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# The Impact of Financial Constraints on Firms Survival and Growth

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# The Impact of Financial Constraints on Firm Survival and Growth

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**Abstract**

We propose a new approach for identifying and measuring the degree of financial constraint faced by firms and use it to investigate the effect of financial constraints on firm survival and development. Using panel data on French manufacturing firms over the 1996 - 2004 period, we find that (i) financial constraints significantly increase the probability of exiting the market, (ii) access to external financial resources has a positive effect on the growth of firms in terms of sales, capital stock and employment, (iii) financial constraints are positively related with productivity growth in the short-run. We interpret this last result as the sign that constrained firms need to cut costs in order to generate the resources they cannot raise on financial markets.

**Keywords**: Financial constraints, Firm growth, Firm survival

## 1 Introduction

The paper develops a new approach for identifying and measuring the degree of financial constraint faced by firms, and uses it to investigate the effect of financial constraints on firm survival and growth. We propose a time-varying and continuous measure of constraint that recognizes the multifaceted feature of this phenomenon and allows one to capture different degrees of constraint. Firm exit and growth represent interesting fields of application, since financial constraints can interfere with market selection mechanisms, and therefore shape market structures in ways not necessarily consistent with efficiency. In fact, given the presence of important sunk entry costs in most markets, one can expect that constrained firms find it more difficult to grow and even to survive. Also, while a large amount of evidence exists on the relation between financial development and growth,

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both cross-country and cross-industry, much less is known at the microeconomic level of the firm.

We can summarize our main results as follows. First of all, we find that financial constraints significantly increase the probability of exiting the market. In addition, access to external financial resources has a positive effect on the growth of firms in terms of sales, capital stock and employment. Last, the presence of financial constraints is positively related with productivity growth in the short-run: we interpret this latter result as the sign that constrained firms need to cut costs in order to generate the resources they cannot raise on financial markets, and this results in improved efficiency.

Our contribution is twofold. First, we propose a new way to measure the degree of financial constraint, which we believe is superior to existing methodologies. Second, we shed new light on the role played by access to external financial resources in shaping firm growth and survival.

The paper is organized as follows. Next Section presents an overview of the empirical literature on financial constraints. Section 3 presents our data and illustrates the empirical methodology we propose to measure financial constraints. In Section 4, we present an application to French firms that specifically investigates the issue of growth and survival. Section 5 concludes.

# 2 A glance at the existing empirical literature

Since the late 1980s, a large number of empirical studies have addressed the issue of financial constraints, mainly in order to study the relation between firm investment and the availability of internal funds. Indeed, a large and convincing evidence exists showing that, when a standard investment equation is augmented with cash flow availability, the fit of the equation improves. Now, under perfect capital markets, internal and external sources of financial funds are perfectly substitutable (Modigliani and Miller, 1958), so that the availability of internal funds should not affect investment decisions.

While there is a substantial consensus on the notion that liquidity does matter in investment equations, much less agreement exists on why this is the case. Chirinko and Schaller (1995) suggest two possible hypotheses: the existence of financial constraints (due to the existence of either asymmetric information or transaction costs), and mere mispecification whereby liquidity takes up the effect of other omitted variables.

## 2.1 Firm growth and survival

The existence of financial constraints can obviously have important effects on the firm's ability to grow and stay in the market. A number of studies exist on the topic, although many stem from the finance and growth macro literature (Levine, 2005) and focus on comparing cross-country performances controlling for the degree of financial development. Hence, for instance, Demirguc-Kunt and Maksimovic (1998) and Beck, Demirguc-Kunt and Maksimovic (2005) find that financial development eases the obstacles firms face to grow faster and therefore improves macroeconomic performance. Similarly, Beck, Demirguc-Kunt, Laeven and Levine (2005) use cross-country and cross-industry data to investigate the role of financial factors in shaping the size distribution of firms. They conclude that financial development exerts a disproportionately positive effect on small firms. Yet, financial development is constant across firms operating in the same economic system. A recent work on the issue, which is very close to our analysis in spirit, is an article by Aghion, Fally and Scarpetta (2007) where the authors address the impact of financial development on firm entry, the size at entry and the post-entry performance of new firms. They find that access to external finance matters most for the entry of small firms, and that it improves market selection by allowing small firms to compete on a more equal footing. Also, financial development is shown to ameliorate significantly post-entry growth of firms. Once again, the paper's results are based on a cross-country comparison that takes financial variables as given for all firms located in the same country. Another interesting investigation on the effect of credit constraints on the real economy is undertaken by Jeong and Townsend (2005), who decompose Total Factor Productivity (*TFP*) growth to account for a number of its determinants. They find a significant effect of aggregate financial development on aggregate *TFP* growth.

