaire surveys are always subject to some
uncertainty, at least there are no indications that small firms have been
subjected to particularly high rejection rates when applying for bank
loans during the financial crisis. Presumably, this reflects the fact that a
relatively larger share of the assets of firms with 5-14 employees are in
buildings and plots that are easy to pledge as collateral. Moreover, the
small firms applying for bank loans have higher profit ratios than larger
firms applying for bank loans.

Small and medium-sized enterprises are normally very domestically
oriented. For around 70 per cent of the firms in the analysis, exports
constitute less than 1 per cent of total sales. As seen from Chart 7.8,
there seems to be no systematic relationship between the firms' export
share and the outcome of applications for bank loans.

For around 60-65 per cent of the firms that applied for bank loans, in-
formation is available about the firm's principal banker. There are no
indications that the rejection rate for loan applications was higher for
banks in the Danish Financial Supervisory Authority's groups 2-4 than for
banks in the Danish Financial Supervisory Authority's group 1, cf. Chart
7.9, although banks in groups 2-3 have generally had substantially larger
loan impairment charges during the financial crisis than banks in group
1. Hence, in 2009, the loan impairment charge ratio for banks in group 1
was 1.5 per cent of loans and guarantees, while the corresponding ratios
for banks in groups 2 and 3 were 5.6 and 4.2 per cent, respectively, cf.
Danish Financial Supervisory Authority (2010). This may indicate that
rather than the banks' own solvency situation, the credit quality of the

OUTCOME OF FIRMS' APPLICATIONS FOR BANK LOANS - BROKEN DOWN
BY BANKER   Chart 7.9

Note: Bank loans do not include access to overdrafts.
Source: Abildgren, Drejer and Kuchler (2012).

firms applying for loans and the banks' credit standards have been the
decisive factors for the outcome of the individual banks' consideration
of loan applications.We can also take a closer look at the firms that re-
frained from applying for loan funding during the financial crisis, be-
cause they expected their applications to be rejected or expected high
interest rates (an example of "self-selection"). As illustrated by Chart
7.10, firms that refrained from applying for loans in 2009/10 for fear of
rejection or high interest rates were characterised by considerably lower

FIRMS' APPLICATIONS FOR LOANS IN 2009/10
- MEDIAN OF PROFIT RATIO YEAR BEFORE APPLICATION   Chart 7.10
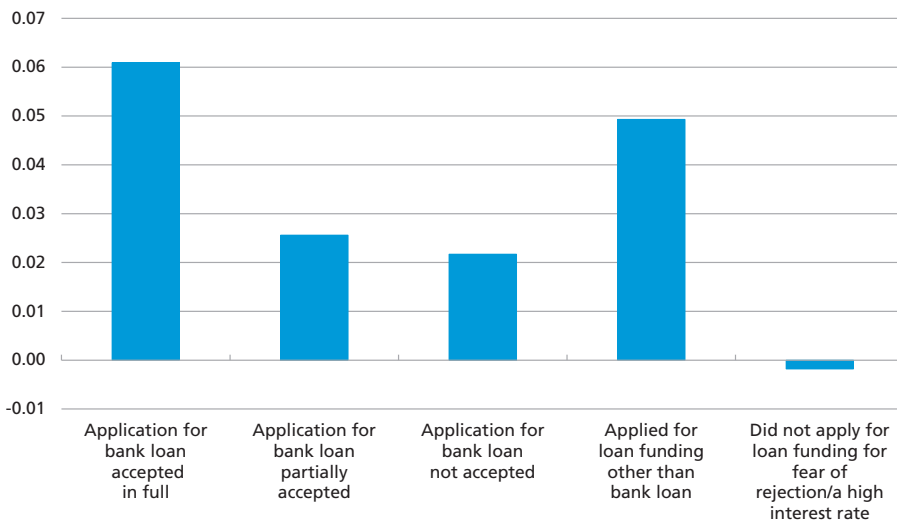
Note: Bank loans do not include access to overdrafts.
Source: Abildgren, Drejer and Kuchler (2012).

profit ratios than firms that applied for loan funding. A similar impression is obtained when considering solvency ratios, liquidity or short-term debt ratios. Before the financial crisis, very few firms refrained from applying for loan funding for fear of rejection or high interest rates.

