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Access to finance of independent SMEs in Luxembourg.

The consequences of the crisis.

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Abstract

This paper analyses the availability of external funding for Luxembourgish independent small and medium-sized enterprises (SMEs) before and during the crisis. SMEs represent a large part of the private sector in Luxembourg. External finance is essential to enable firms to invest in order to increase their productivity, innovate and create employment. Data used come from the Access to Finance (ATF) survey conducted by STATEC in 2010 and coordinated by Eurostat. This paper provides some stylized facts on access to finance in Luxembourg. It presents results from a regression analysis on how the individual characteristics, the past behavior and the business environment perception affect the decision about whether or not to seek external finance. The results of estimations show that past behavior is the most important determinant of seeking finance. Particular emphasis is placed on assessing the consequences of the 2007-2010 recession by introducing variables related to changes in perception between 2007 and 2010 and growth constraints.

Keywords: **SMEs, Access to finance, Luxembourg, survey data**

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1 INTRODUCTION

Assessing the contribution of entrepreneurship to economic performance is important for economic policy. The European Union (EU) has become increasingly interested in small and medium-sized enterprises (SMEs) as SMEs are prominent in the strategy to improve European competitiveness set out in Lisbon (2000 and 2005). The Small Business Act of 2008 making reference to the Europe 2020 Strategy confirms this focus of attention. In this context, the 2007-2009 financial crisis has drawn attention to the difficulties faced by SMEs in accessing external finance. Access to finance refers to the possibility that firms can access financial services, including credit, deposit, payment, insurance, and other risk management services (Demirgüç-Kunt *et al.*, 2008). The euro area banks have tightened up conditions to accessing finance for nonfinancial businesses from mid-2007 to end-2009. This is problematic as access to finance is often crucial to the survival and growth of small firms and start-ups.

Using the definition of the European Commission, SMEs employ fewer than 250 persons employed. They should also have an annual turnover of up to EUR 50 million, or a balance sheet total of no more than EUR 43 million (Commission Recommendation of May 6, 2003).In Luxembourg, the share of SMEs is large: they represent 99% of firms, about 64% of the value added and 69% of the total employment[1].

In this context, the purpose of this paper is to analyse the determinants of seeking finance and to highlight the difficulties met by Luxembourgish firms throughout the financial crisis. We set up an empirical model that allows us to identify these determinants and to measure the impact of lag effects, individual characteristics and firms' perceptions on the firms' behavior regarding their raising of capital. In particular, we highlight the impact of the perception of the changes: businesses' perceptions of the changes that have occurred, both for firms and in the wider economy over the past three years. This is helpful in seeing to which extent perceptions have kept pace with reality, as measured by macroeconomic data, and the extent to which perceived changes may have influenced, or been influenced by, businesses' experiences in seeking credit. Finally, we introduce the different growth constraints that can be met by the firms (external or internal impacts). The empirical strategy involves the estimation of a Probit model, to establish determinants of seeking finance, and a Multivariate Probit model

[1] Computations are based on SBS 2008 for SMEs (firms with less than 250 employees, micro enterprises included). Agriculture, Forestry and Fishing (Section A NACE Rev.2); Financial and Insurance Activities (Section K NACE Rev.2); Public Administration And Defense; Compulsory Social Security; Education, Human Health and Social Work Activities, Arts, Entertainment and Recreation, Other Activities (respectively sections O to U NACE Rev.2) are excluded.

(Seeking funding modes in 2010).

The paper is organized as follows. Section 2 provides a literature review on the determinants of external funding for SMEs and the effect of the economic crisis. Section 3 describes the ATF survey for Luxembourg and gives some stylized facts on Luxembourgish SMEs. Section 4 outlines the empirical strategy adopted in the study and reports results on two outcomes: seeking finance in 2010 and in 2013. The last section concludes.

2 LITERATURE REVIEW

SMEs are considered as a driving force of innovation and employment, and thus they are an important factor in fostering general economic performance (Carree and Thurik, 2008; Van Praag and Versloot, 2007). Recent empirical studies suggest that the creation or development of small and medium enterprises was decisive in economic growth (Beck et al, 2005; Beck et al, 2006; Aghion *et al.*, 2007).

Despite their important role in fostering economic growth, SMEs often face financing difficulties. A firm that is seeking external funding may do so for several reasons: cash flow problems or investment goals. Thus, the types of funding identified in the ATF survey can meet these needs: long-term sources of finance (loans and equity) are rather intended for investment while other funding sources (short-term) are intended both for cash flow problems and investment. These findings describe the behavior of firms and the possible consequences of past behavior on future behavior. Likewise, the past lender behavior can have an impact on present and future one.

The theoretical and empirical literature support the view that, for firms, external financing is more expensive than internal financing. Mach and Wolken (2011) analyze the effects of credit availability on small firm survivability over the period 2004 to 2008, and find that credit constrained firms were significantly more likely to go out of business than non-constrained ones. Central to this finding is the notion of an asymmetric distribution of information between the borrower and the lender, which leads to costly signalling and screening processes (Akerlof, 1970). Because of their small size, SMEs are more affected by this problem. Mishkin (1995) and Bernanke and Gertler (1995) outline the fact that "asymmetric information can be particularly pronounced for small companies" and that they are more likely to be "bank-dependent" (see Canton *et al.*, 2010). This is because the amount of information about such firms is very limited, as well as the quality of such information (Wagenvoort, 2003a, 2003b; Ayadi *et al.*, 2009). A possible

reason for this lack of information is that SMEs are often young firms and, as such, they have a poor loan history or few moral guarantors (Whited and Wu, 2006). This asymmetric information problem leads to differentiate the cost of finance faced by small firms compared to bigger firms.

