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## 5.2. How important are borrowing constraints for Portuguese SMEs' exit and investment decisions?

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### 1. Motivation

*[...] credit conditions remain very heterogeneous across countries and sectors. According to the latest ECB survey on credit access by small- and medium-sized enterprises (SMEs), supply constraints remain especially strong for SMEs in stressed countries. The percentage of financially constrained but viable SMEs – i.e. those with positive turnover in the last six months seeking a bank loan – varies from a minimum of 1% in Germany and Austria to a quarter of the total population in Spain and as much as a third in Portugal.*

2014, by Mario Draghi, ECB Forum on Central Banking

The global financial crisis and the subsequent Portuguese sovereign debt crisis led to an economic adjustment process characterized by a substantial contraction of the economic activity and worse future prospects for economic agents. This economic adjustment comprised a bank lending channel with Portuguese banks being severely affected by international financing restrictions and stronger capital requirements. According to the Bank Lending Survey (BLS), the observed credit contraction during the economic and financial crisis was a result of increased restrictiveness in credit standards and conditions applied on loans as well as of decreased loan demand by firms.

Borrowing constraints have important implications for firm dynamics. Firms may be forced to operate at a smaller scale than desired, may forego investment opportunities, and may not be able to overcome temporary liquidity needs in the presence of negative shocks. While the heterogeneity underlying firm dynamics is not yet fully understood, it is well established that firm dynamics are an important determinant of aggregate outcomes (Hopenhayn and Rogerson, 1993; Melitz, 2003; Klette and Kortum, 2004).

The theoretical literature has emphasized the role of financing constraints in explaining firm dynamics, namely the firm's investment

and exit decisions. Fazzari *et al.* (1988) explain the behaviour of aggregate investment based on financial constraints. Albuquerque and Hopenhayn (2004) develop a theory of endogenous borrowing constraints and find that these are an important determinant of firm growth and survival. Cabral and Mata (2003) find that the firm size distribution of Portuguese manufacturing firms is quite skewed to the right but evolving over time towards a more symmetric one. The explanation relies on the presence of financing constraints for young and smaller firms. Cooley and Quadrini (2001) introduce financial-market frictions in a model of industry dynamics with persistent shocks and show that the combination of these can explain the dependence of firm dynamics on size and age. Furthermore, the models of firm dynamics document that smaller firms may be more sensitive to the worsening of credit market conditions during recessions (Perez-Quiros and Timmermann, 2000) and a tightening of monetary policy (Gertler and Gilchrist, 1994).

Little empirical evidence can be found on the importance of the firm's capital structure for firm dynamics. Mata *et al.* (2010) document that firms with a higher share of long-term debt survive more. Farinha *et al.* (2018) establish this argument with respect to new firms. Farinha and Prego (2013) show that the firms' investment decisions are correlated with the firms' financial standing. Recently, Carreira and Teixeira (2016) use firm-level data for Portugal and show that credit market conditions in the period between 2004 and 2012 explain firm exit, especially in the case of large firms, and employment change.

Farinha and Félix (2015) consider a disequilibrium model to compute the probability of credit rationing and estimate that 15% of Portuguese small and medium-sized enterprises (SMEs) were partially credit rationed in the period between 2010 and 2012, i.e. were granted a loan but in a lower amount than they had applied for. The authors also estimate that in this period 32% of SMEs did not get a loan even though their latent credit demand was positive. Moreover, the authors estimate that the Portuguese SMEs searched for bank loans mainly to finance their operational activity and not for investment. The smaller firms and those with smaller amounts of internal resources are estimated to have higher demand for bank loans. In turn, firms with a higher capacity to generate cash-flows and pay their debt and with more assets to pledge as collateral are estimated to borrow more from banks. These results can have important implications on firm and market dynamics due to the relevance of bank loans as a source of financing for Portuguese SMEs.

This Section is presented in two parts. The first part of the analysis is based on Farinha and Félix (2015) and briefly describes the

credit disequilibrium model estimated by the authors for the period between 2010 and 2012. The estimation of the credit disequilibrium model is restricted to SMEs because these are expected to rely more on bank loans and to have a limited access to other external sources of financing. Then, in the second part of the analysis, we assess the importance of credit constraints in explaining the firm's investment and exit decisions. This second part closely follows the work conducted in Félix (2018).

## 2. The demand and supply of credit

### 2.1. *The disequilibrium model*

The first part of the analysis relies on the estimation of a credit disequilibrium model, which assumes that the observed rate of interest does not ensure that credit demand equals credit supply. The disequilibrium model is comprised of three equations:

- An equation for the demand of new loans:  
 $NL_d^* = f_d(X_d b_d; u_d)$ ;
- An equation for the supply of new loans:  $NL_s^* = f_s(X_s b_s; u_s)$ ;
- And an equation that links the observed quantity of credit with the unobservable credit demand and supply:  
 $NL = \min(NL_d^*; NL_s^*)$ .

Loan demand is assumed to depend on a set of variables  $X_d$  that measure the firm's economic activity, availability of substitute (internal and external) funds, and the cost of bank credit. Loan supply is assumed to be determined by a set of variables  $X_s$  that measure the firm-specific credit risk and the firm collateral. The terms  $u_d$  and  $u_s$  with zero mean and variance  $\sigma_d^2$  and  $\sigma_s^2$ , respectively, represent the unobservable factors that affect credit demand and credit supply, respectively, and it is assumed that they may be correlated with each other. This system of equations is estimated using the maximum likelihood estimator.