Overall, the above descriptive analysis points to a close relationship, especially during the crisis, between the individual firms' financial results and the outcomes of loan applications. Moreover, the analysis indicates that banks tightened their credit standards during the financial crisis, which is consistent with the analysis in section 4.

With a view to testing the statistical sustainability of the above descriptive findings, Abildgren, Drejer and Kuchler (2012) estimate an econometric model of the relationship between firm characteristics and the probability that a loan application is accepted. The econometric model used allows for the selection regarding applications for bank loans seen in Chart 7.9, among others. This is particularly important because we want to compare the outcomes of loan applications during and before the financial crisis, although the firms applying for bank loans in the two periods may be characterised by differences in e.g. key financial ratios. The method used is described in Box 7.2.

MODEL OF THE OUTCOME OF FIRMS' LOAN APPLICATIONS	Box 7.2

Abildgren, Drejer and Kuchler (2012) estimate an econometric model of the outcome of firms' applications for bank loans in 2007 and 2009/10, respectively. The firms applying for bank loans are not a randomly selected group of firms. Furthermore, the characteristics that cause a firm to apply for a loan are not necessarily identical in the two periods. To take this into account, a bivariate probit model with sample selection is estimated for each period.

The model is based on a standard probit model:

$$P(y_1 = 1 \mid x) = \Phi(x\beta) \, , \tag{7.1}$$

where y_1 is a binary variable that assumes the value 1 if the firm's loan application is accepted, and the value 0 if the application is not accepted. Furthermore, x is a vector with explanatory variables, and Φ is the cumulated standard normal distribution function.

We can only observe the variable y_1, if a firm has applied for a bank loan, however. If we let y_2 be a binary variable with the value 1, if the firm has applied for a bank loan, and 0 if it has not, a further probit model can be constructed:

$$P(y_2 = 1 \mid z) = \Phi(z\delta) \, , \tag{7.2}$$

CONTINUED	Box 7.2

where z is a vector with variables explaining the selection. The procedure applied estimates these two equations simultaneously using maximum likelihood, thereby taking into account that the error terms of the two equations may be correlated.

Identification of the model is improved if z includes at least one variable that is not included in x. As the descriptive analysis showed that the size of the firm has no impact on the outcome of the loan application, the selection equation includes two variables that represent the size, i.e. the logarithm of the number of employees and total assets. Another variable is included, indicating whether the firm has applied for a loan from sources other than a bank. In addition to bank loans, the questionnaire includes the option of answering that the firm applied for a loan from the owner, employees, family/friends, other non-financial corporations, mortgage banks or other sources.

The results are reported as coefficient estimates and marginal effects. The marginal effect expresses a change in the probability of a loan application being accepted due to a change of one unit in the explanatory variable. The marginal effect is calculated on the basis of average values of the other explanatory variables and stated in percentage points.

In 2007, a firm's characteristics had no significant effect on the outcome of an application for a bank loan, cf. Table 7.2. This reflects the fact that the applications of most of the firms in the sample applying for bank loans in 2007 were accepted. This could indicate that the high lending growth in the pre-crisis years was at the expense of the credit quality of the loan portfolio.

Conversely, a firm's key financial ratios are seen to have a fairly great impact on the probability of the loan application being accepted in 2009-10. Firms with higher profit ratios, solvency ratios and liquidity ratios are thus more likely to have their loan applications accepted.

Table 7.2 also shows that firms applying for bank loans generally have poorer key financial ratios than firms that do not apply. Compared with the information from Chart 7.10, this indicates that the majority of firms that do not apply for loans are characterised by having sound finances, although the financial ratios of a small group of firms are so poor that the firms refrain from applying in the expectation of their application being rejected. The group of firms that do not apply for loans due to expectations of being rejected is relatively small compared with the group of firms that do not apply for other reasons.