With respect to the determinants of access to finance, studies have attempted to uncover the determinants of this difference in previous costs. Colluzi *et al.* (2009) confirms that the probability of facing financing constraints is even larger for small and young businesses. In addition, there is an influence of the industry level: manufacturing and construction are more often constrained than firms in other industries. Bougheas *et al.* (2006) highlight characteristics such as firm size, age, level of profitability.

With respect to the impact of the financial crisis on access to finance, Campello *et al.* (2010) analyse whether firms in US, Europe and Asia were constrained during the 2008 crisis. They show that constrained firms were also looking for more cash, drew more heavily on lines of credit fearing that banks would restrict access in the future. Moreover, the inability to borrow externally caused many firms to bypass attractive investment opportunities (Blanchard *et al.*, 2010). Ferrando and Griesshaber (2011) identify the determinants in times of crisis: as before, age is an important factor in the probability of facing constrains; firm size and industry appear no longer to be significant.

To the best of our knowledge, the only previous study on Luxembourgish firms on access to finance is the one by Lünnemann and Mathä (2011). The authors analyze a firm-level survey collected by the *Banque Centrale du Luxembourg* (BCL) in mid-2008 and mid-2009, and find that three out of four firms reported that they were affected by the crisis. Many firms report incurring in funding difficulties: while the share of firms reporting strong or very strong funding difficulties is relatively high in Manufacturing (43%) and in Construction (32%), relatively few Market services, Trade and Financial services firms report the same type of funding difficulties (8%, 11% and 12%, respectively).

With respect to these elements, this paper aims at uncovering determinants of credit accessibility for SMEs in Luxembourg. We consider four groups of determinants:

1/ *Persistence over time:* whether having already sought finance has a positive impact on seeking (and obtaining) at present or in future years

2/ *Characteristics of enterprise:* turnover, number of employees and age (as outlined in previous studies).

3/ *Perceived changes in business environment between 2007 and 2010:* how the enterprise perceived positive or negative changes and if this perception is related to seek / or not finance.

4/ *Future growth constraints:* if firms anticipate some constraints in coming years, will it affect their request of finance?

This analysis cannot explore the determinants of success of the application due to the lack of data from the behavior of banks[2].

3 THE ACCESS TO FINANCE SURVEY: SOME EVIDENCE FOR LUXEMBOURG

The survey Access To Finance for SMEs[3] in the European Union was coordinated by Eurostat. STATEC (National Statistical Institute) volunteered to participate and launched the data collection in 2010.

The survey has two main aims: 1) to uncover if SMEs faced barriers concerning the availability of finance and how these may have changed between 2007 and 2010; 2) to gather information on the firms' need for finance in the next years. Moreover, collected data should help to identify the sources from which enterprises wish to obtain finance. The final goal is to sustain policy efforts to support and incentive firms' growth.

To be part of the sample, firms should not be subsidiaries of other businesses (regardless whether the latter are registered in the same member state or foreign-owned). Thus, the subpopulation used in the survey consists of SMEs that have no parent company. This identifies a group of firms particularly vulnerable to funding problems in times of crisis. According to Harrison and McMillan (2003), subsidiaries of foreign companies have fewer constraints to external financing than domestic firms.

[2] In a previous version of the paper, our aim was to analyse the determinants of successful seeking. We considered that this variable is the result of the lenders' behaviour and conditional on firm behaviour in the first place. Thanks to a Heckman specification, we took into account the fact that information about success in seeking finance is only able for those firms who sought finance. Unfortunately, the results did not give any clear-cut conclusions.

[3] For a Luxembourgish copy of the ATF survey, please contact corresponding author.

The target population for the survey is the population of firms with the following characteristics. Enterprises must be classified according to NACE Rev. 2 sections: industry (sections B to E), construction (section F), trade (section G), transportation (H), accommodation and food service activities (I) and other services (sections J and L to N). The financial sector (section K) is excluded.
Moreover, firms must have been in existence at least since 2005 and have been in business in 2008. Finally, only firms employing 10-249 persons in 2005 and at least 10 employees in 2010 are covered.

Table 1 summarizes the main characteristics of our sample and provides some information on the representativeness of the sample. In Luxembourg, 1 181 firms responded to the survey, out of 1 396 firms selected to cover the field of investigation. Hence, the survey is almost exhaustive.

