Sensitivity to the crisis of SME financing in Belgium

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Introduction

The financing of small and medium-sized enterprises (SMEs) is one of the current concerns of policy-makers. In recent years, following the financial and sovereign debt crises, business funding has come under pressure, hampering the economic recovery. It is generally accepted that SME financing is more sensitive to crises than the financing of large firms. The main reason is that SMEs are very dependent on bank credit for developing their business (Wehinger, 2013). Given that the banks tighten their lending criteria during a financial crisis, the impact is likely to be greater for SMEs, which have fewer funding options than large firms. Another possible explanation is the relative lack of information on SMEs' credit quality, which could exacerbate the perceived credit risk from the lenders' point of view (OECD, 2015), making lenders more reluctant to extend additional funding to SMEs in an adverse economic climate.

This article examines whether SME financing in Belgium has actually suffered as a result of the successive crises since 2008, and if so, what are the explanatory factors. The article comprises four sections. The first section describes the funding structure of non-financial corporations in Belgium, with a breakdown by firm size. It is clear from this analysis that bank financing is very important to SMEs. The second section examines whether lending to SMEs has become atypical since the crisis, and tries to assess, notably on the basis of survey data, the extent to which demand and supply factors are involved. In that connection it appears that, apart from demand factors, the perception of the risks inherent in SMEs has also exerted a decisive influence on bank lending conditions. The third section examines, on the basis of a microeconomic analysis, the extent to which the financial health of SMEs, and hence their risk profile, actually changed during the crisis. The fourth section endeavours to determine whether lending was adjusted according to the risk associated with SMEs. It should be noted that the analysis conducted here is based primarily on changes in the volume of lending, and is only indirectly concerned with the price effects (interest rates). Finally, the conclusion summarises the main findings.

To support our analysis, we used multiple sources of both quantitative and qualitative data which, being mutually complementary, gave us a detailed insight into the potential determinants of the pattern of bank loans to businesses, be they SMEs or large firms. The national financial accounts list, at macroeconomic level, the various instruments that businesses use to obtain finance (equities, debt securities and loans) (1). While the non-financial corporations category can be specifically identified from these data, it is not possible to obtain a breakdown by firm size. To take account of that criterion, we used two sources of microeconomic data, namely the Central Balance Sheet Office and the Central Corporate Credit Register (2). The Central Balance Sheet Office collects the accounts and balance sheets of all

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(1) The financial accounts data are usable from 1999 onwards and are produced quarterly. They record both outstanding amounts (stocks at a given moment) and the transactions effected (flows during a given period) for each financial instrument and institutional sector.

(2) These two databases can be linked by means of the enterprise number (a unique number assigned to each firm).

limited liability companies which have to submit their annual accounts each year. We focused mainly on the variables which concern the financial debts of firms, and some accounting ratios which can be used to calculate an indicator of the firms' financial health (namely the Altman Z-score, see below). The Central Credit Register, for its part, records all loans granted by resident banks to non-financial corporations[1]. Finally, we were able to refine our analysis by means of qualitative data for which results are broken down by size of firm. We used the results of (1) the SAFE (Survey on the Access to Finance of Enterprises), which asks SMEs and large firms[2] about their funding sources and needs, their access to the various sources, and the factors accounting for the developments reported; (2) the BLS[3] (Bank Lending Survey), which asks the banks about their lending criteria and the demand from firms, and the factors behind any changes; and finally, (3) for Belgium, the Bank's survey of corporate credit conditions. That survey is addressed to firms and inquires about bank lending conditions and the specific criteria accompanying them (interest rates, ancillary costs, volumes, collateral required).

There are thus multiple sources, and that also limits the analysis to some extent. One limitation concerns the definition of an SME, which varies according to the data source used. In the SAFE and in the NBB survey, an SME is defined on the basis of the number of employees: an SME is a firm with fewer than 250 workers. In the BLS, an SME is a firm with an annual turnover of € 50 million or less, whereas in the data from the Central Credit Register and the Central Balance Sheet Office an SME is a company which submits annual accounts in the abbreviated format (small firms) or one which has an annual turnover of € 37.2 million or less (medium-sized firm). If the turnover exceeds that figure for two consecutive financial years, the enterprise is considered large. We had no option but to go along with the criterion adopted for each data source.

1. Funding structure of non-financial corporations in Belgium

In the euro area, and in Belgium in particular, funds provided by the banks are the primary and most appropriate source of finance for businesses. That is clear both from the qualitative surveys of businesses and from the analysis of their annual accounts.

(1) For each recorded loan, the available data include the size of the credit line (authorised credit), the amount used by the firm, the name of the lender bank and any defaults (from April 2012 in the case of this last variable).
(2) However, the results for this category of firms are not published for Belgium.
(3) The BLS and the SAFE are conducted in all euro area Member States.

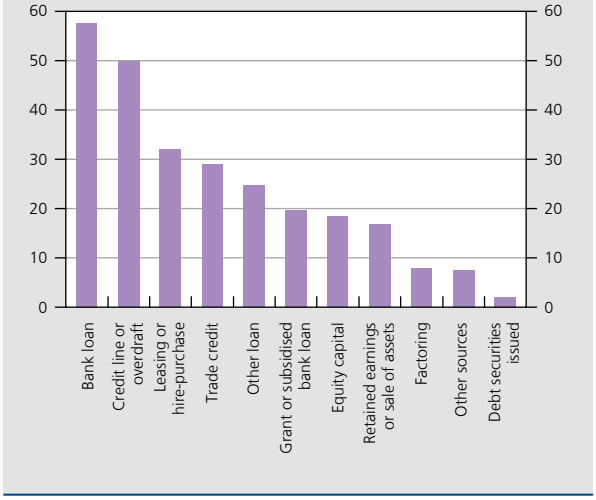
The SAFE survey conducted jointly by the European Central Bank (ECB) and the European Commission (EC) gives information on the financial situation of firms and on their financing needs and conditions. At the level of the euro area, the results obtained can be used to compare SMEs and large firms. The aim is to gain a better understanding of the problems facing non-financial enterprises, be they small, medium-sized or large, in regard to access to finance from banks or other sources.

The data from that survey clearly reveal that bank products are the most appropriate source of finance for euro area enterprises, both for SMEs and for large firms. Many of them (54 % of SMEs and 60 % of large firms, according to the latest wave of the survey at the time of writing this article, namely the one covering the period from October 2014 to March 2015) consider bank credit to be an ideal source of funding for their business. A majority of these firms (55 % of SMEs and 58 % of large firms) also state that they use credit lines or bank overdrafts, or at least intend to do so. In terms of importance, trade credit comes next, being mentioned by 34 % of SMEs and 32 % of large firms. In contrast, market funding sources (factoring, equities and debt securities) are less frequently used or mentioned.

