

Financially distressed firms: exit, recovery and productivity

Fernando Alexandre¹, Nuno Azevedo³, Pedro Bação², Gilberto Loureiro¹, Miguel Portela¹ & Emma Szhao³

¹Universidade do Minho; ²Universidade de Coimbra; ³Banco de Portugal

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- Motivation
- FDF in the Portuguese economy
- FDF and productivity in the Portuguese economy
- Empirical analysis:
 - logit
 - multinomial logit
 - duration analysis (competing risks)
 - bank level analysis
- Concluding remarks

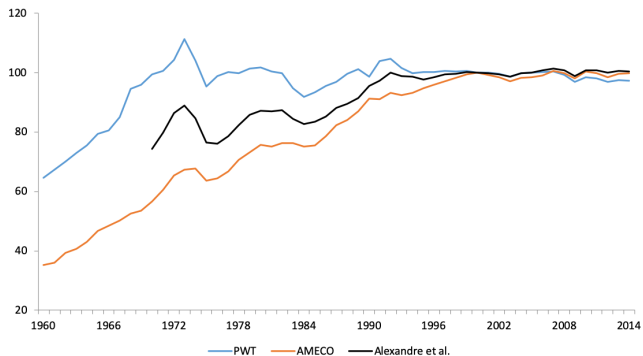


Figure 1: Total Factor Productivity in Portugal (base, 2000 = 100)

- The Portuguese crisis was a debt crisis.
- Firms were highly indebted, very dependent on banks funding and banks had very low capital ratios.
- In 2012, at the height of the crisis, financially distressed firms (FDF) represented 11% of total value-added, 17% of total employment and 25% of total firms' debt.
- In this work we address the following questions:
 - What are the characteristics of FDF condition?
 - What was the role of productivity in the survival and exit of FDF?
 - Have banks contributed to a better allocation of resources?

Credit misallocation and productivity

- Caballero et al. (2008)
- Gopinath et al. (2017)
- Schivardi et al. (2017)
- McGowan et al. (2017)
- Acharya et al. (2018)

Credit misallocation in the Portuguese economy

- Reis (2013)
- Alexandre et al. (2017)
- Gouveia and Osterhold (2018)
- Dias and Marques (2018)
- Azevedo et al. (2018)

Financially distressed firms (FDF):

Interest coverage ratio = $\frac{EBIT}{Interest\ Expenses} < 1$ for at least 3 years and firms must be at least 10 years old

Labour productivity = $\frac{ValueAdded}{Hours}$

Period of analysis: 2006-2017

Datasets: Central Balance Sheet and Central Credit Register

Table 1: Descriptive statistics: Frontier, Non-FDF and FDF

	Frontier			Non-FDF			FDF		
	Mean	Median	s.d.	Mean	Median	s.d.	Mean	Median	s.d.
Labour productivity	38.79	28.81	26.99	11.93	9.04	13.59	6.60	5.43	11.51
Employee	32.88	8.00	147.58	18.48	6.00	146.10	26.44	7.00	234.60
Capital (real)	0.77	0.20	1.21	0.28	0.05	0.68	0.54	0.08	1.05
Turnover	3.05	1.44	3.42	1.07	0.30	2.06	1.11	0.26	2.24
Profitability	0.12	0.09	0.17	0.01	0.04	0.28	-0.18	-0.08	0.38
Leverage	0.23	0.17	0.26	0.31	0.22	0.44	0.56	0.41	0.75
Age	18.12	15.00	14.50	16.19	13.00	13.27	24.21	20.00	14.52

Notes. The number of observations for Frontier, Non-FDF and FDF is 98980, 916829 and 73034, respectively.