Table 1 – ATF survey: Luxembourg sample

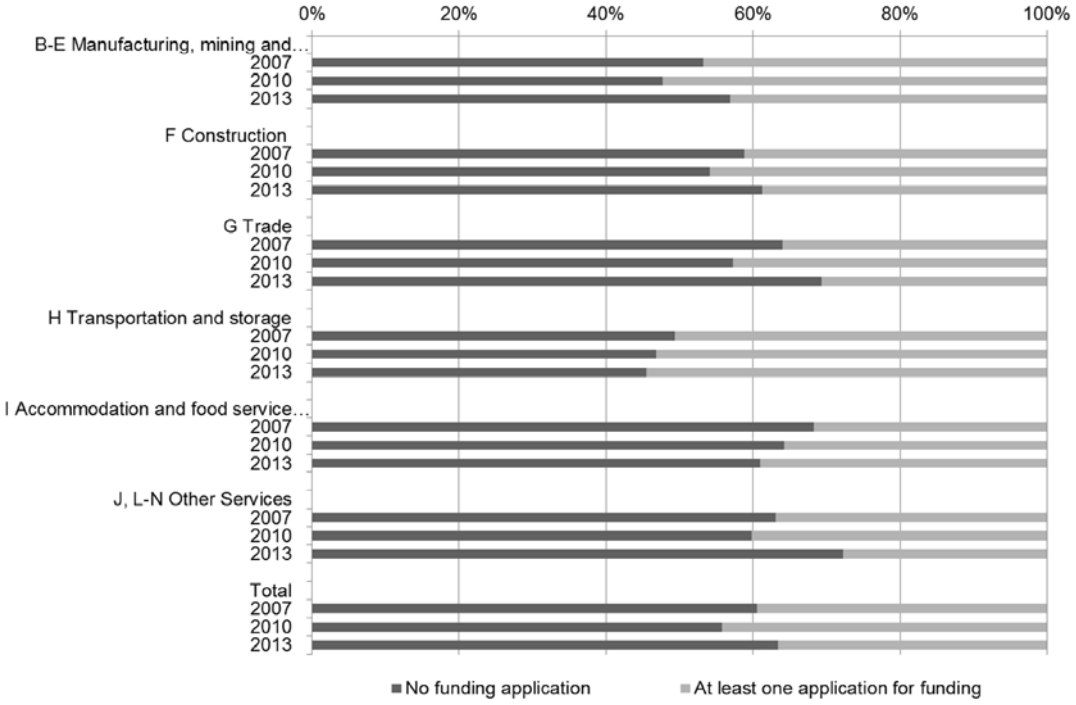
Industry breakdown (NACE Rev.2)		Total number of firms in 2008 (a)	Number of firms with >10 employees in 2008 (b)	Census ATF (c)	Share of (c) in (b)	Sample (d)	Response rate (d)/(c)
B - E	Manufacturing, mining and quarrying and other Industry	983	367	126	34%	109	87%
F	Construction	2 942	947	478	50%	405	85%
G	Trade	6 857	836	336	40%	283	84%
H	Transportation and Storage	1 156	336	90	27%	77	86%
I	Accommodation and food service Activities	2 728	336	153	46%	123	80%
J, L-N	Other Services	10 300	845	213	25%	184	86%
	Total	**24 966**	**3 667**	**1 396**	**38%**	**1 181**	**85%**

Source: Authors' calculations from Register 2008, ATF survey 2010.

The survey, conducted in 2010, allows analysis of the firms' behavior for the period from 2007 to 2010. The reference year for the survey is 2010. In many instances, data are also being collected for 2007 to enable comparison of the latest year with a pre-crisis period. Indeed, first, the questionnaire identifies which firms sought (and what type of)

external funding in 2007 and 2010. Three types of funding source are considered: 1) loan[4], 2) equity[5], or 3) other sources of finance[6]. Firms were also asked about their degree of success in obtaining the funding, and, if applicable, the reasons why they had not been successful. Secondly, firms were asked about their perceptions of the changes have occurred over the past three years. Finally, the last questions looked ahead the coming years. They asked firms whether they anticipate needing finance and, if so, from what source and for what purpose.

Figure 1 – Seeking finance rate by industries (in %).



Source: Authors' calculations from ATF survey 2010.

Next, we provide a descriptive analysis of our sample[7]. Nearly 48% of observed independent SMEs have never requested external finance whereas 31.8% of firms requested finance in both 2007 and 2010. Firms that have requested finance in 2010 are more numerous than in 2007: 44.3% versus 39.5%, notably in manufacturing (5.5 percentage points) and trade (6.72 percentage points). The expectation for 2011-2013 showed that nearly 36.1% of all surveyed enterprises are likely to seek finance. Firms in

[4] Loan finance refers to debt that you have to pay back. Bank overdraft/credit lines, preferred debt, leasing, subsidized loans or subordinated loans are excluded.

[5] Equity finance refers to money or other assets given against part ownership of shares.

[6] Other sources of finance may include leasing, factoring, bank overdraft, subsidized loans, trade credits, export finance facilities or mezzanine financing.

[7] For comparison with European results, see:
http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Access_to_finance_statistics

transportation and accommodation are the most likely to request funding in the next three years (Figure 1).

The number of loans remained stable between 2007 and 2010 (19%), while requests for other types of funding rose: equity from 10% in 2007 to 12% in 2010 and other sources of finance from 21% in 2007 to 27%. Loans are expected to be the most important type of finance in coming years (29%), whereas equity finance and other sources of finance could decrease to 9% and 19% respectively in 2011-2013 (Larue ***et al.***, 2011).

In the next section, in order to explain more specifically which are the determinants for seeking finance, or not, we estimate a model incorporating lag effects, individual characteristics and own perceptions.

4 DETERMINANTS OF FUNDRAISING AND ITS SUCCESS

The previous descriptive analysis has explained some differences between SMEs in the decision to ask for finance. To investigate the determinants of this behavior, two types of analysis are performed. First, thanks to the Probit model, we study the determinants of seeking finance in 2010 and 2013 respectively. Second, a Multivariate Probit model allows analysis of the determinants of seeking finance but for different types of funding in 2010.

4.1 Models

4.1.1 Probit specification

First, we investigate the determinants of seeking finance whatever the type of funding considered (loan equity or other source of funding). Seeking funds is based on the firms' behavior. The model is as follows:

$$Y_i^* = \beta' X_i + \varepsilon_i \quad (1)$$

where Y_i^* is an unobserved variable representing the latent utility or propensity of asking for funding, $\boldsymbol{\beta}$ is a vector of parameters to be estimated, X_i is a vector of observed characteristics and ε_i is a random error term.

