LENDING IN A LOW INTEREST RATE ENVIRONMENT

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INTRODUCTION AND SUMMARY

Competition among credit institutions for corporate customers has intensified in recent years because interest rates are low and demand for loans is subdued. For the most creditworthy firms, this has led to lower loan costs and a slight easing of the terms and conditions for obtaining a loan from a bank. On the other hand, there are no indications that low interest rates and increased competition have prompted credit institutions to ease credit conditions for less creditworthy corporate customers.

Corporate loan demand has been much more subdued since the onset of the financial crisis than in the pre-crisis period. Many firms have wanted to deleverage in part to increase their resilience to economic shocks and in part to ensure more flexibility in future financing choices. Moreover, many firms have not applied for debt financing because they have had no need to do so. They have had a high positive savings surplus in the years since 2009 and are likely to be able to cover most of their financing needs through retained earnings.

Before the financial crisis, the correlation between firms' financial ratios and the probability of obtaining bank loans was weak. But during the financial crisis, credit institutions tightened their excessively loose pre-crisis credit standards. The analysis shows that less creditworthy firms still face very tight credit conditions. Creditworthy firms, on the other hand, stand a good chance of having their financing needs met by both commercial banks and mortgage banks.

The analysis further shows that banks' credit assessments to a large extent entail that loan capital flows to the most productive firms. However, there are also indications that the least productive firms in Denmark have relatively easy access to finance compared with low-productivity firms in other countries. During a period of exceptionally low interest rates, it is important to ensure that low-productivity firms with unprofitable operations are not kept artificially alive. If these firms are kept artificially alive, this will only delay the necessary adaptation processes in the corporate sector – to the detriment of both employment and prosperity.

In recent years, few firms have stated that lack of access to finance impedes their production. Seen in an international perspective, Danish firms have had good access to finance both during the crisis and in recent years. Thus, there are no indications that credit constraints are dampening the current upswing in the Danish economy.

LENDING TO FIRMS

Mortgage debt and bank debt account for the majority of Danish firms' debt, and in the pre-financial crisis period the firms substantially increased their debt. However, since the onset of the financial crisis, corporate lending by commercial banks and mortgage banks has been virtually unchanged, cf. Chart 1 (left). This should be seen in light of the high positive savings surplus (positive net lending) in the corporate sector since 2009. Some firms have wanted to consolidate

their balance sheets to increase their resilience to future economic shocks and ensure more flexibility in future financing choices. Moreover, at the beginning of an economic upturn, Danish firms tend to be able to cover most of their financing needs through retained earnings. Thus, demand for loans has been limited for a number of years.

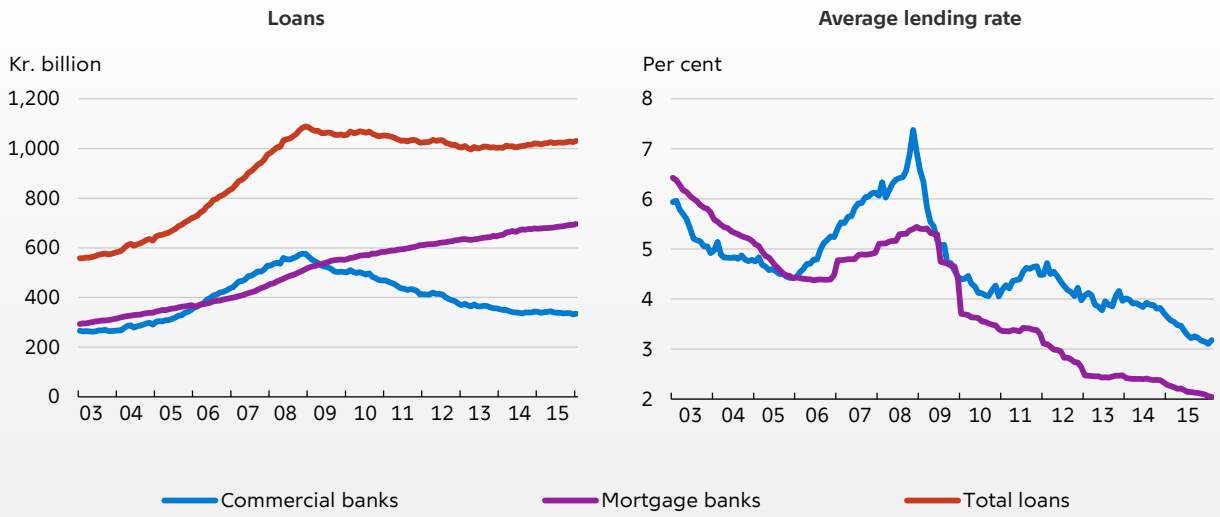
Loans from mortgage banks account for an increasing share of firms' total bank and mortgage bank debt. This should be seen in light of the tightening of collateral requirements by commercial banks. Moreover, the increasing interest differential between commercial bank loans and mortgage loans has undoubtedly been a contributory factor for firms that are able to pledge real estate as collateral, cf. Chart 1 (right). Commercial banks are still an important source of finance, however. One reason is that mortgage loans are provided only against real property as collateral. Thus, commercial bank and mortgage bank financing varies considerably across industries. Moreover, financing from commercial banks is often used to cover firms' operating financing needs, while mortgage bank financing tends to be more long term in nature.