FDF in the Portuguese economy

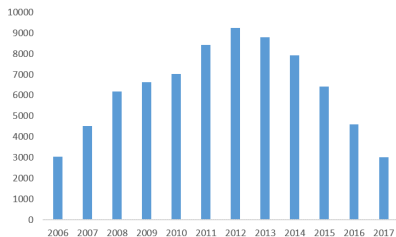


Figure 2: Number of FDF, 2006 – 2017

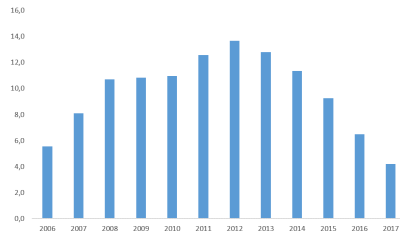


Figure 3: Share of FDF in total firms, 2006 – 2017 (%)

FDF in the Portuguese economy

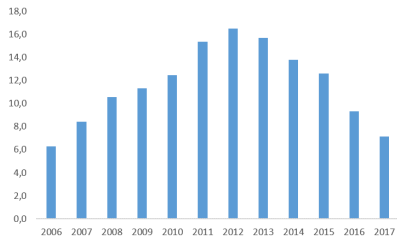


Figure 4: Share of FDF in total employment, 2006 – 2017 (%)

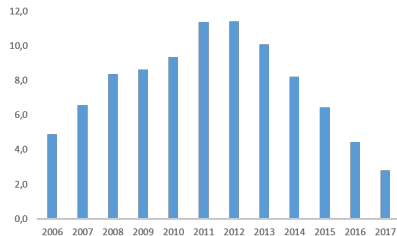


Figure 5: Share of FDF in total value-added, 2006 – 2017 (%)

FDF in the Portuguese economy

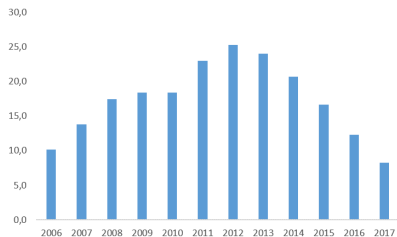


Figure 6: Share of FDF in total debt, 2006 – 2017 (%)

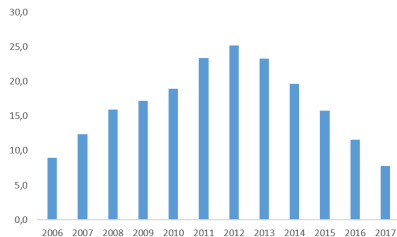


Figure 7: Share of FDF in total interest, 2006 – 2017 (%)

FDF in the Portuguese economy

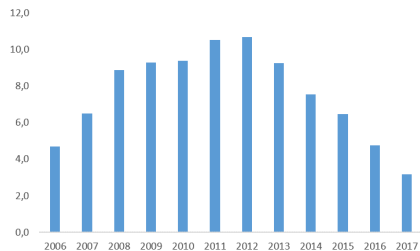


Figure 8: Share of FDF in total exports, 2006 – 2017 (%)

FDF in the Portuguese economy

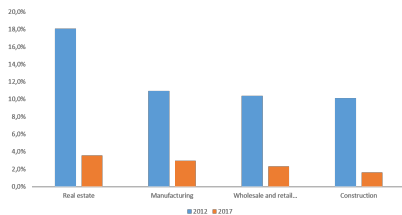


Figure 9: Share of FDF by industry, 2012 – 2017 (%)

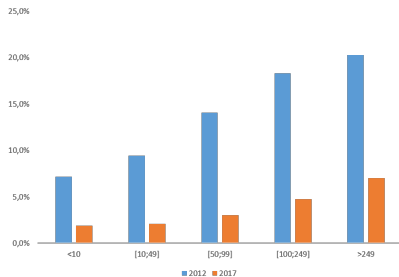


Figure 10: Share of FDF by firm size (employees), 2012 – 2017 (%)

Table 2: FDF transition to recovery and exit (%)

Year (t)	FDF ($t + 1$)	Recovery ($t + 1$)	Exit ($t + 1$)
2008	83.4	8.0	8.6
2009	80.8	11.6	7.6
2010	84.8	8.0	7.2
2011	85.4	7.4	7.2
2012	84.2	9.8	5.9
2013	81.5	13.3	5.2
2014	77.7	17.6	4.7
2015	79.3	16.2	4.4
2016	77.1	16.1	6.8