As mentioned in Box 7.1, information about the firm's principal banker is available for approximately two thirds of those firms in the sample

MODEL OF ACCEPTANCE OF FIRMS' BANK LOAN APPLICATIONS   Table 7.2

	2007		2009-10	
	Coefficient estimate	Marginal effect	Coefficient estimate	Marginal effect
PROBABILITY OF ACCEPTANCE OF A BANK LOAN APPLICATION				
Solvency ratio	0.214	0.022	*0.797	0.186
Profit ratio	-0.018	-0.002	**1.534	0.357
Implied interest	-0.103	-0.011	-1.986	-0.463
Liquidity ratio (broad)	6.035	0.618	**1.830	0.426
Short-term debt ratio	-0.906	-0.093	0.337	0.079
Constant	**1.474		0.491	
SELECTION EQUATION (PROBABILITY THAT A FIRM APPLIES FOR A BANK LOAN)				
Solvency ratio	**-0.693		***-1.005	
Profit ratio	0.001		*-0.209	
Implied interest	*1.863		0.314	
Liquidity ratio (broad)	***-2.123		***-1.302	
Short-term debt ratio	*-0.497		**-0.630	
LN (number of employees)	-0.048		0.027	
LN (total assets)	0.070		0.048	
Applied for loan (other source)............	***1.058		***0.865	
Constant	**-1.072		-0.671	
Number of observations	927		1035	

Note: The selection equation expresses the probability that a firm applies for a bank loan, while the main equation
        expresses the probability that a loan application is accepted. The marginal effect indicates the change in the
        probability of a loan application being accepted due to an increase in the explanatory variable of one unit. For
        categorical variables (dummy variables), however, the marginal effect indicates the difference in the probability
        of acceptance of a loan application between two firms, the only difference being whether the dummy criterion
        is true or false. The marginal effects are calculated on the basis of the average of the explanatory variables. ***
        $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Abildgren, Drejer and Kuchler (2012).

that apply for bank loans. In order to test whether the outcome of a loan application is primarily affected by the firm's or the bank's situation or a combination thereof, a number of indicators of the banks' size and loan impairment charge and solvency situation are included in the regression analysis below. Due to the reduced number of observations, these findings are shown separately in Table 7.3.

Contrary to expectations, the bank's situation has only a limited impact on the outcome of a loan application. There is a slight tendency for firms that are customers in banks with higher loan impairment charge ratios to be a little less likely to have their loan applications approved, but the relationship is only marginally significant. There are no indications, however, that the banks' solvency situation has significantly affected the outcome of a firm's loan application. This should be viewed against the backdrop of the public capital injections into banks as part of Bank Rescue Package 2 of February 2009.

IMPACT OF BANK AND FIRM CHARACTERISTICS ON THE PROBABILITY OF
ACCEPTANCE OF A LOAN APPLICATION   Table 7.3

|	2007		2009-10	
	Coefficient estimate	Marginal effect	Coefficient estimate	Marginal effect
PROBABILITY OF ACCEPTANCE OF A BANK LOAN APPLICATION				
Solvency ratio	1.393	0.056	***1.809	0.434
Profit ratio	-0.035	-0.001	**1.798	0.431
Implied interest	-5.038	-0.204	0.494	0.118
Liquidity ratio (broad)	6.440	0.261	*2.451	0.588
Short-term debt ratio	-0.815	-0.033	0.593	0.142
Bank: Danish Financial Supervisory Authority's group 1	0.409	0.021	-0.017	-0.004
Bank: Loan impairment charge ratio ..	-0.155	-0.006	*-0.055	-0.013
Bank: Excess capital adequacy	-0.207	-0.008	-0.077	-0.019
Constant	1.549		0.145	
SELECTION EQUATION (PROBABILITY THAT A FIRM APPLIES FOR A BANK LOAN)				
Solvency ratio	**-0.836		***-1.066	
Profit ratio	0.000		-0.356	
Implied interest	1.901		-0.950	
Liquidity ratio (broad)	***-2.444		***-2.146	
Short-term debt ratio	-0.314		-0.461	
Bank: Danish Financial Supervisory Authority's group 1	-0.012		***-0.389	
Bank: Loan impairment charge ratio ..	0.328		0.008	
Bank: Excess capital adequacy	0.117		-0.098	
LN (number of employees)	-0.013		-0.033	
LN (total assets)	0.054		0.044	
Applied for loan (other source)	***0.973		***0.916	
Constant	*-1.162		0.080	
Number of observations	695		713	

Note: The selection equation expresses the probability that a firm applies for a bank loan, while the main equation
        expresses the probability that a loan application is accepted. The marginal effect indicates the effect on the
        probability of a loan application being accepted due to an increase in the explanatory variable of one unit. For
        categorical variables (dummy variables), however, the marginal effect indicates the difference in the probability
        of acceptance of a loan application between two firms, the only difference being whether the dummy criterion
        is true or false. The marginal effects are calculated on the basis of the average of the explanatory variables. ***
        $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Abildgren, Drejer and Kuchler (2012).

