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**Firm size distribution:  
do financial constraints explain it all?  
Evidence from survey data**

by Paolo Angelini and Andrea Generale



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# FIRM SIZE DISTRIBUTION: DO FINANCIAL CONSTRAINTS EXPLAIN IT ALL? EVIDENCE FROM SURVEY DATA

by Paolo Angelini\* and Andrea Generale\*

## Abstract

We address the question in the title using survey-based measures of financial constraints, as opposed to the proxies typically used in the literature. We find that in our dataset of Italian firms, those declaring to be financially constrained are smaller and younger than the others. However, the size distribution of non constrained firms is significantly skewed, and virtually overlaps with the FSD for the entire sample. Similar conclusions are drawn from the analysis of a large subsample comprising very young firms. These results are broadly confirmed using several non survey-based proxies of financial constraints, and over a second large sample including firms from OECD and non OECD countries. The analysis of the latter dataset suggests that financial constraints are a relatively more serious problem in developing countries. We conclude that financial constraints cannot be the main determinant of the FSD evolution over time, especially in financially developed economies.

**JEL Classification:** L11.

**Keywords:** firm size distribution, financial constraints.

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## 1. Introduction<sup>1</sup>

The conventional wisdom known as Gibrat's law holds that firm size and growth are independent and that the firm size distribution (FSD) is stable over time and approximately lognormal. This view has been challenged by a series of recent papers (see Sutton (1997), Lotti and Santarelli (2003) for recent surveys of the literature). Among them, Cabral and Mata (2003) (CM henceforth) reach several important results. The paper begins by documenting two stylized facts about the FSD: first, the distribution of young firms is very skewed to the right (most of the mass is on small firms); second, the skewness tends to diminish monotonically with firm age (the distribution of older firms is more symmetric than that of young firms). While these facts have been also discussed in previous literature using cross-sections of firms of different ages, CM focus on longitudinal data, identifying a cohort of firms at birth and following their evolution over time. Next, the paper argues that financial constraints (fc) are the main determinant of the observed FSD evolution; a simple theoretical model shows that the size of startups is given by the minimum between the optimal size and the entrepreneur's wealth, which determines whether fc are binding. Thus, constrained entrepreneurs will be forced to choose a sub-optimal firm size; the optimal size is reached as soon as fc are released. To test this theory, CM resort to a series of assumptions to identify constrained firms: that fc are especially relevant for young firms, that fc can be proxied by the entrepreneur's wealth, and finally, that the latter can be proxied by age (young entrepreneurs should be less wealthy, and hence more financially constrained). The empirical evidence, building on these assumptions, supports the view that the reduction in the FSD skewness over

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time is explained by the gradual relaxation of *fc*.<sup>2</sup> This view, probably presented in its starkest version by CM, has found some support in the recent literature.<sup>3</sup>

Although financial constraints are widely recognized as an important determinant of firm size, the thesis that the evolution of the FSD can be explained mostly or exclusively by *fc* cannot be deemed well-established yet. First, finance is just one of the factors considered in the literature on the determinants of firm growth.<sup>4</sup> In addition, the effect of financial development on average firm size and on the FSD skewness may be a priori ambiguous: the relaxation of financial constraints should allow existing firms to grow faster, but should also foster the creation of new firms, with contrasting effects on the FSD skewness.<sup>5</sup> Furthermore, since financially constrained firms are not directly observed, they are usually identified via assumptions that are typically untested. CM's proxies for *fc* are based on plausible and clever assumptions. However, like those used in most of the literature, they may well be correlated with *fc*, but may also pick up other effects that have nothing to do with them.<sup>6</sup>

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<sup>2</sup> While CM admit that their theoretical model is simplified, and that only “*to some extent* [can *fc*] explain the increased skewness in the size distribution that is typically observed in *young* cohorts of firms” (p. 1079; italics added), the main message of the paper is clear: “the evolution of the size distribution is determined by firms ceasing to be financially constrained” (pp. 1075-6).

<sup>3</sup> Desai, Gompers and Lerner (2003) find that institutional factors, such as corruption and protection of property rights, have an impact on the FSD skewness, especially in developing countries. In the light of previous literature emphasizing the link between these factors and the development of the financial system, they conclude that in these countries capital constraints lead to skewness in the FSD. Cooley and Quadrini (2001) present a theoretical model in which financial frictions generate FSD skewness and explain several stylized facts about firm growth.

<sup>4</sup> Other factors include: functioning of the legal system, bureaucratic burden, tax codes, etc.. See Desai, Gompers and Lerner (2003) for a review of papers dealing with these themes, and Sutton (1997) for a survey of the theoretical literature.

<sup>5</sup> See e.g. Kumar, Rajan and Zingales (1999), Desai, Gompers and Lerner (2003). Rajan and Zingales (1998) find that about two thirds of growth at the industry level are explained by the growth of the average establishment, and only one third by the growth in the number of establishments; however, financial development has a significant effect on the latter, whereas the effect on the average firm size is generally non significant.

<sup>6</sup> Several proxies of *fc* have been proposed in the literature. For instance, Gertler and Gilchrist (1994) use firm size, exploiting the idea that small firms can typically access fewer sources of funds. Petersen and Rajan (1994) assume that firms that are willing to borrow at high interest rates from non-institutional lenders are constrained. Holtz-Eakin, Joulfaian and Rosen (1994) rely on the idea that entrepreneurs receiving an inheritance should not suffer from *fc*. For a critical review, see Schiantarelli (1995).

The present paper provides a quantitative assessment of the relationship between financial constraints and the evolution of the FSD, with a primary focus on survey-based measures of *fc*. Our datasets have a common denominator: in the course of the survey from which they originate, entrepreneurs were asked specific questions concerning their firm's financial needs and problems. This allows us to directly identify financially constrained (constrained for brevity in what follows) firms, sidestepping the above mentioned assumptions, and going directly to the core of the issue: can financial constraints explain the evolution of the FSD?

We proceed as follows. First, we assess the relationship between our survey-based proxies of *fc* and firm size. Controlling for age, we compare nonparametric estimates of the size distributions for constrained firms and for non constrained ones. We also formally test the following two hypotheses: (*h1*) the FSD for constrained firms is equal to that for non constrained ones; (*h2*) the FSD for non constrained firms is equal to that for the entire sample. Note that rejection of (*h1*) is necessary to support the claim that *fc* influence the evolution of the FSD, but only rejection of (*h2*) is in line with the view that they are an important determinant of this evolution: for instance, *fc* firms could be characterized by a highly skewed FSD (*h1* could be rejected), yet, if they were a sufficiently small proportion of the total sample, the overall impact of *fc* on the FSD could be negligible (*h2* would not be rejected).

Inspection of the estimated densities confirms that the FSD of constrained firms is indeed more skewed than that for the rest of the sample, but reveals that the difference is generally modest. Formally, hypothesis (*h1*) is sometimes rejected, depending on the sample and on the proxy of *fc* used, while hypothesis (*h2*) is virtually never rejected. Similar conclusions are derived over the subsample of very young firms, those aged 6 years or less, arguably at the core of CM's empirical findings. The results are broadly confirmed by a series of robustness checks. In particular, since survey-based measures of *fc* such as the ones we propose are themselves subject to criticism, we also use alternative proxies proposed in the literature. Also, the following exercise is performed: we estimate the effect of *fc* in a given year on a firm's growth in that year, and simulate the effect of protracted *fc* on the FSD. Overall, our results are in line with the conclusion that financial constraints have a negative impact on firm growth – a conclusion coherent with a large body of theoretical and

empirical literature – but suggest that they can explain only a modest share of the FSD evolution over time, especially in countries with fully developed financial systems.

