5.1. How important is access to finance for firms' performance in a crisis?

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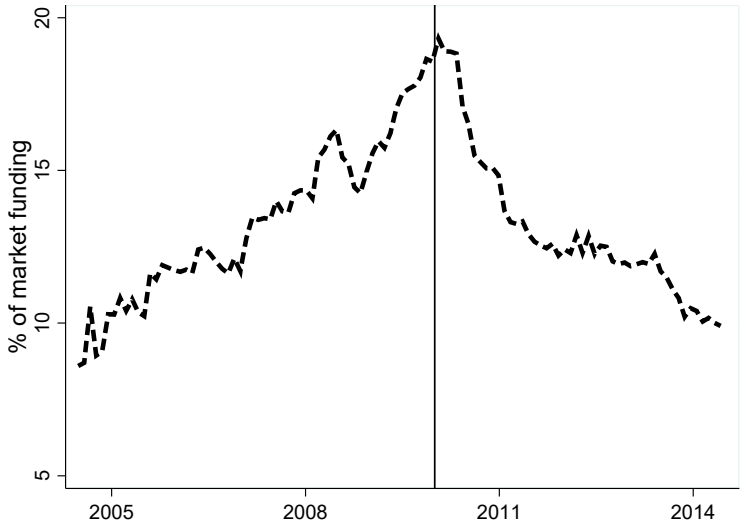
1. Motivation

How important is access to finance for Portuguese firms' performance? What determines bank's credit supply? Are all firms affected in an uniform way or are there important heterogeneities in the data? Such questions are of paramount importance for policymakers. They become even more relevant during crisis scenarios when credit availability is scarce and aggregate demand is low. Ideally, we would want the most productive firms to continue to have access to credit as these "good" firms are the engines of growth. In this Section, we address some of these issues by focussing on a specific crisis episode and try to derive some lessons from it. In particular, we will concentrate on the sovereign debt crisis that began in the spring of 2010.

Until early 2010 the sustainability of sovereign debt was not a concern for the markets. However, in the spring of 2010, when the Greek government requested an EU/IMF bailout package to cover its financial needs, markets started to doubt the sustainability of sovereign debt issued by other peripheral Eurozone countries like Italy, Portugal, and Ireland (Bottero *et al.*, 2015). The credit default swap spreads on Portuguese sovereign bonds increased dramatically and the Portuguese banks lost access to international debt markets which had been an important source of their funding. This sudden stop is attributed mainly to investor's concerns about contagion from the crisis in Greece. The sudden rise in Portuguese CDS spreads meant that the banks that were more exposed to the public sector saw the risk in their balance sheets going up and this relates to the much talked about sovereign-bank nexus (Brunnermeier *et al.* (2011)).[25]

The sudden rise in the riskiness of the asset portfolio might affect the credit activities of the banks via two channels: the equity channel and the funding channel. In the case of Portugal, the funding channel seems to be predominant. It operates purely on the liabilities side

25 For more details, refer to Reis (2013).



(a) Bank funding

(b) Credit spreads

Figure 37: Bank funding and credit spreads

Note: IIS in the bottom panel signifies Ireland, Italy and Spain.

where risky banks find it difficult to rollover their debt in capital markets. This increased funding costs of the banks are then passed onto borrowers, as is observed in Figure 37.[26]

Figure 37a plots the market funding of Portuguese banks as a fraction of their liabilities while Figure 37b plots the interest rates charged on short-term loans (besides Portugal, we also plot some other euro area countries for the sake of comparison). In the rest of the Section we will explore how the banks that were differentially

26 The equity channel is active if the assets are marked-to-market. A sudden rise in riskiness would lead to a depletion of bank equity (liabilities roughly remaining constant) and this would have an adverse impact on credit extension.

exposed to the capital markets behaved differently, in terms of credit extension. We will also document the real effects for the Portuguese firms who experienced a decline in credit, during the same period.

There is an emerging strand of literature that tries to study the real effects of financial shocks (Chodorow-Reich, 2014, Bofondi *et al.*, 2018, Bentolila *et al.*, 2018, Acharya *et al.*, 2014, and so on). In the context of Portugal, Buera and Karmakar (2018) analyze the credit supply and real effects in the immediate aftermath of the sovereign debt crisis. They are able to identify important dimensions of firm heterogeneity that determine their performance during a crisis episode. More precisely, they find that highly leveraged firms and firms that had a substantial amount of short-term debt on their balance sheets contracted significantly more during the crisis. These firms experienced a reduction in credit and were unable to tap into alternative sources of funding. Similar ideas are contained in some other recent papers (Giroud and Mueller, 2017 and Benmelech *et al.*, 2018).