Thus, access to finance is estimated by using a Probit model where the dependent variable Y_i is a dichotomous (0,1) variable indicating whether the *i*-th firm seeks for an external finance or not. The observed binary choice variable Y_i = 1 if $\mathrm{Y_i^*} > 0$, and 0 otherwise.

$$\mathrm{Y_i} = \begin{cases} 0, & \text{if the enterprise i does not seek finance} \\ 1, & \text{if the enterprise i seeks finance} \end{cases} \quad (2)$$

The standard Probit specification assumes that the error terms have the following properties: $\mathrm{E}(\varepsilon) = 0$ and $Var(\varepsilon) = 1$. This leads to the binary Probit model:

$$\Pr(\mathrm{y} = 1|\mathrm{x}) = \int_{-\infty}^{\alpha+\beta\mathrm{x}} \frac{1}{\sqrt{2\pi}} \mathrm{e}^{\left(-\frac{\mathrm{t}^2}{2}\right)} \mathrm{dt} \quad (3)$$

4.1.2 General Specification of the Trivariate Probit Model

The general specification (with the person subscript is omitted for simplicity but without lack of generality) for a multivariate Probit model with three dependent variables is:

$$\mathrm{y_m^*} = \beta_\mathrm{m}'\mathrm{X_m} + \varepsilon_\mathrm{m} \quad , \qquad \mathrm{m} = 1,2,3 \quad (4)$$

$$\mathrm{y_m} = 1 \text{ if } \mathrm{y_m^*} > 0 \text{ and 0 otherwise} \quad (5)$$

- y_m^* is an unobserved variable representing the latent utility or propensity of choosing the best alternative at stage m (where “best” in our context is Loan [vs. not], Equity [vs. not], and Other funding [vs. not], respectively).
- X_m is a vector of observed characteristics relevant to the choice at stake.
- β_m is a vector of unknown coefficients to be estimated.
- ε_m represents the impact of unobserved variables on utility at stage *m*. Those error terms are distributed as a multivariate normal, each with a mean of zero and variance-covariance matrix V, where V has values 1 on the leading diagonal and correlations $\rho_{\mathrm{jk}} = \rho_{\mathrm{kj}}$ as off-diagonal elements.

$$V = \begin{bmatrix} 1 & \rho_{12} & \rho_{13} \\ & 1 & \rho_{23} \\ & & 1 \end{bmatrix}$$

In our case, this is equivalent to:

$$\begin{cases} \text{Loan}^* = \beta_1' X_1 + \varepsilon_1 \\ \text{Equity}^* = \beta_2' X_2 + \varepsilon_2 \\ \text{Other}^* = \beta_3' X_3 + \varepsilon_3 \end{cases} \quad (6)$$

The parameters β_m and the three correlations of the error terms can be estimated via the maximum likelihood method. The log likelihood function for a sample of N independent observations is given by:

$$L = \sum_{i=1}^{N} \log \Phi_3(\mu_i; \Omega) \quad (7)$$

where $\Phi_3(.)$ is the trivariate standard normal distribution. The MVPROBIT Stata program was used to perform this estimation.

4.2 Variables

This section considers variables that should play an active role in seeking finance.[8] The signs in brackets indicate the expected direction of the partial effect. That is, a positive sign (+) indicates that the variable is likely to increase the probability of observing the positive outcome considered (y = 1). Seeking finance is influenced by past decisions, firms' individual characteristics, perceived changes in business environment and foreseen constraints to firms' growth.

Regarding past decisions, we checked whether seeking finance in 2007 affected finance seeking in 2010. To model seeking finance in 2013, we used seeking finance only in 2007, only in 2010 and in 2007 and 2010. Such behaviors are modeled as dichotomous variables, where the base category is no seeking finance in 2007 and in 2010. Past decision effects on finance seeking may depend, on the reason why firms engage in seeking finance (for example, learning costs).

For the specification of seeking finance, we included firm characteristics such as turnover (in log, no particular effect expected), number of employees (in classes, no particular effect expected) and the age of firm (-). These characteristics can be considered as control variables.

[8] Descriptive statistics of all variables used in the regression are displayed in Table 2.

In addition to its own characteristics, the firms' decision may be influenced by several types of factors: past behavior in the funding application, observed degradation of its financial situation and anticipated developments of these elements for the period 2010-2013.

Therefore, we include negative perception of changes in business environment (in comparison to "no change" or "positive change"), as firms were asked to give a judgment on such changes between 2007 and 2010 (?). Perceptions have been collected regarding the evolution of three types of environment. First, the evolution of funds characteristic and condition to obtain financing are explored. A perceived rise in cost of seeking and obtaining finance should result in a decreasing demand for funding (-) but it could also result in increasing the probability of asking for funding when conditions for obtaining financing can be seen as a barrier that only the applicant has experienced (+). Second, firms have been asked whether their own situation is going better, worse or unchanged notably about their ratio ofdebt to turnover. Here the sign could vary among sectors, worse situation could encourage waiting and seeing and not asking for finance or result in higher probability of seeking finance since the needs are becoming more urgent (?). Finally, regarding market conditions, difficulties could increase competition and pressure to invest despite demand for the firms' products and services not increasing. Competition pressure should increase probability of seeking funding (+) since falls in demand and a poor willingness of banks to provide finance should diminish it (-). So, impact and main perceptions could vary from one sector to another.

Finally, we added some dummy variables to capture the more likely constraints that could limit firms' growth in the future. We expect that all this potential constraints increase the probability of seeking finance. Dummy variables were also used to capture the industry breakdown income of the firm in comparison to other services sector.