Our first dataset is derived from several surveys of Italian manufacturing firms run by Mediocredito, a credit institution. The second is the World Business Environment Survey (WBES), comprising firms from a large number of industrialized and developing countries. The two sources complement each other in many respects. The Mediocredito surveys ask firms specific questions, e.g. whether they applied for bank credit but were turned down. These questions allow us to build dummies for very precise notions of financial constraints. However, by their own nature, such notions may overlook important aspects of the phenomenon. For instance, a firm might not wish additional credit, yet its performance could be negatively affected by exceedingly onerous financing conditions, or by an inefficient banking system. The questions in the WBES, looser but broader in nature, help us overcome these potential problems: entrepreneurs are asked to judge, on a four point scale, how problematic is finance for the operation and growth of their business. In addition, the WBES allows us to make sure that the results obtained with the Mediocredito data are not primarily due to peculiarities of the Italian environment or dataset, and to probe differences between industrialized and developing countries.

In the following section we give further details about our datasets and present the definitions of financially constrained firms. The main results are reported in sections 3 and 4. Section 5 concludes.

## **2. The data and the definition of financially constrained firm**

The analysis builds on two main datasets. The first comprises a series of four surveys of Italian firms run in 1992, 1995, 1998 and 2001 by Mediocredito, a long-term credit institution currently part of Capitalia, an Italian banking group. The resulting samples, each comprising over 4,000 firms, are stratified by firm size (number of employees) and by geographical area (North-west, North-east, Center and South), and are representative of the universe of Italian manufacturing firms with more than 10 employees. Surveys include questions concerning labor force, investment and export strategies, finance. Questions are

not always present, as the surveys design evolved over time, and some sections are monographic; balance sheet data are also available.<sup>7</sup> A key section for our purposes is the one concerning bank-customer relationships and investment financing decisions, which allows us to identify constrained firms. Specifically, the 1992 survey asked firms whether they encountered difficulties in financing the last investment project, prompting 5 possible causes (insufficient cash flow, lack of collateral, etc.; see the appendix for details). Each could be assigned various degrees of importance. We define a firm to be constrained in 1992 if at least one prompt was given the highest importance. In subsequent surveys firms were asked a sharper question: whether they had applied for, but failed to obtain more bank credit. Following Guiso (1998), a firm is deemed constrained if it answered “yes” to this question. We deem this our baseline definition. The 1998 and 2001 surveys, which contain slightly more detailed questions, allow us to replicate the baseline definition, and to analyze a broader one: firms who answered “yes” to the question “do you wish additional finance?”, regardless of whether they had actually applied for it. In addition, we can gauge the importance of “discouraged borrowers” (Jappelli (1990)), firms that needed funds but did not go to the bank because they believed that credit would have been denied anyway.<sup>8</sup>

The second main data source used in the paper is the World Business Environment Survey (WBES), run by the World Bank between 1998 and 2000 on a large number of firms with at least 5 employees from OECD and non OECD countries. A summary of the evidence and a detailed presentation of the dataset is in Batra, Kaufman and Stone (2003); Beck, Demirgüç-Kunt and Maksimovic (2004 and 2005), Desai, Gompers and Lerner (2003) are just some of the works that use it. The WBES questions on financing problems are somewhat similar to those in the *Mediocredito* dataset, but broader in scope. Specifically,

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<sup>7</sup> Each time a survey was run, a large number of firms was replaced (the motivation is not available), so that the 1992-1995 and 1998-2001 balanced panels contain about 1,500 and 1,100 firms, in the order. Only these two balanced panels were created, since a common firm identifier between the 1995 and the 1998 surveys was unavailable to us. For firms present in the balanced panels we could check whether the age differential was different from 3, and found some errors. Since age is crucial for the analysis, these observations were dropped from the sample. For the 1998 and 2001 surveys, where the social security code is available, we also checked the age field using the *Cerved Business Information* dataset, that virtually represents the universe of incorporated business in Italy (see [www.cerved.com](http://www.cerved.com) for information). When the figure from *Cerved* matched that available in either *Mediocredito* survey we assumed that it was correct, and replaced it in the other survey.

<sup>8</sup> Definitions of financially constrained firms similar to our baseline are also adopted by Angelini, Di Salvo and Ferri (1998). Jappelli (1990) and Duca and Rosenthal (1993) derive analogous measures from the Survey of Consumer Finances, in the context of studies of credit constraints among US consumers.



entrepreneurs are required to judge how problematic are several factors for the operation and growth of their business. They are prompted to choose from a list comprising ten different factors (finance, infrastructure, taxes and regulation, etc.; see the appendix), and to rank them in order of importance. We define a firm to be constrained if it perceives finance to be a “major obstacle”.

Finally, to address specific drawbacks of the *Mediocredito* sample we use two additional datasets which contain similar survey-based information on *fc*. The first is the Survey on Investment in Industry run annually by the Bank of Italy, a large dataset comprising Italian manufacturing firms of medium-large size (see Guiso (1998) for a synthetic description). While we deemed this data source inadequate for our main analysis, due to its insufficient coverage of young and small firms, we use it in section 3.3 to assess the degree of persistence of the *fc* phenomenon. The second is a one-off survey run in 1995 by *Federkasse*, an institution representing Italian small cooperative banks, and used by Angelini, Di Salvo and Ferri (1998). This dataset, which comprises over 2,000 very small non financial firms, is used in section 3.3 to assess the possible bias generated by the exclusion of units with less than 10 employees from the *Mediocredito* sample.<sup>9</sup>

### 3. Evidence from the *Mediocredito* dataset

#### 3.1 *Stylized facts*

Figure 1 confirms that the stylized facts documented by CM hold in the *Mediocredito* dataset: the FSD for the entire pooled sample (solid thick line) is clearly skewed to the right; the skewness tends to diminish with age.<sup>10</sup> The null hypothesis of equality of the FSDs is strongly rejected for any two contiguous age classes (see the Kolmogorov-Smirnov tests

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<sup>9</sup> The *Mediocredito* dataset can be requested from the provider at [www.capitalia.it](http://www.capitalia.it). See Capitalia (2002) for details. The WBES is freely available on the World Bank’s webpage. The Survey on Investment in Industry is currently subjected to restricted access, due to a pledge of confidentiality made by the Bank of Italy during the data collection phase. The *Federkasse* dataset can be requested from the provider ([rdisalvo@federkasse.bcc.it](mailto:rdisalvo@federkasse.bcc.it)).

<sup>10</sup> In figure 1, as in all the figures presented below, we checked that pooling data from various surveys did not hide significant heterogeneity across individual surveys. Section I of CM, devoted to the stylized facts, also relies on the cross-section dimension of their dataset. The densities appearing in this section are computed using a kernel density smoother with a bandwidth of 0.7.

reported in the figure). One relevant difference relative to CM's data from the Quadros do Pessoal is that the latter comprise a larger share of small firms: the modal size is less than 10 employees, against about 35 in our dataset. This difference to a large extent reflects the design of the Mediocredito sample, which excludes firms with less than 10 employees. This exclusion can represent a serious inconvenience for our purposes, hence we specifically address it in subsection 3.3. With this caveat in mind, we believe that overall figure 1 replicates the patterns found by CM quite well.