FDF and productivity in the Portuguese economy

Table 3: Transition probabilities between productivity deciles for FDF firms, from 2011 to 2012

		year 2012											
		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Exit	
year 2011	D1	396 78.73	66	2	3	1		1				34 6.76	
	D2	121 17.39	471 67.67	60	5	2	1					36 5.17	
	D3	18 2.34	180 23.41	442 57.48	79	9	5	1				35 4.55	
	D4	3 0.39	12 1.56	245 31.86	381 49.54	77	12	6	2			31 4.03	
	D5	6 0.77	11 1.40	34 4.34	234 29.85	390 49.74	55	6			2	46 5.87	
	D6	2 0.28	4 0.55	9 1.25	35 4.85	225 31.16	357 49.45	61	5			24 3.32	
	D7		2 0.28	5 .7	9 1.26	24 3.36	197 27.59	407 57.00	42	4		24 3.36	
	D8			2 0.29	2 0.29	9 1.31	15 2.18	173 25.18	432 62.88	29		1 0.15	24 3.49
	D9	1 0.13					1 0.13	13 1.75	157 21.13	530 71.33	21	2 2.83	20 2.69
	D10				1 0.11		1 0.11		6 0.65	108 11.71		790 85.68	16 1.74

Notes: Within each decile the first row stands for the number of FDF firms, while the second row stands for % FDF firms in that decile.

Table 4: Shares in FDF in 2011

Variable	Share D10 (%)	Share D10 → D10 (%)
Value-added	16.4	10.9
Employment	10.9	8.2
Exports	13.3	10.2
Debt	15.3	9.8
Interest	15.0	9.2
	Mean	Median
Age	28.9	23.0

FDF and productivity in the Portuguese economy

Table 5: Decomposition of productivity growth: the contribution of Non-FDF and FDF

	Recession	Expansion
	2011–2013	2014–2017
Stayers	-0.99	1.54
Share effect	0.22	0.09
Productivity growth	-1.21	1.45
NN	-0.94	1.27
DD	-0.09	0.09
ND	-0.32	-0.11
DN	0.13	0.19
Entry	0.00	0.17
Exit	0.12	-0.20
N-exit	0.10	-0.26
D-exit	0.02	0.06
Total	-0.87	1.51

Notes. **NN**: Non-FDF → Non-FDF. **DD**: FDF → FDF.
ND: Non-FDF → FDF. **DN**: FDF → Non-FDF.
N-Exit: Non-FDF → Exit. **D-Exit**: FDF → Exit.

- Empirical analysis:
 - logit
 - multinomial logit
 - duration analysis (competing risks)
 - bank level analysis

Table 6: Logit (FE)

	2006 – 2017	2008 – 2013	2014 – 2017
Productivity	-0.042*** (0.001)	-0.035*** (0.002)	-0.040*** (0.004)
Export (dummy)	-0.015 (0.032)	0.035 (0.052)	-0.199 (0.131)
Leverage	0.237*** (0.024)	0.484*** (0.049)	0.245** (0.101)
Profitability	-0.069*** (0.001)	-0.085*** (0.001)	-0.069*** (0.003)
Cash holding	-1.607*** (0.091)	-1.083*** (0.157)	-2.399*** (0.398)
Overdue (dummy)	0.410*** (0.023)	0.276*** (0.037)	0.337*** (0.100)
Bank concentration	-0.868*** (0.044)	-1.025*** (0.081)	-1.118*** (0.211)
Observations	150252	64544	18491

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

Table 7: Multinomial Logit, Recovery

	2006–2017	2008–2013	2014–2017
Productivity	0.014*** (0.001)	0.012*** (0.001)	0.023*** (0.001)
Firm age	-0.009*** (0.000)	-0.009*** (0.001)	0.004*** (0.001)
Export (dummy)	0.031* (0.017)	0.092*** (0.022)	-0.026 (0.037)
Leverage	-0.067*** (0.013)	-0.069*** (0.019)	-0.019 (0.020)
Profitability	0.028*** (0.000)	0.026*** (0.001)	0.026*** (0.001)
Overdue (dummy)	-0.424*** (0.015)	-0.364*** (0.019)	-0.314*** (0.029)
Bank concentration	0.179*** (0.023)	0.225*** (0.030)	0.417*** (0.048)
Observations	147465	84206	33467

