

Bank financing and the survival of new firms

Luísa Farinha¹ Sónia Félix¹ João Santos²

¹Banco de Portugal

²Federal Reserve Bank of New York

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This paper:

- Description of the capital structure of new firms established in Portugal in the period 2005-2012
- Analysis of the effect of different financing sources on the probability of survival of new firms

Special focus on:

- The effect of bank credit on the probability of survival of new firms
- Differentiated effect of initial and current conditions
- Persistence of the effect of initial conditions

Two well-known stylised facts about firm dynamics:

- Firms are born small
- The probability of survival is higher for larger firms

An important argument: financing constraints may force new firms to operate at a smaller scale than desired

- The theoretical literature has emphasised the role of financing constraints in explaining firm dynamics (Albuquerque and Hopenhayn (2004), Cabral and Mata (2003))
- However, Robb and Robinson (2012) show that new firms rely heavily on external debt sources, such as bank financing, and less on friends-and-family based funding sources

Introduction

A number of papers discuss the implications of bank debt, credit lines and debt term-structure for firms' performance and survival

- Jensen's (1986) agency theory explains the role of bank debt in reducing agency costs between managers and shareholders
- Caves and Porter (1976) argue that high financial investments in new firms prevent the entry of new competitors, increasing the likelihood of survival
- Flannery (1986) and Diamond (1991) models predict that firms with favourable private information choose short-term debt
- Diamond (1991) also predicts that very high risk firms may not be given the option to have access to long-term debt
- Boot, Thakor and Udell (1987) model suggests that loan commitments (credit lines) can obviate the need to ration credit in a Stiglitz and Weiss (1981) framework

Other determinants of firm survival

- Other funding sources (equity, insiders debt, other debt, trade credit)
- Number of bank lending relationships
- Size (turnover)
- Ratio of fixed assets to total assets
- Profitability (EBIT/total assets)
- Human capital (percentage of workers with college education)
- Liquidity (cash/total assets)
- Market conditions (entry rates defined at the 5-digit NACE level)

- Combine three very rich datasets:
 - Balance sheet information (IES)
 - Credit register data (CRC)
 - Matched employer-employee data (*Quadros de Pessoal*)
- Our sample: new firms established in Portugal in the period 2005-2012
 - New firms are identified using the founding year that they report in IES
 - A firm exits at time t if it is absent from IES at time $t + 1$ and $t + 2$

New firms and survival rates by cohort

Table: New firms and survival rates by cohort

Cohort	Start-ups	Entry rate	Survival rates by life duration of the firm (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							

Entry rate: number of new firms divided by the total number of firms (entrants plus incumbents)

Capital structure of new firms

Table: Funding sources of new firms (as a percentage of total assets)

	Sample with source > 0			Sample with source > 0 at birth		
	Firms (%)	Mean	St. dev.	Firms (%)	Mean	St. dev.
Bank debt/Assets	59.60	0.343	0.597	41.12	0.355	0.631
Effective bank debt/Assets	55.60	0.305	0.496	37.09	0.323	0.550
Credit lines/Assets	26.66	0.106	0.430	15.86	0.148	0.469
Bank debt_sr/Assets	33.77	0.169	0.281	19.84	0.200	0.266
Bank debt_lr/Assets	22.58	0.280	0.343	8.61	0.367	0.314
Equity/Assets	100	0.294	0.278	100	0.271	0.259
Insiders debt/Assets	5.38	0.334	1.103	2.91	0.472	0.511
Securities/Assets	0.078	0.137	0.213	0.083	0.184	0.218
Suppliers debt/Assets	83.51	0.203	0.168	78.93	0.186	0.210
Other debt/Assets	13.26	0.334	0.940	6.64	0.320	0.428

Capital structure of new firms and firms' survival

Table: Funding sources of new firms - over the entire sample period

	(1) Firms that survived	(2) Firms that failed	(3) Difference	(4) t-stat
ln bank debt	5.9326	5.1305	0.8021***	27.43
ln effective bank debt	5.4688	4.7781	0.6907***	23.57
ln credit lines	2.2891	1.7079	0.5812***	26.19
ln bank debt_sr	3.0631	2.9307	0.1325***	5.13
ln bank debt_lr	2.3108	1.7561	0.5547***	22.39
ln equity	9.6638	9.4002	0.2636***	22.06
ln insiders debt	0.5356	0.4449	0.0907***	6.91
ln securities	0.0070	0.0063	0.0007	0.47
ln suppliers debt	7.6751	6.3627	1.3124***	58.56
ln other debt	1.1897	1.1830	0.0067	0.36