2. Data and results

The main dataset used for this analysis is the Central Credit Register, maintained by Banco de Portugal. It contains very detailed information, at the loan level, on all commercial and industrial loans granted to non-financial corporations by all banks operating in Portugal. The dataset is comprehensive, as the reporting threshold for a loan is only 50 euros. We also use detailed, monthly, information on the bank's balance sheets. We will now proceed in two steps: first we look at the bank credit supply effects and next we turn to the firm side and discuss how certain groups of firms found it difficult to roll over their debt, thereby affecting their performance significantly. The discussion of the second part is purely based on the analysis conducted in Buera and Karmakar (2018).

2.1. *Credit supply*

The regression equation we estimate is given by:

$$\begin{aligned} \%\Delta L_{i,j,09:Q4-10:Q4} = & Security\_ratio_{j,09:Q4} + \\ & + B_{j,09:Q4} + \alpha_i + \epsilon_{i,j} \end{aligned} \tag{12}$$

The dependent variable, $\%\Delta L_{i,j,09:Q4-10:Q4}$, is the growth rate of total committed credit for each firm-bank (i-j) pair. The main explanatory variable is $Security\_ratio_{j,09:Q4}$ and it represents the ratio of market funding to total assets of bank 'j' prior to the crisis. $B_{j,09:Q4}$ is

a vector of additional bank level controls while α_i is a vector of firm fixed effects to control for the demand side. The results are presented in Table 7. In column 1, we examine whether banks with a higher fraction of security funding cut back more on credit to firms between 2009:Q4 and 2010:Q4. As results in column 1 show, using the entire lending to firms, there is a significant drop in the growth rate of credit if the lending bank had a higher exposure to international capital markets. In column 2, we add an array of bank level controls. In columns 3 and 4, we restrict the sample to firms that were borrowing at least from two different banks as of December 2009. The coefficient on security funding ratio drops but still remains significant at the 1% level conveying the idea that the effect is much stronger if we include firms with single banking relationships.

One could be concerned that the results could be driven by some demand side conditions rather than supply side factors. Perhaps weaker firms with a lesser credit demand were borrowing more from banks with higher level of security funding. To address this concern, we include firm fixed effects, in columns 3 and 4, to control for heterogeneity both in observable and unobservable characteristics. The intuition is that we keep the firm constant and ask whether for two banks lending to the same firm in 2009:Q4, there is a higher reduction in credit from the banks with a greater security funding ratio. Hence, we are able to hold the observed and unobserved loan demand constant and isolate the loan supply effect. In terms of economic magnitudes, a one standard deviation increase in security funding ratio leads to a decline in credit growth by about 4%.

In columns 3 and 4, we also note that well capitalized banks and banks with higher liquidity ratios cut back lending by less and they were better able to absorb shocks. We also see that the effects were weaker for bigger banks hinting to the fact that they may have alternative sources of funding due to which their credit supply was less affected. Finally, in column 4, we control for the credit between the firm and the bank in 2009:Q4 and find similar results. The results point to the volatile nature of market funding and the consequent effect on borrowers. Banks with relatively higher exposures to the capital markets found it difficult to obtain financing and thereby had to cut back more on their operations. However, what is important to note, is that this was not a general phenomenon. The results are much weaker for bigger banks with alternative sources of funding and banks with stronger capital and liquidity ratios. We cluster standard errors at the bank level but the results are robust to their exclusion as well.

	Growth rate of credit (%ΔL)			
Variables	(1)	(2)	(3)	(4)
Security ratio	-0.648***	-0.349**	-0.277**	-0.303**
	(0.111)	(0.142)	(0.124)	(0.138)
Liquidity ratio		-0.991	0.068***	0.077***
		(1.942)	(0.020)	(0.0246)
Capital ratio		-0.282	0.394***	0.453***
		(0.174)	(0.131)	(0.133)
Return on assets		1.027	1.056	0.914
		(2.284)	(1.203)	(1.208)
Central bank ratio		-1.599**	-0.215	-0.341
		(0.760)	(0.752)	(0.812)
Size			0.049***	0.060***
			(0.010)	(0.011)
Loan amount 09:Q4				-0.061***
				(0.014)
Observations	422,523	422,523	305,190	305,190
R-squared	0.020	0.029	0.373	0.380
Banking relationships >1	No	No	Yes	Yes
Firm Fixed Effects	No	No	Yes	Yes

Table 7: Banks' security funding and credit supply

Notes: The dependent variable is the growth rate of loans between firm ´i´ and bank ´j´ between 2009:Q4 and 2010:Q4. Security ratio is the ratio of market funding to total assets. Liquidity ratio is the ratio of cash, reserves and liquid assets as a fraction of total assets. Return on assets and Capital ratio are the profits before tax and core capital normalized by total assets, respectively. Central bank ratio is the fraction of liabilities financed by central bank funding. Size is the log of bank assets. Loan amount 09:Q4 measures the strength of the bank-firm relationship prior to the incidence of the shock. Columns 1 and 2 consider all firms while columns 3-4 consider only those firms that have at least two banking relationships. Standard errors, reported in parentheses and are clustered at the bank level. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively.