Our choice of age classes deserves a comment. The pooled sample has been broken down in five classes: up to 6 years; 7 to 15 years; 16 to 25; 26 to 50; and above 50. While this partition is relatively coarse (CM distinguish between firms aged 1 year, 2-4 years, 5-9 years, etc.), pooling the four surveys allows us to gather over 1,000 observations in our youngest class, the age group over which CM derive their core regression results.<sup>11</sup>

### 3.2 *Firm size and financial constraints*

Several important facts emerge from Table 1, which reports basic summary statistics from the Mediocredito datasets. First, the overall relevance of the *fc* phenomenon according to our baseline definition is rather minor, affecting at most 6 percent of the firms (column *(c)*). However, this percentage grows considerably if one adopts broader definitions, up to 21 percent among young firms that desire more credit (column *(i)*). Second, *fc* are negatively related to firm age, in line with the existing empirical evidence. The relationship is particularly strong for discouraged borrowers and for firms desiring more credit (columns *(g)* and *(i)*). Third, controlling for age, constrained firms are smaller than their non constrained counterparts, regardless of the definition of *fc* adopted.<sup>12</sup>

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<sup>11</sup> Note also that CM use the longest tenure as a proxy for the firm's age, as the latter is not present in their dataset. Since tenure is a lower bound for age, the 515 firms used in their analysis are in practice likely to include older firms, not just startups. From our youngest age class we discarded firms that had performed acquisitions or carve-outs, as in many cases the age information did not seem reliable. None of the results derived in sections 3.2-3.5 is affected by this choice.

<sup>12</sup> These indications are substantially confirmed by a probit regression of a zero-one dummy built from our baseline definition of *fc* on a series of firm-specific variables and industry and year dummies (regressions not reported). The coefficient of age is found to be negative but not always statistically significant, depending on the specification. In Guiso (1998) the effect of the firm's age on the probability of being constrained is never statistically significant.

Panel 1 of figure 2 reports estimated FSDs for the four pooled datasets. The solid line is the FSD for the entire sample. The small-dash line is the density for firms that declared to have suffered from *fc* in at least one survey. Here we use the baseline definition: firms asked for bank credit but were turned down. The long-dash line relates to firms declaring persistent *fc* problems. These are identified by balancing the 1992-95 and the 1998-2001 panels and tracking firms that reported *fc* in two consecutive surveys. In line with the a priori, these two distributions, especially the one relating to persistently constrained firms, are more skewed than that of the entire sample. However, the distribution of non constrained firms (dotted line) virtually coincides with that for the entire sample (indeed, it is not visible in the figure). This reflects the fact that the number of constrained firms according to this definition is very low, as we saw from table 1.

To support the graphical analysis, we perform nonparametric tests of the following two hypotheses: (*h1*) the FSD for constrained firms is equal to that for the rest of the sample; (*h2*) the FSD for non constrained firms is equal to that for the entire sample. As mentioned above, rejection of (*h1*) is necessary to support CM's claim, but only rejection of (*h2*) is consistent with the view that *fc* are an important determinant of the FSD evolution. In panel 1 of figure 2 only (*h1*) for persistently constrained firms can be rejected.

Panel 2 of figure 2 presents analogous FSDs for young firms (aged 6 years or less). Two main differences emerge relative to panel (1). First, the curve for persistently constrained firms is missing, as there is only one such firm out of 189 very young firms in the joint 1992-95 and 1998-2001 balanced panels. This could to some extent be due to selection, as firms in the balanced panel have managed to survive for at least 3 years, and hence may be comparatively less constrained than newborn firms. However, even if selection explained most of this result, it would imply that *fc* are no longer a problem shortly after birth.<sup>13</sup> Second, neither hypothesis (*h1*) or (*h2*) can be rejected. Overall, the figure

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<sup>13</sup> For the reasons discussed in Section 2 (limited number of startups, large proportion of firms that drop out of the sample for unknown reasons), our dataset is not well-suited to analyze the issue of selection. We attempted to replicate figure 4 in CM by pooling the 1992-95 and 1998-01 balanced panels and following the evolution of startups (defined as firms with less than 4 years of age at the beginning of the period). We found that the density of firms surviving after three years is less skewed, though it is virtually identical to the one calculated for the whole sample of newborn firms at the beginning of the period. As far as it goes, this evidence supports CM's claim that selection does not seem the main driver of the evolution of FSD over time.

delivers the same message as panel (1): the FSD of constrained firms is (slightly) more skewed to the right than that for non constrained firms; the latter FSD is virtually indistinguishable from that of the entire sample. A full breakdown by year of the youngest age class reveals that the share of constrained firms remains modest across the various groups, and does not display a clear relationship with age.

Figure 3 is the equivalent of figure 2 for our broader definition of constrained firms: those that wanted additional finance. Recall from table 1 that the quantitative importance of the fc phenomenon rises substantially according to this measure. Once more, panel 1 looks reasonable in terms of the effects of fc on size. Hypothesis (*h1*) is rejected for both constrained and persistently constrained firms, but the two FSDs are now almost identical; further, as before, hypothesis (*h2*) cannot be rejected, as the distribution for firms not desiring more credit virtually coincides with that for the entire sample. The corresponding densities for young firms are in panel 2. The two curves for firms desiring and not desiring more credit are virtually indistinguishable. As before, the set of persistently constrained firms is virtually empty.

Finally, broadly similar indications emerge from the analysis of our third definition of fc firms, discouraged borrowers (figure 4): hypotheses (*h1*) and (*h2*) cannot be rejected, either for the entire sample or for very young firms; the number of persistently constrained firms is negligible.

Summing up, the evidence presented is at odds with the view that financial constraints can explain the main characteristics of the FSD evolution over time. It is also at odds with a narrower interpretation of CM's paper, i.e. that fc can explain the evolution of the size distribution of young firms.

### *3.3 Potential pitfalls of the analysis*

In this subsection we try to account for three potential problems of the graphical analysis seen thus far. The first has to do with an intrinsic limit of the Mediocredito sample, which does not include firms with less than 10 employees. If fc are related to firm size, as we have just seen, this censoring may generate an underestimate of the number of constrained firms, and therefore bias the FSDs estimated in the previous subsection. However, several

pieces of evidence suggest that this bias may not be substantial. Specifically, firms in the 2001 survey are smaller than in the previous three: the median firm has 24 employees, as opposed to 36 for the pooled sample used in the previous subsection. We replicated figure 2 using this survey, without detecting significant qualitative changes (figure not reported).<sup>14</sup> In addition, Angelini, Di Salvo and Ferri (1998), working on a cross-section of about 2,000 very small firms (about 10 employees on average), find that the size difference between constrained and non constrained firms (according to either the broad or narrow definition used in the present paper) is negligible.<sup>15</sup> We used this dataset to replicate the analysis in section 3.2. The resulting figure (not reported) replicates the patterns of skewness in the latter figure 2 quite well (of course, in this case the density for persistently constrained firms is missing); we could reject hypothesis (*h1*), but not hypothesis (*h2*).