For what concerns microeconometric studies, most works use survey data where firms give a self-assessment of the difficulty faced in accessing external funds. Often the survey are targeted to specific issues, most notably R&D expenses or investment in innovation. So, for instance, Winker (1999) uses data collected from 1,900 enterprises in the 1982–1991 period to show that the perceived credit constraint has a negative effect on innovation expenditures and overall investment. These results are very similar to those reported by Becchetti and Trovato (2002) and Savignac (2006) and reviewed in the previous subsection. In a different fashion, Holtz-Eakin et al. (1994) exploit a unique dataset matching personal wealth (in the form of received bequests) to survival rates among US entrepreneurs. They show that inheritances increase both the probability of survival and future sales growth of the firm whose owner benefited from the windfall, and interpret this as testifying for the existence of significant credit constraints. Binks and Ennew (1996) analyze the perceived credit constraint of 6,000 UK firms using survey data. They find that expected future growth is associated with a higher perceived constraint, so that the latter seems to play a relevant role in shaping firm development decisions. More recently, Carpenter and Petersen (2002) analyze growth of 1,600 small US firms (defined as firms whose total assets range between 5 and 100 million US dollar at time of entry) and find that asset growth is indeed constrained by the availability of internal finance. Firms able to raise a lot of external funds (relative to the group average) in fact display higher growth rates and therefore manage to grow faster.

Overall, compelling evidence seems to exist about the substantial role played by financial constraints in shaping and conditioning firm decisions underlying growth and survival.

## 2.2 Existing research strategies

The usual empirical strategy adopted to detect the existence and the relevance of financial constraints entails segmenting the sample *ex ante* into subgroups of firms with different likelihood of facing financial constraints, and test whether cash-flow plays a different role in explaining investment decisions by more/less constrained firms. Thus, for instance, Fazzari et al. (1988) claim that firms with low dividend payout ratios (likely constrained) display higher investment-cash flow sensitivity. Subsequent studies tend to find supporting evidence using a number of different variables to identify constrained firms (Bond and Meghir, 1994; Gilchrist and Himmelberg, 1995; Chirinko and Schaller, 1995).

The first paper finding opposite results is, to the best of our knowledge, Devereux and Schiantarelli (1990), which reports a higher cash flow coefficient for larger firms, even after controlling for sector heterogeneity. But it is only with the work by Kaplan and Zingales (1997) that the usefulness of investment-cash flow sensitivity as a measure of financial constraint has been definitely questioned. Exploiting qualitative information from financial statements of firms classified as constrained in Fazzari et al. (1988), the authors show that less constrained firms display substantially higher investment-cash flow sensitivity. Hence, they conclude, the latter can no longer be regarded as a useful measure of financial constraint. Since then, other authors have reported evidence of a negative relation between investment-cash flow sensitivity and financial constraints (for instance Kadapakkam et al., 1998; Cleary, 2006).

Although a reference to the above literature is due, in what follows we will try to steer clear of this debate and only review in greater detail the way in which different authors have identified financially constrained firms, irrespective of the specific aim of their study. In other words, we will review the empirical strategies adopted in the literature, keeping in mind our goal of building a time-varying and continuous measure of financial constraint.

[Table 1 about here.]