2.2. *Real effects*

The credit market developments are important to the extent that they have real effects. If firms are easily able to substitute the loss in bank financing elsewhere, there will be no real decline in economic activity. Now that we have documented the credit supply effects, let us focus on the real side. The discussion in this section is based on Buera and Karmakar (2018) and the reader is advised to refer to the paper

for extensive details. Here we will only discuss the main results and conclusions.

The effects of the sovereign debt crisis on firms were not uniform. The firms that were significantly higher leveraged and those that had been holding a significant amount of short-term debt on their balance sheets found it difficult to obtain fresh credit from banks, in the aftermath of the outbreak of the crisis.[27] On the other hand, there was no significant credit reduction to firms in the lower quartiles of leverage and maturity structure of debt, which definitely appears to be a positive development in the credit markets. To get a sense of the magnitudes, let us consider a highly leveraged firm that was simultaneously borrowing from two banks: one of which had a sovereign exposure in the top decile (highly exposed) while the other had a sovereign exposure in the bottom decile (less exposed). The highly exposed bank cut lending to the highly leveraged firm by 3.5 percentage points more than the less exposed bank. The number would stand at 4.7 percentage points for high short-term debt firms. The authors also document that these firms were not able to, instantaneously, seek funding elsewhere, e.g. trade credit. Should that have been the case, one would not find any effect on firms performance because they could continue with their operations unperturbed.

This was indeed not the case. The "fragile" firms were unable to obtain funding through other banks or other firms. As a result, they had to scale down the size of their operations and, therefore, report lower growth rates in terms of employment, fixed assets, and intermediate commodities. In order to have a sense of magnitudes, a highly leveraged firm contracted 1.7 percentage points more, in terms of employment, than its lower leveraged counterpart. The figure was 7.2 percentage points in case of assets and 3.9 percentage points in terms of intermediate commodities. These numbers are non-negligible and provide a sense of how financial shocks manifest themselves by interacting with firm characteristics. The effects are qualitatively similar for firms with a high degree of short-term debt on their balance sheets, albeit smaller quantitatively.

The above results point out to the fact that leverage and shorter maturity of debt seem to be two important dimensions of firm heterogeneity that influence their growth and performance. After documenting these results, the authors take a step back and ask the question: What drives the distribution of these variables? It is imperative

27 Leverage was defined as the sum of all interest bearing liabilities divided by total assets while short-term debt consisted of the debt that was due to mature in the next one year. A highly leveraged firm was defined to be one that had a leverage ratio greater than 47% in 2009:Q4. A high short-term debt firm was defined to be as one that had more than 53% of the total debt maturing in a one year horizon.

to answer this question in order to be able to make sound policy recommendations.

The authors analyze this question theoretically by means of a simple model of firms' decision making. In the model, firms need to issue debt in order to finance an investment opportunity. They can choose an optimal mix of short-term and long-term debt. If the firm issues the optimal amount of long-term debt, then it is hedged against interest rate fluctuations in the interim periods (financial shock).[28] In that sense, long-term debt acts as an insurance tool to hedge against shocks. On the other hand, owing to a positive term premium, long-term debt is costly. This trade-off generates an interior solution for the amount of long-term debt issued. The authors document that the firms might be issuing more than the optimal amount of short-term debt owing to two reasons: they might be expecting higher cash flows in the future or the interest rate on long-term debt is too expensive for them. The implications of the two cases are extremely different. In the first case, the sub-optimal amount of long-term debt is exactly offset by the cash flows and in that case there are no real effects even if the adverse shock materializes. In the second scenario, this is not the case and should the adverse shock occur, the firm would have to refinance in the peak of the downturn (no cash flows and not sufficient long-term debt) and that would lead to severe real effects. Lastly, the authors revert back to the data and document that the Portuguese firms debt maturity structure is much more sensitive to firm specific interest rates than cash flows. This last exercise lends further support to the results obtained earlier, in the empirical exercise.

3. Concluding remarks

Access to finance is a key determinant of firms' performance and growth, even more so in crisis times when bank and alternative sources of funding are relatively scarce. We have just studied the veracity of this statement using the recent sovereign debt crisis as an example. We have observed that banks that saw the risk in their balance sheets rise by more, cut back lending more but this effect was muted for banks with sound capital and liquidity ratios. On the real side, the firms with significantly higher amounts of leverage and short-term debt were the ones that found it difficult to refinance in the peak of the crisis and hence reported poor growth performance. Therefore, the overall amount of debt (leverage) and

28 If the status quo is maintained, it is the good state while if the interest rates turn out to be higher, it is equivalent to the bad state materializing.

the maturity structure turn out to be important dimensions of firm heterogeneity, in the data. In recent discussions within the Eurosystem, there has been a lot of attention dedicated to corporate leverage but the portfolio mix of short vs. long-term debt is an equally important indicator of firms' performance that should be monitored and discussed in greater detail.

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