Another potential problem of the analysis in section 3.2 has to do with the fact that the survey questions about *fc* refer to the year before the survey was run (see the appendix). Thus, while firms reported themselves as non constrained, say, in 1991 and 1994, based on a literal interpretation of the questionnaire they could have been constrained in 1989 and 1992 and/or in 1990 and 1993, i.e., in up to 4 years out of 6. By symmetry, firms declaring to be constrained in 1991 or 1994 could have been non constrained in the other years. This problem does not affect the analysis of the next section, as the WBES questions concerning financial constraints are not referred to a specific year. However, it may well bias the estimated FSD in figures 2 through 4.

Since this is, once more, an intrinsic limit of the Mediocredito surveys, run every 3 years, we gauge the persistence of the *fc* phenomenon using the Survey on Investment in Industry run annually by the Bank of Italy, briefly described in section 2. It turns out that the

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<sup>14</sup> Also, for the 2001 survey stratification weights are available. Therefore, weighted versions of the FSDs in figures 1 and 2 were estimated. The median firm is now even smaller, around 21 employees. However, the overall patterns of the figure remain unchanged. Moreover, figure 1 was replicated using pooled information for more than 300,000 firms over the 1993-2002 period, obtained from Cerved Business Information database (see footnote 6). This database is particularly suited to check the FSD by age class, reported in fig.1. The median age is 6 years and median sales are around 540,000 euro, against 20 years and around 2 million euro for the Mediocredito counterpart. In spite of these differences, computing the analogue of fig. 1 over this dataset yields qualitatively similar results.

<sup>15</sup> They also find that the share of firms desiring more credit is 26 percent, i.e. much higher than in the Mediocredito sample, confirming that the exclusion of firms with less than 10 employees from the latter probably leads to underestimate the pervasiveness of the *fc* phenomenon.

probability of being (not being) constrained in  $t$  conditional upon being (not being) constrained in  $t-1$  is 36.4 (96.9) percent. A firm constrained in  $t$  and  $t-3$  has a 70 percent probability of being constrained in three out of four years (35 percent in all four years). By contrast, conditional on not being constrained in the first and fourth year, the probability of not being constrained at all in the entire period is 98 percent. These figures, obtained with our baseline definition of  $fc$ , are similar to those derived using the broader definition, firms desiring more credit. Thus, there is a reasonably high likelihood that the firms deemed “constrained”, “persistently constrained” and “non constrained” are indeed such. Note that this applies particularly to very young firms: when a one year old firm declares to have been constrained, the statement applies to its entire life; in the case of a two year old firm declaring  $fc$  in her second year of life, based on the transition probabilities given above, we can expect her to have been constrained for about two thirds of her life, and so forth.

A third potential shortcoming of our approach is that survey-based measures of financial constraints may misrepresent the complex phenomenon of firms’ financing conditions.<sup>16</sup> To check for this possibility we split our sample according to the distribution of two alternative, frequently used proxies for financial constraints. The first is the interest payments coverage suggested by Whited (1992), measured as financial expenses over financial expenses and profits. This proxy should be directly related to financial constraints, since if a firm can generate sufficient internal funds it will not be likely to run up against its debt limit. The second proxy is the ratio between the firm’s fixed and total assets, a measure of assets tangibility. According to theory and empirical evidence (e.g. Rajan and Zingales (2001), Giannetti (2003)) the availability of collateral, in the form of “hard assets”, increases the entrepreneur’s effort, thereby making external finance more easily available. We define a firm to be constrained if it lies in the bottom quartile of the distribution of either indicator, and use the related dummy variables to replicate the graphical analysis. Figure 5, obtained with the first measure, broadly confirms the results seen thus far: constrained firms are smaller than the rest of the sample, but the difference in the relative FSDs is small and not statistically significant, for the entire sample as well as for the subsample of very young

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<sup>16</sup> Batra et al. refer to the *kvetch* (Yiddish for “continually complain”) factor: firms that perform poorly may tend to shift the blame on difficulties presented by the economic environment, e.g. by the financial system, and likewise, those that perform well may tend to underplay the role of these external factors.

firms. Figure 6 uses the collateral-based proxy. In panel (1) both hypotheses (*h1*) and (*h2*) are rejected. However, the difference between the FSDs for non constrained firms and for the entire sample is very small. In addition, neither hypothesis (*h1*) or (*h2*) can be rejected for younger firms (panel (2)).

Finally, following Rajan and Zingales (1998), we split the sample between firms belonging to sectors that are highly dependent on external finance and the others, and compare the related FSDs. No significant differences between the two groups emerge (results not reported). This may suggest that this partition is suited to detect cross-country differences regarding the development of the financial system, rather than to proxy for the intensity of fc in a given country.

### 3.4 Regression analysis

In sub-section 3.2 we looked at the FSD of firms that declared to suffer from fc in a given year, as opposed to the FSD of firms that did not. We argued that doing so is reasonable if financial constraints are sufficiently persistent, and provided some evidence that they are. However, since one might not be convinced by this persistence argument, in what follows we try to assess the effect of fc in a given year on firms' *growth* in that year. We then use this estimated effect to simulate the consequence of persistent financial constraints on the FSD. While the evidence in the previous two sections has no implications for (nor is it affected by) causality issues, following CM we now assume that causality goes from fc to size, and estimate the following regression (overlooking firm-specific subscripts):

$$\begin{aligned} \ln(n^\circ employees_t) - \ln(n^\circ employees_{t-1}) = & \alpha_0 \text{Dummy for } fc_t + \alpha_1 \ln(\text{total assets}_{t-1}) \\ & + \alpha_2 \ln(\text{age}_t) + \alpha_3 (ROA_{t-1}) + \sum_j \alpha_j \text{yeardummy}_j + \sum_j \beta_j \text{sectordummy}_j + \varepsilon_t \end{aligned}$$

Since the survey questions about financial constraints refer to 1991, 1994, 1997 and 2000, we use the percentage change in employment in those years as the dependent variable.<sup>17</sup> We control for the size of the firm, proxied by the logarithm of total assets and for its profitability, proxied by ROA (defined as earnings before interest and taxes over total

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<sup>17</sup> This can be computed because in each survey firms report their end-of-year number of employees in each of the previous three years.

assets). The regression allows us to control for several potentially important determinants of the FSD (e.g. industry effects) overlooked in the graphical analysis.

The estimates are reported in table 2. The various proxies of *fc* discussed above are included, one at the time, among the explanatory variables. The first two columns, showing results obtained with the baseline definition of *fc*, suggest the following conclusions. First, the effect of *fc* in a given year on growth in that year is negative and statistically significant. Based on specification (a), constrained firms grow by 0.9 percentage points less than the rest of the sample. Second, this effect is entirely due to firms with less than 50 employees (specification (b)). This finding is consistent with a large body of literature supporting the existence of a relationship between size and *fc* (see e.g. Carpenter and Petersen (2002)). Third, the coefficient of the dummy for young constrained firms is not significant. Fourth, more profitable firms tend to grow faster. Moreover, confirming existing results (see e.g. Evans (1987), Hall (1987)), older firms tend to grow more slowly.

Specifications (c) through (f)) replicate the estimates using the dummies for discouraged borrowers and for firms desiring more credit. While constrained firms according to the former definition do not grow significantly less than the rest of the sample, the latter do. Allowing the effect to differ across firms of different size (column (f)) reveals again that the effect is concentrated among small firms.<sup>18</sup> Results for our non survey-based proxies, in columns (g) through (j), do not significantly affect the overall picture. Constrained firms grow significantly less than the rest of the sample. In the case of firms with low collateral, the estimated effect of *fc* is slightly smaller than that obtained with our baseline definition of constrained firms, in columns (a)-(b).