Table 1 reports a list of papers in chronological order and the segmenting variables used to distinguish among constrained and unconstrained firms. Often firms are simply placed in two different groups on the basis of some arbitrary threshold, such as median values, or first quartiles (Devereux and Schiantarelli, 1990; Gilchrist and Himmelberg, 1995; Greenaway et al., 2005; Cleary, 2006). Other authors use a finer classification and classify firms in three or more groups (Fazzari et al., 1988; Kadapakkam et al., 1998;

Kaplan and Zingales, 1997). Almost all the papers rely on a limited list of variables such as size, age, dividend policy, membership in a group or conglomerate, existence of bond rating, and concentration of ownership. All these variables are meant to capture sources of informational asymmetries which can potentially constrain access to capital markets. So, for instance, Fazzari et al. (1988) claim that dividends are a residual decision in firm strategy and, under the assumption that external finance is more costly than internal funds, paying high dividends in the presence of profitable investment opportunities is not consistent with profit maximization. Hence, high dividend payout ratios signal the absence of financial constraints. Big and mature firms are likely to find easier access to external funds, as it should be easier to collect information on them compared to young and small enterprises. Similarly, membership in a larger conglomerate should facilitate market access both because of the signaling exercised and because the single firm can likely receive funds from its headquarters. Also, the mere existence of a bond rating (even irrespective of the rating itself) can signal a commitment of the firm *vis-à-vis* financial markets. In a similar vein, the existence of a dominant shareholder is seen as a way to reduce the agency problem with management and therefore to act as a guarantee toward external investors. Other papers, namely Becchetti and Trovato (2002) and Savignac (2006), use survey data whereby firms themselves give a self-assessment of their difficulty to access external financial funds.

There are a few weaknesses related to the above strategies. First, Hubbard (1998) notes how most of the chosen criteria tend to be time invariant, whereas one can imagine that firms switch between being constrained or unconstrained depending on overall credit conditions, investment opportunities and idiosyncratic shocks. Second, all works relying on dividend payments are restricted to quoted firms which, at least for what concerns continental Europe, tend to be larger and more mature. As a further potential problem, we add that all the above studies rely on a unidimensional definition of financial constraint, i.e. they assume that a single variable can effectively identify the existence of a constraint, viewing the latter as a clear-cut phenomenon that is either in place or not, without allowing for different degrees. Notable exceptions are the works by Lamont et al. (2001), Cleary (1999, 2006), and Whited and Wu (2006). The first paper proposes a multivariate index that builds on Kaplan and Zingales (1997), whereby five variables are weighted using regression coefficients and collapsed into a single indicator.[1] The main difficulty with this approach is the need to extrapolate results obtained on a small sample of 49 US quoted firms (those used in Kaplan and Zingales, 1997) and apply them to a larger population (and in a different period). Furthermore, one of the variables needed to compute the index is Tobin's Q, the use of which as a proxy for investment opportunities is rather controversial

[1] The variables are (i) cash flow to fixed assets, (ii) market to book ratio, (iii) debt to total assets, (iv) dividends to fixed assets, and (v) cash to fixed assets.

and lies at the core of the investment-cash flow debate outlined above. Whited and Wu (2006) take a similar route, but perform their own estimate and base their index on a structural model, whereby they measure financial constraints by means of the shadow price of capital.[2]

Another interesting attempt to develop a time-varying, continuous measure of financial constraints is due to Cleary (1999), which uses multiple discriminant analysis (in a way similar to Altman, 1968) to compute a score based on six variables.[3] The methodology entails two steps: first, one needs to classify firms as constrained or unconstrained according to some characteristic, and second, the statistical analysis is performed which delivers a coefficient for each of the (six) control variables.[4] The score is then obtained as the predicted value of the empirical model, and it can be applied also to firms excluded from the first step of the analysis. To separate firms, Cleary (1999) makes the hypothesis that firms reducing dividend payments one year to the next are likely to be financially constrained, whereas those augmenting them are likely not to be constrained. Firms keeping dividend payment constant are not used in the multiple discriminant analysis, but later they are nonetheless attributed a score.[5]

# 3 Data and empirical strategy

## 3.1 Measuring financial constraints

We have two main aims when looking for a new strategy to measure financial constraints: the first is to derive a time-varying index that allows for firms being more or less constrained in different periods; the second is to account for (possible) different degrees of financial constraints. We claim that one of the main weaknesses of earlier approaches lies in the choice of a single variable to classify firms *ex ante*.