8. ALTERNATIVE FUNDING SOURCES AND MACROECONOMIC EFFECTS OF CREDIT SHOCKS

In addition to bank loans, firms use many other funding sources, e.g. mortgage loans, equity funding, intra-group loans, issuance of bonds, trade credits, leasing or factoring.

Mortgage funding is the most widely used alternative to bank funding in Denmark. Chart 8.1 shows lending by banks and mortgage banks in

LENDING BY BANKS AND MORTGAGE BANKS, AND CREDIT MIX   Chart 8.1
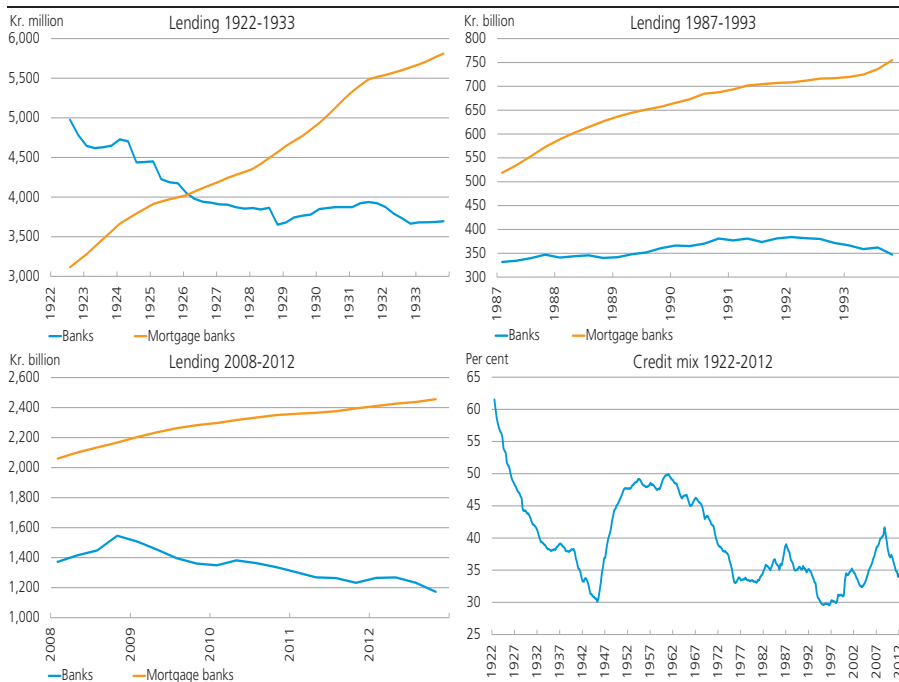
Note: Quarterly observations. Comprises lending to domestic non-MFIs. The credit mix is calculated as bank lending as a
        ratio of total bank and mortgage-bank lending.
Source: Abildgren (2012a).

1922-1933, 1987-1993 and 2008-12, all periods characterised by defaults in the banking sector and a falling or stagnating trend in bank lending[1]. On the other hand, lending by mortgage banks increased during the same periods. This may indicate that households and firms were able to cover part of their credit requirements in the mortgage-credit sector during periods when banks needed to reduce their lending exposure. Non-financial corporations have also increased their bond issuance in recent years, although the total outstanding volume remains limited, cf. Ministry of Business and Growth (2012).

   Chart 8.1 also shows the credit mix, defined here as bank lending as a ratio of total bank and mortgage-bank lending. The credit mix has been characterised by a long-term downward trend as mortgage-bank lending has gained increased weight in the economy. This should be viewed in conjunction with the rise in real house prices over the period shown,

[1] It should be noted, however, that part of the fall in bank lending since 2008 is attributable to the transfer of loans from banks under the Financial Stability Company to units without a banking licence. In addition, foreign banks in Denmark transferred loans to Danish firms to the parent bank in their home country. Moreover, the joint funding agreement between BRFkredit and several banks in 2012 contributed to a small decline in bank lending.

cf. Abildgren (2006). However, there is a clear tendency for the credit mix to fall in periods of crisis in the banking sector.