Both commercial banks and mortgage banks tightened credit standards substantially at the beginning of the financial crisis, cf. Chart 2 (left). The tightening was primarily implemented in the form of price increases and higher collateral requirements. Prices have also become more differentiated. Since early 2014, commercial banks, in particular, have gradually eased their credit standards somewhat. The easing has especially taken the form of price reductions, cf. Chart 2 (right). It appears from the institutions' responses to the lending survey that both credit standards and pricing policies have been eased for the most creditworthy firms in particular. In many cases, the reason given for the easing is increased competition among institutions, especially for the best customers. In March 2015, the Danish Financial Supervisory Authority published a survey of new corporate loans granted by selected commercial banks. This survey, like Danmarks Nationalbank's lending survey, showed that intensified competition among commercial banks was reflected in lower lending rates for the most creditworthy customers and to a lesser extent in easing of other terms and conditions such as collateral requirements.

Danmarks Nationalbank's lending survey indicates a slight increase in demand for mortgage loans among firms since 2012, cf. Chart 3. On

Commercial banks' and mortgage banks' loans and interest rates towards corporate customers

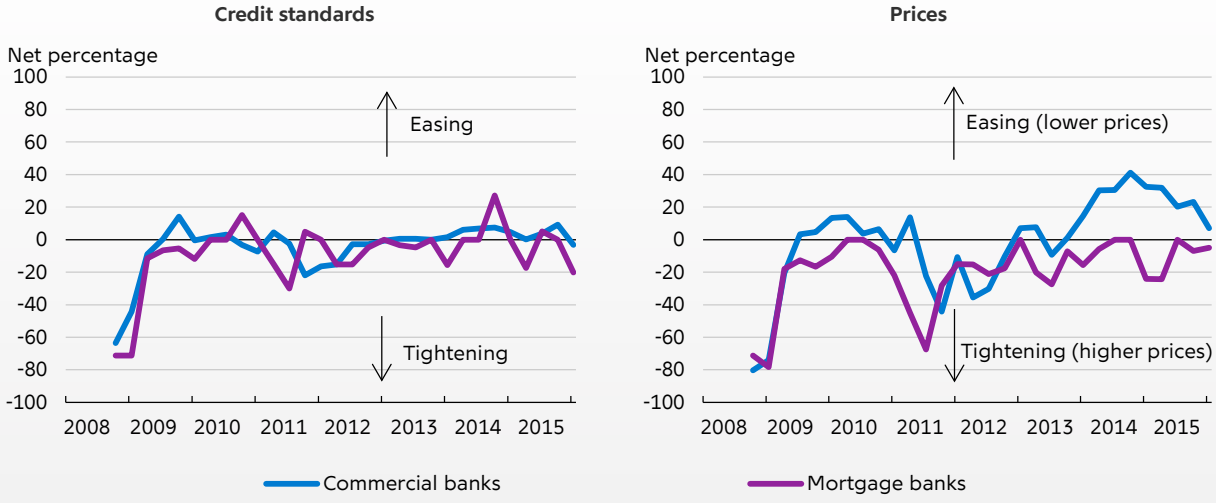
Chart 1



Note: Left-hand chart: Loans are at nominal value and seasonally adjusted. Right-hand chart: Average effective interest rates (including administration margins) on outstanding loans. Interest rates on mortgage bank loans excluding indexed loans.
Source: Danmarks Nationalbank.

Change in credit standards and prices

Chart 2

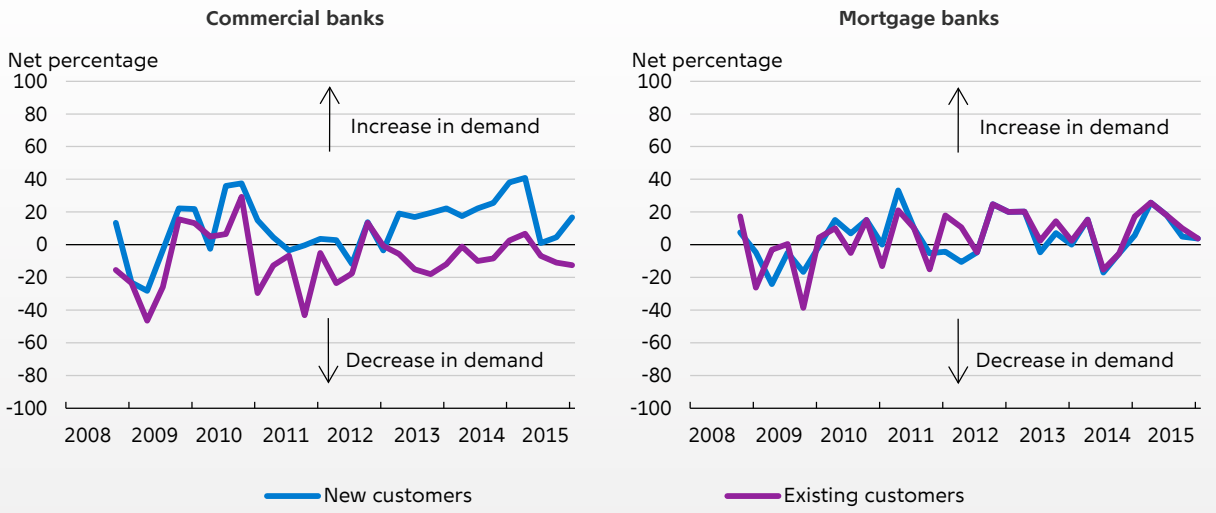


Note: The lending survey provides qualitative statistical data based on responses from the largest Danish commercial banks and mortgage banks. Each response is given a value of -100, -50, 0, 50 or 100, and the value is weighted according the institution's share of total lending. The net percentage can therefore vary between -100 and 100. A negative figure indicates a tightening and a positive figure an easing of credit standards. For example, a net percentage of -100 (100) means that all institutions have tightened (eased) their credit standards considerably, while a net percentage of -50 (50) means that they have tightened (eased) them a little.