Capital structure of new firms and firms' survival

Table: Funding sources of new firms - at founding year

	(1) Firms that survived	(2) Firms that failed	(3) Difference	(4) t-stat
ln bank debt	3.7533	4.0937	-0.3404***	-10.42
ln effective bank debt	3.3060	3.7243	-0.4183***	-13.15
ln credit lines	1.3194	1.2926	0.0268	1.27
ln bank debt_sr	1.5868	1.9807	-0.3939***	-15.96
ln bank debt_lr	0.9729	0.6813	0.2916***	15.12
ln equity	9.0343	8.8264	0.2079***	19.49
ln insiders debt	0.3881	0.0846	0.3035***	28.18
ln securities	0.0053	0.0112	-0.0058	-3.20**
ln suppliers debt	6.9624	6.5849	0.3775***	13.96
ln other debt	0.6914	0.4079	0.2835***	18.37

Bank financing and firm survival

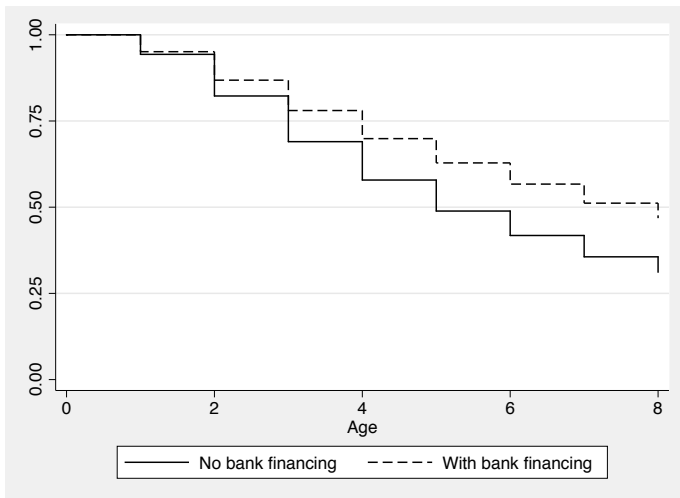


Figure: Kaplan-Meier survival function by current financing position

Bank financing at founding and firm survival

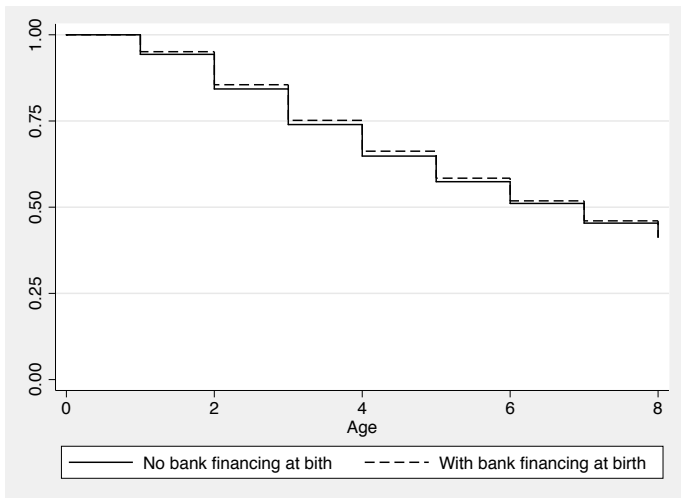


Figure: Kaplan-Meier survival function by bank financing position at birth

- A key concept in duration analysis is the hazard function, which represents the instantaneous probability of exit at time t , conditional on survival to time $t - 1$

$$\lambda(t) = \Pr(T = t | T \geq t)$$

- We follow Geroski et al. (2010). First, we evaluate the impact of current financing conditions considering

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

- To assess the impact of initial conditions controlling for current conditions ($H_0: \theta = \beta$)

$$\log \lambda(t | \Delta \mathbf{x}_t, \mathbf{x}_0) = \lambda_0(t) + \beta \Delta \mathbf{x}_t + \theta \mathbf{x}_0 \quad (1)$$

- To assess whether the effects of initial conditions are transitory or permanent we allow the coefficient θ to change with time

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

- To limit possible endogeneity problems driven by differences in firm quality, we consider a model with unobserved heterogeneity

Table: The determinants of new firms' survival: current conditions

	(1) Exit	(2) Exit	(3) Exit
In bank debt	-0.0850*** (0.0107)		
In effective bank debt		-0.0161*** (0.0061)	
In credit lines		-0.0422*** (0.0041)	-0.0413*** (0.0039)
In bank debt_sr			0.0007 (0.0034)
In bank debt_lr			-0.0283*** (0.0039)
In equity	0.0198 (0.0131)	0.0173 (0.0130)	0.0157 (0.0130)
In insiders debt	-0.0099 (0.0082)	-0.0095 (0.0082)	-0.0090 (0.0082)
In securities	-0.0065 (0.0418)	-0.0071 (0.0417)	-0.0114 (0.0417)
In other debt	0.0048 (0.0048)	0.0039 (0.0047)	0.0026 (0.0047)
In suppliers debt	-0.0211*** (0.0045)	-0.0215*** (0.0045)	-0.0212*** (0.0045)
no. banks	0.2658*** (0.0129)	0.2646*** (0.0130)	0.2748*** (0.0128)
Int	0.0914*** (0.0306)	0.0738** (0.0307)	0.0776** (0.0307)
Observations	116,747	116,747	116,747

