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Is Bigger Always Better ? The Effect of Size on Defaults

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Is Bigger Always Better ? The Effect of Size on Defaults*

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Abstract

Analyzing a large sample of Italian firms we find that the probability of default increases with size. This contrasts with the common observation, based on measures of exit from business registry data, that firms' death rate is inversely related to the scale of their operation and suggests a rethinking of the economic role of larger companies.

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1 Introduction

Studies based on business registry data typically find that the death rate of firms rapidly decreases as size and age increase. Since death or exit are commonly associated to the notion of business failure, the lesson usually drawn is that aging and increasing in size imply for business enterprises, as for humans, a more quiet demeanor and a safer conduct. This impression can be deceiving. The reason rests in the catch-all meaning of the exit events recorded in business registries. In fact these events are often associated with a simple relabeling of the economic subject, following changes of ownership or modifications of incorporation status. Moreover, even when exit is 'true exit', it can correspond to both negative (bankruptcy) and positive (M&A, voluntary liquidation) outcomes.[1] Since the label 'exit' is likely to mix so disparate events, it cannot be taken as the best proxy when one is interested into identifying business failures.

In this letter we follow a different approach. We identify potential business failure with firm default. A default occurs when obligations are past due more than 90 days or when the creditor institution considers that the obligor is unlikely to repay its debt in full. Default events are both a signal of business troubles and a costly condition that should be in principle avoided. Although defaults are not immediately related with exit, several reasons suggests defaults to represent a good proxy for failure. Firstly, there is a tight link beteen default and failure. Indeed, the declaration of default constitutes the main prerequisite for initiating a bankruptcy procedure, and even when formal bankruptcy procedures are not pursued, it is very likely that defaulting firms go through a process of profound restructuring (Shrieves and Stevens, 1979; Hotckiss et al., 2008) eventually leading to failure. A further advantage of default events rests in their timely nature. Solvency conditions are strictly monitored by lending banks, and defaults reflect the prompt reporting of the insurgence of critical situations. Instead, exit events reported in business registries usually record the final step of a long procedure started several years before, when the actual bankruptcy, from an economic point of view, took place.

Taking default as proxy of failure, we investigate how its relative frequency depends on firm size, also including age and credit ratings as control variables. The next section describes the data.

[1] Only few studies try and propose a more structured re-classification of exit events. See Honjo (2000); Esteve-Pèrez et al. (2010).

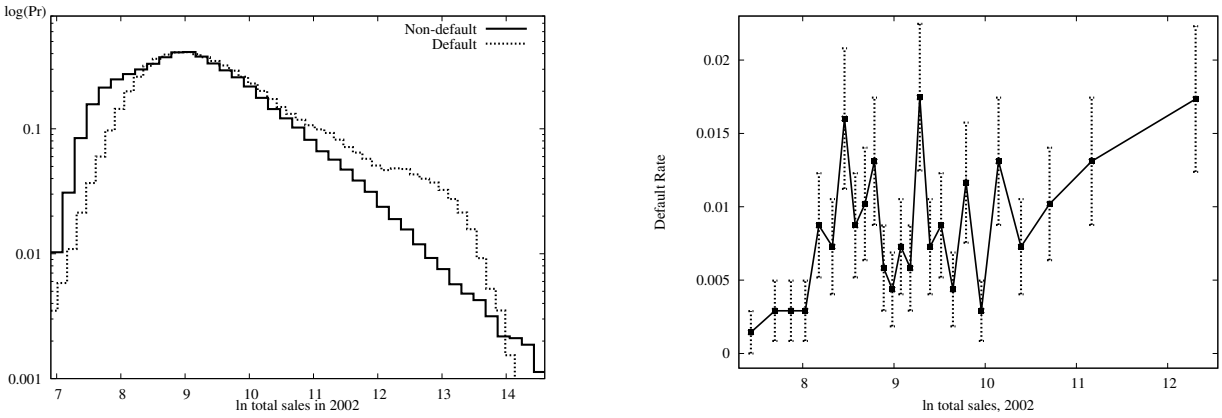

Figure 1: Size and default rate. *Left:* Empirical size distribution of defaulting versus non defaulting firms, 2002. *Right:* Default probability by size classes, 2002.

Section 3 presents our results. Section 4 provides further comments and conclude.

2 Data and variables

We build a database covering virtually all Italian *limited liability* firms active in manufacturing industries (NACE codes 15-36, Rev. 1.1) over the period 1998 to 2003. Annual figures on size (as total sales) and credit ratings are gathered by the Italian Account Data Service (Centrale dei Bilanci, CeBi), while age is derived from business registry data.

These data are supplemented with default events provided by one of the largest Italian commercial banks. Defaults are represented as a dummy variable taking value 1 if a firm incurs default in 2003 or 2004, i.e. at the end of the sample period. We focus the analysis on firms displaying at least a minimal level of structure and operation, thus we exclude firms with only one employee and annual turnover below one million Euros. The final dataset contains 33 187 firms and 161 default events, amounting to approximately 25% of the defaults taking place in those years in the reference population of limited firms.

3 Analysis

We start by comparing the size distribution of non defaulting versus defaulting firms. Figure 3 (left panel) reports kernel estimates for 2002, just before default occurs. The two distributions seem

similar. However, a Fligner-Policello test cannot reject that defaulting firms stochastically dominate the non defaulting group (statistic=3.14, p-score=0.002): with a probability significantly higher than 50%, a firm randomly drawn from the population of defaulters is bigger than a firm randomly drawn from non defaulters, hinting at a positive relationship between size and default rate. The same significant differences are also observed in 2000/2001, while stochastic equality cannot be rejected in 1998/1999: as expected, the differences get reduced the farther from the default event.

