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The analyses, opinions and findings of these papers represent the views of the authors, they are not necessarily those of the Banco de Portugal or the Eurosystem

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Bank Funding and the Survival of Start-ups

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Abstract
We document that start-ups with more access to long-term bank loans and those with more available credit in their credit lines survive longer. These findings do not appear to be driven by bank selection. Start-ups (including those founded by entrepreneurs without a business track record) that access these funding sources, in particular long-term loans, right at the beginning of their lives – when it is arguably more difficult for banks to identify winners – survive longer. Further, our findings continue to hold when we control for unobserved heterogeneity in start-ups, and when we instrument for banks' lending decisions. In addition, our findings do not seem to be entirely driven by bank monitoring because we do not find that accessing short-term bank loans yields similar results. Our results suggest that reducing uncertainty about future access to bank funding helps start-ups survive longer, possibly because it offers them insurance against future shocks and/or affords them the opportunity to make investments that they would not consider otherwise.

Keywords: Start-ups, bank funding, firm survival.

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1. Introduction

The inability of the financial system to guarantee funding under the same conditions for the entire duration of a corporation's life keeps firms susceptible to a sense of fragility: What if banks refuse to roll over its loans or demand a high spread the next time it seeks an extension? Firms likely worry about this problem the most in the early stages of their life, when their future prospects are most uncertain. Further, uncertainty about future funding is likely to have the biggest impact at the early stages of firms' lives, when they are more vulnerable to shocks and have to make significant investment decisions. In this paper, we investigate the importance of securing stable access to bank funding for the survival of start-ups. We posit that start-ups that are able to secure access to bank funding for an extended period of time survive longer.

Start-ups have proven to be a valuable source of innovation and job growth, and to perform an important competitive role in their industries. However, start-ups fail at an alarming rate, often shortly after they are born. Dunne *et al.* (1989) document that approximately 45 percent of firms fail within their first five years.

The high failure rate of start-ups has led many researchers to investigate the potential causes of this phenomenon. Some researchers have focused on the importance of start-ups' founding conditions/choices, building on the idea that decisions made at the formation stage can dictate a firm's performance for many years to come. They have unveiled supporting evidence for this hypothesis by showing that start-ups' chances of survival depend on their initial business strategies (Sandberg and Hofer, 1987; Duchesneau and Gartner, 1990; McDougall *et al.*, 1994), entry size (Mata *et al.*, 1995; Geroski *et al.*, 2010), degree of completeness of their management teams (Keeley and Roure, 1990), and level of capitalization (Duchesneau and Gartner, 1990; Brüderl *et al.*, 1992).

Other researchers have investigated the importance of access to external funding for the survival of start-ups, building on the idea that they are capital constrained. Start-ups' lack of a credit history and reputation together with acute information and incentive problems likely hamper their ability to raise external funding. This in turn precludes them from making optimal profit maximizing choices, thereby reducing their chances of survival. Robb and Robinson (2012) find that firms, including those in the early stages of their life, rely heavily on external debt sources such as bank financing, and less extensively on friends-and-family-based funding sources. Huyghebaert and Van de Gucht (2004) find that unlike established firms, start-ups contract less bank debt when adverse selection and moral hazard problems are potentially high. Holtz-Eakin *et al.* (1994), in turn, document that start-ups launched by entrepreneurs who receive inheritances are more likely to survive.

Our paper is related to the latter studies, but it differs from them in two important respects. Like Robb and Robinson (2012) and Huyghebaert and Van de Gucht (2004), we are interested in the importance of bank funding, but in contrast to them we investigate how access to bank funding impacts start-ups' chances of survival. More importantly, in contrast to Huyghebaert and Van de Gucht (2004) and Holtz-Eakin *et al.* (1994), we attempt to identify the importance for start-ups of securing access to bank funding for an extended period of time. In other words, we want to understand to what extent a decline in uncertainty about future access to bank funding improves the odds of start-ups surviving.

We consider two financial arrangements that firms usually adopt to lock in access to funding for longer periods of time: long-term loans and/or lines of credit. Long-term loans alleviate the risk of early firm closure and liquidation problems induced by short-term debt among firms without access to outside funds to meet debt repayments (e.g., Diamond, 1991, Gertner and Scharfstein, 1991). With regards to credit lines, researchers have put forth several reasons as to why they are valuable, citing, for example, the protection they offer against liquidity shocks (Campbell, 1978) and interest rate changes (Boot *et al.*, 1987), as well as their utility in helping to reduce credit rationing (Thakor, 2005). Importantly, given that credit lines do not offer complete liquidity insurance to borrowers, long-term loans are likely a more effective arrangement for start-ups to secure access to funding for a prolonged period of time.[1] For this reason, we investigate the importance for start-ups of securing access to these two financial arrangements separately.

We capitalize on a rich set of information, which includes balance sheet data and information on bank borrowing for virtually all of the start-ups created in Portugal during a decade from their first year of activity up until their failure or the end of our sample period. We start out by investigating the importance of securing access to *stable* bank funding by taking out long-term bank loans and/or maintaining large portions of undrawn funds in credit lines for start-ups' chances of survival. The results of this part of our investigation show that long-term bank funding is negatively correlated with start-ups' probability of failure, *ceteris paribus*. Our results also show that start-ups with access to undrawn credit lines are able to survive for longer periods of time.

These results suggest that providing start-ups with some assurance with regards to their future access to bank funding is valuable, enabling them to survive for longer periods of time. Even though we control for a large set of firm-specific factors that are likely to help explain start-ups' chances of survival, an obvious concern with our findings is that our proxies for *stable* bank funding are endogenous. Consequently, one may wonder whether our findings could instead be the result of reverse causality: banks granting long-term loans and/or credit lines to (unobservable) better firms. Another concern is that our results may derive from a bank effect, e.g. bank monitoring, as opposed to *certainty* with regards to future access to funding.

1. While borrowers are able to increase draw downs on their credit lines ahead of a rating downgrade by their bank (Santos and Winton, 2019) and ahead of default (Jiménez *et al.*, 2009; Norden and Weber, 2010), they also may experience cuts following a covenant violation (Roberts and Sufi, 2009), a rating downgrade or the failure of a syndicate member bank (Santos and Viswanathan, 2019).

Our results suggest that access to bank funding impacts start-ups' survival, not the other way around. One reason is that we find evidence that access to long-term bank debt and to undrawn credit lines at birth plays an important role on start-ups' chances of survival while accounting for current conditions. Importantly, the effect of accessing long-term bank debt at birth on start-up survival persists over time. We do not find similar evidence in the case of credit lines, possibly because as we discussed above credit lines do not fully insure borrowers against liquidity needs. Further, these findings continue to hold when we restrict our sample to start-ups of entrepreneurs who do not a track record in business, that is, entrepreneurs who did not create other firms in the five years prior to the launch of their current start-up. Given that it is likely difficult for banks to systematically identify winners right at the time firms are born, particularly in the case of entrepreneurs without a track record, these findings suggest that it is indeed valuable for start-ups to secure steady access to bank funding early on.

Another reason in support of this interpretation is that our findings continue to hold when we consider a model that accounts for unobserved heterogeneity – that is, the possibility that our results are driven by differences in the intrinsic quality of firms. Yet another reason is that our findings continue to hold when we instrument for banks' lending decisions using the duration of legal proceedings in the legal jurisdiction the start-ups operate in.

As we noted above, another potential interpretation of our findings is that they could be the result of bank monitoring. That does not appear to be the case because we do not find similar results when we investigate the effects of start-ups' access to short-term bank debt. Of course it is possible that long-term loans and/or credit commitments induce more bank monitoring than short-term loans and that our results derive from this difference. However, according to Diamond (1991) short-term loans are more effective at incentivizing bank monitoring. It is also possible that our findings could derive from the positive signal that start-ups enjoy when they are able to access those funding sources, which could help them in developing their business plans and gaining market share. Short of these caveats, our results suggest that reducing uncertainty about future access to bank funding helps start-ups survive longer, possibly because it offers them insurance against future shocks and/or affords them the opportunity to make investments that they would not consider otherwise. As Diamond and He (2014) show in a dynamic setting with multiple investment opportunities, given that shorter-term debt triggers earlier default, thus eliminating future growth opportunities, this negative force may feed back to today and undermine current investment incentives.

The remainder of the paper is organized as follows. Section 2 presents our empirical methodology. Section 3 presents our data sources and characterizes our sample. Section 4 presents the results of our investigation into the importance of securing access to *stable* bank funding for start-up survival. Section 5 discusses the results of our tests to address concerns with reverse causality. Section 6 concludes with some final remarks.

2. Empirical methodology

We rely on duration analysis which is often used to study problems that involve the passage of time before an event occurs. The event of interest for us is the failure of a start-up. Duration analysis gives us the opportunity to investigate the drivers of the probability that a start-up fails at a certain date conditional on having survived up until that date.

We follow Geroski *et al.* (2010), who use a semiparametric discrete proportional hazard model formally represented by model (1):

$$\log \lambda(t|\mathbf{x}_t) = \lambda_0(t) + \beta \mathbf{x}_t, \tag{1}$$

where $\lambda(t|\mathbf{x})$ is the hazard rate, $\mathbf{x}_t$ is a vector of covariates measured at time t, and β is a vector of coefficients. The term $\lambda_0(t)$ is the baseline hazard function and corresponds to exit rates when the covariates $\mathbf{x}_t$ equal zero.

Our main interest is to understand the importance of securing stable access to bank funding for start-ups' chances of survival. In other words, we want to ascertain whether securing access to bank funding for a prolonged period of time helps start-ups survive longer. We consider two proxies for start-ups' *stable* access to bank funding. The first one is the amount of unused credit in bank credit lines scaled by the total amount of external funding they raised from debt holders (*Credit lines/Total funding*). Credit lines provide a promising way to evaluate the impact of steady access to bank funding because they give firms a "guarantee" of future access to funding.[2] Absent a major deterioration in the bank's financial conditions that precludes it from honoring the credit commitment or a deterioration in the firm's financial conditions that allows the bank to evoke the material adverse clause that is usually part of a credit line contract, firms can draw down their credit lines at their will at the pre-specified rates.[3]

Our second proxy is the amount of long-term funding start-ups raise from banks, again scaled by the total amount of their external funding (*LT bank debt/Total funding*). Long-term debt hedges borrowers against the rollover risk posed by short-term funding (see, for example, Barnea *et al.*, 1980 and Ho and Singer, 1982). It can

2. Credit lines are valuable for other reasons, including to signal the firm is creditworthy (Thakor, 1989; Boot *et al.*, 1987; Kanatas, 1987), reduce the sub-optimal liquidation associated with short-term financing (Houston and Venkataraman, 1996), and mitigate the Myers's (1977) underinvestment problem (Berkovitch and Greenbaum, 1991).