We therefore build a synthetic index, collapsing information coming from seven different variables that we esteem convey important information relative to the existence of financial constraints. They have been selected on the basis of their performance in existing studies, and their perceived importance in determining ease of access to external financial funds. They are: size (measured by total assets), profitability (return on total assets), liquidity (current ratio: current asset over current liabilities), cash flow generat-

[2]The variables included in the model are (i) the ratio of long-term to total debt, (ii) a dividend dummy, (iii) sales growth (both for the individual firm and the sector), (iv) (the log of) total assets, (v) the number of analysts following the firm, (vi) the ratio of liquid to total assets, (vii) the industry debt to assets ratio.

[3]There are (i) the current ratio, (ii) the debt ratio, (iii) the fixed charge coverage, (iv) the net income margin, (v) sale growth, and (vi) slack over total assets. See Cleary (1999) for a definition of the variables.

[4]This is very much similar to what a *probit* or a *logit* estimation would do. In fact, multiple discriminant analysis is nothing more than an ancestor of these methodologies, which, because of current computer power, are probably preferable as more robust.

[5]An obvious requirement of this methodology is working with quoted firms. One could then derive a score for non quoted firms as well, but it is not clear how well the index would behave.

ing ability[6], solvency (own funds over total liabilities, measuring the ability by a firm to meet its long-term financial obligations), trade credit over total assets and repaying ability (financial debt over cash flow).

For each of these seven dimensions, and each year, we first compute the value of the firm relative to the average of all enterprises belonging to the same 2-digit NACE sector, and then place it in one of the quintiles in which the resulting distribution is divided.[7] Hence, for each firm/year observation we end up with 7 scores ranging from 1 to 5, with 1 containing the smallest values. This information is then combined in different ways to obtain a synthetic index, which is then rescaled to have a common 1–10 range, with smaller values being associated with more constrained firms. In what follows, we concentrate on two ways to combine the information: (i) a simple sum of the 7 scores (Score A); (ii) the number of dimensions for which the firm/year lies in the first quintile (Score B). Interestingly, the ranking of firm/year observations is very robust to the different ways to aggregate the information from the 7 variables, with a correlation of over 0.78.[8]

### 3.2 Data sources: the EAE survey and the DIANE database

We use data from two main sources. Both of them collects information on French firms, though their coverage is somehow different. The first (*EAE*) is a survey that gathers information from the financial statements and balance sheets of all individual manufacturing firms with at least 20 employees, from 1990 to 2004.[9] Each unit is endowed at birth with an identifying number that allows us to track the firm over time. We rely on the following standard definition of continuing and exiting firms (Bellone et al., 2008): an exiting firm is an identifying number that exists in year $t$, but not in $t + 1$; a continuing firm is an identifying number that exists in years $t$, $t + 1$ and $t - 1$. The second source of information is the *DIANE* database published by Bureau van Dijk, which collects data on over 1 million French firms for the period 1996–2005. This database provides us with many financial stock variables absent from the *EAE* survey. Merging the two datasets yields around 104,000 firm/year observations, stemming from an unbalanced panel of over 16,500 manufacturing enterprises followed over the period 1996–2004.[10]

In what follows, we compute Total Factor Productivity using the so-called *Multilateral*

[6] This is the maximum amount of resources that a firm can devote to self-financing, and corresponds to the French *capacité d'autofinancement*.

[7] To account for the presence of outliers we trim the top and bottom 0.5% observations for each variable.

[8] We have tried other ways to combine the information, with identical results. Additional details are available upon request.

[9] The survey (*Enquête Annuelle d'Entreprises*) is conducted by the French Ministry of Industry. The surveyed unit is the legal (not the productive) unit, which means that we are dealing with firm-level data. To investigate the role of financial constraints on growth and survival, firm, rather than plant level data, seem appropriate.