Source: Danmarks Nationalbank.

Change in demand

Chart 3



Note: The lending survey provides qualitative statistical data based on responses from the largest Danish banks and mortgage banks. Each response is given a value of -100, -50, 0, 50 or 100, and the value is weighted according the institution's share of total lending. The net percentage can therefore vary between -100 and 100. A negative figure indicates a decrease in demand relative to the previous quarter, while a positive figure indicates an increase in demand.

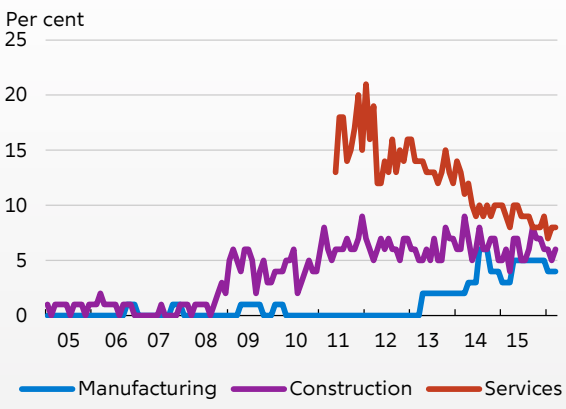
Source: Danmarks Nationalbank.

the other hand, demand for loans from existing commercial bank customers has declined in most quarters since 2012. During the same period, commercial banks have eased credit standards slightly. Given that, other things being equal, existing customers are likely to be a larger customer group than new customers, the lending survey thus indicates that the slow growth in commercial bank loans over the last few years is driven, in particular, by low demand for loans.

As far as commercial banks are concerned, demand from new customers has been growing, showing a more positive trend than demand from existing customers. This could imply that firms are increasingly considering to switch banks or to use more than one bank. There are also indications that competition among commercial banks has intensified.

Danmarks Nationalbank's lending survey gives an impression of firms' access to finance as seen from the commercial banks' and mortgage banks' point of view. Surveys on firms' perceived conditions for access to loans are also conducted at regular intervals. Statistics Denmark's confidence indicators are based on surveys conducted among firms in the manufacturing, construction and services industries. On average, only a small share of firms have stated financial constraints as impediments to production, cf. Chart 4. It should also be mentioned that firms currently tend to state labour shortages rather than lack of finance as impediments to production.

Share of firms for which financial constraints limit production Chart 4



Note: The questionnaires were redesigned in the 1st and 2nd quarters of 2013, contributing to a decrease in the "no production constraints" response category in favour of responses stating production constraints. Data for manufacturing is quarterly, while data for other industries is monthly.
Source: Statistics Denmark.

ACCESS TO FINANCE OF SMALL AND MEDIUM-SIZED ENTERPRISES

The confidence indicators are weighted according to employment, entailing that large firms carry relatively large weights. Below, we examine the access to finance of small and medium-sized enterprises based on surveys conducted by Statistics Denmark. The detailed responses are compared with firm-level register data. This enables an analysis e.g. of whether there is link between firms' financial ratios and the outcome of their loan applications. The method and results are reviewed and documented in Andersen and Kuchler (2016).

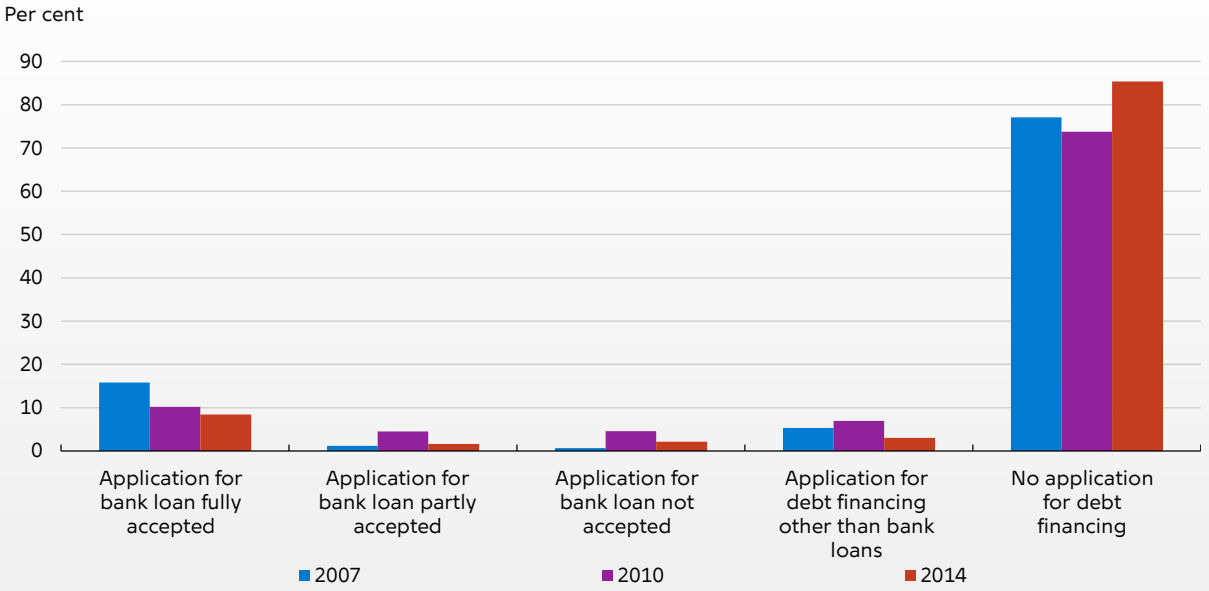
The most recent survey on this topic was conducted by Statistics Denmark in 2014. A similar survey was conducted in 2010, dealing with the access to finance in 2007 and 2010. An analysis of this survey shows that commercial banks tightened credit standards during the crisis from a very loose level in the run-up to the crisis, cf. Abildgren et al. (2013).