Table 2 – Descriptive statistics

		observation	mean	(std dev.)
Dependent variables				
Seeking finance in 2010	(dummy)	1 181	0.443	(0.49693)
Seeking loans in 2010	(dummy)	1 181	0.191	(0.39297)
Seeking equity in 2010	(dummy)	1 181	0.118	(0.32310)
Seeking other sources in 2010	(dummy)	1 181	0.271	(0.44448)
Seeking finance in 2013	(dummy)	1 181	0.361	(0.48041)
Seeking loans in 2013	(dummy)	1 181	0.292	(0.45484)
Seeking equity in 2013	(dummy)	1 181	0.095	(0.29378)
Seeking other sources in 2013	(dummy)	1 181	0.187	(0.39027)
Seeking finance				
Seeking finance in 2007	(dummy)	1 181	0.395	(0.48897)
Seeking finance only in 2007	(dummy)	1 181	0.077	(0.26679)
Seeking finance only in 2010	(dummy)	1 181	0.125	(0.33122)
Seeking finance in 2007 AND in 2013	(dummy)	1 181	0.318	(0.46571)
Firm's characteristics				
Turnover (2009)	(ln)	1 179	1.099	(0.99100)
Number of employees (2009)	(dummy)			
[10;19]		1 181	0.500	(0.50021)
[20;49]		1 181	0.375	(0.48436)
[50; 99]		1 181	0.086	(0.27977)
[100; max]		1 181	0.038	(0.19153)
Age	(years)	1 181	24.096	(17.86670)
Negative changes perceived between 2007 and				
Financial situation of your business	(dummy)	1 181	0.312	(0.46368)
Cost (interest and other) of obtaining finance	(dummy)	1 181	0.141	(0.34771)
Debt/turnover ratio	(dummy)	1 181	0.201	(0.40067)
Burden or effort of obtaining finance	(dummy)	1 181	0.068	(0.25140)
Willingness of banks to provide finance	(dummy)	1 181	0.199	(0.39941)
Relationships with competitors in your industry	(dummy)	1 181	0.228	(0.41957)
Prices of raw materials (oil, etc.)	(dummy)	1 181	0.656	(0.47516)
Demand for your products and services	(dummy)	1 181	0.438	(0.16850)
Constraint on the growth in future				
General economic outlook	(dummy)	1 181	0.760	(0.42755)
Limited demand in the local markets	(dummy)	1 181	0.512	(0.50006)
Limited demand in the foreign market	(dummy)	1 181	0.136	(0.34328)
Necessary investment into equipment	(dummy)	1 181	0.118	(0.32239)
Not enough financing	(dummy)	1 181	0.059	(0.23623)
New entrants in the market	(dummy)	1 181	0.321	(0.46703)
Industry breakdown				
Manufacturing	(dummy)	1 181	0.092	(0.28956)
Construction	(dummy)	1 181	0.343	(0.47489)
Trade	(dummy)	1 181	0.240	(0.42704)
Transportation	(dummy)	1 181	0.065	(0.24698)
Accommodation and food service activities	(dummy)	1 181	0.104	(0.30558)
Other services	(dummy)	1 181	0.156	(0.36282)

Source: Authors' calculations from ATF survey 2010.

4.3 RESULTS

Tables 3 and 4 display the estimated parameters for seeking finance in 2010 and 2013. The first column displays the information about determinant in the entire sample. The next two columns deal with the probability of seeking finance, per sector breakdown (manufacturing *versus* services). The last three columns show the parameters relative to the Trivariate Probit Model (triprobit). For each probit model, we specify the sample size, the pseudo R2, the log-likelihood (and its probability) and the concordance percentage (predictive value). Moreover, for triprobit, we take into account correlations between error terms and the likelihood ratio test.

4.3.1 Determinants of seeking finance in 2010

Influence of previous funding applications

First, we note from Table 3 that the probability of a firm to seek finance in 2010 increases if the firm sought finance in the past. Past behavior seems to be the most important significant determinant, overall and for each industry. Funding application appears as a recurring action for some businesses which regularly seek external funding. The conclusion remains true when considering the type of funding requested (last three columns).

Impact of degradation observed between 2007 and 2010

The likelihood that a business seeks funding in 2010 increases under the influence of other factors, particularly when they perceived negative effects of the crisis on their financial situation, their market prices or conditions access to financing.

The surveyed firms were asked to describe the trends they have observed through their financial situation, the costs of obtaining financing (interest, etc.), their ratio of debt to revenue, other financing conditions (e.g. maturity, bank covenant, etc.), procedures or efforts to obtain financing, the willingness of the finance company to provide financing, relations with competitors in the same industry, the prices of intermediate products (raw materials, oil, etc..), and through the application addressed to them.

Among the changes observed, five are likely to have a significant impact on seeking funding in 2010. When considering firms in the service industry a decline in demand addressed to them negatively influences their propensity to seek funding. This effect disappears in the overall sample and request types when funds are distinguished.

Two perceptions negatively influence the probability of seeking funding in 2010: a deteriorating financial situation (for manufacturing businesses) or the increase in raw material prices (whatever the industry). When splitting by type of funding the propensity to apply for a loan or equity is negatively affected by the deterioration of the financial situation, whereas the increase in raw material prices influences in the same way the propensity to ask for a loan.

Firms who perceived an increase in their ratio of debt to turnover during the period 2007-2010 also have a slightly higher probability of seeking funding in 2010: the impact is stronger for manufacturing businesses and remains positive and significant when distinguishing each type of financing. In conclusion, the degradation of this ratio is not a constraint for new research of funding.

Surprisingly, the increase in administrative difficulties (imposing greater efforts to obtain finance) has a significant impact on the probability of applying for funding but not in Manufacturing. This type of result (which is a priori counter-intuitive) is in fact quite general when the firm perceives some barriers or constraints to one activity or another: those whose business is expanding more feel the associated limits strongly. However, this effect is only significant for other types of funding and is still not significant when seeking a loan or equity.

Consequences of anticipated developments

Firms were not only asked about perceived changes during the period 2007-2010, but also about their expectations of future problems, by identifying factors that could curb their growth in the coming years (2011-2013) from a list of proposals. Those factors reflect anticipated developments by firms and are assumed to influence their current efforts to obtain funding. To sum up, growth prospects should condition their investment decisions which, in turn, induce decisions on research of external funding. Factors that may limit future growth according to our (almost exhaustive) sample are: the general economic outlook, a limited demand on the local market, a limited demand on foreign markets, difficulties to invest in equipment, a lack of funding and finally new entrants in the market.