[10] Chirinko and Schaller (1995) note that focusing on manufacturing only —as it is often done in the literature— may exaggerate the role played by financial constraints because of the specialized nature of the assets involved in those firms.

*Productivity Index*, first introduced by Caves et al. (1982) and extended by Good et al. (1997). This methodology consists of computing the *TFP* index for firm $i$ at time $t$ as follows:

$$\ln TFP_{it} = \ln\ Y_{it} - \overline{\ln\ Y_t} + \sum_{\tau=2}^{t}\left(\overline{\ln\ Y_\tau} - \overline{\ln\ Y_{\tau-1}}\right) - \left[\begin{array}{l} \sum_{n=1}^{N} \frac{1}{2}\left(S_{nit} + \overline{S_{nt}}\right)\left(\ln\ X_{nit} - \overline{\ln\ X_{nt}}\right) \\ + \sum_{\tau=2}^{t}\sum_{n=1}^{N} \frac{1}{2}\left(\overline{S_{n\tau}} + \overline{S_{n\tau-1}}\right)\left(\overline{\ln\ X_{n\tau}} - \overline{\ln\ X_{n\tau-1}}\right) \end{array}\right] \quad (1)$$

where $Y_{it}$ denotes the real gross output of firm $i$ at time $t$ using the set of $N$ inputs $X_{nit}$, where input $X$ is alternatively capital stocks ($K$); labor in terms of hours worked ($L$); and intermediate inputs ($M$). $S_{nit}$ is the cost share of input $X_{nit}$ in the total cost[11]. Subscripts $\tau$ and $n$ are indices for time and inputs, respectively. Symbols with an upper bar correspond to measures for the reference point (the hypothetical firm), computed as the means of the corresponding firm level variables, for all firms, in year $t$. This methodology is particularly well suited to comparisons of within firm-level panel datasets across industries, in that it guarantees the transitivity of any comparison between two firm-year observations by expressing each firm's input and output as deviations from a single reference point.

Labor Productivity is defined as the log-ratio of real value added on labor (hours worked):

$$\ln LP_{it} = \ln\left(\frac{V_{it}}{L_{it}}\right) \quad (2)$$

where $V_{it}$ denotes the value added of the firm deflated by the sectoral price indexes published by INSEE (French System of National Accounts).

# 4 Results

## 4.1 Firm survival

In this section, we present results from an empirical model that estimates the hazard of exit controlling for unobserved heterogeneity (for more details see Prentice and Gloeckler, 1978; Jenkins, 1995; Bellone et al., 2008). Suppose there are firms $i = 1, \ldots, N$, which enter the industry at time $t = 0$. The hazard rate function is defined as the probability of failure in interval $t$ and $t+1$ divided by the probability of surviving at least until $t$. The hazard rate function for firm $i$ at time $t > 0$ and $t = 1, \ldots, T$ is assumed to take the proportional hazard form: $\theta_{it} = \theta(t) \cdot X_{it}^{'}\beta$, where $\theta(t)$ is the baseline hazard function and

[11] See Bellone et al. (2008) for more details on the method and a full description of the variables.

$X_{it}$ is a series of time-varying covariates summarizing observed differences among firms. The discrete time formulation of the hazard of exit for firm $i$ in time interval $t$ is given by a complementary log logistic function such as:

$$h_t\left(X_{it}\right) = 1 - \exp\left\{-\exp\left(X_{it}^{\prime}\beta + \theta(t)\right)\right\} \tag{3}$$

where $\theta(t)$ is the baseline hazard function, relating the hazard rate $h_t\left(X_{it}\right)$ at the $t^{th}$ interval to the spell duration. This model can be extended to account for unobserved but systematic differences among firms. Suppose that unobserved heterogeneity is described by a random variable $\mu_i$ independent of $X_{it}$. The proportional hazards form with unobserved heterogeneity can be written as :

$$h_t\left(X_{it}\right) = 1 - \exp\left\{-\exp\left(X_{it}^{\prime}\beta + \theta(t)\right) + \mu_i\right\} \tag{4}$$

where $\mu_i$ is an unobserved individual-specific error term with zero mean, uncorrelated with the $X$s. Model (4) can be estimated using standard random effects panel data methods for a binary dependent variable, under the assumption that some distribution is provided for the unobserved term. In this paper, we assume that $\mu_i$ is distributed Normal.[12]