Compared to firms in the euro area as a whole, Belgian SMEs have an even greater preference for bank credit, which is the funding source most often cited and used by these firms (see chart 1): 58 % of them consider it entirely

CHART 1 SOURCES OF FINANCE CONSIDERED APPROPRIATE BY SMEs IN BELGIUM

(in % of the number of respondent firms; data for the second half of 2014)



Source: ECB (SAFE survey).

TABLE 1 STRUCTURE OF THE LIABILITIES OF BELGIAN FIRMS[1]

(in % of the balance sheet total, unless otherwise stated; data for 2013)

Liabilities items	Small firms			Medium-sized firms			Large firms		
	Without financial debts	With financial debts	Total	Without financial debts	With financial debts	Total	Without financial debts	With financial debts	Total
Equity and provisions	**59.6**	**37.9**	**42.7**	**70.8**	**45.3**	**49.7**	**67.7**	**43.6**	**46.3**
Capital, share premiums and revaluation surplus	31.5	24.4	26.0	45.5	31.6	33.9	36.4	23.5	24.9
Reserves and accumulated profits	26.1	11.5	14.7	22.0	11.4	13.3	19.9	14.0	14.7
Other[2]	2.0	2.0	2.0	3.4	2.3	2.5	11.5	6.1	6.7
Debts	**40.4**	**62.1**	**57.3**	**29.2**	**54.7**	**50.3**	**32.3**	**56.4**	**53.7**
Financial debts to credit institutions and leasing[3]	0.0	27.5	21.4	0.0	15.9	13.2	0.0	13.4	11.9
Other financial debts	0.0	6.1	4.8	0.0	17.8	14.8	0.0	24.9	22.1
of which:									
Subordinated loans payable after more than one year[4]	n.	n.	n.	0.0	2.6	2.2	0.0	4.5	4.0
Unsubordinated debentures payable after more than one year[4]	n.	n.	n.	0.0	1.6	1.4	0.0	2.3	2.0
Other debts[5]	40.4	28.5	31.1	29.2	21.0	22.4	32.3	18.1	19.7
Balance sheet total (€ million)	**51.460**	**181.119**	**232.579**	**64.671**	**312.150**	**376.821**	**79.728**	**629.567**	**709.296**
p.m. Debts to affiliated enterprises	*n.*	*n.*	*n.*	*13.1*	*27.3*	*24.9*	*11.6*	*33.4*	*30.9*
Number of firms (units)	*105.499*	*197.302*	*302.801*	*6.195*	*9.929*	*16.124*	*608*	*1.630*	*2.238*
Average balance sheet total (€ thousand)	*488*	*918*	*768*	*10.439*	*31.438*	*23.370*	*131.132*	*386.238*	*316.933*

Source: NBB (Central Balance Sheet Office).

(1) Aggregate data constructed on the basis of the annual accounts filed by Belgian firms with the Central Balance Sheet Office. Firms active in agriculture, forestry, fisheries, mining and quarrying, financial and insurance activities, and in the sectors regarded as non-market (public administration, education, health, social work, etc.) were disregarded. Firms whose annual accounts contain anomalies, i.e. if certain accounting identities are not verified, were also excluded from the sample.

(2) Investment grants, reserves and deferred taxes.

(3) Including amounts payable after more than one year falling due within one year.

(4) This item is not reported in the annual accounts compiled in the abbreviated format.

(5) This item includes trade debts, advances received on contracts in progress, tax, wage and social security debts, deffered charges and accrued income.

appropriate. Credit lines or bank overdrafts are also considered very relevant (50 % of Belgian SMEs had used them in the six months preceding the survey or considered this source of finance to be appropriate). Conversely, they seem to make less use than their euro area counterparts of grants or subsidised loans, or their own resources.

The importance of bank credit for SMEs is reflected in their annual accounts[1] (see table 1). However, it should be noted that just over a third of them do not make use of loans from credit institutions, nor other forms of financial debt. Those firms are generally relatively modest in size, and finance their business mainly with equity. Their reserves, and particularly their accumulated profits, make up a bigger proportion of their balance sheet total. In the case of firms funded partly by means of financial debts, small firms make much more use of loans granted by credit institutions (27.5 % of the balance sheet total, on average) than medium-sized firms (15.9 %) and large firms (13.4 %). The annual accounts reveal in fact that large firms make more use than SMEs of bond loans and subordinated loans. Debts to affiliated enterprises also represent a considerable proportion of their funding sources. Finally, firms – regardless of size – report other types of debts (apart from own funds and financial debts) on the liabilities side of their balance sheets which also constitute a substantial proportion of the liabilities. They include in particular short-term trade debts and tax, wage and social security debts.

2. Bank financing in the context of the crisis

During the recent financial and economic crises, changes were apparent in the funding sources used by or accessible to Belgian firms. This resulted in some modifications in the type of debt taken on by firms – meaning all bank loans and issued bonds. To follow developments in regard to bank credit and debt securities, it is possible to use both the data from the financial accounts (data on outstanding amounts and flows relating to bank credit and debt securities for all firms) and the data from the Central Credit Register, which permit a breakdown of firms by size in the case of bank credit.

The period considered for the analysis was determined according to the availability of the data. It extends from 2000 to 2015. In order to present an overview of the data, several sub-periods were defined on the basis of economic activity. During this 15-year period there were two episodes of recession or weak economic growth (2001-2005 and 2009-2015) and one boom period (2006-2008). The years 2001 to 2005 followed the burst of the dot-com bubble: this was a period when activity gradually picked up following the 2000-2001 "recession". The years 2006 to 2008 are regarded as a period of economic revival: in that period the business survey indicator was almost continuously higher than the average. Finally, the period 2009-2015 suffered the repercussions of the 2008 financial crisis, the sovereign debt crisis and the ensuing downturn.

The developments in terms of bank credit and debt security issuance are summed up by the annual growth rate of these two types of instrument in each of these sub-periods (see table 2). A number of lessons can be drawn. The pro-cyclicality of bank credit is clearly apparent: the annualised growth rate for all firms regardless of size is lower during the two periods of weak economic activity (2001-2005 and 2009-2015) than during the boom (2006-2008). From 2006 to 2008, the annualised growth rate came to 10.3 %, compared to an average of 1.5 % from 2009 to 2015. From 2001 to 2005, it was actually negative (–0.5 %). In the case of debt securities, we find that the growth rate was slightly negative in the years following the outbreak of the burst of the dot-com bubble (–1.1 %), but the issuance of securities surged in the years from 2009 to 2015, and that is reflected in their high growth rate (19.3 %), even exceeding the figure recorded in the boom period (15 %). During the financial crisis, firms therefore continued to make successful calls on the financial markets, and debt instruments constituted an alternative source of funding to bank credit, at least for the largest firms.