This analysis uses survey data for 2007, 2010 and 2014 for around 2,000 firms with between 5 and 249 employees. This data is linked with register data from Statistics Denmark's account and firm statistics, containing information about the firms' employment, turnover, result before financial items, equity and total assets.

The surveys deal with firms' access to finance, including loans from commercial banks and mortgage banks, among other things. The vast majority of small and medium-sized enterprises included in the analysis, close to 80 per cent of the respondent firms in 2014, did not apply for debt financing in the year in question, cf. Chart 5. This percentage is in line with the corresponding percentage both before and during the crisis, and the changes between the three time periods can, to some extent, be attributed to statistical uncertainty of the sample survey.

Thus, firms that do not apply for debt financing make up the majority of the firms surveyed in 2014. Of these firms, 70 per cent did not apply

Distribution of firms in the analysis Chart 5



Note: Bank loans do not include overdraft facilities. Debt finance other than bank loans includes e.g. loans from mortgage banks or firm owners and employees.
Source: Own calculations based on firm-level data from Statistics Denmark.

because they did not need debt financing. On average, these firms are also the most solvent firms, cf. Chart 6.[1] Low demand for loans should be seen in light of a large positive savings surplus in the corporate sector since 2009, and thus firms are likely to be able to cover much of their financing needs through retained earnings. In addition, a small group of firms do not apply for loans out of fear of rejection. On average, these firms are less solvent than other firms.

Firms whose loan applications with commercial banks and mortgage banks are fully or partly accepted are more solvent than firms whose applications are rejected, cf. Chart 6. If financial ratios other than the solvency ratio are used, e.g. the profit margin, the same pattern applies, cf. Andersen and Kuchler (2016). Loan applications from firms with high interest costs relative to their total debt are also rejected more often than the applications of other firms, cf. Chart 7. There is usually a close link between the interest rate a firm is charged and its creditworthiness. To summarise, the above clearly indicates that the most creditworthy firms have easier access to debt financing than less creditworthy firms.

A more formal econometric analysis in Andersen and Kuchler (2016) also indicates that both in 2010 and 2014, more solvent firms had a higher probability of having their loan applications accepted than less solvent ones. This link did not exist before the crisis, in 2007, cf. Box 1.

A firm's productivity level also impacts its decision of whether to apply for debt financing as well as the outcome if the firm does apply, cf. Chart 8. Overall, a slightly larger share of more productive firms apply for loans than less productive firms. The most productive firms are less inclined to apply for loans, however.

A firm's productivity often determines its ability to generate a profit and profitable prospects for expanding the firm's activities. There is a clear tendency for the most productive firms to have their loan applications accepted to a greater extent than less productive firms.

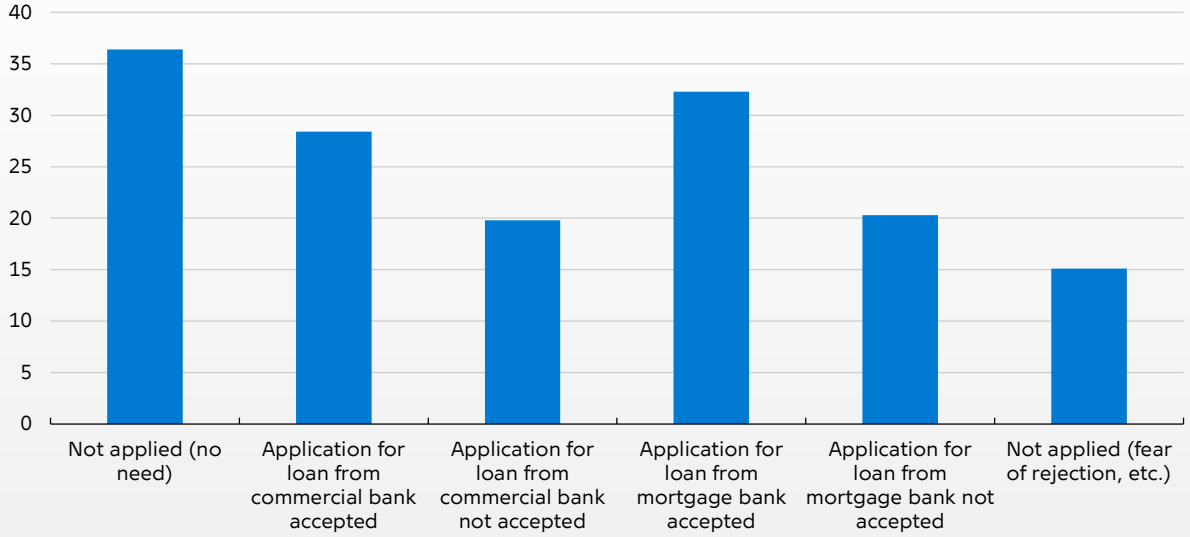
Commercial banks tightened their credit standards in the aftermath of the outbreak of the