Chart 8.1 indicates that in periods of crisis in the banking sector, there has been relative substitution of lending by banks towards lending by mortgage banks, reflecting that the business models of banks and mortgage banks are fundamentally different.

The main activity of mortgage banks is to offer loans against real property as collateral, financed by issuance of negotiable bonds. The business model of mortgage banks follows the balance principle, ensuring that the terms of the issued mortgage bonds reflect the terms of the loans granted, cf. Gundersen et al. (2011). The balance principle thus sets the limits for the financial risks that mortgage banks can assume, including interest-rate, option, liquidity and exchange-rate risk. This means that Danish mortgage banks assume risks other than credit risk to a very limited extent, the latter risk being limited by requiring that property be pledged as collateral for all loans – even the "most secure" part of the property value (first mortgage). In contrast, banks grant both collateralised and uncollateralised loans.

The different business models are reflected in substantial differences in the level of loan impairment charges between banks and mortgage

LOAN IMPAIRMENT CHARGES IN BANKS AND MORTGAGE BANKS   Chart 8.2
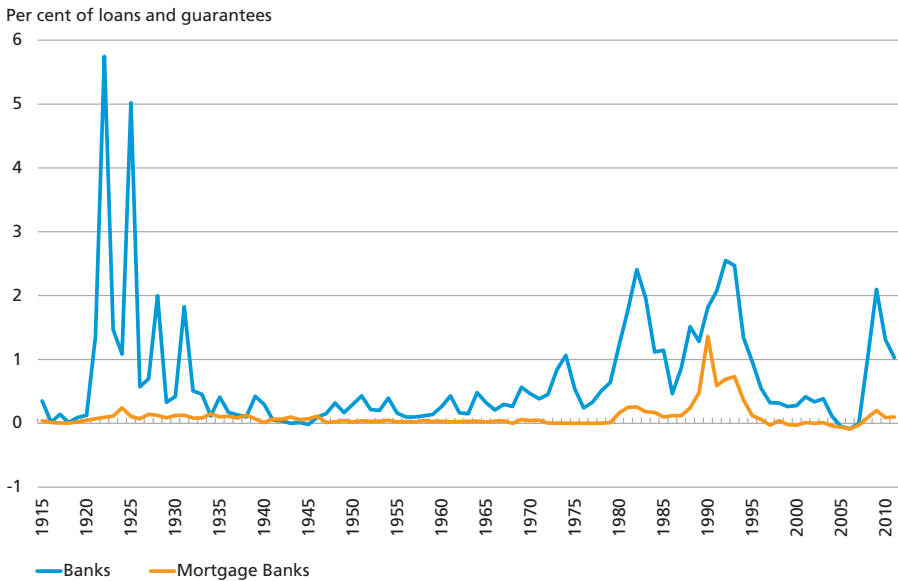

Note: In 1990, the principles for mortgage banks' loan impairment charges were changed so that provisions had to be made for probable losses and not just for certain losses. In principle, part of the provisions in 1990 therefore concern previous years.

Source: Statistics Denmark and Danish Financial Supervisory Authority.

banks, even during periods of financial crisis, cf. Chart 8.2. The very low level of mortgage banks' loan impairment charges during the recent financial crisis compared with the late 1980s and early 1990s should be viewed in the context of considerably lower rates of enforced sales and unemployment, cf. Abildgren and Thomsen (2011).

These conditions contribute to explaining how it is possible for mortgage banks' lending to improve in periods of crisis in the banking sector, while banks have to consolidate and reduce their lending exposure. Accordingly, households and firms were able to cover part of their credit requirements in the mortgage-credit sector during periods when banks needed to reduce their lending exposure. This contributed to the fact that, during the recent crisis, total lending by banks and mortgage banks did not decline substantially relative to GDP, cf. Chart 8.3.

The increase in the credit mix in the mid-1930s and in the second half of the 1990s does not imply that mortgage-bank lending declined in absolute levels in the years following periods of banking crisis. But bank lending increased more strongly than mortgage-bank lending during those periods. Since mortgage banks only grant loans based on real property as collateral, this may reflect that marginal borrowing during a cyclical upswing – when the outlook for the ability of firms and households to meet payments is good – takes place to a greater extent on an uncollateralised basis via banks.