Results are reported in Table 2. In Columns (1) to (3), we use *Score A*, whereas in Columns (4) to (6) we display results obtained using *Score B*. The probability of exiting the market is assumed dependent on age, size, profitability, productive efficiency (*TFP*) and our measure of financial constraint. All variables have the expected sign and are strongly significant. The way we build our measure of financial constraint (smaller values associated with a higher degree of constraint) is consistent with the negative sign associated with the estimated coefficient: an easier access to external funds (hence a higher Score) lowers the probability of exiting the market. This results is robust to inclusion of a number of standard controls used in the literature on hazard rates: all regressions control for the age of the firm and for its size (in terms of employment), which display the expected negative sign. In Columns (2) and (3), we also add an index of technical efficiency (*TFP*) and a measure of profitability (operating income over assets): both play a significant role in reducing the hazard rate, and their inclusion slightly reduces the (absolute value of the) coefficient associated with the index of financial constraint, which nevertheless remains significant and displays the same order of magnitude.

[Table 2 about here.]

Similarly, results are rather robust to the choice of the way we measure financial constraints. Substituting *Score B* for *Score A* in fact does not alter the results; the only

[12]See Chapters 17 and 18 of Cameron and Trivedi (2005) for a discussion on the appropriate choice of distribution for the parameter of unobserved heterogeneity.

minor change is due to the fact that profitability, while retaining the expected negative sign, is no longer significantly different from zero. Remarkably, the size of the of the financial constraints coefficients is very stable and does not depend at all on the choice of the Score included in the regression.

### 4.2 Firm growth

We move now to investigate the impact of financial constraints on firm growth, both in terms of size and in terms of productivity. To do this, we will focus hereafter on results obtained using *Score A* only, as this does not alter the resulting picture.

[Table 3 about here.]

In Table 3, we report results obtained investigating the relation between size growth at different time horizons, initial financial constraints, and a set of standard control variables. We measure size growth in terms of (i) output, (ii) employment, and (iii) capital stock. Growth is computed over three different time spans: 1-, 3- and 5-years. Controls include the age of the firm, productive efficiency (*TFP*), and initial size. Once again, results are very stable across specifications, choice of the dependent variable, and time horizon. Access to external financial resources does have a positive effect on firm growth, even after controlling for productivity, initial size and age. The effect is somewhat smaller over the longer 5-year horizon, and is less significant for employment growth. As our measure of employment is worked hours, we suppose that financial constraints pose fewer problems in this domain: it is reasonably easier to finance an increase in worked hours than the investment needed to enlarge the capital stock. Initial size is negatively related with future growth, meaning that smaller firms tend to grow faster. Also, initial productivity is positively related with growth in employment and in the stock of capital, whereas it displays a negative coefficient in the output regression.

[Table 4 about here.]

Last, in Table 4, we present results based on a regression where the dependent variable is the growth rate of productive efficiency, both in terms of *TFP* and in terms of average labor productivity. We find that initial size is positively related to future productivity growth, whereas the latter is lower for more productive firms. Interestingly, the presence (and degree) of financial constraints exert a positive effect on the dynamic of efficiency. We read this phenomenon as an indication that constrained firms are forced to improve their efficiency in order to remain on the market. Since by construction we observe future productivity growth of successful firms only, there is an evident self-selection that drives our result. Moreover, such a behavior is consistent with works by Nickell et al. (1997)

and Nickell and Nicolitsas (1999) on the role of financial pressure on firm performance. In particular, Nickell and Nicolitsas (1999) find that financial pressure is associated with gains in productivity, and suggest that financial market discipline helps solving agency problems and therefore improves firm performance. In light of the results displayed in Table 4, it would be interesting to pursue this line of research and test the effect of financial constraints on short- versus long-term efficiency. In fact, it is reasonable to expect that, in the attempt to free financial resources, constrained firms will scale down long-term investment (for instance R&D), with detrimental effects on longer term growth prospects.