To relate these results to the graphical analysis of the previous subsection, we performed the following exercises. First, we reduced the size of each firm in the entire pooled sample by 7 percent, roughly corresponding to the estimated effect of *fc* for 7 consecutive years, based on the 0.9 coefficient in specification (a). We then computed the

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<sup>18</sup> These regressions were run over the last two surveys, whereas those in columns (a)-(b) and (g)-(j) use all four surveys. To make sure that results are not reflecting this sample difference, the latter regressions were re-run over the 1998-2001 surveys only. Also, all the regressions in table 2 were re-run without ROA, which could also proxy for *fc*, and therefore be collinear with our dummies for constrained firms. In none of these cases did significant differences emerge (results not reported).



FSD for these firms, and plotted it against the FSD for the pooled sample. Next, the exercise was replicated by reducing the size of firms with less than 50 employees by 12 percent, based on the coefficient in specification (b). The resulting curves are in figure 7. The difference between the FSDs for fc and non fc firms is very small. Note that the order of magnitude of our estimated effects in table 2 is broadly in line with previous studies. In particular, Rajan and Zingales (1998) find that firms with heavy dependence on external finance grow significantly less than firms with low dependence if they are located in financially underdeveloped countries. The estimated effect on the firm's annual growth rate ranges between 0.4 and 1.3 percent, depending on the proxy of financial development used. Beck, Demirgüç-Kunt and Maksimovic (2005), using the WBES sample, find that the effect of financial constraints on firm's annual growth is at most 4.3 percent and tends to become statistically zero in financially developed countries. Summing up, these results confirm the negative relationship between fc and firm size, but suggest that the overall impact on the FSD is quantitatively modest.

### *3.5 Additional issues*

In what follows we report the findings from a series of additional checks which do not qualitatively alter the main results emerging from the previous subsections, but may be relevant for qualifying and assessing them.

First, we looked at alternative definitions of size. Figures 1 through 6 were replicated replacing the number of employees with total sales (results not reported). The only visible change concerns the density for the entire pooled sample, which becomes more symmetric than its counterpart in figure 1, although some right skewness remains clearly visible. None of the other patterns record significant qualitative changes.

Next, we checked whether accounting for group membership can affect our results. Participation in a group may allow the firm to access inter-company funds through the holding company, typically a large, well-established firm with easy access to capital markets. In fact, group membership has been used as a proxy for no financial constraints (Hoshi, Kashyap and Scharfstein (1991); Guiso, Kashyap, Panetta and Terlizzese (1999)). Industrial groups represent an important phenomenon in Italy. A relatively large share of firms in our dataset (over 20 percent on average) declares to belong to a group. Indeed, the

average number of employees of these firms is much larger if compared to the rest of the sample (365 vs. 62 over the pooled dataset). First, we look at the relationship between our dummies for *fc* and group membership dummies. In all four surveys the share of constrained firms (according to the baseline definition) is slightly but systematically smaller among firms belonging to a group (4.2 vs. 4.9 percent over the pooled sample), confirming that group membership does proxy for *fc*. However, the analysis of the motivations for group membership, made possible by a specific section of the 1995 survey, suggests that firms perceive the advantages of membership as mainly related to efficiency considerations, and not to financial problems.<sup>19</sup> Second, we replicated figure 1 over the subsample of firms belonging to a group. No significant alteration in the patterns of the figure are detected; all the age densities are shifted to the right, but the dispersion among them remains basically unaffected. Next, we looked at the size of group members vs. non members. In the age class of up to 6 years the average number of employees is 162 for the former, against 44 for the latter, entailing a ratio of 3.7 to 1. If group membership released *fc*, and if *fc* were especially relevant among young firms, this ratio should be highest for this age class. By contrast, it increases for older age classes, reaching 6 among firms aged 50 years or more. Overall, this evidence suggests that group membership is strongly related to firm size, but that this relationship is not the main determinant of the stylized facts documented above.

#### **4. Evidence from the WBES sample**

Could our results reflect peculiarities of Italian firms, or of our specific sample? The Italian industrial system has several well-known peculiarities – the most evident one being the exceptional share of very small firms – which may reflect country-specific institutional

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<sup>19</sup> In the 1995 survey firms were asked to choose from the following motivations for group membership: a) labor cost reduction; b) business diversification; c) scope economies; d) advantages in the acquisition of production inputs; e) better control of the distribution process; f) fiscal benefits; g) increased access to risk capital; h) reduction in business risk; i) family members involvement; j) other advantages. Motivations a), b) and e) were the most frequently chosen and highly ranked. Relatively few firms chose answers g) and j), that could entail financial considerations.

factors and historical developments. Therefore, in what follows we analyze the World Business Environment Survey (WBES), briefly described in section 2.<sup>20</sup>

After eliminating missing values for the relevant variables (i.e. age and annual sales that is a proxy for size), we are left with 3,133 firms, mostly from non OECD countries. As a preliminary step, we estimate FSDs for the age classes in figure 1, and find similar patterns (results not reported). Next, we split the sample according to the values of the synthetic indicator of financial problems described in section 2 and in the appendix. This indicator has two important advantages with respect to the ones derived from the *Mediocredito* surveys. First, the question concerning *fc* is worded in very broad terms, not just in terms of bank finance. Second, it does not specifically refer to a given year; thus, it can be argued that firms declaring to face major financial problems are indeed persistently constrained. As we argued above, this holds, in particular, for young firms. The resulting FSDs are in figures 8 and 9, for OECD and non OECD countries, in the order. One difference relative to the previous graphs is that size is measured by the dollar value of annual sales.<sup>21</sup> Aside from this, the main message emerging from figure 8 is broadly in line with that of the previous section. First, financial constraints are negatively related to firm size, but the amount of skewness that they can explain seems modest, as the FSD for non constrained firms is very similar to the one for the entire sample. Second, neither hypothesis (*h1*) or (*h2*) can be rejected (in either panel none of the densities is statistically different from the others), although in the case of young firms this may depend on the limited number of observations available. Finally, in both panels the difference between the FSDs of constrained vs. non constrained firms appears to be larger than in the figures of the previous section. This could

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<sup>20</sup> The synthetic indicator of financial obstacles to growth reported by Beck, Demirgüç-Kunt and Maksimovic (2005) using the WBES has an average value of 1.98 for Italian firms. This corresponds to a perception of finance as a minor obstacle and squares well with the evidence in the previous section. The index for Portugal averages 1.82, suggesting that the two financial systems should be broadly comparable.

<sup>21</sup> The densities discussed in this section (computed using a kernel density smoother with a bandwidth of 1.5) appear more symmetric than those in the previous figures. The evidence in section 3.5 suggests that this is probably due to the use of sales as a measure of size. The WBES questionnaire features specific questions concerning the number of employees. However, the WBES spreadsheet contains only a dummy for small, medium and large firms. Beck, Demirgüç-Kunt and Maksimovic (2005) mention that these classes correspond to 5-50 employees, 51-500 and beyond 500 employees. Using this size breakdown - instead of sales - does not alter the main messages emerging from the analysis. We also experimented with alternative definition of *fc*, built using the detailed information in the finance section of the questionnaire. Broadly, we found the relationship between firm size and these alternative definitions to be weaker.

be due to the above mentioned fact that the WBES survey questions do not refer to a given year, and may therefore identify persistently constrained firms.