1 A firm's solvency ratio is calculated as the ratio of equity to total assets.

Firms' solvency ratios – according to loan application status

Chart 6

Average solvency ratio in 2014, per cent

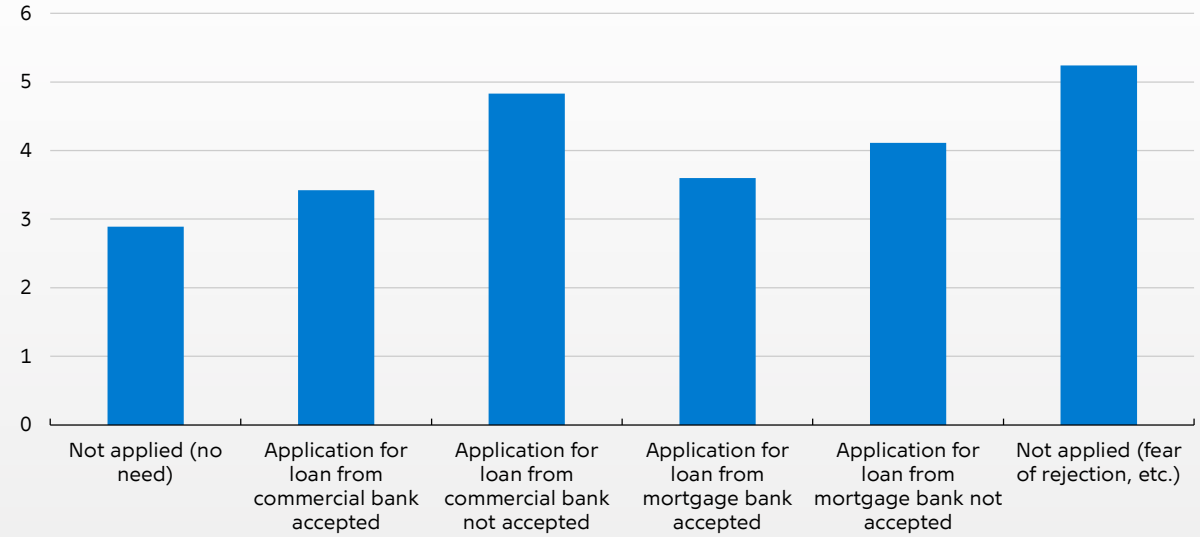


Note: Bank loans do not include overdraft facilities. A firm's solvency ratio is calculated as the ratio of equity to total assets. A loan application is classified as accepted if it has been accepted in full or in part.
Source: Own calculations based on firm-level data from Statistics Denmark

Firms' implied interest rate level according to loan application status

Chart 7

Average implied interest rate on gross debt in 2014, per cent



Note: Implied interest rates on gross debt are defined as the ratio of the firm's interest expenses, etc. to total debt at the end of the year. Bank loans do not include overdraft facilities. A loan application is classified as accepted if it was accepted in full or in part.
Source: Own calculations based on firm-level data from Statistics Denmark.

Model for the outcome of firms' applications for bank loans

Box 1

Andersen and Kuchler (2016) estimate an econometric model for the outcome of firms' applications for bank loans for the years 2007, 2010 and 2014, based on survey data for about 2,000 firms with 5-249 employees. This data is linked with register data from Statistics Denmark's account and firm statistics, providing information about the firms' employment, turnover, result before financial items, equity and total assets.

Which firms apply for bank loans is not random. This may have an impact on the outcome of the loan applications. To take this into account, a bivariate probit model with sample selection is estimated for each of the three years.

The probability of having an application for a loan fully accepted is modelled in a standard probit model:

$$P(y_1=1|x) = \Phi(x\beta),$$

where y_1 is a binary variable that takes the value 1 if the firm's loan application is fully accepted. If the loan application is not fully accepted, the value is set to 0. Furthermore, is a vector of explanatory variables, and Φ is the cumulative distribution function for the standard normal distribution.

The outcome of the loan application, y_1, is observed only when firms have applied for loans. Let y_2 be a new binary variable taking the value 1 if the firm has applied for a bank loan, and 0 if the firm has not applied. This allows us to construct a further probit model:

$$P(y_2=1|z) = \Phi(z\delta),$$

where z is a vector of variables explaining the selection. The two equations are estimated simultaneously by maximum likelihood. This is to take into account a potential correlation between the error terms in the two equations.

The table below shows the results, with sample selection correction as described above, in the form of coefficient estimates and marginal effects. The marginal effect indicates the change in the probability (in percentage points) of having the loan application accepted due to a one unit change in the explanatory variable. Marginal effects are evaluated at the mean of the values of the other explanatory variables.