# 5 Conclusions

In this paper, we have proposed a new methodology to measure financial constraints using a synthetic index based on a number of different variables. Our measure has two main advantages over existing methods: first, it accounts for the multifaceted nature of the phenomena under investigation, and, second, it delivers a time-varying, continuous measure. The index is then applied to the study of firm survival and growth. The relation between financial constraints at the firm level and structural issues such as innovation and growth is a long standing issue in the economic arena. It has recently enjoyed renewed interest, as papers by Aghion et al. (2005), Aghion, Askenazy, Berman, Cette and Eymard (2007), and Aghion, Fally and Scarpetta (2007) testify.

We have shown that financial constraints play a significant role in determining the probability of firm survival, even after controlling for size, age, profitability and productive efficiency. Moreover, access to external funds increases firm growth. On the other hand, and consistent with previous results, our measure of financial constraint is associated with positive productivity growth in the short-run. Future work will add R&D and innovation expenditures to the picture, to see whether financial constraints have a different effect on long-term efficiency.

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Table 1: Segmenting variables used in the literature

| Paper | Segmenting variables |
|---|---|
| Fazzari et al. (1988) | – dividend payout ratio |
| Devereux and Schiantarelli (1990) | – age |
| | – size |
| | – age + size |
| Hoshi et al. (1991) | – group membership |
| Bond and Meghir (1994) | – dividend over capital stock + share issues |
| Chirinko and Schaller (1995) | – age |
| | – concentration of ownership |
| | – group membership |
| Gilchrist and Himmelberg (1995) | – dividend payout ratio |
| | – size |
| | – existence of bond rating |
| Kaplan and Zingales (1997) | – qualitative data from financial statements |
| Kadapakkam et al. (1998) | – size |
| Becchetti and Trovato (2002) | – survey data (firm self-assessment) |
| Campa and Shaver (2002) | – group membership |
| Greenaway et al. (2005) | – liquidity |
| | – credit rating |
| Cleary (2006) | – size |
| | – dividend payout ratio |
| | – $\Delta$ dividend payout ratio |
| Savignac (2006) | – survey data (firm self-assessment) |
| Whited (2006) | – dividend policy |
| | – size |
| | – group membership |

Table 2: Firm survival

| | Score A | | | Score B | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| fin constr | -0.16342 | -0.14474 | -0.13349 | -0.16723 | -0.15328 | -0.1476 |
| | [0.0154]*** | [0.0157]*** | [0.0164]*** | [0.0119]*** | [0.0121]*** | [0.0128]*** |
| log empl | -3.61161 | -3.66843 | -3.63775 | -3.62153 | -3.67192 | -3.65528 |
| | [0.1130]*** | [0.1139]*** | [0.1143]*** | [0.1126]*** | [0.1135]*** | [0.1140]*** |
| log TFP | | -1.53346 | -1.16557 | | -1.44053 | -1.23854 |
| | | [0.2566]*** | [0.2965]*** | | [0.2539]*** | [0.2940]*** |
| log profit | | | -0.42446 | | | -0.23124 |
| | | | [0.1738]** | | | [0.1710] |
| constant | 35.8454 | 36.30043 | 36.07551 | 36.34993 | 36.76391 | 36.63507 |
| | [1.2410]*** | [1.2487]*** | [1.2496]*** | [1.2367]*** | [1.2442]*** | [1.2465]*** |
| Observations | 75,397 | 75,397 | 75,397 | 75,397 | 75,397 | 75,397 |
| Firms | 14,963 | 14,963 | 14,963 | 14,963 | 14,963 | 14,963 |