Thus, and quite logically, firms that anticipate their growth may be constrained by limited demand on the local market or a lack of funding are more likely to apply for funding in 2010. In contrast, those who expect some new entrants on their market are less likely to seek funding in 2010. These last two effects are significant only for services.

Table 3 – Determinants of seeking finance 2010

	PROBIT (mfx)			TRIPROBIT (coefficient)		
	All	Manufacturing	Services	Loans	Equity	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Seeking finance						
Seeking finance in 2007	0.601 ***	0.656 ***	0.589 ***	0.790 ***	0.979 ***	1.313 ***
	(0.026)	(0.039)	(0.044)	(0.095)	(0.117)	(0.092)
Firm's characteristics						
Turnover (2009) *(ln)*	0.007	-0.037	0.025	-0.071	0.164 **	0.044
	(0.019)	(0.037)	(0.019)	(0.074)	(0.083)	(0.070)
Number of employees (2009) *{Reference class [10;19]}*						
[20;49]	0.028	0.039	0.042	0.154	-0.145	-0.074
	(0.032)	(0.056)	(0.037)	(0.119)	(0.138)	(0.114)
[50; 99]	0.041	0.186	-0.017	0.191	-0.562 **	0.005
	(0.056)	(0.123)	(0.048)	(0.197)	(0.239)	(0.183)
[100; max]	-0.019	0.081	0.012	0.239	-0.192	-0.460
	(0.074)	(0.159)	(0.091)	(0.294)	(0.323)	(0.291)
Age	-0.001	-0.003 *	0.000	-0.001	0.000	-0.003
	(0.001)	(0.002)	(0.001)	(0.003)	(0.003)	(0.003)
Negative changes perceived between 2007 and 2010						
Financial situation of your business	-0.042	-0.115 ***	0.029	-0.250 **	-0.293 *	0.059
	(0.029)	(0.043)	(0.040)	(0.126)	(0.152)	(0.119)
Cost (interest and other) of obtaining finance	0.028	0.081	-0.011	0.117	0.132	-0.107
	(0.041)	(0.071)	(0.042)	(0.138)	(0.161)	(0.138)
Debt/turnover ratio	0.110 **	0.267 ***	0.020	0.270 **	0.506 ***	0.279 **
	(0.046)	(0.084)	(0.042)	(0.127)	(0.149)	(0.126)
Burden or effort of obtaining finance	0.143 **	0.084	0.155 **	0.243	0.142	0.365 **
	(0.060)	(0.083)	(0.077)	(0.156)	(0.192)	(0.158)
Willingness of banks to provide finance	0.004	-0.009	0.022	0.194	0.136	-0.051
	(0.041)	(0.062)	(0.049)	(0.149)	(0.180)	(0.148)
Relationships with competitors in your industry	0.012	0.041	-0.017	0.196	0.079	-0.009
	(0.033)	(0.057)	(0.034)	(0.121)	(0.142)	(0.118)
Prices of raw materials (oil, etc.)	-0.072 **	-0.104 **	-0.048 *	-0.248 **	-0.145	-0.045
	(0.029)	(0.048)	(0.028)	(0.109)	(0.128)	(0.105)
Demand for your products and services	-0.012	0.074	-0.049 *	-0.110	0.016	-0.108
	(0.031)	(0.063)	(0.029)	(0.125)	(0.145)	(0.121)
Constraint on the growth in future						
General economic outlook	0.037	0.084 *	0.007	0.061	0.103	0.083
	(0.031)	(0.051)	(0.034)	(0.114)	(0.139)	(0.110)
Limited demand in the local markets	0.078 **	-0.017	0.135 ***	0.105	0.104	0.107
	(0.031)	(0.040)	(0.043)	(0.097)	(0.115)	(0.095)
Limited demand in the foreign market	0.021	-0.003	0.026	0.186	-0.135	0.044
	(0.039)	(0.061)	(0.044)	(0.135)	(0.168)	(0.134)
Necessary investment in equipment	0.070	0.199 **	-0.021	0.288 **	-0.180	0.189
	(0.046)	(0.085)	(0.039)	(0.135)	(0.177)	(0.138)
Not enough financing	0.171 **	*0.055*	0.275 **	0.363 **	0.297	0.406 **
	(0.075)	(0.101)	(0.108)	(0.178)	(0.202)	(0.178)
New entrants in the market	-0.059 **	-0.017	-0.060 **	-0.246 **	-0.020	-0.115
	(0.025)	(0.042)	(0.027)	(0.105)	(0.120)	(0.100)
Industry breakdown *(Reference class Manufacturing)*						
Construction	-0.026	-0.041		-0.120	-0.395 **	-0.013
	(0.044)	(0.049)		(0.165)	(0.200)	(0.164)
Trade	-0.024			0.034	-0.079	-0.297
	(0.048)			(0.183)	(0.213)	(0.184)
Transportation	-0.016		0.034	-0.056	0.145	-0.038
	(0.061)		(0.056)	(0.220)	(0.252)	(0.220)
Accommodation and food service activities	-0.052		0.022	0.051	0.219	-0.512 **
	(0.053)		(0.049)	(0.207)	(0.239)	(0.222)
Other Services	-0.055		-0.011	-0.521 **	0.016	0.058
	(0.049)		(0.037)	(0.205)	(0.223)	(0.186)
Constant				-1.217	-1.879 ***	-1.280
				(0.216)	(0.262)	(0.214)
				rho21	0.231 ***	(0.078)
				rho31	-0.240 ***	(0.071)
				rho32	-0.251 ***	(0.077)
N	1 129	493	636	1 129		
LogL	-528.882 ***	-219.485 ***	-287.269 ***	-1310.254 ***		
Pseudo R-squared (%)	31.79	35.59	33.74	*L. ratio test of rho21 = rho31 = rho32 = 0:*		
Predictive Value (%)	80.34	81.95	80.03	*chi2(3) = 27.6324 Prob > chi2 = 0.0000*		