3. Credit line contracts specify a credit spread, which the borrower pays on drawn funds to compensate the bank for the corresponding credit risk, and an undrawn fee that the borrower pays regardless of whether he draws down the credit line. The undrawn fee is to compensate the bank for the liquidity risk it incurs by guaranteeing the firm access to funding at its discretion over the life of the credit line and up to the total commitment amount. See Bord and Santos (2014) and Santos and Viswanathan (2019) for evidence on banks' pricing of credit lines.

also be used to create financial slack and insure access to funding for a prolonged period of time.[4]

Long-term debt provides a higher certainty about future access to bank funding than credit lines because it is not contingent on the firm's or bank's financial condition. On the other hand, to the extent that bank monitoring is valuable to start-ups, a funded loan is more likely to induce monitoring than a commitment to lend. To reduce concerns that our long-term bank debt proxy is primarily picking up a monitoring effect and following Diamond's (1989) insight that short-term loans are more effective at promoting bank monitoring, we control for start-ups' reliance on short-term bank funding as measured by their share of short-term bank debt in total funding (*ST bank debt/Total funding*).

We control for other factors that are likely to affect the likelihood of start-ups' survival, including their leverage as measured by the debt to assets ratio (*Debt/Total assets*), their size as measured by (the logarithm of) turnover ($\ln$ *turnover*), and their ability to pledge collateral as proxied by the portion of their fixed assets in total assets (*Fixed assets/Total assets*). Firms with higher leverage are more likely to fail.[5] Larger firms, on the other hand, usually survive longer (see, for example, Huyghebaert and Van de Gucht, 2004, Mata and Portugal, 1994, 2002, Sharma and Kesner, 1996, and Geroski *et al.*, 2010) possibly because they are more diversified, able to attract better managerial capabilities, less likely to be financially constrained (Fazzari *et al.*, 1988), or more likely to have achieved the efficient scale (Audretsch and Mahmood, 1994). Following the theoretical literature on collateral (see, for example, Bester, 1985 and Chan and Kanatas, 1985), which suggests that low-risk borrowers tend to pledge collateral to signal their quality, we expect start-ups with more fixed assets to survive for longer periods of time.

We also control for start-ups' liquidity and profitability as measured, respectively, by the portion of assets in cash (*Cash/Total assets*), and the ratio of earnings before interest and taxes to sales (*EBIT margin*). Start-ups with more liquidity and higher profitability are likely to survive longer because they are better positioned to meet their financial obligations. Hambrick and D'Aveni (1988) and Silverman *et al.* (1997), for example, document that profitability has a positive impact upon the survival of firms.

Additionally, we control for start-ups' number of bank lending relationships (*No. banks*). Borrowing from a single bank may provide that bank with more incentive to obtain information about the firm, making it easier for the bank to supply a steady stream of funding. However, this will give the bank an informational advantage

4. Consistent with this idea, Mata *et al.* (2010) document that firms that rely on relatively more short-term bank debt are more likely to go bankrupt.

5. We can control for both long-term and short-term bank funding as well as leverage at the same time because leverage is defined over assets and it includes, in addition to bank loans, trade credit, non-bank loans (i.e. loans from investors) and bond financing. Furthermore, our long- and short-term bank funding covariates are defined over the total amount of funding start-ups raised from both debt holders.

and an opportunity to extract rents.[6] For example, Farinha and Santos (2002) show that as start-ups age, those that grow faster and make more investments tend to begin borrowing from multiple banks, possibly to reduce the holdup costs that are likely to emerge from borrowing from a single bank.

Following Mata and Portugal (2002), Cooper *et al.* (1994), and Gimeno *et al.* (1997), who present evidence that firms employing more skilled labor are less likely to fail, we account for the "quality" of the start-up's labor force by controlling for the percentage of workers with a college education (*College*). Lastly, we control for the entry rate in each sector of activity, calculated as the ratio of start-ups in each sector (defined at the 5-digit NACE level) to total firms (*Entry rates*). Dunne *et al.* (1988), Huyghebaert and Van de Gucht (2004) and Geroski *et al.* (2010) document that start-ups are less likely to survive in industries with higher entry rates.

2.1. Endogeneity issues

An important concern with the findings from the first part of our empirical analysis is the presence of endogeneity. It is possible that start-ups with steady access to bank funding survive longer because certainty about access to funding for a prolonged period of time allows them to make better investments or helps them to weather adverse shocks. It is also possible that these firms survive longer because they benefit from the monitoring that comes with bank funding. However, as we argued above to the extent that bank monitoring is valuable we should capture this effect by controlling for start-ups' use of short-term bank debt. More problematic is the possibility that banks grant long term funding or credit lines to start-ups that are good in unobservable ways to us. We carry out three tests in an attempt to reduce concerns about the latter hypothesis.

2.1.1. Initial conditions. Our first test attempts to separate the effect of start-ups' obtaining steady access to bank funding at the time they are born from the importance of securing access to stable bank funding in subsequent years. The effect of securing steady access to bank funding at birth on start-ups' likelihood of survival is less prone to be the result of reverse causality because banks have less information about start-ups' prospects in their formative stage than in subsequent years.

To isolate the effect of securing access to long-term bank funding or a credit line at the outset of a start-up's life, we start by rewriting our model (1) as:

$$\log \lambda(t|\mathbf{x}_t, \mathbf{x}_0) = \lambda_0(t) + \beta\mathbf{x}_t + \gamma\mathbf{x}_0, \quad (2)$$

6. See Santos and Winton (2008), Hale and Santos (2009), and Schenone (2010) for empirical evidence that banks charge higher rates on their loans when they have an informational advantage over borrowers.

where $\mathbf{x}_0$ is the set of covariates measured at date $t = 0$ and γ is a vector of parameters that measure the impact of founding conditions on start-ups' survival, controlling for the current conditions measured by $\mathbf{x}_t$. If current and initial conditions matter for start-up's survival we expect $\beta \neq 0$ and $\gamma \neq 0$, respectively.

A useful variant of equation (2) is:

$$\log \lambda(t|\Delta\mathbf{x}_t, \mathbf{x}_0) = \lambda_0(t) + \beta\Delta\mathbf{x}_t + \theta\mathbf{x}_0, \tag{3}$$

where $\Delta x_t \equiv x_t - x_0$ stands for the difference between current and initial conditions. In this specification, $\theta \equiv \beta + \gamma$ and, therefore, the hypothesis that only current conditions matter in explaining start-ups' probability of survival, i.e. $\gamma = 0$, corresponds to the test that $\theta = \beta$.

The previous model isolates the effects of founding conditions but it does not tell us whether those effects are transitory or permanent. This distinction is relevant because if it is indeed valuable for start-ups to secure access to stable bank funding then we expect that accessing stable bank funding at birth has a long lasting effect. A straightforward way to investigate this hypothesis is to express θ in equation (3) as a function of time:

$$\log \lambda(t|\Delta\mathbf{x}_t, \mathbf{x}_0) = \lambda_0(t) + \beta\Delta\mathbf{x}_t + (\eta + \delta t)\mathbf{x}_0, \tag{4}$$

where $\theta = \eta + \delta t$. Alternatively, we can write equation (4) as:

$$\log \lambda(t|\Delta\mathbf{x}_t, \mathbf{x}_0) = \lambda_0(t) + \beta\Delta\mathbf{x}_t + \eta\mathbf{x}_0 + \delta t\mathbf{x}_0. \tag{5}$$

The model formulated in equation (5) is identical to that formulated in equation (3) when the parameter δ is equal to zero, meaning that the effect of founding conditions on survival is permanent. In turn, if δ is different from zero, it is expected to be negative, and larger (absolute) values of δ imply shorter duration of the effects.

Focusing on the importance of securing access to *stable* bank funding right at the time the start-up is born reduces concerns about selection because banks have less information about firms' prospects at that time. However, start-ups' chances of survival will likely depend on the skills of the entrepreneurs behind them. Further, it is possible that banks have access to information on entrepreneurs' prior business initiatives. To reduce concerns about the implications of this explanation for our findings, we repeat our analysis on the importance of securing access to *stable* bank funding at the time the start-up is launched after we exclude from our sample start-ups whose founders had created other businesses in the prior five years.

2.1.2. Duration model with unobserved heterogeneity. To further reduce concerns about endogeneity, our second test considers a model with unobserved heterogeneity, accounting for the possibility that the results could be driven by differences in the intrinsic quality of start-ups. A relevant empirical issue in the estimation of hazard rates is how to account for unobserved heterogeneity in the level of the hazard function. Unobserved heterogeneity can lead do downward-sloping hazard functions even if the true hazard function is upward sloping or flat (see, for example, Lancaster, 1979 and Heckman and Singer, 1986). To deal with this issue, we estimate the model proposed by Lancaster (1979) that allows for multiplicative unobserved heterogeneity in the level of the hazard function. The conditional hazard rate for that model can be written as follows:

$$\lambda(t|\mathbf{x}_i, \nu_i) = \lambda_0(t)\exp(\mathbf{x}_i'\beta)\nu_i, \tag{6}$$

where ν_i denotes an unobserved heterogeneity term for firm i. We assume that the unobserved heterogeneity term is gamma distributed with unit mean and variance σ^2_ν. Under these conditions, firms with above-average values of ν exit the market faster, meaning that, other things remaining equal, the corresponding hazard rate is higher and, consequently, they survive for shorter periods of time. The opposite holds true for firms with below-average values of ν.

2.1.3. Instrumental variables. In our final test, we attempt to account for the endogeneity of banks' lending decisions through an instrumental variable approach. We instrument our proxy for steady access to bank funding – the ratio of the sum of long-term bank loans and undrawn credit lines to total funding – by considering the duration of enforcement proceedings in the *comarca* (jurisdictional areas in Portugal) where the start-up is located in. Our start-ups are located in 214 *comarcas*. For reference, during the sample period Portugal was divided into 231 *comarcas*.

We argue that the institutional environment is correlated with the risk faced by banks, namely the prospect of firms going bankrupt. While this variable is not directly correlated with start-ups' idiosyncratic probability of failure, it may affect banks' willingness to grant credit, in particular long-term loans. The reason is that in jurisdictional areas where courts take longer to finalize processes, it will be harder for banks to resolve disputes or gain possession of collateral in the event that the borrower becomes financially distressed or fails. This effect will likely be more important for start-ups because of the high rate of failure these firms experience in their initial years of life.