Link function: complementary log-log with unobserved heterogeneity. Non parametric baseline, hazard Function. All models include a full vector of industry dummies, year dummies and an indicator variable for the age of the firm. Standard errors in brackets.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Firm size growth (Within regression)

| | Output | | | Employment | | | Capital stock | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | t,t+1 | t,t+3 | t,t+5 | t,t+1 | t,t+3 | t,t+5 | t,t+1 | t,t+3 | t,t+5 |
| fin constr$_{t=0}$ | 0.00225 | 0.00251 | 0.00094 | 0.00072 | 0.00182 | 0.00026 | 0.00336 | 0.00257 | 0.00119 |
| | [0.00058]*** | [0.00037]*** | [0.00029]*** | [0.00044] | [0.00030]*** | [0.00024] | [0.00053]*** | [0.00039]*** | [0.00030]*** |
| log TFP$_{t=0}$ | -0.3276 | -0.16809 | -0.0875 | 0.18328 | 0.11817 | 0.07426 | 0.18037 | 0.15251 | 0.07395 |
| | [0.00958]*** | [0.00595]*** | [0.00478]*** | [0.00727]*** | [0.00489]*** | [0.00399]*** | [0.00851]*** | [0.00619]*** | [0.00489]*** |
| log output$_{t=0}$ | -0.02777 | -0.04526 | -0.03733 | | | | | | |
| | [0.00108]*** | [0.00085]*** | [0.00075]*** | | | | | | |
| log empl$_{t=0}$ | | | | -0.02874 | -0.05258 | -0.04473 | | | |
| | | | | [0.00100]*** | [0.00088]*** | [0.00081]*** | | | |
| log capital$_{t=0}$ | | | | | | | -0.02982 | -0.0526 | -0.05165 |
| | | | | | | | [0.00084]*** | [0.00079]*** | [0.00077]*** |
| constant | 0.37113 | 0.5072 | 0.47131 | 0.37176 | 0.61124 | 0.56676 | 0.24153 | 0.5025 | 0.51061 |
| | [0.02469]*** | [0.01403]*** | [0.01161]*** | [0.02068]*** | [0.01350]*** | [0.01191]*** | [0.01843]*** | [0.01404]*** | [0.01166]*** |
| Observations | 64,261 | 42,823 | 25,248 | 64,261 | 42,823 | 25,248 | 64,261 | 42,823 | 25,248 |
| Firms | 13,365 | 11,280 | 9,485 | 13,365 | 11,280 | 9,485 | 13,365 | 11,280 | 9,485 |

Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
All models include a full vector of time-industry dummies.

Table 4: Firm productivity growth (Within regression)

| | TFP | | | Labor productivity | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | t,t+1 | t,t+3 | t,t+5 | t,t+1 | t,t+3 | t,t+5 |
| fin constr$_{t=0}$ | -0.00114 | -0.00128 | -0.00065 | -0.00658 | -0.00359 | -0.00192 |
| | [0.0002]*** | [0.0001]*** | [0.0001]*** | [0.0005]*** | [0.0003]*** | [0.0002]*** |
| log product$_{t=0}$ | -0.30844 | -0.21171 | -0.13836 | -0.12295 | -0.11437 | -0.07419 |
| | [0.0031]*** | [0.0016]*** | [0.0013]*** | [0.0019]*** | [0.0012]*** | [0.0010]*** |
| log empl$_{t=0}$ | 0.00573 | 0.00414 | 0.00389 | 0.02334 | 0.02013 | 0.01291 |
| | [0.0004]*** | [0.0003]*** | [0.0002]*** | [0.0012]*** | [0.0008]*** | [0.0006]*** |
| constant | -0.0653 | -0.02868 | -0.04829 | -0.32243 | -0.29077 | -0.18809 |
| | [0.0090]*** | [0.0040]*** | [0.0032]*** | [0.0223]*** | [0.0125]*** | [0.0095]*** |
| Observations | 64,261 | 42,823 | 25,248 | 64,261 | 42,823 | 25,248 |
| Firms | 13,365 | 11,280 | 9,485 | 13,365 | 11,280 | 9,485 |

Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
All models include a full vector of time-industry dummies.