The variables included in the analysis were computed using the Portuguese database Simplified Corporate Information - IES - which consists of detailed balance sheet data and covers the population of virtually all Portuguese nonfinancial corporations. The formal details of the model and a description of the determinants of the demand and supply of new loans are presented in Farinha and Félix (2015).

Partial rationing (in % of firms with loans)	
SMEs	15
Very small firms	19
Small firms	13
Medium firms	9
Young SMEs	26
Manufacturing	12
Construction	21
Trade	16
Hotel and restaurant	9
Information and communication	11
Other services	14

Table 8: Credit rationing for Portuguese SMEs.

Notes: Partial rationing in percentage of firms with bank loans. The model was estimated for the period between 2010 and 2012.

We assume that a firm is affected by borrowing constraints, i.e. is partially credit rationed, whenever the probability that the latent credit demand is higher than the supply of credit exceeds 0.5. The model was estimated for SMEs in the period between 2010 and 2012.<sup>29</sup>

## 2.2. *Borrowing constraints*

The estimates of the partial credit rationing model for Portuguese SMEs are presented in Table 8. According to the results, approximately 15% of SMEs with a bank loan were partially credit rationed. The most affected firms are the younger and the smaller, and the most affected sectors of economic activity are construction and trade.

<sup>29</sup> We consider a sample of Portuguese SMEs in the period between 2005 to 2012. The relevant period for the estimation starts in 2010 because we impose in the estimation of the disequilibrium model that firms stay at least for four consecutive years in the sample. Furthermore, we consider the Rivers and Vuong (1988) estimation strategy to deal with the endogeneity problems raised by some variables and consider the first differences of the explanatory variables lagged one and two periods as instruments of the endogenous variables.

### 3. Borrowing constraints and firm dynamics

#### 3.1. Empirical framework

In the second part of this Section, we closely follow the work conducted in Félix (2018). The author presents a very simple model to investigate the importance of borrowing constraints for firms' investment and exit decisions. The analysis proceeds in two steps: first, the author picks the estimates of the credit disequilibrium model estimated in Farinha and Félix (2015) to identify which firms were affected by borrowing constraints. Second, the author analyses the importance of partial credit rationing in two outcomes: firm exit from the market and the firm's investment rate.

To assess the importance of borrowing constraints on firm's investment and likelihood of survival the author considers the following baseline equation:

$$y_{it} = \beta_0 + \alpha_i + \delta_s + \lambda_t + \beta_1 \text{BorrowingConstraints}_{it} + \beta_2 \text{Size}_{it} + u_{it}, \quad (13)$$

where  $y_{it}$  assumes two outcomes: exit and investment rate of firm  $i$  in year  $t$ . A firm exit in year  $t$  is defined by its absence from the IES in that year, provided that this absence does not constitute a reporting gap. The firm's investment rate is calculated as the ratio between the change from year  $t-1$  to year  $t$  in net fixed assets, i.e. adjusted for depreciations, and total assets. The variable *Borrowing Constraints* assumes two possibilities: first, the probability of partial credit rationing as estimated in Farinha and Félix (2015), and second, a dummy variable that equals one whenever the probability that the latent credit demand is higher than the supply of credit exceeds 0.5, and zero otherwise. *Size* is a categorical variable for firm size with categories very small, small, and medium-sized firms.<sup>30</sup> The terms  $\delta_s$  and  $\lambda_t$  denote a set of sector of economic activity and time fixed effects, respectively. The term  $\alpha_i$  denotes a vector of firm fixed effects that account for firm (observed and unobserved) time-invariant heterogeneity.<sup>31</sup> The formal details of the estimation procedure are presented in Félix (2018).

<sup>30</sup> The classification of firms according to size follows the European classification of SMEs.

<sup>31</sup> Firm fixed effects are only included in the investment specification because of the single failure per firm data that would lead to the inconsistency of the fixed effects in the exit model.

### 3.2. *Propensity to exit and investment*

Félix (2018) estimates that firms that were affected by borrowing constraints have a higher propensity to exit from the market. In particular, the estimated average marginal effect after fitting a complementary log-log model equals 0.034, which implies that the higher the probability of being affected by borrowing constraints the higher the likelihood of firm exit. Moreover, the author also finds that firms that were estimated to have been partially credit constrained in the period between 2010 and 2012 are on average 1.61 percentage points less likely to survive, *ceteris paribus*. The average exit rate for the firms in the sample in this period is approximately 2.5% and therefore this estimate implies that credit constrained firms are on average 64% less likely to survive than their counterparts.

The estimates also suggest that borrowing constraints played a role in explaining investment dynamics in the period between 2010 and 2012. The results suggest that a one standard deviation increase in the probability of being credit constrained contributes to decrease the investment rate by 1.6 percentage points. Furthermore, the results suggest that the investment rate of SMEs that were estimated to have been partially credit constrained is on average 2.7 percentage points lower than that of their counterparts, *ceteris paribus*.

All in all, the results tally with the theoretical and empirical literature on firm dynamics and financing constraints, and suggest that borrowing constraints are important to explain the firms' investment rate and the likelihood of firm exit from the market in the period between 2010 and 2012.

## 4. **Final remarks**

This Section contributes to the empirical literature on credit constraints and firm dynamics by analyzing the investment behaviour and exit decisions of Portuguese SMEs that were estimated to have been partially credit rationed in the period between 2010 and 2012. The results suggest that partially credit constrained firms are significantly less likely to survive than their counterparts. Moreover, it is estimated that in this period the firm's investment rate is negatively correlated with the presence of financing frictions in the credit market. These findings tally with the theoretical underpinnings that financing constraints play a crucial role in explaining firm dynamics and emphasize the importance of sources of funding other than bank credit for SMEs.

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