We use a two-stage procedure (see Wooldridge, 2015). In the first stage, we estimate the following equation:

$$b_{it} = \beta_0 + \beta_1 \ln(duration)_j + \gamma X_{it} + \alpha_i + \theta_t + \lambda_s + \varphi_{mb} + u_{it}, \tag{7}$$

where the dependent variable b_{it} is the fraction of stable bank debt in total funding. The variable $\ln(duration)_j$, the logarithm of the duration of enforcement proceedings in the *comarca* j where the start-up is located, is our instrumental variable. The vector X_{it} is the set of exogenous control variables described in the baseline empirical specification (2). The term α_i denotes a set of firm fixed effects, α_{mb} denotes a set of fixed effects of the main bank from which the firm borrows, λ_s is a set fixed effects corresponding to the two-digit sector of economic activity, and φ_t is a set of year fixed effects. The term u_{it} is an error term. We estimate the first-stage equation with OLS and standard errors are robust and clustered at the firm level.

In the second stage of our procedure, we consider the following equation:

$$exit_{it} = \rho_0 + \rho_1 b_{it} + \psi \widehat{u}_{it} + \gamma X_{it} + \alpha_i + \theta_t + \lambda_s + \varphi_{mb} + v_{it}, \quad (8)$$

where $\widehat{u}_{it}$ are the estimated residuals from the first-stage equation, and b_{it} is the endogenous variable. Including the endogenous variable in the second-stage along with the residuals from the first-stage equation allows us to filter out the potential endogeneity problems in the model. The second-stage equation is estimated using a complementary log-log model and standard errors are bootstrapped using 1,000 replications.

3. Data and sample characterization

3.1. Data

The data for this project come from three Portuguese databases. The first dataset is Informação Empresarial Simplificada (IES), which collects annual accounting and financial data for virtually all firms operating in Portugal.[7] We use this dataset to gather balance sheet information an year of formation for each of the start-ups in our sample.

Our second data source is the Central Credit Registry (CRC) of Banco de Portugal, which collects comprehensive information on firms' bank loans. Banco de Portugal requires all entities that extend credit in Portugal to report their activity to the CRC each month. We use this dataset to calculate how much outstanding bank credit and unused amounts in credit lines are to these start-ups at the end of the year.[8] We consider end-of-year data on outstanding bank credit because balance sheet information for start-ups is only available at year end.

Our final dataset is *Quadros de Pessoal* (QP), a matched employer-employee dataset created by the Portuguese Ministry of Employment containing information on employment for all establishments employing at least one wage earner. Data are available from 1986 to 2013 for each wage earner, with the exception of workers

7. The only exceptions are firms operating in the financial intermediation sector, general government, private households with employed persons, international organizations, and other non-resident institutions.

8. Data on loan maturity is only available in CRC since 2009 and therefore we consider firm balance-sheet information to distinguish short- and long-term bank debt. In our sample, the correlation between total credit reported to CRC and that registered in IES is fairly high and equals approximately 82 percent.

of the Public Administration sector and domestic servants.[9] We use this dataset to compute a proxy for each start-up's human capital stock.

3.2. Sample characterization

To build our sample, we start by identifying all of the start-ups created between 2005 and 2014. We drop from our sample start-ups that do not employ any workers. We also drop start-ups that belong to economic groups because they are likely to receive support from their parent corporation and/or benefit from ties to its subsidiaries. We follow Geroski *et al.* (2010) and assume that a firm fails when it stops reporting economic activity for at least two consecutive years. Therefore, a firm fails at year t if it is absent from the IES database, which reports data for virtually all firms operating in Portugal, in years $t+1$ and $t+2$.[10] Since we need the last two years of our sample to identify the start-ups that fail in 2012, we restrict our investigation to start-ups created between 2005 and 2012.

Table 1 presents the number of start-ups, entry rates, and survival rates by founding year. Entry rates are defined as the number of start-ups divided by the total number of firms (start-ups plus incumbents) in a given year. Table 1 confirms that start-ups fail at a high rate: approximately 50 percent of start-ups stop their activity before their seventh year of life. That table also shows that a large fraction of start-ups fails in their first year of life.

Cohort	Start-ups	Entry rate	Survival rates by life duration of start-ups (in percentage)							
			1	2	3	4	5	6	7	8
2005	12,514	3.42	99	92	82	73	65	59	53	48
2006	14,227	3.81	94	85	74	65	58	52	46	
2007	15,100	3.92	93	82	71	63	55	48		
2008	14,642	3.77	94	83	72	62	55			
2009	9,721	3.00	93	83	72	63				
2010	8,883	3.24	95	86	76					
2011	10,143	3.72	95	85						
2012	8,205	3.16	95							

Table 1. New firms and survival rates by cohort.

Notes: The sample period goes from 2005 to 2012.

Table 2 reports descriptive statistics for the variables we consider in our analysis. The table reports statistics for both current conditions and conditions at the time

9. Self-employed individuals who do not employ any other workers are not required to report to *Quadros de Pessoal*. This may explain why many start-ups report to IES but do not report to *Quadros de Pessoal*.

10. If a firm does not report information for one year, say year t, we assume the firm was active during that year and input data for that year as the average of variables between $t-1$ and $t+1$. These gaps represent only 0.68 percent of the observations in our sample of start-ups.

firms are born. We truncate all of the ratio variables at the first and 99 percentiles to limit the effects of outliers. The definitions of all of the variables we use in the analysis are reported in Appendix A.

A quick look at Table 2 reveals that start-ups undergo important changes as they age. Their leverage goes up, fueled by an increase in bank debt. *Total funding* includes bank debt, trade credit, bond financing, personal loans, and unused credit lines; the portion that we classify as *stable* bank funding – long-term bank debt (debt with maturity longer than one year) and unused credit lines – increases significantly as start-ups age. While *Stable funding* represents 15 percent of start-ups' *Total funding* over the sample period, it only accounts for 8 percent of their funding at the time they are born. This increase in *Stable funding* is driven predominantly by additional long-term bank borrowing.

As start-ups age they expand the network of borrowing relationships they have with banks; their turnover goes up as does their performance, although their profit margin continues to be negative on average. Interestingly, the quality of start-ups' labor force does not seem to change significantly: the fraction of workers with a college degree equals 15 percent at birth while the sampling average is approximately 16 percent.

	Full sample			Full sample at birth		
	Count	Mean	St. dev.	Count	Mean	St. dev.
Bank debt/Total funding	302,660	0.25	0.33	70,898	0.17	0.31
LT bank debt/Total funding	302,660	0.12	0.25	70,898	0.06	0.20
Credit lines/Total funding	302,660	0.03	0.08	70,898	0.02	0.07
Stable funding/Total funding	302,660	0.15	0.27	70,898	0.08	0.22
ST bank debt/Total funding	302,660	0.13	0.26	70,898	0.11	0.25
Debt/Total assets	302,660	0.19	0.30	70,898	0.12	0.25
$\ln$ turnover	302,660	11.40	1.41	70,898	10.61	1.44
Fixed assets/Total assets	302,660	0.25	0.24	70,898	0.24	0.24
Ebit margin	302,617	-0.20	0.75	70,895	-0.41	1.08
Cash/Total assets	302,660	0.15	0.19	70,898	0.17	0.20
No. banks	302,660	1.17	1.34	70,898	0.58	0.80
Entry rates	300,473	0.06	0.03	70,898	0.07	0.04
College	241,514	0.16	0.31	52,171	0.15	0.31

Table 2. Summary statistics

Notes: The sample period goes from 2005 to 2012. *Full sample* and *Full sample at birth* refer to the current and founding conditions for our sample of start-ups, respectively.

3.2.1. Start-ups' access to stable bank funding. Table 3 provides a characterization of our sample of 70,898 start-ups established between 2005 and 2012, comparing start-ups that survive up until 2012 to those that fail prior to that year. Columns (1) and (2) report the average value of each covariate for these subsamples computed over the entire sample period. The difference in means is reported in column (3) and the t-statistic (t-stat) for the test of equality of means is reported in column (4).

	(1) Start-ups that survive	(2) Start-ups that fail	(3) Difference	(4) *t*-stat
Bank debt/Total funding	0.2521	0.2573	-0.0052*	-2.31
LT bank debt/Total funding	0.1209	0.0993	0.0216***	12.83
Credit lines/Total funding	0.0332	0.0256	0.0076***	13.46
Stable bank funding/Total funding	0.1541	0.1249	0.0292***	16.41
ST bank debt/Total funding	0.1312	0.1580	-0.0268***	-15.69
Debt/Total assets	0.1866	0.2361	-0.0495***	-24.89
ln turnover	11.4513	10.7768	0.6745***	72.30
Fixed assets/Total assets	0.2499	0.1990	0.0509***	31.55
Ebit margin	-0.1652	-0.5385	0.3733***	75.54
Cash/Total assets	0.1490	0.1479	0.0011	0.87
No. banks	1.1652	1.1958	-0.0306***	-3.42
Entry rates	0.0568	0.0574	-0.0006**	-2.72
College	0.1649	0.1275	0.0374***	14.53

Table 3. Characteristics of start-ups in our sample – over the entire sample period.

Notes: *Start-ups that survive* and *Start-ups that fail* stand for the sub-sample of firms that survived up until 2012 and the sub-sample of firms that failed prior to 2012, respectively. *Difference* is the difference of current means between these two sub-samples and *t-stat* is the t-statistic under the null hypothesis of no difference of means between the two sub-samples. Detailed data definitions are provided in Section 2. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

A quick look at Table 3 shows that the differences between the two groups of start-ups are generally consistent with expectations. Start-ups that fail have higher leverage, are smaller, have less ability to pledge collateral, and perform worse than those that survive. They also have a lower percentage of workers with a college degree, and operate in sectors with slightly higher rates of entry than start-ups that survive. The number of bank lending relationships is slightly higher for start-ups that fail.

Turning our attention to the funding variables we see that start-ups that survive rely more on our two sources of *stable* bank funding – long term bank debt and unused credit lines – than start-ups that fail. In contrast, start-ups that fail rely more on short-term bank debt than those that succeed. These findings are consistent with our prior that having stable access to bank funding increases start-ups' chances of survival. Of course, as we noted above, it could be the case that banks grant long-term credit and extend credit lines only to the best firms and this explains the aforementioned differences.

A simple way to determine whether reverse causality is at play in those findings is to compare start-ups that survive with those that fail not throughout the sample period but at the time they are born. It is arguably more difficult for banks to identify "winners" right at the time start-ups are launched. We report these comparisons in Table 4, which has the same structure as Table 3. Interestingly, we find similar results. Start-ups that begin their activity with a relatively higher amount of stable funding, in particular long-term bank debt, are more likely to survive. In contrast, start-ups that begin their activity with higher amounts of short-term bank debt are more likely to fail.