We then show default rates by size classes (right panel), built according to equipopulated bins based on firms' sales in 2002. The pattern is clearcut: larger firms display, on average, a larger default frequency. The same result holds in previous years, even if, again, differences are smaller the farther from the default event.

Finally, we turn to a parametric analysis. We consider a probit specification modeling default probability conditional on size and two additional controls, age and credit ratings. The inclusion of age seems mandatory, since age is correlated with size and has been traditionally identified as a factor reducing death probability. Credit ratings serves a twofold purpose: firstly, by summarizing a large number of qualitative and quantitave indicators, they succinctly account for a wide range of potential sources of financial problems; secondly, by yielding a forecast of firms' ability to repay debts, ratings represent a proxy for access to credit. The CeBi index is particularly reliable on both respects, given its wide use among Italian banks and the long lasting reputation of CeBi in financial analysis. The index is an "issuer credit rating", i.e. assessing the obligor's *overall* ability to meet obligations. It assigns each firm a score from 1 (highly solvable) to 9 (at serious risk of default), updated every year. In the present study we build three classes: LOW risk firms (rated 1-6), MID risk firms (rated 7) and HIGH risk firms (rated 8-9).[2] Then, for each class, we define a dummy variable equal to 1 if a firm belongs to the class in t, and estimate the following specification

$$\begin{aligned} p\left(Y_T = 1 \mid X_t\right) &= \Phi(\beta_{0t} + \beta_{1t}\ \ln S_t + \beta_{2t}\ \ln AGE_t + \\ &\quad \delta_{1t}\ LOW_t + \delta_{2t}\ MID_t + \delta_{3t}\ HIGH_t) \end{aligned} \tag{1}$$

at different time distances to default.

[2]Results are not sensitive to re-allocation of the 9 original groups into the three classes. See Bottazzi et al. (2009) for more details and for the inclusion of different financial indicators.

	Bootstrap Probit regressions			
	1999	**2000**	**2001**	**2002**
ln SIZE	0.0021*	0.0018*	0.0058*	0.0064*
ln AGE	0.0012	0.0028	0.0016	0.0047*
CONSTANT	-0.3506*	-0.4341*	-0.3085*	-0.1211*
LOW risk	-0.0360*	-0.0164*	-0.0516*	-0.1533*
MID risk	0.0168*	0.0453*	0.0219*	-0.0142*

Table 1: Probit estimates - Bootstrap means of marginal effects at the sample average of covariates, variables in z-scores. * Significant at 1% level.

Since under-weighting of default events is likely to give raise to choice-based sample bias (Manski and McFadden, 1981), we adopt an estimation scheme involving randomized re-sampling (see, for instance Grunert et al., 2005). Given the low number of default events, we cure possible biases by performing a sector-wide (2-Digit level) stratified resampling of non defaulters, keeping the ratio of defaulting over non defaulting firms equal to the official population-wide default rates reported by the Italian Chambers of Commerce at this level of sectoral aggregation. The sampling procedure is repeated several times with replacement. Averaging over the number of runs then yields robust point estimates and estimation errors.

Table 1 reports results based on 200 independent replications, which turned out to be a large enough bootstrap sample to achieve convergence.[3] The impact of size is significant and positive, increases the nearer to default and, notwithstanding the expected huge effect exerted by credit ratings, remains significant when controls are included. Conversely, age seems a much poorer predictor of default, and exerts its effect only over the very short run.[4]

4 Conclusion

We have found that bigger firms are more prone to incur the extreme financial distress represented by default events. This seemingly contrasts with the often reported evidence that smaller firms are more

[3] Sectoral dummies are also included, but not reported because non significant.

[4] Given the possible nonlinear effects suggested by Figure 3, we also experimented with a quadratic term for size, $\ln^2(S_t)$. Results confirmed the positive effect of size, while the other coefficients remain practically unchanged.

likely to exit. However, since bankruptcies represent but a minimal part of exits (consider a typical industrial turnover of about 1-2% against an average bankruptcy rate of 0.5%[5]) as long as other exit causes are more abundant among younger firms, they can explain alone the observed exit-size relationship. In any case, our result that default rates increase with size tells that while bigger firms can be more successful than smaller firms in recovering from default and thus in avoiding exit, they are nonetheless more likely to experience severe problems leading to default. Adding to previous studies on similar data, finding weak linkages between firm growth and operating performance (Bottazzi et al., 2010) and a positive relationship between unit labor cost and size (Bottazzi and Grazzi, 2010), we conclude that bigger firms' resilience to exit does not necessarily associate with a real operating advantage. The recovering ability of bigger firms seems thus much more likely to arise from inefficiency factors, such as excessive market power and preferential credit channels, or from external helps justified by (perfectly legitimate) political considerations about the social consequences of failures.

Our results bear relevant implications about the actual economic role of bigger firms, at least in Italy. Default events are unanticipated and costly. The pressure generated by lenders is likely to promote possibly disruptive divestment, hinder long-term commercial relationships with customers and suppliers, and ultimately generate losses for owners and employees. These events should be in principle avoided. The finding that small-medium enterprises seem as good as larger ones, if not better, in avoiding such conditions of extreme financial distress suggests to revise the common wisdom, often prevailing in the political arena, that bigger firms represent an essential asset which should be preserved at any cost.

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[5]Sources: Italian Statistical Office (ISTAT - annual survey on bankruptcies; and Italian Chambers of Commerce (UNIONCAMERE - Movimprese database on firm demography.

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