Finally, the credit data broken down by size show that, during the boom period, the growth of bank credit was strong for all types of firms. In addition, the larger the firm, the higher the growth. Large firms thus took most advantage of the availability of bank credit during that period. Conversely, during the years of weak activity or crisis, the growth rates collapsed. They became negative for large firms, whereas they remained positive – albeit at a low level – for small and medium-sized firms (at least at the time of the financial crisis and in the ensuing years in the case of medium-sized firms).

The pro-cyclicality of lending is due mainly to fluctuations in demand for credit: firms generally request less (more) funding in periods of weak (strong) economic growth. In periods of weak economic activity, most firms have to downgrade their outlook for growth and profits, so

(1) The accounting data used here cover a period up to the year 2013, as the annual accounts for 2014 were not yet available for all firms when this article was finished. Interested readers will find an account of the financial health of firms in 2014 in the article by D. Vivet published in this Economic Review (pp. 67-81).

TABLE 2 BANK LENDING AND DEBT SECURITY ISSUANCE

(annualised growth rate[1], in %, 2000Q1-2015Q2)

	Average			
	2000-2015	2001-2005	2006-2008	2009-2015
Bank credit used				
Total non-financial corporations	3.0	–0.5	10.3	1.5
By size				
Small firms	5.3	5.2	9.7	2.5
Medium-sized firms	4.0	–2.3	12.4	4.2
Large firms	–0.5	–6.3	14.8	–4.0
Debt securities	11.8	–1.1	15.0	19.3
Total bank credit[2] and debt securities	4.1	–0.4	10.4	4.5

Source: NBB (Central Corporate Credit Register, financial accounts, balance sheets of credit institutions).

(1) The annualised growth rate is determined as follows: an average is calculated from the quarterly growth rates $(Outstanding\ amount_{Q-1}/Outstanding\ amount_{Q-1} - 1)$. That average is then annualised. In the case of bank credit, the quarter featuring a break in the data series from the Central Corporate Credit Register, namely the second quarter of 2012, was disregarded.

(2) According to Scheme A (balance sheet of credit institutions).

that their propensity to invest diminishes and their debt repayment burden increases. In addition, supply factors may also contribute to the pro-cyclical character of lending. The banks are normally more exacting when activity is weak than during expansion phases since, overall, the credit risks are then higher whereas the assets which can be provided as collateral are generally lower in value. However, that is not reflected solely or necessarily in a contraction in the volume of lending, as lenders may also choose to increase their interest margins or demand additional collateral.

The decline in bank credit during the financial crisis and the ensuing years was more marked for large firms than for SMEs. However, as the financial accounts data indicate, some firms were able to tap other sources of funding at relatively favourable cost. At the end of the second quarter of 2015, the outstanding amount of bank credit used by large firms stood at € 25.9 billion, compared to € 33.5 billion in December 2008, whereas the outstanding amount of bonds recorded as firms' liabilities came to € 43.5 billion (for all non-financial corporations[1]) in the first quarter of 2015, compared to € 15.5 billion in December 2008.

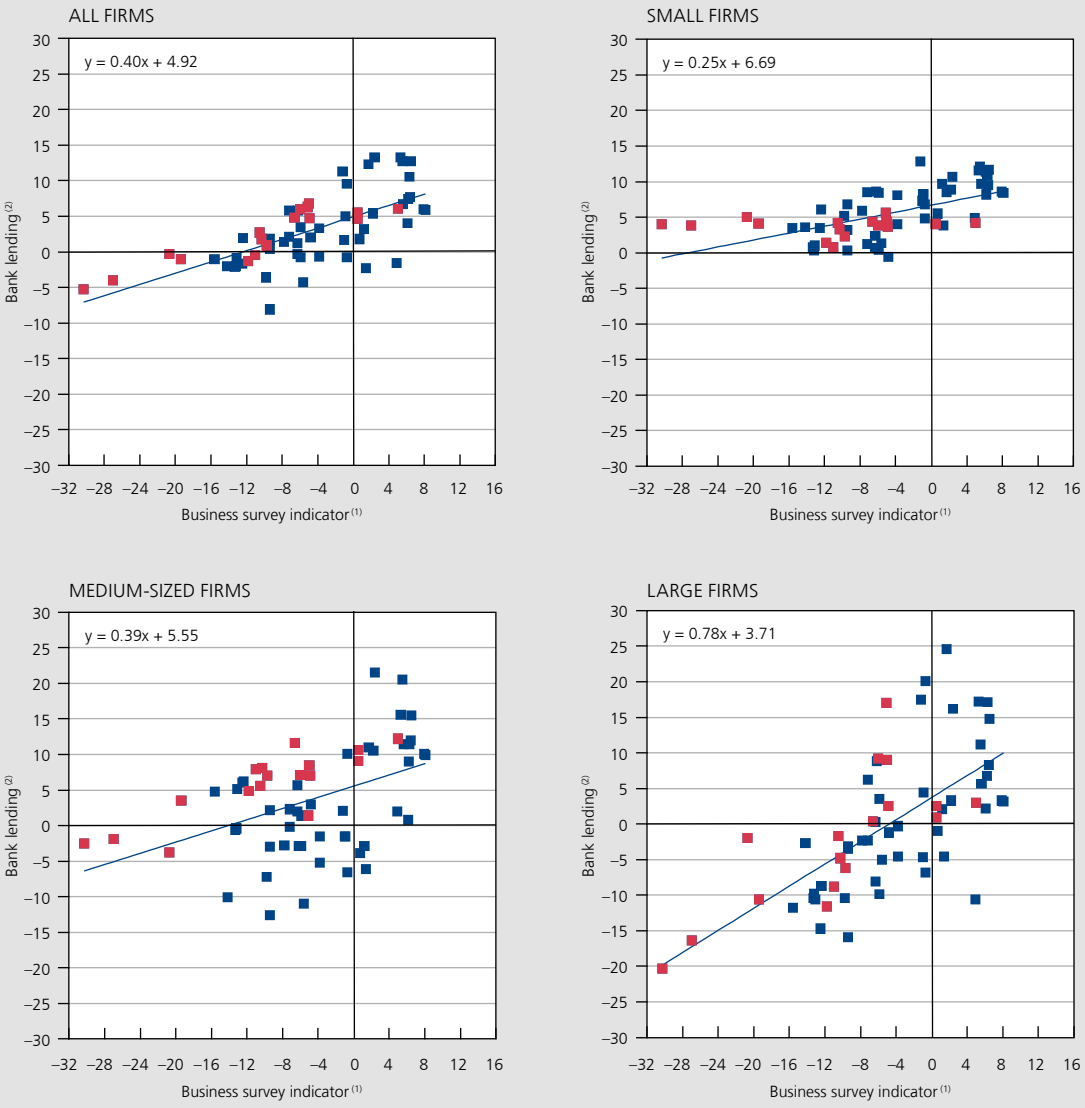
In order to distinguish between the impact of these changes on economic activity and the specific impact of the financial crisis (2008Q3-2009Q2) or the sovereign debt crisis affecting the euro area (2009Q4-2012Q3), we began by comparing the business survey indicator to the credit growth rate between 2000 and 2015 for the various categories of firms. To take account of lending's delayed response to economic developments, we applied a lag of three quarters to the growth of lending compared to the economic growth represented by the business survey indicator. That time lag was chosen because it shows a better correlation between the two variables. The reason for the delayed response of credit growth to cyclical fluctuations is that firms sometimes wait several months for an upturn in activity to be confirmed before they seek new sources of funding, and that the banks need time to process applications for loans. Finally, another reason is that part of the outstanding amount of bank credit has a maturity of several years. This means that the volume of credit can only be adjusted in line with the (deterioration in) economic activity when the loans mature, and that makes the growth of credit more persistent. Next, we looked at the sub-period covering the financial and sovereign debt crises (2008Q3-2012Q3) and tried to determine the degree to which the cyclical sensitivity of bank credit in Belgium was affected by the crises, by estimating a simple regression for the three categories of firms with the aid of a dummy variable equal to 1 over the whole of the period 2008Q3-2012Q3.