Overall, the figures indicate that in 2007 there was no statistically significant link between firm characteristics and the firm's probability of having a loan application accepted. On the other hand, both in 2010 and 2014, more solvent firms had a higher probability of having their loan applications accepted than less solvent ones. In 2010, firm profitability and liquidity also played a key role in the probability of having a loan application accepted.

Model of acceptance of firms' bank loan applications

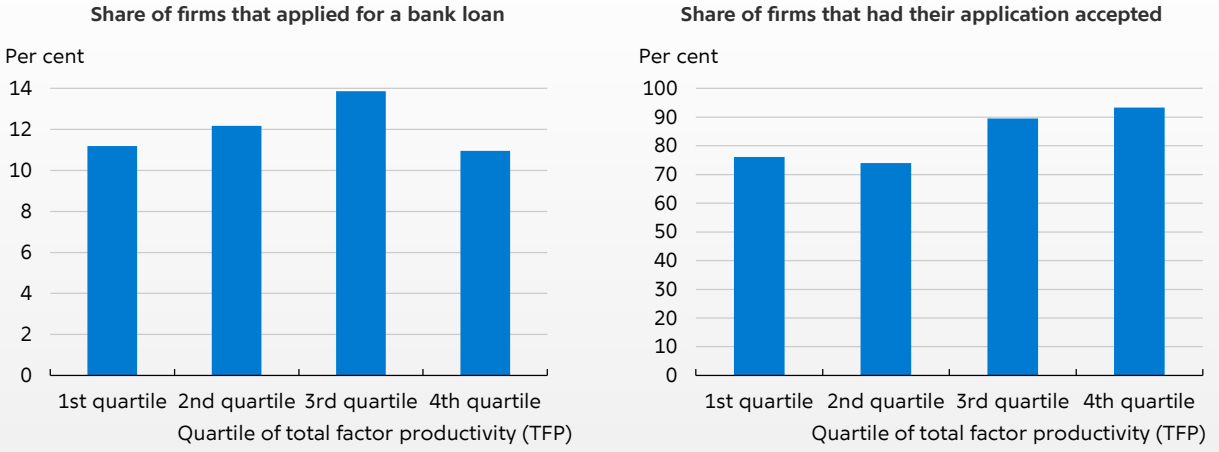
	2007		2010		2014	
	Coefficient estimate	Marginal effect	Coefficient estimate	Marginal effect	Coefficient estimate	Marginal effect
Solvency ratio	0.334	0.038	*0.865	0.203	**1.858	0.391
Profit ratio	-0.019	-0.002	**1.492	0.350	0.345	0.073
Implied interest rate	-1.088	-0.124	-1.963	-0.460	-5.297	-1.116
Liquidity ratio (narrow)	5.572	0.634	*1.589	0.373	-2.020	-0.426
Short-term debt ratio	-0.932	-0.106	0.347	0.081	1.109	0.234
Log (number of employees)	-0.110	-0.013	-0.053	-0.012	-0.135	-0.028
Number of observations	927		1,035		625	

Note: Results express the probability of having a loan application fully accepted. All specifications contain a constant. The model has been corrected for sample selection using similar control variables and an indicator of whether the firm has applied for debt financing other than bank loans. The marginal effect of a one unit change in the explanatory variable on the probability of having the application for a bank loan accepted. However, for categorical variables (dummy variables), the marginal effect is the difference in probability between two firms, the only difference being whether the category of the respective dummy variable is true or false. Marginal effects are evaluated at the mean of the values of the explanatory variables. * p<0.10, ** p<0.05, ***p<0.01.

Source: Andersen and Kuchler (2016).

Firms' productivity and loan applications, 2014

Chart 8



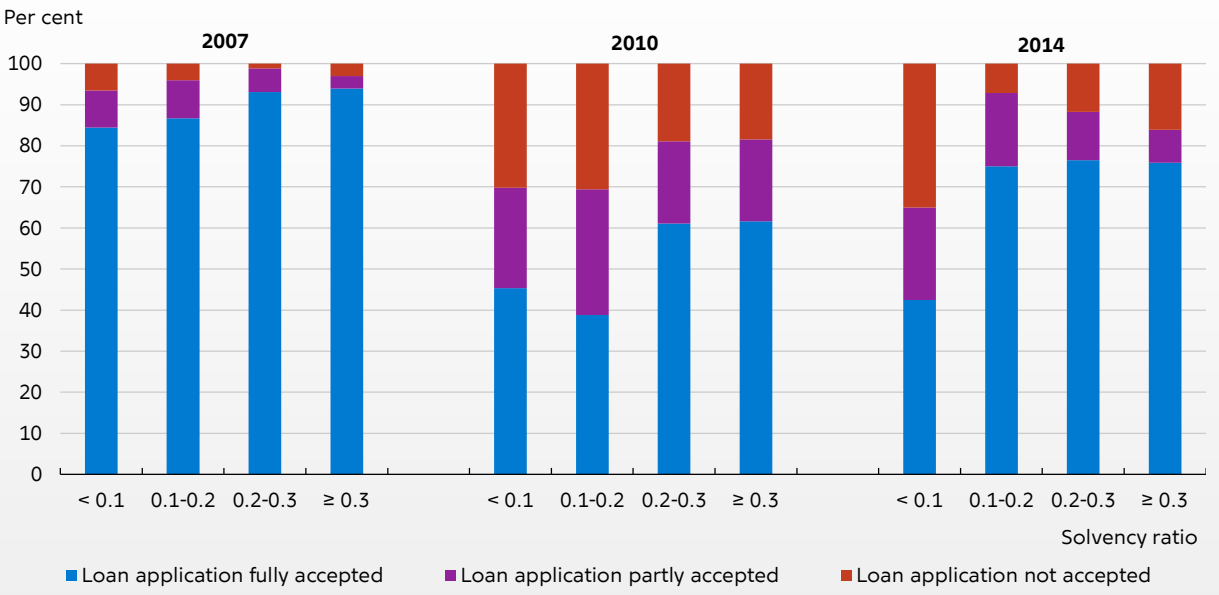
Note: A loan application is classified as accepted if it has been accepted in full or in part. The right-hand chart includes only firms that applied for bank loans. Firms' productivity is calculated as the total factor productivity, TFP, estimated based on data for the firms in question during the period 2001-14, cf. Andersen and Kuchler (2016).
Source: Own calculations based on firm-level data from Statistics Denmark.