Figure 9, relating to non-OECD countries, confirms that financial constraints are negatively related to firm size. However, in panel (1) both hypotheses (*h1*) and (*h2*) can be rejected, in contrast with the results for OECD countries;<sup>22</sup> furthermore, as regards young firms in panel (2), hypothesis (*h1*) is rejected. This evidence is consistent with the view that fc are a relatively more serious problem in developing countries, a view supported by a body of empirical literature too large to discuss here (see e.g. Rajan and Zingales (1998); Demirgüç-Kunt and Maksimovic (1998); Desai, Gompers and Lerner (2003); Beck, Demirgüç-Kunt and Maksimovic (2005)).

## 5. Conclusions

The evidence presented in this paper confirms the stylized facts about firm size distribution (FSD) discussed by Cabral and Mata (2003): the size distribution of firms is highly skewed to the right at birth (most of the mass is on small firms); the skewness tends to diminish with firm age. At the same time, we challenge the explanation of the stylized facts advanced by CM, which assigns a central role to financial constraints (fc). Our analysis has relied on survey-based measures of financial constraints available in two large datasets. The main results can be summarized as follows.

First, the negative link between fc and firm size is confirmed. Firms who declare to be constrained are on average smaller than those who do not; their FSD is relatively more skewed to the right. This excess skewness tends to become more pronounced for firms that, according to our proxies, can be deemed persistently constrained. Although the differences in the estimated FSD of constrained and non constrained firms are not always statistically significant, overall this evidence appears consistent with CM's conclusions.

Second, when narrow definitions of fc are adopted, fc seem to be a real problem for a small minority of firms, always well below 10 percent in our sample; when alternative,

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<sup>22</sup> While this result can reflect the higher power of the tests for the much more numerous sample of non-OECD countries, we replicated the tests in figure 9.1 after dropping randomly selected observations from this sample, and were able to reject the null of equality of distributions (a) and (b) with as little as 250 observations.

broader measures are used the percentages increase around 20 percent. Regardless of the definition adopted, however, the FSDs estimated for non constrained firms are virtually indistinguishable from those for the entire sample. The visual impression is almost invariably confirmed by formal nonparametric tests of equality of distributions. Thus, *fc* can only explain a small fraction of the FSD skewness observed in the entire dataset.

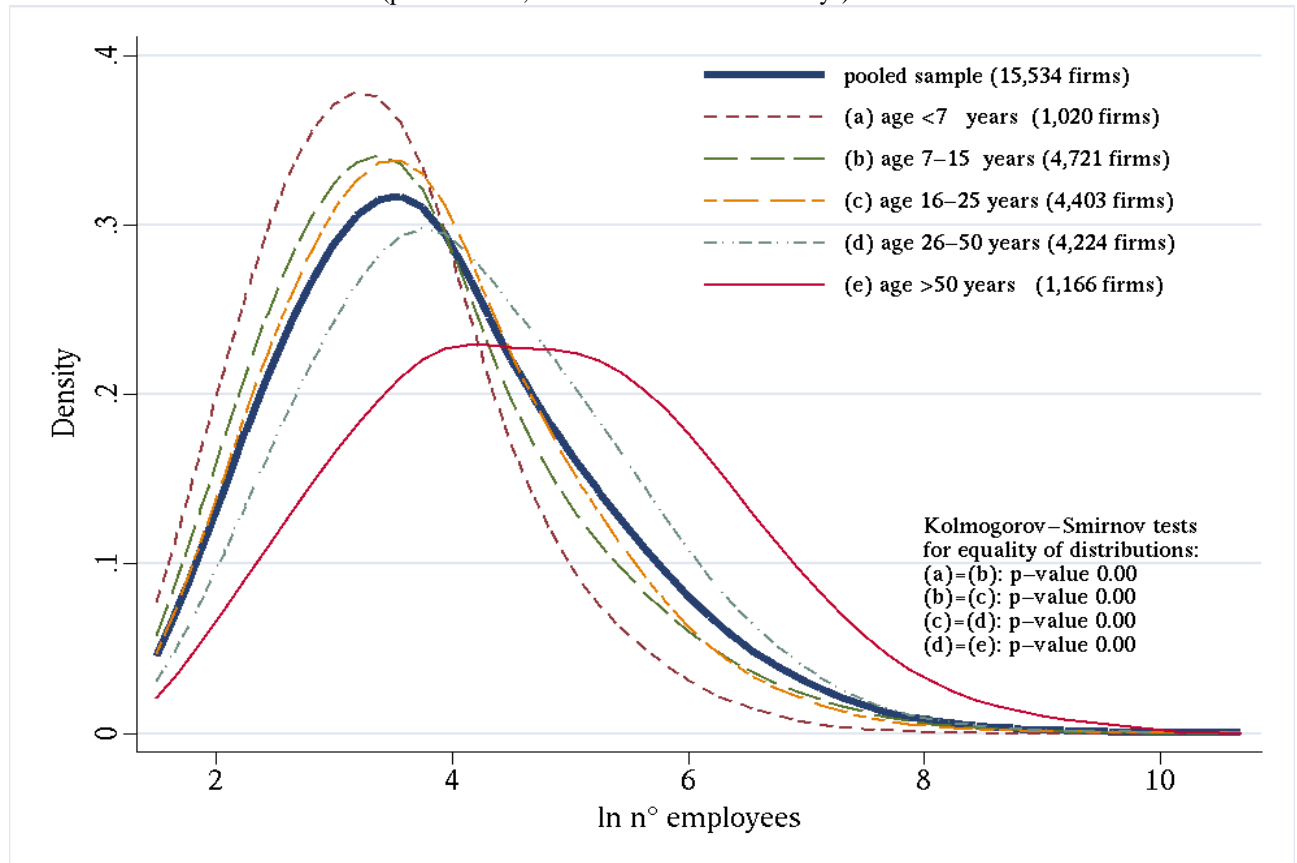
Third, these two conclusions hold not only for the entire sample, but also for very young firms, those not older than 6 years. This class is particularly important in this context, because it lies at the core of CM's empirical results, and also because over this segment of firms *fc* problems are a priori likely to be more important, and our measures of presence and persistence of *fc* are arguably more precise. The share of young firms suffering from *fc* problems is higher than in the rest of the sample, but this is not sufficient to alter the conclusions reached for the other age classes.

These results, obtained on a sample of Italian firms, are broadly confirmed and qualified from the analysis of the WBES international dataset, which suggests that the relationship between firm size and *fc* tends to be stronger in developing countries. When attention is restricted to non-OECD countries, arguably those in which the financial system is relatively underdeveloped, the difference between the estimated FSDs of constrained vs. non constrained firms becomes statistically significant, even among very young firms. The robustness of the main results is also confirmed using traditional proxies of *fc* proposed in the literature, instead of the survey-based measures used for most of the paper, and by means of a counterfactual exercise. Specifically, using the sample of Italian firms we quantify the effect of *fc* in a given year on the firm's *growth* in that year, controlling for a number of factors such as age, industry, profitability, etc. We then use the estimates to simulate the effect of protracted financial constraints on the FSD, and show that this effect can only explain a modest fraction of the FSD evolution over time.