The first part of the analysis confirms the overall findings presented above (see chart 2). The cyclical variations account for part of the fluctuations in lending (annualised

(1) In practice, however, most debt securities are issued by large firms which have the necessary size, competence and reputation.

CHART 2 BUSINESS CYCLE AND BANK CREDIT GROWTH

(period 2000Q1-2015Q2)



Source: NBB (Central Corporate Credit Register and business surveys).

(1) Synthetic business survey curve (smoothed curve), average over three months, three months ahead.

(2) Variation in credit used by non-financial corporations (granted by resident banks), calculated as the average of quarterly growth over four quarters which is then annualised (excluding the break in the series in 2012Q2).

Note: The crisis period (2008Q3-2013Q3) is indicated in red.

growth rate) observed for all firms between 2000 and 2015. When the economy is doing better, the credit growth rate is generally higher, indicating the pro-cyclicality of lending (positive regression coefficients). That finding holds for each firm size category. However, the link is stronger the bigger the firm, indicating that sensitivity varies according to the size criterion. These data show that lending to large firms was therefore more sensitive to the business cycle in Belgium than lending to SMEs.

In the second part of the analysis, the regressions confirm that bank lending becomes more sensitive to the business cycle the larger the firm. During the periods 2000Q1-2008Q2 and 2012Q4-2015Q2, a 1 percentage point rise in the business survey indicator was accompanied by credit growth averaging 0.3 percentage point for small firms, 0.6 percentage point for medium-sized firms and 0.9 percentage point for large firms (see table 3). In the period covered by the two crises, namely 2008Q3 to 2012Q3, the discrepancies actually

TABLE 3 IMPACT OF THE GLOBAL FINANCIAL CRISIS AND THE SOVEREIGN DEBT CRISIS IN THE EURO AREA ON THE GROWTH OF BANK LENDING

(regression coefficients; estimation period: 2000Q1-2015Q2)

	Small firms	Medium-sized firms	Large firms
Constant (in %)	6.67 ***	5.51 ***	3.68 ***
$BC_{(-3)}$ [1]	0.35 ***	0.65 ***	0.92 ***
$BC_{(-3)} \times Dummy_{(-3)}$ [1]	–0.18 **	–0.46 ***	–0.26
Combined effect	0.17	0.19	

(1) "*BC*" corresponds to the quarterly average of the synthetic business survey curve (smoothed indicator) and "*Dummy*" is a binary variable for the global financial crisis and the sovereign debt crisis in the euro area, equivalent to 1 during the period 2008Q3-2012Q3. Regarding significance thresholds, "***" (**) indicate that the estimated coefficient differs from zero with a significance of 1 % (5 %) respectively.

increased further. Thus, in the case of lending to small and medium-sized firms, the sensitivity to the business cycle dropped to 0.2, while the decline of 0.3 recorded for large firms is not statistically significant.

Although the annual percentage change in lending to small firms declined sharply during the crisis, the above results suggest that the reduction in credit growth was smaller than might have been expected in view of the economic climate. The reason could be that small firms need a minimum amount of bank credit to be able to pursue their activities (in the absence of alternative funding sources) and that demand for credit therefore becomes less elastic when the economy is exceptionally weak, as was the case during the period 2008Q3-2009Q2.

The smaller contraction in demand for loans on the part of SMEs as opposed to large firms during periods of weak economic activity is likewise reflected in the results of the BLS, in which banks are asked about changes in their credit criteria and changes in the level of demand. In regard to the latter, there are several differences depending on the size of the firms. In the case of large firms, demand for bank credit diminishes sooner and more sharply at times of crisis, whereas demand from SMEs is steady for a time before also weakening, but the decline is generally smaller and more short-lived (see chart 3).

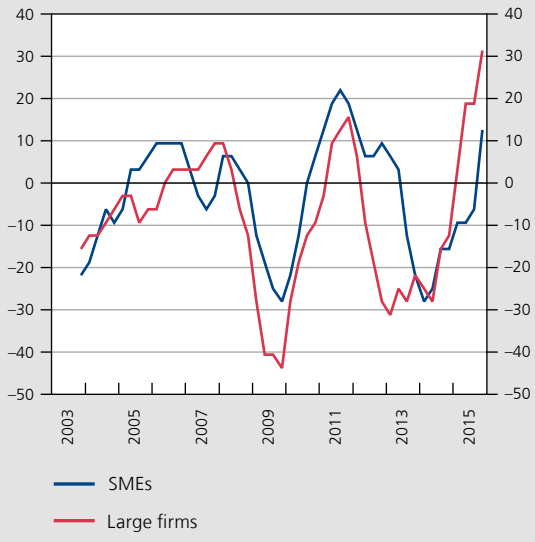
The banks also attribute these downward movements to the option available to firms of using other sources of funding (issuance of shares or bonds). However, that explanation mainly concerns large firms, as SMEs have only limited access to the financial markets. In order to finance their activities, SMEs therefore have no alternative but to maintain their demand for bank credit even if the supply conditions may seem unattractive.

After having considered the determinants of firms' demand for credit, we shall now examine the other aspect of the lender-borrower relationship, namely the conditions associated with the supply of credit. The qualitative surveys reveal both the viewpoint of the firms (the SAFE survey and the NBB survey of credit conditions) and that of the banks (the BLS).