Table: The determinants of new firms' survival: initial conditions

	(1) Exit	(2) Exit	(3) Exit	(4) Exit	(5) Exit	(6) Exit
In bank debt_0	-0.0961*** (0.0134)			-0.1238*** (0.0160)		
decay_In bank debt				0.0383*** (0.0113)		
Δ In bank debt	-0.0751*** (0.0135)			-0.0607*** (0.0141)		
In effective debt_0		-0.0292*** (0.0080)			-0.0438*** (0.0106)	
decay_Ineffective debt					0.0201** (0.0096)	
Δ Ineffective debt		-0.0174** (0.0080)			-0.0107 (0.0087)	
In credit lines_0		-0.0463*** (0.0063)	-0.0424*** (0.0060)		-0.0508*** (0.0093)	-0.0407*** (0.0087)
decay_In credit lines					0.0057 (0.0086)	-0.0015 (0.0082)
Δ In credit lines		-0.0447*** (0.0060)	-0.0433*** (0.0059)		-0.0430*** (0.0062)	-0.0430*** (0.0061)
In bank debt_sr_0			-0.0071 (0.0052)			-0.0121 (0.0076)
decay_Inbank debt_sr						0.0070 (0.0075)
Δ In bank debt_sr			-0.0006 (0.0047)			0.0017 (0.0050)

Results: Continued

	(1) Exit	(2) Exit	(3) Exit	(4) Exit	(5) Exit	(6) Exit
In bank debt_lr_0			-0.0372*** (0.0071)			-0.0382*** (0.0104)
decay_Inbank debt_lr						0.0020 (0.0105)
Δ In bank debt_lr			-0.0242*** (0.0052)			-0.0226*** (0.0054)
In equity_0	0.0468** (0.0190)	0.0448** (0.0189)	0.0429** (0.0189)	0.0296 (0.0282)	0.0279 (0.0280)	0.0268 (0.0279)
decay_Inequity				0.0238 (0.0262)	0.0233 (0.0260)	0.0218 (0.0259)
ΔIn equity	-0.0766*** (0.0208)	-0.0766*** (0.0208)	-0.0786*** (0.0208)	-0.0499** (0.0220)	-0.0517** (0.0220)	-0.0556** (0.0220)
In insiders debt_0	-0.0291 (0.0257)	-0.0293 (0.0257)	-0.0280 (0.0257)	-0.0342 (0.0343)	-0.0338 (0.0341)	-0.0317 (0.0341)
decay_In insiders debt				0.0079 (0.0476)	0.0072 (0.0469)	0.0073 (0.0467)
ΔIn insiders debt	-0.0133 (0.0112)	-0.0123 (0.0111)	-0.0117 (0.0111)	-0.0111 (0.0112)	-0.0102 (0.0112)	-0.0098 (0.0112)
In securities_0	0.0010 (0.0575)	0.0014 (0.0573)	-0.0075 (0.0574)	0.0281 (0.0627)	0.0268 (0.0628)	0.0170 (0.0627)
decay_In securities				-0.0652 (0.0784)	-0.0607 (0.0778)	-0.0611 (0.0777)
ΔIn securities	-0.0798 (0.0609)	-0.0810 (0.0608)	-0.0819 (0.0604)	-0.1208 (0.0838)	-0.1187 (0.0825)	-0.1214 (0.0825)
In other debt_0	0.0076 (0.0092)	0.0064 (0.0092)	0.0040 (0.0092)	-0.0002 (0.0138)	-0.0019 (0.0138)	-0.0049 (0.0137)
decay_In other debt				0.0112 (0.0138)	0.0120 (0.0137)	0.0131 (0.0137)
ΔIn other debt	0.0037 (0.0065)	0.0035 (0.0064)	0.0024 (0.0064)	0.0062 (0.0066)	0.0059 (0.0066)	0.0048 (0.0066)

Results: Continued

	(1) Exit	(2) Exit	(3) Exit	(4) Exit	(5) Exit	(6) Exit
In suppliers debt_0	-0.0253*** (0.0057)	-0.0253*** (0.0057)	-0.0240*** (0.0057)	-0.0198** (0.0086)	-0.0203** (0.0086)	-0.0190** (0.0086)
decay_In suppliers debt				-0.0057 (0.0081)	-0.0053 (0.0080)	-0.0056 (0.0080)
Δ In suppliers debt	-0.0319*** (0.0075)	-0.0331*** (0.0074)	-0.0329*** (0.0074)	-0.0340*** (0.0077)	-0.0353*** (0.0078)	-0.0354*** (0.0078)
Observations	78,732	78,732	78,732	78,732	78,732	78,732

Main conclusions

- Bank financing is negatively correlated with new firms' probability of exit
- Firms that rely more on short-term debt are more likely to fail
- Access to credit lines is negatively related with the probability of exit
- Bank financing conditions at birth play an important role in new firms' chances of survival, while accounting for current conditions
- In general, the effects of initial funding conditions on the probability of survival of new firms are likely to persist over time