Notes : *mfx are calculated at 0 for discrete variables, 20 for age and mean for other continuous variables.*
Standard errors in brackets *** p<0.01 ; ** p<0.05 ; * p<0.10

Concerning manufacturing, factors limiting growth are not all the same. In fact, propensity to seek funding in 2010 is stronger if those firms anticipated that new investments in equipment would be needed. In addition, each type of application for funding is determined by different factors. The anticipation of constraints on the growth, whatever their nature, has no significant impact on research for equity. Loan applications are more common for businesses which anticipate that new equipment will be needed and that funding will become scarce (the latter is also significant for other sources of funding). Loan applications are less frequent when firms anticipate constraint due to new entrants in the market.

4.3.2 Determinants of (expecting) seeking finance in 2013

Influence of previous funding applications

Here, three variables represent the influence of past behavior: research funding only in 2007, research funding only in 2010 and research funding in 2007 AND 2010 (whatever the type: loan, equity, other). Considering the whole sample or sub-samples of manufacturing and service businesses, the effect of the past is always significant and the marginal effect is largest for the third variable (research funding in 2007 AND 2010). This result confirms what we already observed: firms seeking external funding have a high propensity to do so on a regular basis. Thus, the past not only explains the present but also the future and it has a positive impact on the propensity to potentially ask for funding.

Impact of damages observed between 2007 and 2010

Unsurprisingly, all variables describing the deterioration of the economic environment between 2007 and 2010 have limited explanatory power to explain the expected behavior. However, manufacturing firms have their propensity to consider a request for funding increase slightly in 2013 when they experienced a worsening deterioration financial situation between 2007 and 2010. Nevertheless, all businesses - but especially in services- that witnessed an intensification of competition consider more frequently seeking external financing in 2013. This positive effect is new compared to previous estimations. Finally, the positive impact of the increase in the administrative burden on the propensity to seek funding in 2013 is persistent: it is especially significant in services and for other funding sources.

Table 4 – Determinants of seeking finance 2013

	PROBIT (mfx)			TRIPROBIT (coefficient)		
	All	Manufacturing	Services	Loans	Equity	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Seeking finance						
Seeking finance only in 2007	0.224 ***	0.172 **	0.236 ***	0.788 ***	0.308	0.604 ***
	(0.061)	(0.081)	(0.081)	(0.157)	(0.242)	(0.178)
Seeking finance only in 2010	0.145 ***	0.134 **	0.147 **	0.409 ***	0.727 ***	0.486 ***
	(0.046)	(0.066)	(0.057)	(0.137)	(0.179)	(0.156)
Seeking finance in 2007 AND in 2010	0.345 ***	0.317 ***	0.357 ***	0.832 ***	0.964 ***	1.038 ***
	(0.052)	(0.070)	(0.066)	(0.100)	(0.138)	(0.113)
Firm's characteristics						
Turnover (2009) *(ln)*	0.006	0.020	-0.005	0.016	0.030	0.004
	(0.012)	(0.023)	(0.012)	(0.067)	(0.087)	(0.075)
Number of employees (2009) *{Reference class [10;19]}*						
[20;49]	0.013	-0.002	0.014	0.094	0.038	0.038
	(0.020)	(0.029)	(0.022)	(0.108)	(0.140)	(0.120)
[50; 99]	0.014	0.011	0.008	0.196	0.057	0.024
	(0.033)	(0.055)	(0.034)	(0.177)	(0.228)	(0.197)
[100; max]	0.007	0.013	-0.029	0.292	0.203	-0.154
	(0.050)	(0.080)	(0.040)	(0.272)	(0.323)	(0.297)
Age	-0.001	-0.000	-0.001	-0.000	-0.000	-0.003
	(0.000)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Negative changes perceived between 2007						
Financial situation of your business	0.018	0.090 *	-0.018	0.076	-0.078	-0.044
	(0.022)	(0.051)	(0.018)	(0.111)	(0.149)	(0.125)
Cost (interest and other) of obtaining finance	-0.017	-0.000	-0.024	-0.164	-0.022	-0.113
	(0.021)	(0.032)	(0.021)	(0.131)	(0.165)	(0.141)
Debt/turnover ratio	0.002	-0.018	0.010	0.058	0.083	-0.046
	(0.022)	(0.027)	(0.026)	(0.120)	(0.151)	(0.132)
Burden or effort of obtaining finance	0.086 **	0.108	0.051	0.194	0.191	0.377 **
	(0.043)	(0.067)	(0.043)	(0.145)	(0.177)	(0.155)
Willingness of banks to provide finance	0.021	0.003	0.032	0.202	-0.063	-0.032
	(0.028)	(0.035)	(0.036)	(0.136)	(0.168)	(0.147)
Relationships with competitors in your industry	0.075 **	0.041	0.097 **	0.264 **	0.169	0.251 **
	(0.032)	(0.037)	(0.046)	(0.108)	(0.137)	(0.117)
Prices of raw materials (oil, etc.)	0.001	0.006	-0.003	0.079	0.101	0.070
	(0.018)	(0.029)	(0.019)	(0.102)	(0.133)	(0.113)
Demand for your products and services	0.011	-0.018	0.034	-0.044	0.153	0.115
	(0.021)	(0.026)	(0.030)	(0.111)	(0.140)	(0.120)
Constraint on the growth in future						
General economic outlook	0.025	0.022	0.024	0.093	-0.030	0.066
	(0.020)	(0.028)	(0.024)	(0.105)	(0.137)	(0.115)
Limited demand in the local markets	0.046 **	0.060 *	0.024	0.209 **	0.268 **	0.144
	(0.022)	(0.034)	(0.021)	(0.089)	(0.117)	(0.098)
Limited demand in the foreign market	0.010	-0.000	0.024	0.107	0.143	0.143
	(0.024)	(0.034)	(0.030)	(0.127)	(0.159)	(0.137)
Necessary investment into equipment	0.131 ***	0.134 *	0.110 **	0.590 ***	0.142	0.407 ***
	(0.047)	(0.070)	(0.053)	(0.128)	(0.162)	(0.134)
Not enough financing	0.260 ***	*0.263* **	0.202 **	0.661 ***	0.138	0.379 **
	(0.081)	(0.122)	(0.092)	(0.168)	(0.202)	(0.171)
New entrants in the market	-0.027 *	-0.009	-0.031 *	-0.249 ***	0.016	0.010
	(0.016)	(0.023)	(0.017)	(0.095)	(0.121)	(0.104)
Industry breakdown *(Reference class Manufacturing)*						
Construction	-0.012	-0.015		-0.072	0.170	-0.280 *
	(0.027)	(0.028)		(0.159)	(0.220)	(0.163)
Trade	-0.032			-0.169	0.183	-0.559 ***
	(0.030)			(0.176)	(0.240)	(0.188)
Transportation	0.049		0.075	-0.093	0.526 **	0.108
	(0.047)		(0.049)	(0.210)	(0.267)	(0.212)
Accommodation and food service activities	-0.011		0.007	-0.034	0.570 **	-0.484 **
	(0.034)		(0.029)	(0.200)	(0.262)	(0.218)
Other Services	-0.038		-0.013	-0.330 *	0.386	-0.468 **
	(0.030)		(0.022)	(0.186)	(0.245)	(0.196)
Constant				-1.376 ***	-2.535 ***	-1.471 ***
				(0.211)	(0.308)	(0.230)
				rho21	0.525 ***	(0.056)
				rho31	0.617 ***	(0.043)
				rho32	0.421 ***	(0.061)
N	1 129	493	636	1 129		
LogL	-586.456 ***	-269.454 ***	-308.851 ***	-1261.797 ***		
Pseudo R-squared (%)	21.19	18.87	24.70	*L. ratio test of rho21 = rho31 = rho32 = 0:*		
Predictive Value (%)	74.84	71.60		*chi2(3) = 247.417 Prob > chi2 = 0.0000*		