Although it seems that, on average, Belgian SMEs face few constraints in accessing finance [1] (according to the SAFE survey), the supply of credit nevertheless poses problems for some of them. Thus, as regards the terms and conditions associated with bank financing, the first obstacles to credit cited by SMEs are the high level of costs other than the interest rate, and the collateral that credit institutions demand. Firms considered the collateral requirements to be particularly high at the time of the surveys conducted between the second half of 2011 and the first half of 2013 (i.e. taking account of a time lag, during the sovereign debt crisis and the ensuing months). During that period, those perceptions were reflected in practice

CHART 3 DEMAND FOR BANK CREDIT IN BELGIUM

(weighted net percentages [1], averages over four quarters)



Sources: ECB, NBB (Eurosystem Bank Lending Survey).

(1) A positive (negative) percentage corresponds to an increase (reduction) in firms' demand for credit.

(1) According to the SAFE survey, fewer than 10 % of Belgian SMEs overall mention finance as the biggest problem that they face. A larger number report that staff recruitment, labour or production costs, and finding customers are bigger problems.

in an increased percentage of SMEs being refused a bank loan, rejecting a loan on cost grounds, being discouraged from contracting a new loan, or receiving only a small part of the sum requested.

In addition, these findings are borne out by the survey of credit conditions conducted by the Bank, which provides information broken down by firm size (see chart 4). Thus, according to that survey, small firms appear to be more negative than others about all the criteria, monetary or not, associated with borrowing, except for the interest rate: a systematically larger number of them report a deterioration in both other expenses and the volume of the loan and the collateral demanded. In general, they therefore report less favourable credit conditions than large firms. However, it should be noted that the general assessment of those conditions has improved for all firms in the recent period, although there is still a noticeable effect related to firm size.

The information obtained from the surveys of firms is supplemented by that derived from the BLS. Thus, the BLS results show that the banks adjust their supply of credit differently according to the type of firm. To justify changes in their credit conditions, they may invoke three types of explanatory factors: their funding costs and balance sheet constraints, pressure of competition, and risk perception. They also have to state their position on specific determinant(s) associated with the loan (interest rate, other costs, volume or duration of the loan, collateral, special clauses) which may have been modified (see chart 5).

CHART 4 ASSESSMENT OF CREDIT CONDITIONS BY FIRMS IN BELGIUM: BREAKDOWN BY SIZE

(net percentages (1), averages over four quarters (2))

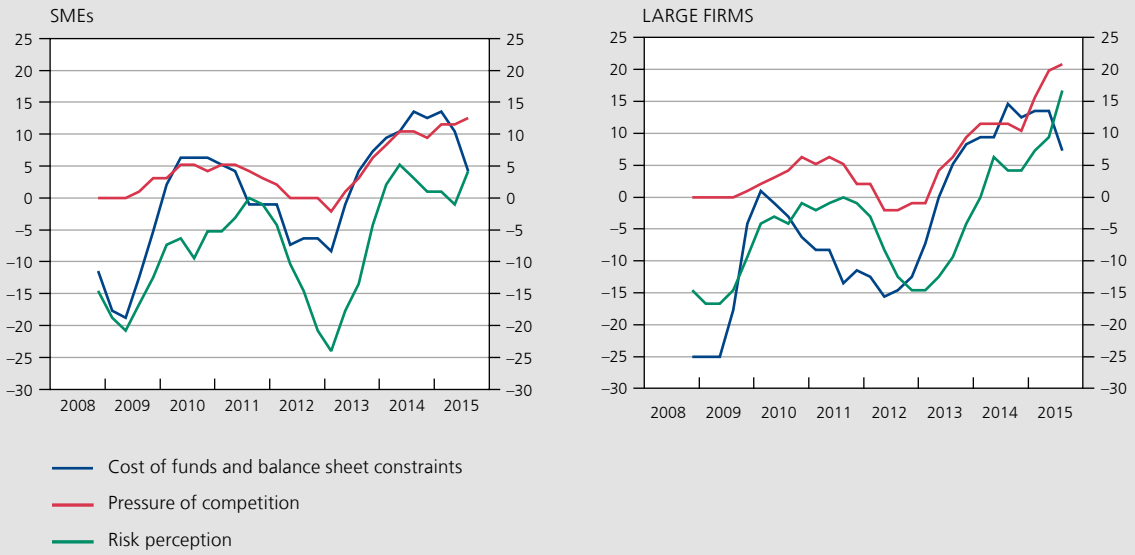
Source: NBB (quarterly survey of business credit conditions).

(1) Net percentages of responses by business managers indicating an improvement (+) or a deterioration (–) compared to the previous quarter. Variation in credit used by non-financial corporations (granted by resident banks), calculated as the average of quarterly growth over four quarters which is then annualised (excluding the break in the series in 2012Q2).

(2) Annual data between 2002 and 2008, quarterly data from the first quarter of 2009.

CHART 5 BANK LENDING CONDITIONS IN BELGIUM: EXPLANATORY FACTORS

(net percentages[1], averages over four quarters)



Sources: ECB, NBB (BLS).

(1) A positive (negative) percentage corresponds to a factor which has contributed to the easing (tightening) of credit standards.

The tightening of the credit supply for SMEs during the crisis was evidently dictated mainly by an increase in the risk perception, giving rise to the application of higher interest margins and demands for additional collateral, rather than a reduction in credit volumes. Conversely, for large firms, the tougher conditions were caused mainly by a rise in funding costs and balance sheet constraints, reflected in higher interest margins and limits on the amount and duration of loans.

At the end of the period (2014-2015), the banks' perception of the risks relating to SMEs improved considerably, although the improvement was less marked than in relation to large firms, and that likewise contributed to a general easing of credit conditions.

3. Impact of the crisis on the financial health of SMEs

One of the key findings of the survey data concerns the Belgian banks' perception of an increased credit risk following the crisis. According to those same data, this problem was more acute for loans to SMEs, suggesting that the crisis had a bigger impact on SMEs' financial health and hence on their solvency.

Indicators based on SMEs' annual accounts permit a more detailed review of the financial health of SMEs and how that has changed since the start of the crisis. One approach involves calculating the probability of failure for each firm, i.e. the likelihood that the firm will go bankrupt in the coming years. An indicator of this type, composed of a wide range of financial variables, was developed by the Bank (Vivet, 2011) and is now used in the company files produced by the Central Balance Sheet Office. The following analysis is based mainly on an indicator calculated from a smaller number of financial ratios, which can thus cover a bigger sample of firms. This is the "Z-score" developed by Altman (1968), a measure of financial health which is internationally recognised and often used in the economic literature. The Z-score is based on a linear combination[1] of four balance sheet indicators[2], namely:

– the working capital, i.e. the difference between the current assets and the debts at up to one year. It can

(1) The coefficients of the linear combination that determines the value of the Z-score for each firm are estimated on the basis of a multiple discriminant analysis. This is a statistical method which can be used to estimate the function of multiple variables allocating the observations as accurately as possible among various pre-identified groups. Here, the sample used to estimate the coefficients is the population of Belgian firms which published their annual accounts in 2009, from which the data needed to calculate the four variables considered were extracted. These firms were divided into two groups: firms going bankrupt before 1 January 2015 and firms still in business after that date. The score thus calculated can therefore be considered representative of the probability of failure in the medium term.