	(1) Start-ups that survive	(2) Start-ups that fail	(3) Difference	(4) *t*-stat
Bank debt/Total funding	0.1551	0.1830	-0.0279***	-11.64
LT bank debt/Total funding	0.0655	0.0505	0.0150***	9.61
Credit lines/Total funding	0.0216	0.0218	-0.0001	-0.23
Stable bank funding/Total funding	0.0871	0.0723	0.0149***	8.87
ST bank debt/Total funding	0.0896	0.1324	-0.0429***	-21.93
Debt/Total assets	0.1275	0.1118	0.0156***	7.97
ln turnover	10.7310	10.4241	0.3069***	27.62
Fixed assets/Total assets	0.2513	0.2176	0.0337***	18.35
Ebit margin	-0.3151	-0.5624	0.2474***	29.76
Cash/Total assets	0.1759	0.1504	0.0255***	16.72
No. banks	0.5471	0.6424	-0.0953***	-15.41
Entry rates	0.0625	0.0694	-0.0069***	-23.49
College	0.1650	0.1278	0.0372***	13.26

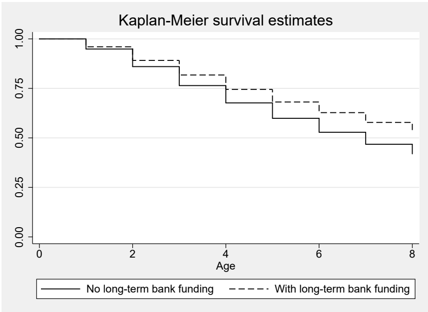
Table 4. Characteristics of start-ups in our sample – at founding year.

Notes: *Start-ups that survive* and *Start-ups that fail* stand for the sub-sample of firms that survived up until 2012 and the sub-sample of firms that failed prior to 2012, respectively. *Difference* is the difference of means between these two sub-samples at founding and *t-stat* is the *t*-statistic under the null hypothesis of no difference of means between the two sub-samples. Detailed data definitions are provided in Section 2. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

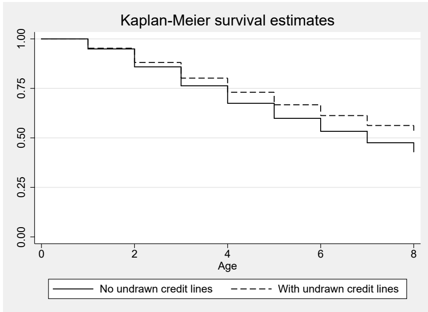
The univariate comparisons we have reported thus far while informative do not account for the fact that the amount of information available varies across start-ups. For example, the maximum age for start-ups born in 2005, the first year of our sample, is eight years. In contrast, the maximum age for start-ups born in 2012, the last year for which we can consider new firms, is only two years. A way to overcome this limitation is to use the Kaplan-Meier survival function, which gives the fraction of start-ups that survive a given number of years after they are born.

The estimates of the Kaplan-Meier survival function for start-ups with (and without) long-term bank financing, and for start-ups with (and without) unused credit lines are plotted in the left and right figures, respectively, of Figure 1. As we can see from these figures, start-ups with access to long-term bank funding fail at a lower rate than those that do not have access to this source of funding and the difference increases as firms age. Approximately 24 percent of start-ups with no long-term bank debt do not survive for more than three years and more than 53 percent of them fail before their sixth year of life. Only about 42 percent of those start-ups survive for eight years. Failure rates are lower for the case of start-ups with access to long-term bank loans, with approximately 54 percent of them surviving for at least eight years.

The same insights hold with respect to start-ups' access to unused credit lines. Among start-ups that do not have unused credit lines, only about 43 percent survive for eight years. In contrast, about 52 percent of start-ups with unused credit lines are able to survive for at least eight years.



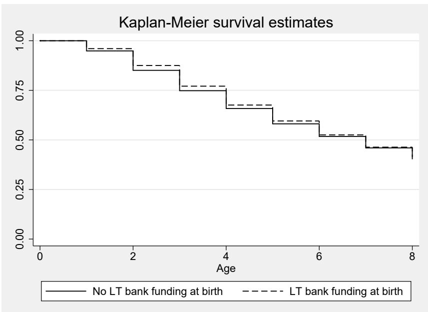
(a) Current long-term bank debt



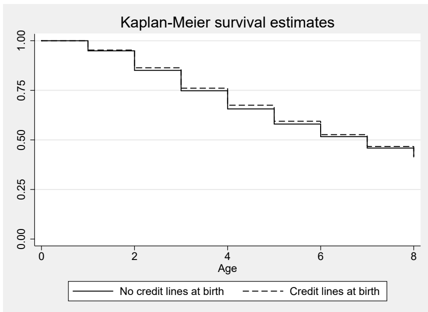
(b) Current credit lines

Figure 1: Kaplan-Meier survival function by current bank financing position.

Panels (a) and (b) in Figure 3 depict the estimates of the Kaplan-Meier survival function but this time comparing start-ups with access to long-term bank financing and unused credit lines to those with no access to these forms of funding at birth, respectively. While there is only a small difference between the two sets of start-ups in each exercise, it is worth noting that both start-ups that have access to long-term bank funding at the time they are born and those with unused credit lines at the time they are born are more likely to survive at all ages than their counterparts that do not have access to these funding sources at birth.



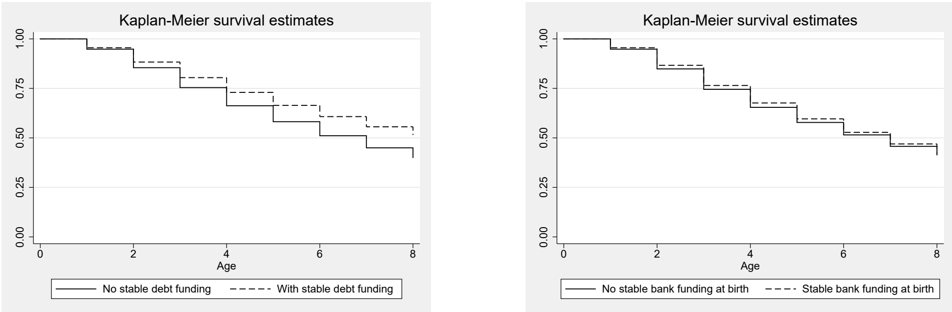
(a) Long-term bank debt at birth



(b) Credit lines at birth

Figure 2: Kaplan-Meier survival function by bank financing position at birth.

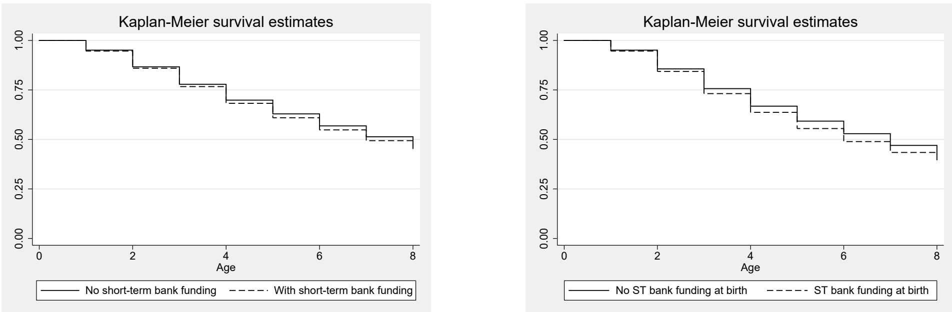
For completeness, we show in Figure 4 the estimates of the Kaplan-Meier survival function for start-ups with and without short-term bank debt. Panel (a) shows the estimates for start-ups' current use of short-term bank debt *versus* those that do not use this funding source. Panel (b) shows a similar comparison but for start-ups' use of short-term bank funding at the time they are born. In contrast with our previous results on unused credit lines and long-term bank debt, we do not find that the use of short-term bank funding is always positively correlated with start-ups' chances of survival. In fact, start-ups that rely more on short-term bank



(a) Current stable bank debt (b) Stable bank debt at birth

Figure 3: Kaplan-Meier survival function by access to stable bank financing.

funding at birth are less likely to survive at all ages than those that do not rely on this funding source.



(a) Current short-term bank debt (b) Short-term bank debt at birth

Figure 4: Kaplan-Meier survival function by access to short-term bank debt.

In sum, the findings from our univariate comparisons along with those based on the Kaplan-Meier survival functions are consistent with our prior that an increase in certainty about the future availability of bank funding is valuable to start-ups. Both start-ups with access to long-term bank debt and those with access to unused credit lines are able to survive longer. However, it is worth noting that neither of the exercises we carried out in this section account for other factors that likely help to explain start-ups' chances of survival. In addition, they can be the result of bank selection. In the next section, we attempt to address both of these issues.

4. Does access to *stable* bank funding help start-ups survive longer?

We begin our empirical investigation by estimating model (1). This model tells us whether start-ups' current use of the two proxies we consider to measure their access to *stable* bank funding – the fractions of long-term bank debt and unused credit lines in the total funding they raised from debt holders – help explain the length of time they are able to survive. We attempt to identify these effects by controlling for a set of factors, described in the methodology section, that are likely to affect start-ups' chances of survival. These factors include size, leverage, short-term bank borrowing, profitability, and ability to pledge collateral. We also include a set of dummy variables for the main bank of the firm to account for bank-level heterogeneity constant over time.[11] In addition, we include a set of 2-digit NACE level dummy variables to control for industry-specific factors, and year dummy variables to account for common macroeconomic factors.[12] Lastly, we consider the logarithm of duration to control for duration dependence, that is, how the hazard rate varies with survival times.

The results of this investigation are reported in Table 5. Looking at column (1), we see that start-ups with access to larger amounts of *stable* bank funding (*Stable bank debt/Total funding*) are able to survive longer. Turning our attention to column (2), where we split our measure of *stable* bank funding into its two components – long-term bank debt and undrawn credit lines – we see that both variables have the same directional effect and are highly statistically significant. In other words, start-ups with more access to long-term bank debt and those with access to credit lines with larger amounts of undrawn funds (both scaled by total funding) are able to survive longer. Interestingly, both columns also suggest that access to short-term bank funding is beneficial to start-ups (more on this below).

Looking at the remaining controls we see they all produce the expected results. Larger start-ups, more profitable start-ups as well as start-ups with more fixed assets survive longer. Consistent with Mata and Portugal (2002), Cooper *et al.* (1994), and Gimeno *et al.* (1997) our results also show that start-ups with more employees with a college degree survive longer. In contrast, start-ups with higher levels of leverage survive for shorter periods of time, as do those in sectors with higher entry rates. The latter result is consistent with findings by Dunne *et al.* (1988), Huyghebaert and Van de Gucht (2004) and Geroski *et al.* (2010) that start-ups in competitive industries are less likely to survive. Our results also show that start-ups that borrow from a larger number of banks survive for shorter periods of time. This is in line with a finding by Farinha and Santos (2002) that start-ups that are doing poorly tend to start borrowing from multiple banks sooner than high performance start-ups. Lastly, the dummy variables for sector of economic activity, main bank, and time are jointly statistically significant, suggesting the presence of sector effects, heterogeneity across banks, and aggregate time effects.