Notes : mfx are calculated at 0 for discrete variables, 20 for age and mean for other continuous variables.
Standard errors in brackets *** p<0.01 ; ** p<0.05 ; * p<0.10*

Consequences of anticipated developments

The main significant factors are those that also determine the propensity to seek funding in 2010, but they are more stable across the different estimations that were performed. As in the previous model, the most significant and important effect is the anticipation of a lack of funding. This effect also becomes significant for manufacturing taken separately and not only for service firms. It is the same case when firms take into account necessary investments in equipment as a limit of growth: the marginal effect becomes significant also for service firms and the coefficient remains significant for other sources of funding in the triprobit model. Other significant effects have a lower marginal impact in the first three models.

As for the 2010 model, a limited expected demand on the local market stimulates research of funding in the case of manufacturing firms. The effect is significant for loan applications as well as for equity ones. As we found previously, the only negative effect comes from the new entrants (as a limit of growth): this factor discourages applications of services firms but its impact remains low when considering the marginal effects. When considering the type of funding this effect is still significant only when seeking loan.

5 CONCLUSION

The purpose of this paper is to investigate the determinants of seeking finance. Moreover, our paper aims at highlighting the difficulties encountered by Luxembourgish independent SMEs throughout the financial crisis. To examine these facts, we use micro data from the Eurostat Survey for Luxembourg on access to finance. We set some working assumptions to distinguish between lag effects, individual characteristics impact and own perceptions (changes occurred during the last three years and impact of the growth constraints met by firms). A firm who seeks external funding may do so for several reasons such as cash flow problems or investment policy. In our empirical study, using a Probit model, we first identify which are the determinants for seeking finance in 2010 and 2013. Then, we use a Multivariate Probit model to analyse the impact of those determinants on seeking modes.

Finally, in the representative sample of Luxembourgish firms that are most vulnerable in the economic context in 2007-2010, it appears that they were not seriously affected particularly by rationing their sources of external funding. Nevertheless, the situation can

change very quickly and it should be followed with appropriate tools (e.g. a Barometer).
In the long run perspective that fits this study of structural determinants, it should be borne in mind that the investigation cannot observe the investment decisions of the company, but simply the decision to seek funding. On the one hand, the firm can invest without resorting to external financing and secondly, it can apply for funding which are not subject to investment. Indeed, other sources of funding cover instruments in the short term that could be used for other purposes such as cash advances.

Despite those important limits, the contribution of this survey and the different models presented is significant. First, the models emphasized the force of habit in seeking funding. Thus, firms which seek external funding incline to do it regularly. Second, the survey shows that when a business chooses to seek external financing, mostly they get it (88%). Models cannot determine whether this result is due to a kind of self-rationing (with constraint integration). However, models clearly show that a perception of the potentially negative effects of the crisis increases the likelihood of using external funding to invest. Everything happens as if the businesses that are more aware of the crisis risks felt more strongly the need to consolidate and expand their business in order to stay on the market.

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