(2) The Z-score as developed by Altman (1968) comprises a fifth indicator, namely the firm's turnover divided by its total assets. Since the turnover figure is not mentioned in the annual accounts compiled in the abbreviated format applicable to small firms, it cannot be included in calculating the Z-scores for most Belgian firms.

also be seen as the part of the assets linked to current activities (inventories, total claims taking all maturities together, and current investment) financed with equity capital and long-term debts. This indicator flags up any problems concerning inadequate reserves of liquidity to repay short-term loans;

- the accumulated profits (or losses), which measure the returns accumulated by the firm during its existence. They are generally more substantial for older firms, which explains why the financial health of the latter is often more robust than that of firms established more recently;
- the operating profit, i.e. the profit made by the firm before taking account of financial or extraordinary income and charges and corporation tax. In a way, this is a measure of the "real" profitability of the means of production;
- the ratio between the equity and the debts, both short and long-term, which constitutes a measure of solvency.

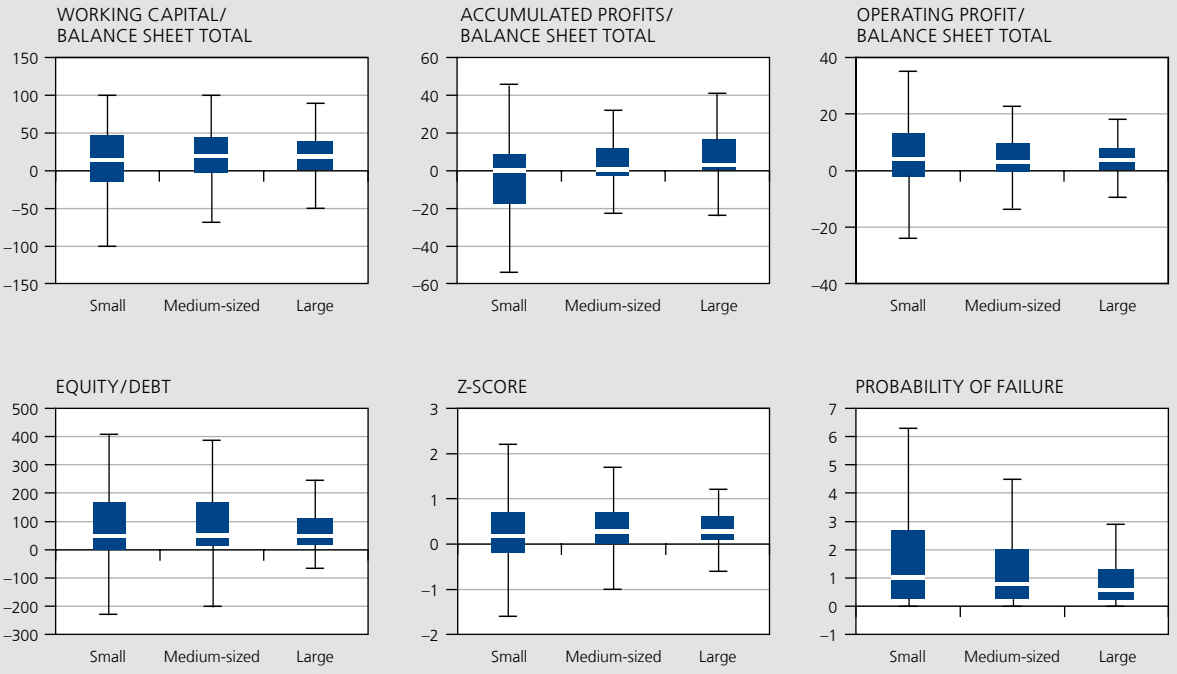
The first three indicators listed above are expressed as a percentage of the total assets. The Z-score is very simple to interpret: the higher a firm's score, the healthier its financial situation.

The distributions of the Z-scores and of their four components, calculated for Belgian firms on the basis of their annual accounts filed in 2013, are shown in chart 6. Generally speaking, the central values of these distributions do not deviate significantly between small, medium-sized and large firms, as the medians for each of those categories are relatively similar. Nonetheless, the accumulated profits are often negative for small firms. The differences between these three groups are much more marked as far as the dispersion for each indicator is concerned, which is systematically greater for small firms and smaller for large firms. This heterogeneity is naturally reflected in the Z-scores, and it is also seen in the indicator of the probability of failure, calculated according to the method developed by Vivet (2011).

The level of financial health therefore appears more disparate for SMEs than for large firms. This means in particular that, even though some SMEs may be in a very sound financial position, the riskiest borrowers from the credit

CHART 6 INDICATORS OF FINANCIAL HEALTH (1)

(in %, data for 2013)



Sources: NBB (Central Balance Sheet Office) and own calculations.