financial crisis. In 2007, just over 80 per cent of the least solvent firms with a solvency ratio below 0.1 had their loan applications accepted, cf. Chart 9. In 2010, this number was down to just over 40 per cent. A similar tightening was introduced for firms with higher solvency ratios, although their loans applications were still accepted to a greater extent than those of firms with a low solvency ratio.

In 2014, credit standards tended to be looser for more solvent firms, especially for the group of

Loan application status according to solvency ratios

Chart 9



Note: Bank loans do not include overdraft facilities. A firm's solvency ratio is calculated as the ratio of equity to total assets.
Source: Own calculations based on firm-level data from Statistics Denmark.

firms with solvency ratios in the range of 0.1-0.2. In this group, the share of firms having their loan applications fully accepted had risen from just under 40 per cent to about 75 per cent. Credit standards for the least solvent firms have not been eased. The tendency to ease credit standards for solvent firms is the same across the main industries, cf. Andersen and Kuchler (2016).

FIRMS' ACCESS TO FINANCE IN AN INTERNATIONAL PERSPECTIVE

Despite international differences in corporate financing structures, debt financing is still a key source of finance for firms in most countries. The European Commission, in collaboration with the European Central Bank, ECB, conducts recurring surveys of the access to finance of small and medium-sized enterprises in all 28 EU member states. Unlike Statistics Denmark's survey, which surveys firms with between 5 and 249 employees, the Commission's survey also includes the smallest firms with just one employee. However, in general, the findings of the two surveys are reasonably consistent.

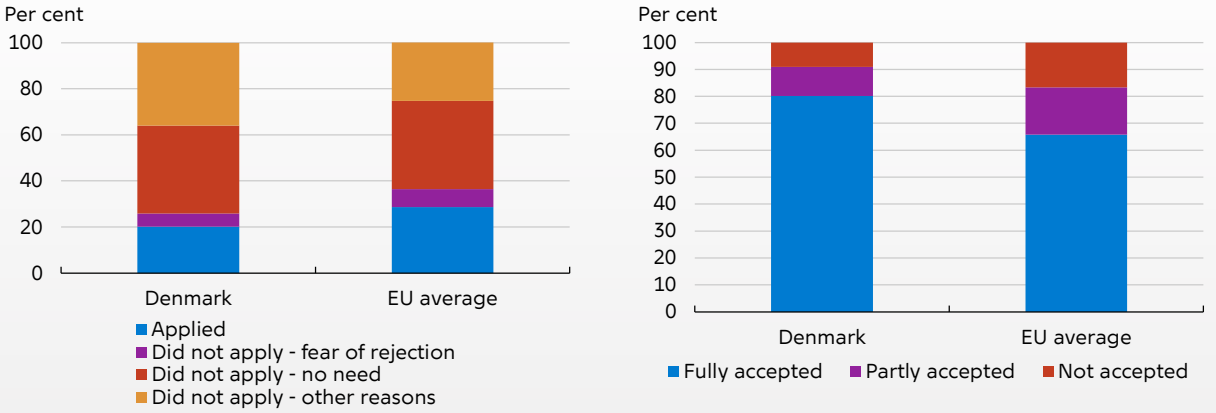
Compared with firms in other EU member states, a relatively small share of small and medium-sized Danish enterprises applied for financing in a commercial bank in 2014, cf. Chart 10 (left).[2] Among other things, this reflects that mortgage credit is an important source of finance for these enterprises. According to the survey, 80 per cent of Danish firms applying for loans in a commercial bank in 2014 had their loan applications fully accepted, cf. Chart 10 (right). The corresponding share of firms across the EU was 66 per cent.

By analysing developments in firms' financial figures, it is possible not only to get an indication of their perception of the access to finance, but also of the extent of financial constraints. Such an analysis has been conducted in a number of EU member states, including Denmark, cf. Box 2. The results generally indicate that, by international standards, Danish firms have good access to finance and that commercial banks' credit assessments to a large extent mean that loan capital flows to the most productive firms.

However, there are also indications that the least productive firms in Denmark are relatively less financially constrained than firms in other countries. During a period of exceptionally low in-

Firms distributed according to whether they have applied for bank financing and the outcome of the application

Chart 10



Note: The survey was conducted in September and October 2014. The right-hand chart includes only firms that applied for bank financing. The EU average is calculated as a weighted average of all 28 EU member states. Firms that rejected a loan offer due to the interest rate being too high are classified as not accepted.