We conclude that financial constraints cannot be the main determinants of the FSD evolution, especially in financially developed economies. We believe that this conclusion is in line with a large part of the available theoretical and empirical literature on the subject, which points out that finance is just one of many factors influencing firm entry, exit and growth, and that the effects of financial constraints on firm growth tend to be inversely related to the development of the financial system.

## Tables and Figures

**Fig. 1: Firm size distribution and firm's age in the Mediocredito dataset<sup>(\*)</sup>**  
(pooled 1992, 1995 1998 and 2001 surveys)



<sup>(\*)</sup> The curves are obtained by pooling the 1992, 1995, 1998 and 2001 surveys. In each survey, the number of employees refers to the year before the survey.

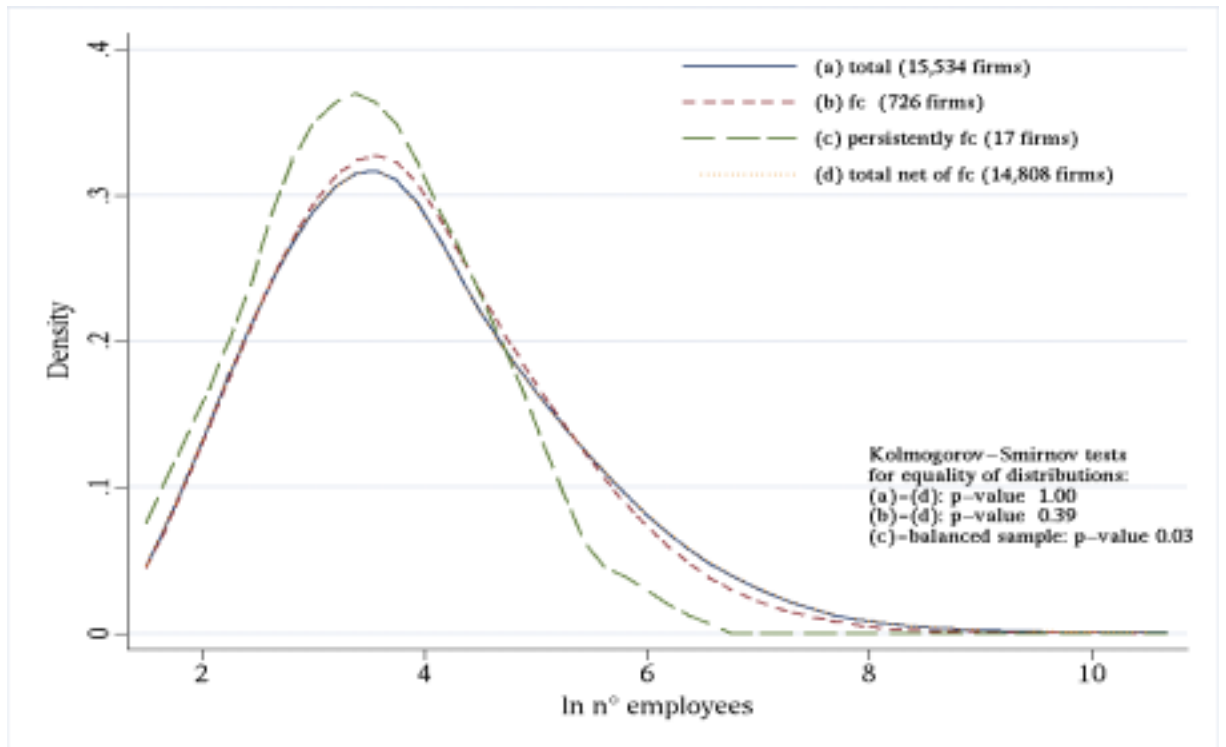
**Table 1: Financially constrained firms by age class in the Mediocredito dataset <sup>(\*)</sup>**

Firm's Age (years)	Total 1992-2001 sample		Financially constrained		Total 1998-2001 sample		Discouraged borrowers		Desiring more credit	
	N° obs. (a)	N° of employees: average (median) (b)	N° obs. (% of 1992-01 sample) (c)	N° of employees: average (median) (d)	N° obs. (e)	N° of employees: average (median) (f)	N° obs. (% of 1998-01 sample) (g)	N° of employees: average (median) (h)	N° obs. (% of 1998-01 sample) (i)	N° of employees: average (median) (j)
<b>&lt;7</b>	1,020	48 (24)	57 (5.6)	45 (23)	463	33 (22)	26 (5.6)	28 (22)	98 (21.2)	31 (20)
<b>7-15</b>	4,721	97 (30)	240 (5.1)	68 (30)	2,346	66 (25)	92 (3.9)	43 (22)	469 (20.0)	46 (23)
<b>16-25</b>	4,403	102 (34)	198 (4.5)	87 (37)	2,548	78 (27)	78 (3.1)	39 (26)	394 (15.5)	49 (25)
<b>26-50</b>	4,224	159 (53)	177 (4.2)	107 (55)	2,436	126 (36)	77 (3.1)	89 (37)	353 (14.5)	65 (31)
<b>&gt;50</b>	1,166	353 (110)	54 (4.6)	315 (105)	570	245 (53)	15 (2.6)	79 (35)	83 (14.6)	71 (40)
<b>Total</b>	15,534	132 (36)	726 (4.7)	100 (37)	8,363	97 (29)	288 (3.4)	55 (27)	1,397 (16.7)	52 (25)

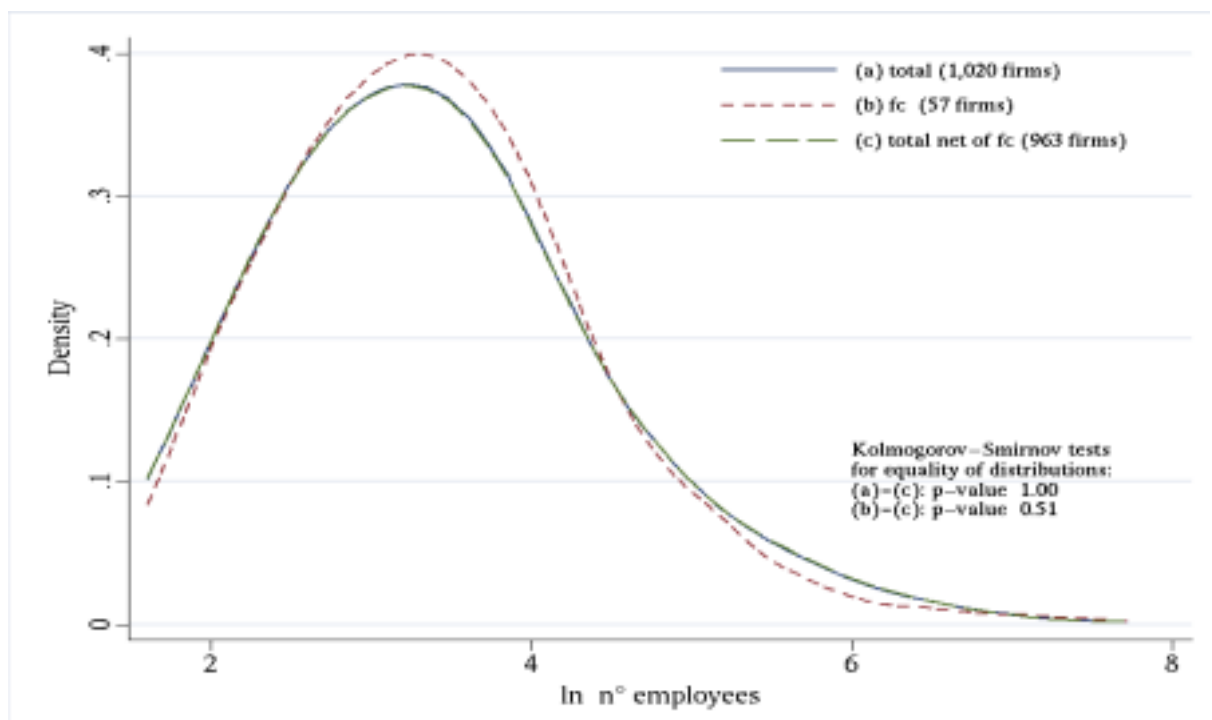
<sup>(\*)</sup> The definition of financially constrained firms and the notion of “discouraged borrowers” and of firms “desiring more credit” is in Section 2 and in the appendix. In each survey, the answers to the questions about financial constraints refer to the previous year.