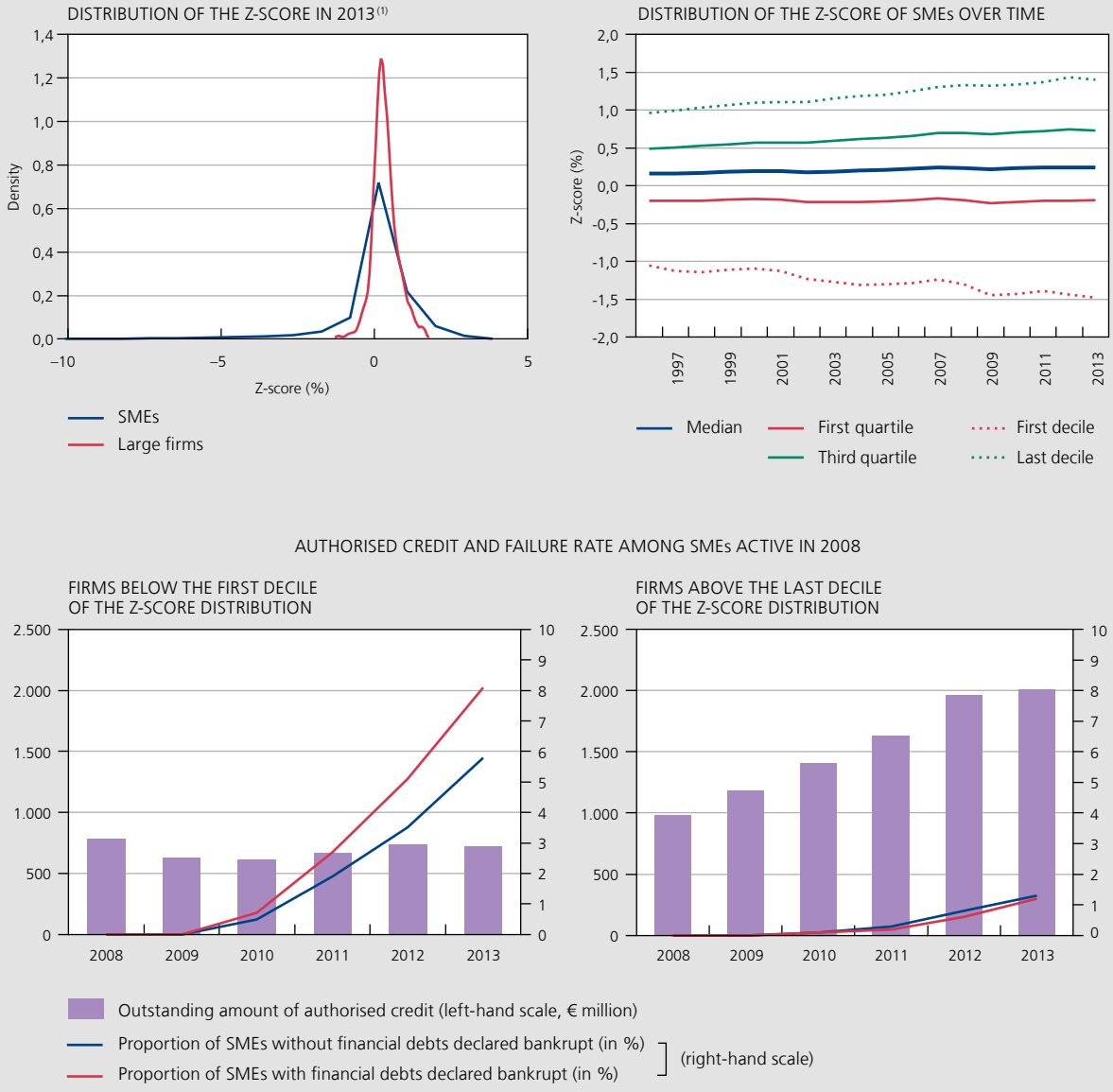
(1) In this chart, the distributions of each indicator for a given category are represented in the form of a box plot. The lower and upper edges of each box correspond respectively to the first and third quartiles of the distribution, while the line inside the box shows the median. The extreme ends of the lines, whose length is determined on the basis of the interquartile range, correspond to the "adjacent values", i.e. the minimum and maximum values observed once the extreme values have been eliminated from the distribution.

institutions' point of view, i.e. the ones most likely to default at a given moment, are found among this category of firms[1]. A more detailed examination of the firms with a Z-score below the first decile of the distribution, which can be considered the most fragile firms, shows that they are generally smaller in terms of both their balance sheet total and their number of employees than firms above the last decile, i.e. the healthiest firms. However, these size differences are relatively small. By way of illustration, on the basis of that definition, the most precarious firms employed on average 6.1 workers in 2013, while the most robust had 7.7 employees. The divergences are much more marked in the case of productivity levels as measured on the basis of the value added per employee: the average came to around € 13 000 for the most fragile firms, compared to € 133 000 for the healthiest firms.

Taking account of this apparent link between firms' productivity (and more generally, their economic performance)

(1) That is also borne out by an above-average proportion of non-performing loans for SMEs (see De Backer *et al.*, 2015).

CHART 7 FINANCIAL HEALTH OF SMEs AND AUTHORISED CREDIT



Sources: FPS Economy (Central Enterprise Data Bank), NBB (Central Balance Sheet Office and Central Corporate Credit Register) and own calculations.
(1) Observations below the first centile and above the last centile of the distributions are not shown in this chart.

and their financial health, the crisis probably had a detrimental effect on the financial health of some of them. The changing distribution of SMEs' Z-scores over time, shown in chart 7, suggests that it was mainly the firms in the most precarious situation according to their Z-score in 2008 that experienced deteriorating health after that year, while the position of the strongest firms remained generally stable, and actually improved in some cases. In reality, as indicated by the change in the first decile of the distribution of the Z-score, the most fragile firms tend to become more fragile over the years, and the crisis seems to have somewhat accelerated that tendency in 2009.

Moreover, this was the group with the highest failure rate in the years following the start of the crisis, particularly among those with financial debts, which illustrates the riskiness of the loans granted to them. In fact, 8.1 % of SMEs which could be considered the weakest in 2008 and which had financial debts on the liabilities side of their balance sheets were declared bankrupt in the ensuing five years. For those without any borrowings, the bankruptcy rate was lower (5.8 %), suggesting that lending to the most fragile firms increases their risk of failure. Such a link between debts and failure rates is not seen among the soundest SMEs.

Belgian banks seem to take account of these differences in financial health, and hence also in the level of the credit risk, in their lending policy. In fact, the soundest firms benefited from the growth in authorised credit after the onset of the crisis, while the outstanding amount of lending to the most fragile firms was down slightly in 2009 and 2010.

4. Microeconomic determinants of lending to SMEs

The data described in the previous section clearly reveal that there is a link between firms' financial health – and hence their risk profile – and the credit that they are granted. The deteriorating financial situation of some firms during the crisis period is therefore very likely to have influenced the movement in the outstanding amount of lending by banks to SMEs. However, an econometric analysis is needed in order to assess the degree to which banks may have adjusted their credit risk policy after the crisis erupted. The analysis conducted for this article is in two parts:

- the first part concerns the determinants of the year-on-year change in the credit granted to each SME which already had a credit line or loan with at least one bank in the previous year. For this purpose, we use a simple linear model estimated by the ordinary least squares method, with the growth rate of the amount of authorised credit as the dependent variable.
- the second part concerns the conclusion of new contracts between SMEs and banks. The dependent variable of the ("logit" type) model used for that purpose is the probability that, in a given year, an SME obtains a loan from a bank with which it did not previously have any credit relationship.