11. The main bank of the firm is computed using the consolidated amount of debt in each bank in each year.

12. Geroski *et al.* (2010), Boeri and Bellmann (1995), and Ilmakunnas and Topi (1999) find that macroeconomic conditions matter for firms survival and that young firms are the more likely to suffer in adverse states of the economy.

	(1) Exit	(2) Exit
Stable funding/ Total funding	-0.6600***	
	(0.0445)	
LT bank debt/Total funding		-0.5717***
		(0.0460)
Credit lines/Total funding		-1.3513***
		(0.1198)
ST bank debt/Total funding	-0.1616***	-0.1438***
	(0.0384)	(0.0385)
Debt/Assets	0.4057***	0.3802***
	(0.0348)	(0.0353)
$\ln$ turnover	-0.3982***	-0.3961***
	(0.0105)	(0.0105)
Fixed assets/Total assets	-1.2612***	-1.2853***
	(0.0525)	(0.0526)
Ebit margin	-0.1780***	-0.1792***
	(0.0108)	(0.0108)
Cash/Total assets	-0.0039	0.0005
	(0.0621)	(0.0620)
No. banks	0.1894***	0.1902***
	(0.0084)	(0.0084)
Entry rates	1.3023***	1.3295***
	(0.3383)	(0.3375)
College	-0.3770***	-0.3707***
	(0.0414)	(0.0414)
$\ln$ Time	0.1659***	0.1617***
	(0.0216)	(0.0216)
constant	-0.5438**	-0.5543**
	(0.2196)	(0.2197)
N	157,018	157,018

Table 5. Bank funding and start-ups' probability of exit: current conditions

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. Detailed data definitions are provided in Section 2. Complementary log-log estimates with asymptotic standard errors in parentheses. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

The initial results from our duration analysis are in line with our univariate findings and suggest that a reduction in the uncertainty about future access to bank funding, as captured by start-ups' access to unused credit lines or long-term bank debt, is valuable to start-ups. Our duration analysis also suggests that access to short-term bank debt is valuable to start-ups, although it does not appear to be as important as their access to long-term bank debt. In the remainder of this section we investigate the robustness of these findings.

4.1. Isolating the importance of accessing stable funding

4.1.1. Access to stable funding at birth. An important concern with our initial results is that they could derive from selection: banks grant long-term loans and/or credit lines to the best (unobservable) start-ups and this explains why they survive for longer periods of time. Given that it is arguably more difficult for banks to identify winners right at the time firms are born, our first attempt to address that endogeneity problem is to estimate separately the effect of gaining access to *stable* bank funding at birth from the effect of current access to *stable* bank funding. To that end, we estimate the model formulated in equation (3). According to this model, failure to reject the null hypothesis $H_0 : \theta = \beta$ means that only current conditions matter in terms of explaining start-ups' survival probability.

The results of this investigation are reported in Table 6. The *p*-values under the null hypothesis that only current conditions matter $H_0 : \beta = \theta$ are reported at the bottom of Table 6. The full set of estimates is reported in the Appendix Table B.1. Looking at the estimates reported in column (1), which investigates the importance of *stable* bank funding, we see that we can reject the null hypothesis that only current conditions matter for start-ups' survival, though, only at a 10 percent significance level.

Looking at column (2) we see that there is a significant difference on the importance of the two drivers of *stable* bank funding. While we can reject the hypothesis that only current access to long-term bank debt matters, we fail to reject this null hypothesis in the case of unused credit lines. This suggests that start-ups' access to long-term bank debt at the time they are born helps them survive longer. In contrast, their access to unused commitments at the time they are born does not seem to help explain their chances of survival. Interestingly, according to the results shown in columns (1) and (2) we fail to reject the null hypothesis in the case of short-term bank debt, indicating that access to this funding source at the time the start-up is born is not a determinant of its chances of survival.

While the tests produce mixed results for our two proxies for *stable* access to bank funding, it is reassuring to see that we find the result in the case of long-term bank debt, which is arguably a better way for start-ups to guarantee access to bank funding for a prolonged period of time. In the case of credit lines, the absence of a similar effect is not entirely unexpected because as we note in the introduction they do not provide complete liquidity insurance. In other words, there is always the risk of firms being unable to fully utilize their credit lines.[13] That risk emerges because credit lines may experience cuts following a covenant violation (Roberts and Sufi, 2009), a rating downgrade by the bank or the failure of a syndicate member bank (Santos and Viswanathan, 2019).

13. The absence of an effect in the case of credit lines may also be related to the fact that only about 19 percent of start-ups have credit lines at birth.

	(1) Exit	(2) Exit	(3) Exit	(4) Exit
Stable funding/Total funding_0	-0.5911***		-0.5098***	
	(0.0638)		(0.1007)	
Decay Stable funding/Total funding_0			-0.0753	
			(0.0896)	
Δ Stable funding/Total funding_0	-0.6835***		-0.6623***	
	(0.0588)		(0.0622)	
LT Bank debt/Total funding_0		-0.4671***		-0.3979***
		(0.0726)		(0.1117)
Decay LT Bank debt/Total funding_0				-0.0602
				(0.1077)
Δ LT Bank debt/Total funding		-0.6050***		-0.5824***
		(0.0620)		(0.0648)
Credit lines/Total funding_0		-1.2564***		-1.1523***
		(0.1427)		(0.1962)
Decay Credit lines/Total funding_0				-0.0936
				(0.1494)
Δ Credit lines/Total funding		-1.3694***		-1.3427***
		(0.1512)		(0.1608)
ST Bank debt/Total funding_0	-0.1370**	-0.1079*	-0.1268	-0.1002
	(0.0557)	(0.0566)	(0.0839)	(0.0849)
Decay ST Bank debt/Total funding_			0.0087	0.0080
			(0.0789)	(0.0801)
Δ ST Bank debt/Total funding	-0.1785***	-0.1604***	-0.1207**	-0.1027*
	(0.0533)	(0.0534)	(0.0569)	(0.0569)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1007		0.1772	
LT bank debt/Total funding		0.0532		0.1422
Credit lines/Total funding		0.1509		0.3534
ST bank debt/Total funding	0.4451	0.3445	0.9506	0.9800
No. of observations	113,871	113,871	113,871	113,871

Table 6. Bank funding and start-ups' probability of exit: initial conditions, current conditions, and decay

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include the full set of control variables discussed in Section 2, dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. The full set of estimates is reported in the Appendix Table B.1. Detailed data definitions are provided in Section 2. Complementary log-log estimates with asymptotic standard errors in parentheses. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

It is also reassuring to see that in contrast to long-term bank debt, access to short-term bank debt at the time the firm is born does not help to explain its chances of survival. This difference is important because it suggests that our finding on long-term bank debt is not entirely driven by a "bank effect", that is, monitoring that is triggered by any kind of bank debt.

4.1.2. Is the effect at birth persistent? The exercise we carried out in the previous section identifies separately the effects of covariates at birth from the importance of current conditions for start-ups' probability of survival. That exercise, however, is mute as to whether the effects of founding conditions are transitory or permanent. Determining whether the effects of start-ups' access to *stable* bank funding at time of launch persist as they age helps us establish the importance of securing access to bank funding for a prolonged period of time. Also, comparing the future impact of accessing long-term bank debt at birth to that of accessing short-term bank debt at birth will help us further reduce concerns that our results are not solely driven by banks' decision to grant fudning to those start-ups at launch.

The results of our investigation into whether the impact of the founding conditions decays over time are reported in columns (3) and (4) of Table 6. They correspond to the estimation of the model presented in equation 5. In this exercise, the hypothesis that the coefficients of the decay terms are not statistically significant corresponds to the null hypothesis $H_0 : \delta = 0$ and means that the effect of the initial conditions persists over time. We consider the logarithm of time to model the decay parameter.

The estimates reported in columns (3) and (4) of Table 6 confirm that there are important differences in the future impact of start-ups' access to *stable* bank funding at the time they are born. According to the estimates of the decay coefficients presented in column (3), we fail to reject the null hypothesis of no decay in the case of *Stable funding* (the estimated coefficient associated with the variable *Decay Stable funding/Total funding*_0 is not statistically significant), suggesting that the impact of accessing *stable* bank funding at the time the firm is born persists over time. According to the estimates reported in column (4), we also fail to reject the null hypothesis of no decay in the impact of accessing both long-term bank debt and credit lines at birth (the estimated coefficients associated with *Decay LT Bank debt/Total funding*_0 and *Decay Credit lines/Total funding*_0, respectively, are not statistically significant). In line with the findings in our previous test, according to the estimates reported in columns (3) and (4), the impact of accessing short-term bank debt at birth is not statistically significant (*ST Bank debt/Total funding*_0).[14]

These results add further support to the thesis that securing access to *stable* bank funding helps start-ups survive for longer periods of time. Further, the striking difference between the impacts of accessing long-term and short-term bank debt adds support to our assertion that our finding is not solely determined by a bank effect i.e. bank monitoring. For, in this case we would expect to find a similar pattern for the impact of short- and long-term bank debt on start-ups' chances of survival.

14. Overall, a global test of joint significance of the decay coefficients of all variables included in the models presented in columns (3) and (4) of Table 6 (including the remaining control variables) leads to the rejection of the null hypothesis of permanent effects.

4.1.3. Accounting for entrepreneurs' business track records. In the test above we argued that the effect of accessing stable bank funding at birth is less prone to be driven by selection because banks have less information about the prospects of start-ups at the time they are born than in subsequent years. However, it could still be the case that banks have valuable information about entrepreneurs. In this case, the effect we identified from accessing stable bank funding at birth could derive from banks granting long-term loans and/or credit lines at the time start-ups are born to entrepreneurs that have prior business experience and are therefore more likely to have a credit reputation with a bank.

We are able to address this concern, because one of our data sources, *Quadros de Pessoal*, contains information on the identity of the owner(s) of each firm. This gives us the opportunity to ascertain whether entrepreneurs have or had other businesses in the past. Using this information, we started by identifying the start-ups in our sample whose entrepreneur(s) did not have other businesses at any time in the five years prior to the establisment of the new start-up. We found that 58,046 of 70,898 start-ups in our sample meet these conditions. Next, we replicated our analysis for that sample of 58,046 start-ups.

The results of this exercise are reported in Table 7, which is similar to Table 6.[15] Columns (1) and (2) report the results of equation (3) while columns (3) and (4) report the results of equation (4). Recall that the former equation isolates the effects of founding conditions from current conditions on start-ups' chances of survival while the latter equation investigates whether the effects of founding conditions are temporary.