Source: The European Commission and the ECB's survey on the access to finance of small and medium-sized enterprises (SAFE).

2 Due to the low number of Danish firms applying for debt financing in the 2015 survey, data from 2014 is used.

International comparison of financial constraints based on firm-level data

Box 2

An indicator of financially constrained firms, developed in the Competitiveness Research Network, CompNet, can be used to assess the extent of financial constraints in various countries. CompNet is a research network coordinated by the European Central Bank, ECB. A number of European central banks participate in the research network.[1]

To establish the indicator, firm i's financing gap, F_{it}, is defined as

$$F_{it} = I_{it} - CF_{it}$$

where I_{it} is net real investment (i.e. investment in fixed assets and increase in current assets except for liquid assets) in year *t* and CF_{it} is the cash flow in year *t* (defined as profit plus depreciation and amortisation). The financing gap can be seen as an indicator of the firm's savings surplus (with the opposite sign). Firms with a positive financing gap need additional financing as they are unable to finance their real investment through their cash flow. Firms which have a positive financing gap but do not obtain external financing, e.g. by obtaining credit or raising additional capital from the stock market, are classified as financially constrained. Instead, they use internal financing, e.g. though retained earnings. In addition, firms with a positive financing gap that liquidate assets (i.e. firms which have negative net investment) are classified as financially constrained irrespective of whether they obtain external financing. This is based on the hypothesis that they are unable to raise sufficient external capital in order for them to be able to preserve their capital stock.

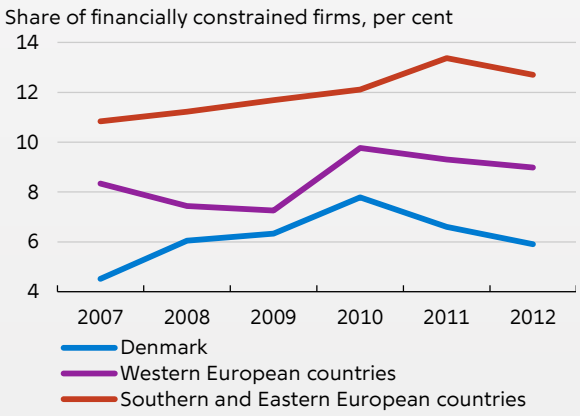
According to this approach, 6 per cent of Danish firms were classified as financially constrained in 2012, the most recent year of fully comparable data for the other countries. This level corresponds to the level e.g. of Statistics Denmark's confidence indicators, cf. Chart 4.

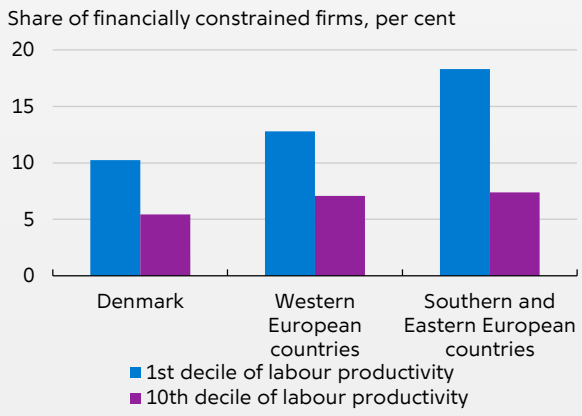
A key assumption of this indicator is that firms use internal financing only if they are unable to obtain external financing. This assumption could be debated in a Danish context, given that Danish firms tend to finance themselves to a relatively high extent through retained earnings, cf. Petersen and Risbjerg (2009). Moreover, firms have had a high positive savings surplus since 2009, cf. Abildgren et al. (2014), entailing that financing through retained earnings must be expected to have been particularly significant in recent years. Adjusted for financing through retained earnings, the share of Danish firms classified as financially constrained is somewhat lower, cf. Andersen and Kuchler (2016).

Compared with other countries, the extent of financial constraints among Danish firms is relatively low, cf. the chart (left). The chart also illustrates the loose credit standards in Denmark in the period leading up to the crisis and the subsequent tightening, bringing the level of financially constrained Danish firms closer to the level of other Western European countries.

Both in Denmark and in the other countries, there is a link between firm labour productivity and financial constraints, cf. the chart (right). Firms with low labour productivity are more financially constrained than firms with high labour productivity. Thus, credit allocation supports a positive development in productivity. The results generally indicate that, by international comparison, Danish firms have relatively good access to finance.

Financially constrained firms in Denmark and other EU member states





Note: The charts are based on firms with at least 20 full-time employees. Western European countries: Belgium, France and Germany. Southern and Eastern European countries: Estonia, Italy, Lithuania, Poland, Portugal, Spain (from 2009), Slovenia and Hungary. Country results are weighted by each country's gross domestic product, GDP. Decile group 1 for labour productivity contains the 10 per cent of firms with the lowest labour productivity, while decile group 10 contains the 10 per cent of firms with the highest labour productivity. Labour productivity is defined as value added divided by the number of full-time employees.

Source: ECB and own calculations based on firm-level data from Statistics Denmark.

1. Further information on the method can be found in Ferrando et al. (2015) and Lopez-Garcia et al. (2015).

terest rates, it is important to ensure that low-productivity firms with unprofitable operations are not kept artificially alive. Otherwise, this will only delay the necessary adaptation processes in the corporate sector – to the detriment of both employment and prosperity.

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