The two models comprise the same explanatory variables. The one of primary interest is the financial health, still viewed in terms of the Z-score. A slope dummy variable, i.e. the product of the Z-score and a binary variable with a value of 0 until 2008 and 1 from 2009, was also included in each model. That interaction variable can be used to determine whether there has been a change in the relationship between the financial health of firms and the credit extended to them. Other variables which may influence the loans that a credit institution grants to an SME were also taken into account in specifying the two econometric models, namely:

- the number of employees, to take account of any size-related effects;
- labour productivity, to measure economic performance;
- age, i.e. the number of years of activity. This variable is used in the specification in order to take account of the fact that demand for loans could be stronger among the newest firms, i.e. those which are most likely to develop new activities and will therefore more often need new funds to finance investment;
- a dummy variable specific to each year, to capture the change in the macroeconomic and macrofinancial situation;
- a dummy variable specific to each industry (at the 2-digit NACE level) to isolate any sectoral effects.

The two models were estimated for the period from 1999 to 2011. The data for subsequent years could not be used owing to methodological changes in 2012 to the collection of data by the Central Credit Register[1]. In the equations, the number of employees and labour productivity are expressed in logarithmic form.

The results of the estimations for the two models are presented in table 4. In general, the elasticities estimated for the Z-score confirm the importance of a firm's financial health for the total credit granted to the firm by the banks. Thus, all other things being equal, a 1 percentage point rise in the Z-score of a given firm was reflected – on

(1) That change concerned in particular the inclusion of all lending to non-financial corporations, whereas previously only loans of € 25 000 or more had to be entered in the database.

average up to 2008 – in a 3.6 percentage point increase in the annual growth of the total amount of credit granted to the firm. Contrary to what might be assumed, that elasticity edged downwards from 2009, dropping to 3.3. That result could be due to a slightly less restrictive policy on credit risk on the part of banks towards their existing SME customers. Since the model cannot separate the supply and demand effects, this lower coefficient could also reflect a slightly stronger demand for credit than before the crisis. In any case, the decline in this elasticity is small, emphasising the fact that the risk profile of SMEs is still a major determinant of the amounts made available to them by credit institutions. The deterioration in the financial health of a relatively small group of firms (see above) therefore probably exerted a negative effect on the movement in total credit.

The estimations concerning the establishment of new credit relationships present a very different picture. While banks' lending to new customers is likewise greatly influenced by the level of risk associated with those customers, this aspect became more important after the onset of the crisis. According to the model, this was reflected in the fact that credit institutions tended increasingly to favour financially sound firms in granting new loans, to the detriment of more fragile firms. Nevertheless, this effect – the estimation of which is illustrated in chart 8 – was relatively moderate, and the negative impact on the creation of new credit relationships essentially concerned SMEs in an extremely weak financial position, namely those with a very negative Z-score.

TABLE 4 ESTIMATED PARAMETERS FOR THE ECONOMETRIC MODELS[1]

(estimations by ordinary least squares for credit growth and by maximum likelihood for the probability of a new loan)

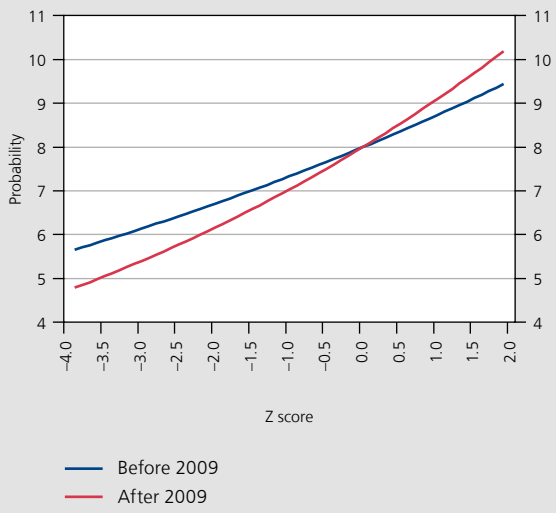
Explanatory variables	Dependent variable	
	Year-on-year growth of a firm's authorised credit	Probability that a firm receives a new loan[2]
Z-score before 2009	3.615	0.713
Z-score after 2009	3.292	1.063
Number of employees ...	0.003	0.011
Value added per employee	–0.013	0.005
Age of the firm	–0.115	–0.129
Number of observations	**686 491**	**1 146 692**

(1) The parameters relating to the Z-score, the number of employees and the value added per employee are interpreted as the average impact of a one percentage point increase in each of these explanatory variables on the dependent variable. The parameters relating to the firm's age are interpreted as the effect of one additional year of activity on the dependent variable. The Z-score, the number of employees and the value added per employee are incorporated with one lag in the specification in order to prevent any endogeneity problems. The specification of each equation also comprises dummy variables to capture the effects specific to each year and to each industry; their estimated coefficients are not included here. All the parameters mentioned in this table are significant at the 1 % level.

(2) Marginal effects calculated on the basis of the average values for the whole sample.

CHART 8 PROBABILITY OF THE GRANT OF A NEW LOAN DEPENDING ON THE Z-SCORE[1]

(in %)



(1) The probabilities are estimated on the basis of the model described in the second column of table 4, fixing the value of the other variables at their averages observed for the whole sample.

Although statistically significant, the estimated elasticities for the other variables in the two models are fairly low. The estimated link between credit growth and firms' productivity is negative in the first equation, suggesting that economic performance exerts hardly an influence – at least not directly – on the banks' lending decisions, and that the banks are indeed influenced primarily by the borrower's risk profile. Moreover, as expected, lending to SMEs shows a negative correlation with the firm's age.

Finally, most of the estimated parameters for the annual dummy variables (not mentioned in table 4) proved to be significant. This confirms that the economic climate has a significant impact on lending to businesses, and probably also confirms the importance of factors specific to the banking sector, such as those concerning balance sheet constraints, alongside considerations relating to the credit risk specific to each firm.

Conclusion

Most SMEs depend on bank credit to fund their activities and are more likely to need this source of finance than

larger firms which can resort to other instruments by accessing the capital markets. This lack of alternatives is one reason why, in the context of the financial crisis that erupted in 2008 with the collapse of Lehman Brothers, demand for bank credit from SMEs did not diminish as sharply as demand from large firms, even though credit conditions had been tightened. Indeed, Belgian banks, having perceived an increase in the risks associated with lending to SMEs, reduced their supply, in particular by adjusting the required collateral.

Various points made in this study indicate that the risk factor did indeed play a major role in the lending policies of Belgian banks, and the deterioration in the financial situation of a relatively small number of SMEs is therefore likely to have exerted some downward pressure on the granting of bank loans in recent years. Nonetheless, it seems that firms in better financial health saw an increase in the amount of their authorised credit.

Overall, however, given the same level of risk, the Belgian banks do not seem to have imposed tougher restrictions on their existing customers after the outbreak of the crisis, which suggests that they preferred to maintain long-term relationships with those customers. Conversely, the findings presented in this article reveal that the banks also became a little less inclined to take risks in lending to SMEs with which they had no previous business relationship, by tending to favour those with a better risk profile.

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