LENDING BY BANKS AND MORTGAGE BANKS TO DANISH HOUSEHOLDS AND
NON-FINANCIAL CORPORATIONS   Chart 8.3

Per cent of GDP
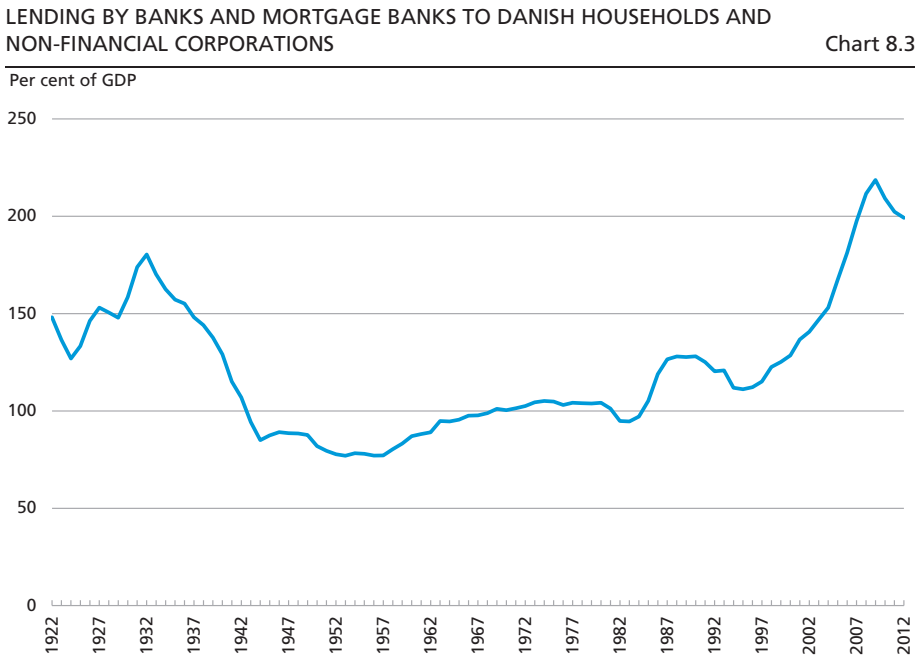
Source: Abildgren (2012), Hansen (1983), Danmarks Nationalbank and Statistics Denmark.

The above analyses do not necessarily mean that individual households and firms or even whole industries may not have found it hard to obtain sufficient funding during the crisis, e.g. due to insufficient real estate equity. Nor is there any doubt that the recent financial crisis has given rise to considerable additional loss of output in the Danish economy, cf. Abildgren et al. (2011).

The financial crisis had negative social effects through several channels – in addition to the negative impact from the international economy, which was characterised by financial and debt crises. The financial crisis eroded the firms' credit standing and ability to meet payments in particular, which caused banks to tighten their credit standards and to limit their lending exposure. In addition to the negative impact on the real economy caused by lending restraint in a crisis-stricken banking sector, the financial crisis also adversely affected the economy in more general terms. The growing perceived uncertainty about the future economy and the economic outlook for households and firms brought about by the financial crisis may have led to lower consumption and investment and thus to lower demand for credit. Furthermore, corporate confidence in the banking sector's willingness and ability to always meet the demand for credit and liquidity in an economic downturn may have weakened. This may have amplified consolidation and debt reduction by non-financial corporations and dampened credit demand, investment activity and employment. Non-financial corporations show substantial savings surpluses, and the financial savings surpluses of Danish firms and households relative to GDP have reached the highest levels since the start of the statistical series in the early 1970s. The savings surpluses are thus higher than during the deep recessions in the early 1980s and 1990s.

All other things being equal, due to the consolidation and debt reduction of the corporate sector, there is no reason to expect strong growth in demand for bank loans when the economy improves. This is particularly true, considering that Danish firms traditionally use retained earnings to fund part of their fixed gross investments at the beginning of an upswing rather than loans from mortgage banks in Denmark and abroad, cf. Abildgren (2009). If a coming upswing is accompanied by moderate demand for credit, it is paramount to future financial stability that banks do not ease their credit standards to a level that is too low.

9. LITERATURE

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