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

Table 8: Multinomial Logit, Exit

	2006–2017	2008–2013	2014–2017
Productivity	-0.022*** (0.002)	-0.037*** (0.002)	0.005 (0.003)
Firm age	0.008*** (0.001)	0.011*** (0.001)	0.008*** (0.002)
Export (dummy)	-0.060 (0.048)	-0.039 (0.060)	-0.114 (0.082)
Leverage	0.051*** (0.019)	0.114*** (0.027)	-0.006 (0.030)
Profitability	-0.006*** (0.000)	-0.008*** (0.000)	-0.003*** (0.000)
Overdue (dummy)	1.560*** (0.034)	1.706*** (0.043)	1.351*** (0.059)
Bank concentration	0.626*** (0.063)	0.808*** (0.080)	0.364*** (0.108)
Observations	147465	84206	33467

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

Table 9: Competing Risks

	Recover: 2011	Exit: 2011
Productivity	0.006** (0.003)	-0.012*** (0.002)
Firm age	0.011*** (0.002)	-0.020*** (0.002)
Export (dummy)	0.075 (0.130)	-0.002 (0.063)
Leverage	-0.092 (0.061)	-0.135*** (0.024)
Profitability	0.034*** (0.004)	-0.002*** (0.000)
Overdue (dummy)	-1.084*** (0.121)	0.715*** (0.054)
Bank concentration	0.382** (0.192)	-0.589*** (0.088)
Observations	3205	3205

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

$$\text{Std.Dev.Productivity}_{ijt} = \beta_0 + \beta_1 \Delta \text{Productivity}_{ijt} + \beta_2 \text{ShareFDF}_{ijt} + \beta X_{ij,t-1} + \eta_j + \gamma_t + \varepsilon_{ijt}$$

Table 10: Bank level data (2006 – 2017) – Productivity dispersion

	Model (1)	Model(2)	Model (3)
Δ Productivity _{ijt}	0.357*** (0.065)	0.357*** (0.065)	0.357*** (0.065)
Share FDF _{ijt}	4.257*** (1.424)	4.252*** (1.422)	4.202*** (1.421)
Loan Ratio FDF _{ij,t-1}		0.034*** (0.008)	
Loan Ratio Exit _{ij,t-1}			1.378*** (0.355)
Observations	12439	12439	12439

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

Table 11: Bank level data (2008 – 2013) – Productivity dispersion

	Model (1)	Model(2)	Model (3)
Δ Productivity _{ijt}	0.367*** (0.075)	0.367*** (0.075)	0.367*** (0.075)
Share FDF _{ijt}	3.769* (2.119)	3.824* (2.115)	3.765* (2.120)
Loan Ratio FDF _{ij,t-1}		0.029*** (0.007)	
Loan Ratio Exit _{ij,t-1}			0.906*** (0.317)
Observations	4817	4817	4817

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

Table 12: Bank level data (2014 – 2017) – Productivity dispersion

	Model (1)	Model(2)	Model (3)
Δ Productivity _{ijt}	0.707*** (0.122)	0.707*** (0.122)	0.705*** (0.122)
Share FDF _{ijt}	7.126** (2.992)	7.048** (3.000)	6.899** (2.952)
Loan Ratio FDF _{ij,t-1}		0.120*** (0.039)	
Loan Ratio Exit _{ij,t-1}			2.013*** (0.495)
Observations	2230	2230	2230

Notes: standard errors in parenthesis. Significance levels: *, 10%; **, 5%; ***, 1%.

- Higher productivity:
 - reduces the likelihood of being FDF.
 - being FDF, increases the probability of recovery and decreases the probability of exit.
 - accelerates the recovery and delays the exit of FDF.
- Higher leverage and lower profitability.
 - increases the likelihood of being FDF.
 - being FDF, reduces the likelihood of recovery and increases the likelihood of exit.

- The probability of being FDF is inversely related with the concentration of bank loans.
- Firms with less bank concentration are more likely remain in FDF state.
- The higher the share of FDF and the share of credit given to FDF the worse the credit bank allocation.
- The higher the share of credit given to FDF firms that exit the worse the credit bank allocation.