A careful examination of Table 7 and Table 6 shows that dropping from the sample those start-ups whose entrepreneurs already have a business track record at the time they establish the new start-up does not impact our findings on the importance of accessing *stable* bank funding, in particular long-term bank loans, at birth for the survival of start-ups. This finding is important because it further reduces concerns that bank selection drives our results, thereby adding support to our thesis that securing access to bank funding for a prolonged period of time reduces start-ups' risk of failure.

4.1.4. Unobserved heterogeneity. To further reduce concerns about the endogeneity of our proxies for start-ups' access to *stable* bank funding, in our second test we reestimate the model reported in equation 5 this time using a model that accounts for unobserved heterogeneity at the firm level. The results of this investigation are reported in Table 8. These results were obtained by fitting a complementary log-log model with gamma unobserved heterogeneity in order to limit potential endogeneity arising from the presence of unobserved idiosyncratic characteristics of the firm.

15. The full set of estimates is reported in the Appendix Table B.4.

	(1) Exit	(2) Exit	(3) Exit	(4) Exit
Stable funding/Total funding_0	-0.5496***		-0.5024***	
	(0.0703)		(0.1112)	
Decay Stable funding/Total funding_0			-0.0283	
			(0.0990)	
Δ Stable funding/Total funding_0	-0.6360***		-0.5982***	
	(0.0649)		(0.0686)	
LT Bank debt/Total funding_0		-0.4376***		-0.4041***
		(0.0792)		(0.1227)
Decay LT Bank debt/Total funding_0				-0.0080
				(0.1183)
Δ LT Bank debt/Total funding		-0.5830***		-0.5435***
		(0.0683)		(0.0713)
Credit lines/Total funding_0		-1.0942***		-1.0482***
		(0.1568)		(0.2160)
Decay Credit lines/Total funding_0				-0.0250
				(0.1653)
Δ Credit lines/Total funding		-1.1667***		-1.1160***
		(0.1662)		(0.1771)
ST Bank debt/Total funding_0	-0.1334**	-0.1065*	-0.1234	-0.0999
	(0.0615)	(0.0624)	(0.0927)	(0.0937)
Decay ST Bank debt/Total funding_0			0.0178	0.0186
			(0.0872)	(0.0883)
Δ ST Bank debt/Total funding	-0.1614***	-0.1489**	-0.0948	-0.0821
	(0.0592)	(0.0592)	(0.0632)	(0.0633)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1618		0.4428	
LT bank debt/Total funding		0.0585		0.3120
Credit lines/Total funding		0.4050		0.7654
ST bank debt/Total funding	0.6423	0.4891	0.7935	0.8712
No. of observations	90,760	90,760	90,760	90,760

Table 7. Bank funding and start-ups' probability of exit: restricted sample

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include the full set of control variables discussed in Section 2, dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. The full set of estimates is reported in the Appendix Table B.2. Detailed data definitions are provided in Section 2. Complementary log-log estimates with asymptotic standard errors in parentheses. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

Even though the *p*-values for the likelihood ratio test of gamma heterogeneity equal zero, which is consistent with the presence of unobserved heterogeneity, comparing the results reported in Table 6 with those reported in Table 8 we see that the point estimates are stable and maintain the level of statistical significance in most cases. This is important because it means that even if there is some unobserved heterogeneity in our model, it does not lead our estimates to be substantially biased. In particular, we continue to find that start-ups that have access to long-term bank debt at the time they are born survive longer. As before, we do not find a similar result in the case of access to credit lines. Also, in line with our previous findings, we see that accessing short-term bank debt at birth does not help start-ups survive longer.

	(1) Exit	(2) Exit	(3) Exit	(4) Exit
Stable funding/Total funding_0	-0.6239***		-0.5342***	
	(0.0675)		(0.1068)	
Decay Stable funding/Total funding_0			-0.1238	
			(0.0967)	
Δ Stable funding/Total funding_0	-0.7026***		-0.7069***	
	(0.0610)		(0.0669)	
LT Bank debt/Total funding_0		-0.4880***		-0.4070***
		(0.0765)		(0.1185)
Decay LT Bank debt/Total funding_0				-0.0935
				(0.1170)
Δ LT Bank debt/Total funding		-0.6254***		-0.6257***
		(0.0643)		(0.0697)
Credit lines/Total funding_0		-1.3225***		-1.2425***
		(0.1490)		(0.2078)
Decay Credit lines/Total funding_0				-0.1351
				(0.1584)
Δ Credit lines/Total funding		-1.4105***		-1.4212***
		(0.1564)		(0.1709)
ST Bank debt/Total funding_0	-0.1431**	-0.1108*	-0.1276	-0.0963
	(0.0586)	(0.0597)	(0.0896)	(0.0908)
Decay ST Bank debt/Total funding_0			0.0071	0.0095
			(0.0853)	(0.0867)
Δ ST Bank debt/Total funding	-0.1919***	-0.1736***	-0.1407**	-0.1211**
	(0.0554)	(0.0555)	(0.0616)	(0.0617)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1865		0.1503	
LT bank debt/Total funding		0.0677		0.1020
Credit lines/Total funding		0.2949		0.4081
ST bank debt/Total funding	0.3968	0.2869	0.9014	0.8165
LR gamma variance (*p*-value)	0.0011	0.0007	0.0000	0.0000
No. of observations	113,871	113,871	113,871	113,871

Table 8. Bank funding and start-ups' probability of exit: accounting for unobserved heterogeneity

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include the full set of control variables discussed in Section 2, dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. The full set of estimates is reported in the Appendix Table B.2. Detailed data definitions are provided in Section 2. Complementary log-log estimates accounting for unobserved heterogeneity with asymptotic standard errors in parentheses. The LR gamma variance (*p*-value) reported are the p-values associated with the likelihood ratio test of gamma heterogeneity. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

4.1.5. Instrumental variables. In our last test, we attempt to account for the endogeneity of start-ups' selection of our proxies for stable access to bank funding by relying on an instrumental variable approach. We use the quality of the legal system in the jurisdictional area (*comarca*) in which the start-up operates – as measured by the duration of legal proceedings – as an instrumental variable for start-ups' access to *stable* bank funding. The descriptive statistics of the instrument are reported in the Appendix Table B.3. The mean duration of a legal proceeding in our sample is approximately 33 months with considerable variation in the duration of legal proceedings across legal jurisdictions. The estimation results of the first-stage equation are presented in column (1) of Table 9 and the second-stage estimates are presented in column (2) of the same table.

According to the estimates reported in column (1), the firm's ratio of stable bank funding to total funding (*Stable bank funding/Total funding*) is negatively correlated with (the logarithm of) the duration of enforcement proceedings, which corroborates the idea that banks' willingness to grant stable funding – long-term loans and credit lines – depends on the efficiency of the courts in the regions where start-ups are located.[16] The instrument is statistically significant at the 1% significance level and the associated t-ratio equals -4.66, confirming that banks are more willing to grant start-ups access to stable funding when they operate in legal jurisdictions where courts decide cases faster.

Looking at column (2), which reports the results of the second stage, we see that the new results confirm our previous findings that access to *stable* bank debt helps start-ups survive longer. Note that the estimated coefficient associated with *Stable bank funding/Total funding* is negative and highly statistically significant in column (2). This finding further reduces concerns that our results are driven by bank selection and therefore adds support to the key insight of our paper that securing access to bank funding for an extended period of time helps start-ups survive longer.

16. In this exercise we focus on our measure of stable bank funding (*Stable bank funding/Total funding*) as opposed to its two determinants (long-term bank debt and unused credit lines) because we do not have instrumental variables for each of them.

	(1) Stable funding/Total funding	(2) Exit
ln Duration	-0.0202***	
	(0.0043)	
Stable bank funding/Total funding		-5.4164***
		(1.6874)
ST Bank debt/Total funding	-0.5018***	-2.5531***
	(0.0040)	(0.8490)
Debt/Assets	0.2151***	1.4313***
	(0.0063)	(0.3659)
ln turnover	-0.0090***	-0.4422***
	(0.0016)	(0.0193)
Fixed assets/Total assets	0.1474***	-0.5554**
	(0.0074)	(0.2594)
Ebit margin	0.0098***	-0.1304***
	(0.0018)	(0.0197)
Cash/Total assets	0.0734***	0.3388**
	(0.0071)	(0.1422)
No. banks	0.0384***	0.3737***
	(0.0010)	(0.0650)
Entry rates	-0.0494	0.9391***
	(0.0388)	(0.3304)
College	0.0090	-0.3387***
	(0.0061)	(0.0457)
ln Time	-0.0057	0.1403***
	(0.0046)	(0.0227)
1^{st} stage residuals		4.7607***
		(1.6869)
constant	0.2357***	0.1885
	(0.0316)	(0.3656)
Firm FE	Yes	No
No. of observations	154,632	154,632
Adj. R^2	0.381	

Table 9. Stable bank funding and the probability of exit: IV approach

Notes: The dependent variable in column (1) is the fraction of stable bank debt (long-term bank debt and undrawn credit lines) on total funding and in column (2) is a dummy variable equal to one if the firm exits the market and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. Detailed data definitions are provided in Section 2. Both specifications include dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. OLS estimates with robust standard errors clustered at the firm level in column (1). Complementary log-log estimates with bootstrap (1,000 replications) standard errors in parentheses in column (2). ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

5. Final remarks

It is well established that start-ups are a key driver of economic growth. There is also overwhelming evidence that start-ups fail at high rates during the early years of their lives. Yet, our understanding of the root causes of these failures is limited mostly because we still lack comprehensive information about start-ups. In this paper, we capitalize on a set of databases that enable us to follow virtually all Portuguese start-ups right from the beginning of their lives, tracking their evolution over time, including their business and funding choices. Using these data, we investigate the importance that securing stable access to bank funding has for the survival of start-ups. We focus on the importance for start-ups of securing access to funding for an extended period of time because uncertainty about future funding availability will likely hamper firms' investment decisions and reduce their ability to weather shocks.

Our findings that start-ups with more access to long-term bank loans and those with more available credit in their credit lines survive longer are consistent with the idea that it is valuable to have certainty about access to funding. A concern with this interpretation, however, is that these start-ups may survive longer because banks grant long-term loans or credit lines to start-ups that are better in ways that we do not observe. This does not appear to be the entire reason for that evidence. First, start-ups that access these funding sources, in particular long-term loans, right at the beginning of their lives (when it is arguably more difficult for banks to identify winners) survive longer. Also, the importance of accessing long-term loans at birth to a start-ups' future chances of survival does not decay as the firm ages. In addition, these findings continue to hold when we restrict our sample to start-ups founded by entrepreneurs without a business track record, which makes it even more difficult for banks to identify likely winners among newly launched start-ups.

Second, our findings are robust to accounting for unobserved heterogeneity by incorporating a gamma mixture distribution in the estimated duration model. Lastly, our findings continue to hold when we instrument for banks' lending decisions by using the duration of legal proceedings in the legal jurisdiction in which the firm is located.

Another potential alternative explanation for our findings is that they derive instead from the monitoring banks conduct after they grant funding, which helps start-ups survive longer. It is possible that bank monitoring plays a role in our findings, but it does not appear to be the sole driver. Following Diamond (1989), when banks choose to monitor their borrowers they shorten the maturity of their loans. Yet, according to our findings, accessing short-term bank loans does not yield similar results to those we obtain on long-term bank loans. This suggests that securing access to bank funding for an extended period of time helps start-ups survive longer for reasons that go beyond bank monitoring.

Our findings suggest some potentially fruitful ideas for future research. For example, implicit in our results is the idea that start-ups that are able to reduce uncertainty about their future access to bank funding "perform" better. It would be interesting to investigate, for example, whether these start-ups do indeed make more investments. Similarly, it would be interesting to study whether these start-ups do better in response to external shocks.

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Appendix A: Variable definitions

Bank debt/Total funding: Ratio of the sum of firm's short- and long-term bank debt over total funding, where total funding is the sum of bank debt, trade credit, bond financing, personal loans, and unused credit lines.
LT bank debt/Total funding: Ratio of firm's long-term bank debt (bank debt with maturity longer than one year) over total funding.
Credit lines/Total funding: Ratio of firm's unused amount in credit lines over total funding.
Stable funding/Total funding: Ratio of the sum of firm's long-term bank debt and unused credit lines over total funding.
ST bank debt/Total funding: Ratio of firm's short-term bank debt (bank debt with maturity shorter than one year) over total funding.
Debt/Total assets: Ratio of firm's debt - sum of bank debt and other financial debt - over total assets.
$\ln$ *turnover*: Logarithm of firm's turnover.
Fixed assets/Total assets: Ratio of firm's fixed assets over total assets.
Ebit margin: Ratio of firm's earnings before interest and taxes over sales.
Cash/Total assets: Ratio of firm's cash over total assets.
No. banks: Firm's number of bank lending relationships.
Entry rates: Ratio of new firms to total firms (new firms plus incumbents) in each sector defined at the 5-digit NACE level.
College: Percentage of workers with college education.

Appendix B: Appendix: Additional results

Table B.1. Bank funding and probability of exit: initial conditions, current conditions, and decay

	Exit	Exit	Exit	Exit
Stable funding/Total funding_0	-0.5911***		-0.5098***	
	(0.0638)		(0.1007)	
Decay Stable funding/Total funding_0			-0.0753	
			(0.0896)	
Δ Stable funding/Total funding_0	-0.6835***		-0.6623***	
	(0.0588)		(0.0622)	
LT Bank debt/Total funding_0		-0.4671***		-0.3979***
		(0.0726)		(0.1117)
Decay LT Bank debt/Total funding_0				-0.0602
				(0.1077)
Δ LT Bank debt/Total funding		-0.6050***		-0.5824***
		(0.0620)		(0.0648)
Credit lines/Total funding_0		-1.2564***		-1.1523***
		(0.1427)		(0.1962)
Decay Credit lines/Total funding_0				-0.0936
				(0.1494)
Δ Credit lines/Total funding		-1.3694***		-1.3427***
		(0.1512)		(0.1608)
ST Bank debt/Total funding_0	-0.1370**	-0.1079*	-0.1268	-0.1002
	(0.0557)	(0.0566)	(0.0839)	(0.0849)
Decay ST Bank debt/Total funding_0			0.0087	0.0080
			(0.0789)	(0.0801)
Δ ST Bank debt/Total funding	-0.1785***	-0.1604***	-0.1207**	-0.1027*
	(0.0533)	(0.0534)	(0.0569)	(0.0569)
Debt to assets_0	0.3776***	0.3282***	0.1362	0.0858
	(0.0574)	(0.0617)	(0.0916)	(0.0963)
Decay Debt to assets_0			0.3035***	0.3129***
			(0.0830)	(0.0879)
Δ Debt to assets	0.4628***	0.4427***	0.4584***	0.4373***
	(0.0457)	(0.0467)	(0.0457)	(0.0464)
$\ln$ Turnover_0	-0.3711***	-0.3696***	-0.2453***	-0.2452***
	(0.0130)	(0.0130)	(0.0193)	(0.0193)
Decay $\ln$ Turnover_0			-0.1406***	-0.1391***
			(0.0163)	(0.0164)
Δ $\ln$ Turnover	-0.5350***	-0.5322***	-0.5632***	-0.5606***
	(0.0159)	(0.0160)	(0.0163)	(0.0163)
Fixed assets/Total assets_0	-1.1724***	-1.2038***	-1.2699***	-1.3021***
	(0.0690)	(0.0693)	(0.1102)	(0.1107)
Decay Fixed assets/Total assets_0			0.1038	0.1046
			(0.0961)	(0.0965)
ΔFixed assets/Total assets	-1.1642***	-1.1857***	-1.0999***	-1.1205***
	(0.0810)	(0.0811)	(0.0827)	(0.0829)
Ebit margin_0	-0.1363***	-0.1376***	-0.1744***	-0.1754***
	(0.0128)	(0.0128)	(0.0132)	(0.0132)
Decay Ebit margin_0			0.0001	0.0001
			(0.0030)	(0.0030)
ΔEbit_margin	-0.1321***	-0.1336***	-0.1704***	-0.1715***

continued

	(0.0128)	(0.0128)	(0.0132)	(0.0132)
Cash/Total assets_0	-0.0955	-0.0866	-0.0266	-0.0151
	(0.0852)	(0.0853)	(0.1371)	(0.1372)
Decay Cash/Total assets_0			-0.0464	-0.0504
			(0.1222)	(0.1223)
Δ Cash/Total assets	0.1212	0.1272	0.1702*	0.1749*
	(0.0853)	(0.0854)	(0.0894)	(0.0894)
No. banks_0	0.2419***	0.2445***	0.1572***	0.1620***
	(0.0152)	(0.0152)	(0.0295)	(0.0295)
Decay No. banks_0			0.0889***	0.0864***
			(0.0245)	(0.0245)
Δ No. banks	0.1755***	0.1750***	0.1966***	0.1960***
	(0.0113)	(0.0113)	(0.0115)	(0.0115)
Entry rates_0	1.5514***	1.5761***	1.1352**	1.1587**
	(0.3906)	(0.3897)	(0.5308)	(0.5297)
Decay Entry rates_0			1.1121**	1.1103**
			(0.5310)	(0.5300)
ΔEntry rates	0.2949	0.3078	1.3418**	1.3498**
	(0.5576)	(0.5561)	(0.6197)	(0.6186)
College_0	-0.3937***	-0.3875***	-0.6000***	-0.5938***
	(0.0527)	(0.0527)	(0.0885)	(0.0886)
Decay College_0			0.2173***	0.2176***
			(0.0743)	(0.0744)
ΔCollege	-0.1488*	-0.1463*	-0.1009	-0.0983
	(0.0835)	(0.0835)	(0.0834)	(0.0834)
$\ln$ Time	0.2364***	0.2341***	1.5005***	1.4845***
	(0.0262)	(0.0263)	(0.1896)	(0.1898)
constant	-0.8494***	-0.8572***	-2.0307***	-2.0254***
	(0.2365)	(0.2366)	(0.2889)	(0.2889)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1007		0.1772	
LT bank debt/Total funding		0.0532		0.1422
Credit lines/Total funding		0.1509		0.3534
ST bank debt/Total funding	0.4451	0.3445	0.9506	0.9800
No. banks	0.0001	0.0000	0.2100	0.2791
$\ln$ turnover	0.0000	0.0000	0.0000	0.0000
Debt to assets	0.1444	0.0766	0.0011	0.0007
Fixed assets/Total assets	0.9198	0.8237	0.2044	0.1765
Ebit margin	0.0000	0.0000	0.2396	0.2456
Cash/Total assets	0.0069	0.0080	0.2080	0.2245
Entry rates	0.0089	0.0081	0.7901	0.8053
College	0.0024	0.0028	0.0000	0.0000
No. of observations	113,871	113,871	113,871	113,871

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. Detailed data definitions are provided in Section 2. Complementary log-log estimates with asymptotic standard errors in parentheses. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

Table B.2. Bank funding and probability of exit: accounting for unobserved heterogeneity

	Exit	Exit	Exit	Exit
Stable funding/Total funding_0	-0.6239***		-0.5342***	
	(0.0675)		(0.1068)	
Decay Stable funding/Total funding_0			-0.1238	
			(0.0967)	
Δ Stable funding/Total funding_0	-0.7026***		-0.7069***	
	(0.0610)		(0.0669)	
LT Bank debt/Total funding_0		-0.4880***		-0.4070***
		(0.0765)		(0.1185)
Decay LT Bank debt/Total funding_0				-0.0935
				(0.1170)
Δ LT Bank debt/Total funding		-0.6254***		-0.6257***
		(0.0643)		(0.0697)
Credit lines/Total funding_0		-1.3225***		-1.2425***
		(0.1490)		(0.2078)
Decay Credit lines/Total funding_0				-0.1351
				(0.1584)
Δ Credit lines/Total funding		-1.4105***		-1.4212***
		(0.1564)		(0.1709)
ST Bank debt/Total funding_0	-0.1431**	-0.1108*	-0.1276	-0.0963
	(0.0586)	(0.0597)	(0.0896)	(0.0908)
Decay ST Bank debt/Total funding_0			0.0071	0.0095
			(0.0853)	(0.0867)
Δ ST Bank debt/Total funding	-0.1919***	-0.1736***	-0.1407**	-0.1211**
	(0.0554)	(0.0555)	(0.0616)	(0.0617)
No. banks_0	0.2626***	0.2662***	0.1628***	0.1679***
	(0.0177)	(0.0178)	(0.0313)	(0.0314)
Decay No. banks_0			0.1317***	0.1298***
			(0.0273)	(0.0274)
Δ No. banks	0.1769***	0.1764***	0.2059***	0.2053***
	(0.0120)	(0.0120)	(0.0130)	(0.0130)
$\ln$ Turnover_0	-0.3882***	-0.3876***	-0.2460***	-0.2460***
	(0.0148)	(0.0149)	(0.0209)	(0.0210)
Decay $\ln$ Turnover_0			-0.1828***	-0.1823***
			(0.0192)	(0.0193)
$\Delta \ln$ Turnover	-0.5603***	-0.5586***	-0.6288***	-0.6273***
	(0.0187)	(0.0188)	(0.0214)	(0.0214)
Debt to assets_0	0.4070***	0.3521***	0.1504	0.0919
	(0.0609)	(0.0653)	(0.0988)	(0.1038)
Decay Debt to assets_0			0.3613***	0.3638***
			(0.0931)	(0.0980)
Δ Debt to assets	0.4936***	0.4732***	0.5275***	0.5037***
	(0.0490)	(0.0501)	(0.0526)	(0.0533)
Fixed assets/Total assets_0	-1.2429***	-1.2797***	-1.3453***	-1.3828***
	(0.0762)	(0.0770)	(0.1176)	(0.1184)
Decay Fixed assets/Total assets_0			0.0286	0.0272
			(0.1037)	(0.1043)
ΔFixed assets/Total assets	-1.2138***	-1.2379***	-1.2137***	-1.2373***
	(0.0857)	(0.0860)	(0.0920)	(0.0923)
Ebit margin_0	-0.1455***	-0.1472***	-0.2069***	-0.2085***
	(0.0142)	(0.0142)	(0.0166)	(0.0167)
Decay Ebit margin_0			-0.0003	-0.0004
			(0.0035)	(0.0035)

continued

ΔEbit_margin	-0.1411***	-0.1429***	-0.2027***	-0.2044***
	(0.0142)	(0.0143)	(0.0166)	(0.0167)
Cash/Total assets	-0.1092	-0.0989	-0.0298	-0.0153
	(0.0909)	(0.0911)	(0.1457)	(0.1460)
Decay Cash/Total assets_0			-0.0807	-0.0833
			(0.1331)	(0.1332)
Δ Cash/Total assets	0.1359	0.1427	0.2080**	0.2132**
	(0.0894)	(0.0895)	(0.0978)	(0.0979)
Entry rates_0	1.5940***	1.6190***	1.1639**	1.1877**
	(0.4202)	(0.4208)	(0.5911)	(0.5914)
Decay Entry rates_0			1.2314**	1.2289**
			(0.5834)	(0.5836)
ΔEntry rates	0.1900	0.1938	1.2123*	1.2096*
	(0.5823)	(0.5824)	(0.6736)	(0.6740)
College_0	-0.4205***	-0.4152***	-0.6196***	-0.6126***
	(0.0560)	(0.0562)	(0.0936)	(0.0938)
Decay College_0			0.1837**	0.1826**
			(0.0793)	(0.0794)
ΔCollege	-0.1540*	-0.1516*	-0.1116	-0.1093
	(0.0862)	(0.0863)	(0.0902)	(0.0904)
$\ln$ Time	0.3092***	0.3109***	2.0882***	2.0852***
	(0.0371)	(0.0374)	(0.2316)	(0.2324)
constant	-1.0113***	-0.9666***	-0.2403	-0.2217
	(0.3571)	(0.3434)	(0.1947)	(0.1919)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1865		0.1503	
LT bank debt/Total funding		0.0677		0.1020
Credit lines/Total funding		0.2949		0.4081
ST bank debt/Total funding	0.3968	0.2869	0.9014	0.8165
No. banks	0.0000	0.0000	0.1985	0.2659
$\ln$ turnover	0.0000	0.0000	0.0000	0.0000
Debt to assets	0.1506	0.0726	0.0004	0.0003
Fixed assets/Total assets	0.7346	0.6281	0.3578	0.3117
Ebit margin	0.0000	0.0000	0.3043	0.3140
Cash/Total assets	0.0057	0.0067	0.1566	0.1740
Entry rates	0.0058	0.0051	0.9548	0.9796
College	0.0016	0.0018	0.0001	0.0001
LR gamma variance (*p*-value)	0.0011	0.0007	0.0000	0.0000
No. of observations	113,871	113,871	113,871	113,871

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. Detailed data definitions are provided in Section 2. Complementary log-log estimates accounting for unobserved heterogeneity with asymptotic standard errors in parentheses. The LR gamma variance (*p*-value) reported are the p-values associated with the likelihood ratio test of gamma heterogeneity. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

	No. obs.	Mean	St. dev.	Min.	Q1	Q2	Q3	Max.
Duration	298,115	33.312	11.053	8.043	12.784	31.538	37.830	66.777

Table B.3. Main descriptive statistics: duration of legal proceedings

Notes: The sample period goes from 2005 to 2012. $Count$ refers to the number of observations and $Q1$, $Q2$, and $Q3$ refer to the first, second, and third quartiles of the distribution, respectively. *Duration* is the duration of legal proceedings in each *comarca* measured in months.

Table B.4. Bank funding and probability of exit: restricted sample

	Exit	Exit	Exit	Exit
Stable funding/Total funding_0	-0.5496***		-0.5024***	
	(0.0703)		(0.1112)	
Decay Stable funding/Total funding_0			-0.0283	
			(0.0990)	
Δ Stable funding/Total funding_0	-0.6360***		-0.5982***	
	(0.0649)		(0.0686)	
LT Bank debt/Total funding_0		-0.4376***		-0.4041***
		(0.0792)		(0.1227)
Decay LT Bank debt/Total funding_0				-0.0080
				(0.1183)
Δ LT Bank debt/Total funding		-0.5830***		-0.5435***
		(0.0683)		(0.0713)
Credit lines/Total funding_0		-1.0942***		-1.0482***
		(0.1568)		(0.2160)
Decay Credit lines/Total funding_0				-0.0250
				(0.1653)
Δ Credit lines/Total funding		-1.1667***		-1.1160***
		(0.1662)		(0.1771)
ST Bank debt/Total funding_0	-0.1334**	-0.1065*	-0.1234	-0.0999
	(0.0615)	(0.0624)	(0.0927)	(0.0937)
Decay ST Bank debt/Total funding_0			0.0178	0.0186
			(0.0872)	(0.0883)
Δ ST Bank debt/Total funding	-0.1614***	-0.1489**	-0.0948	-0.0821
	(0.0592)	(0.0592)	(0.0632)	(0.0633)
No. banks_0	0.2535***	0.2561***	0.1805***	0.1850***
	(0.0175)	(0.0175)	(0.0335)	(0.0336)
Decay No. banks_0			0.0779***	0.0757***
			(0.0281)	(0.0282)
Δ No. banks	0.1821***	0.1815***	0.2028***	0.2023***
	(0.0131)	(0.0131)	(0.0133)	(0.0133)
ln Turnover_0	-0.4057***	-0.4046***	-0.2707***	-0.2708***
	(0.0149)	(0.0149)	(0.0220)	(0.0220)
Decay ln Turnover_0			-0.1491***	-0.1480***
			(0.0185)	(0.0185)
Δ ln Turnover	-0.5531***	-0.5504***	-0.5829***	-0.5805***
	(0.0180)	(0.0180)	(0.0183)	(0.0184)
Debt to assets_0	0.3590***	0.3121***	0.0857	0.0404
	(0.0624)	(0.0670)	(0.1012)	(0.1060)
Decay Debt to assets_0			0.3335***	0.3395***
			(0.0900)	(0.0952)
Δ Debt to assets	0.4413***	0.4280***	0.4437***	0.4279***
	(0.0508)	(0.0519)	(0.0507)	(0.0515)
Fixed assets/Total assets_0	-1.1942***	-1.2211***	-1.2803***	-1.3084***
	(0.0764)	(0.0768)	(0.1221)	(0.1227)
Decay Fixed assets/Total assets_0			0.0930	0.0933
			(0.1063)	(0.1068)
ΔFixed assets/Total assets	-1.1924***	-1.2100***	-1.1315***	-1.1480***
	(0.0899)	(0.0900)	(0.0917)	(0.0918)
Ebit margin_0	-0.1224***	-0.1235***	-0.1645***	-0.1652***
	(0.0140)	(0.0140)	(0.0145)	(0.0145)
Decay Ebit margin_0			0.0013	0.0012
			(0.0031)	(0.0030)
ΔEbit_margin	-0.1182***	-0.1194***	-0.1592***	-0.1600***
	(0.0140)	(0.0140)	(0.0145)	(0.0145)
Cash/Total assets	-0.1210	-0.1119	-0.0275	-0.0175
	(0.0947)	(0.0949)	(0.1517)	(0.1518)
Decay Cash/Total assets_0			-0.0653	-0.0676
			(0.1348)	(0.1351)
Δ Cash/Total assets	0.0802	0.0867	0.1334	0.1396
	(0.0953)	(0.0954)	(0.1001)	(0.1002)
Entry rates_0	1.6813***	1.7014***	1.1637*	1.1853**

continued

	(0.4347)	(0.4338)	(0.6052)	(0.6035)
Decay Entry rates_0			1.3232**	1.3177**
			(0.5929)	(0.5916)
ΔEntry rates	0.2066	0.2060	1.4444**	1.4406**
	(0.6320)	(0.6308)	(0.6928)	(0.6922)
College_0	-0.4207***	-0.4153***	-0.6206***	-0.6159***
	(0.0574)	(0.0574)	(0.0960)	(0.0961)
Decay College_0			0.2101***	0.2114***
			(0.0811)	(0.0812)
ΔCollege	-0.1689*	-0.1669*	-0.1212	-0.1191
	(0.0915)	(0.0915)	(0.0915)	(0.0915)
ln Time	0.2682***	0.2670***	1.5963***	1.5834***
	(0.0296)	(0.0297)	(0.2129)	(0.2131)
constant	-0.4876*	-0.4942*	-1.7607***	-1.7553***
	(0.2627)	(0.2628)	(0.3227)	(0.3228)
	p-values under the null hypothesis $H_0 : \beta = \theta$			
Stable funding/Total funding	0.1618		0.4428	
LT bank debt/Total funding		0.0585		0.3120
Credit lines/Total funding		0.4050		0.7654
ST bank debt/Total funding	0.6423	0.4891	0.7935	0.8712
No. banks	0.0002	0.0001	0.5329	0.6305
ln turnover	0.0000	0.0000	0.0000	0.0000
Debt to assets	0.1947	0.1000	0.0011	0.0007
Fixed assets/Total assets	0.9840	0.9016	0.3160	0.2813
Ebit margin	0.0000	0.0000	0.1195	0.1242
Cash/Total assets	0.0219	0.0249	0.3529	0.3652
Entry rates	0.0073	0.0065	0.7494	0.7711
College	0.0043	0.0049	0.0001	0.0001
No. of observations	90,760	90,760	90,760	90,760

Notes: The dependent variable is a dummy variable equal to one if the firm exits operation and 0 otherwise ($Exit$). The sampling period goes from 2005 to 2012. All specifications include dummies for the main bank of the firm, 2-digit sectoral dummies, and year dummy variables. Detailed data definitions are provided in Section 2. Complementary log-log estimates accounting for unobserved heterogeneity with asymptotic standard errors in parentheses. The LR gamma variance (*p*-value) reported are the p-values associated with the likelihood ratio test of gamma heterogeneity. ***, **, and * stand for statistical significance at 1%, 5%, and 10%, respectively.

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