**Fig. 2: FSD and financial constraints: Baseline definition of fc**  
(Mediocredito dataset; pooled 1992, 1995, 1998 and 2001 surveys)

(1) Entire sample (\*)



(2) Young firms (age up to 6 years)



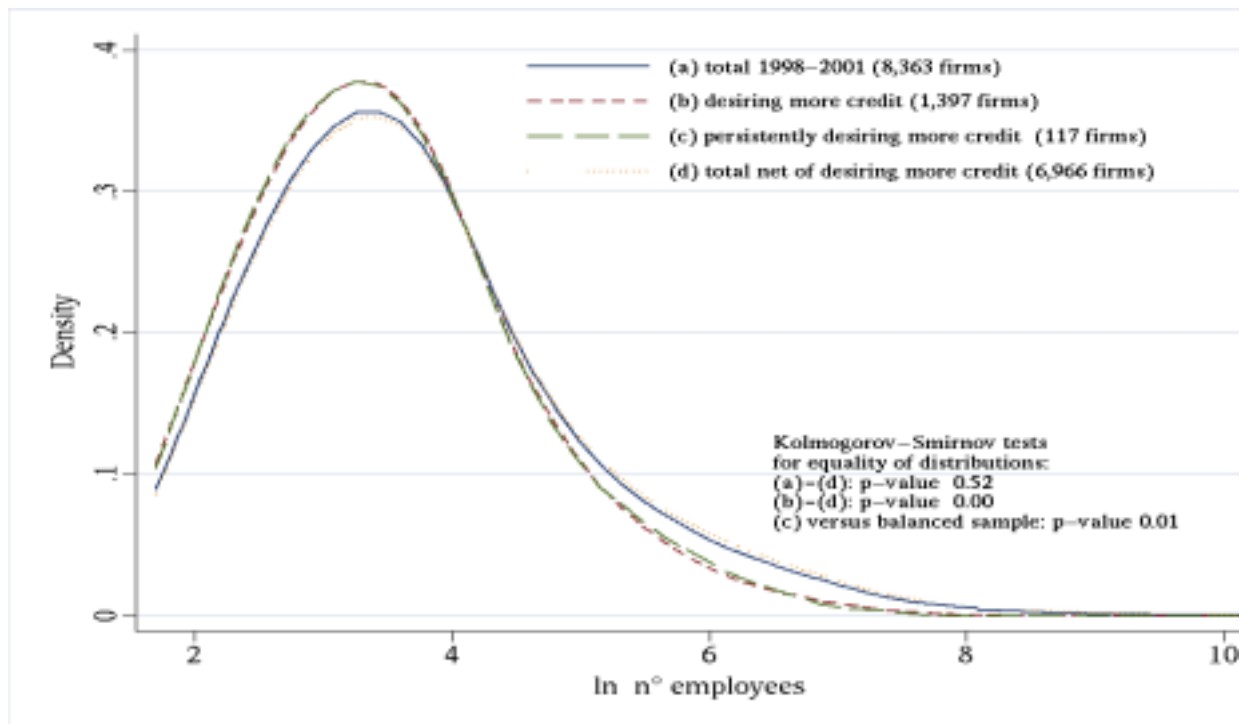
(\*) We test for equality of FSD (c) vs. that of the balanced sample (not shown) because the former is computed using the balanced panel.



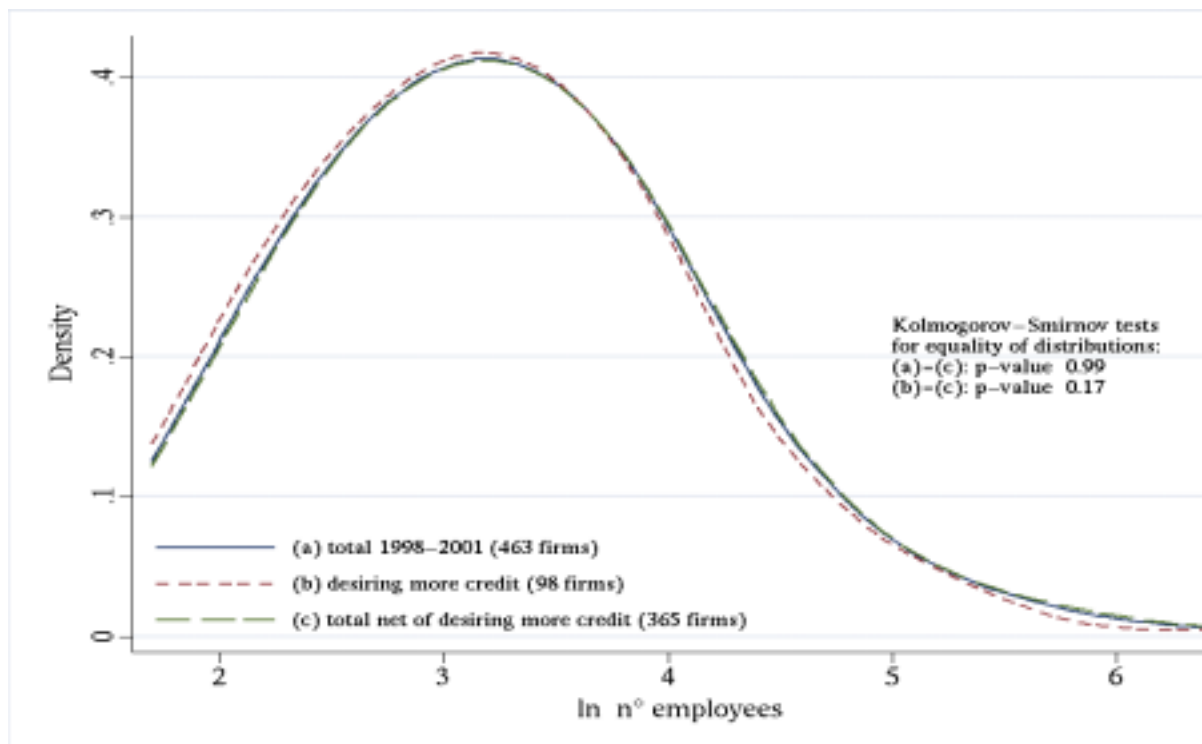
### Fig. 3: FSD and financial constraints: Firms desiring more credit

(Mediocredito dataset; pooled 1998 and 2001 surveys)

#### (1) Entire sample (\*)



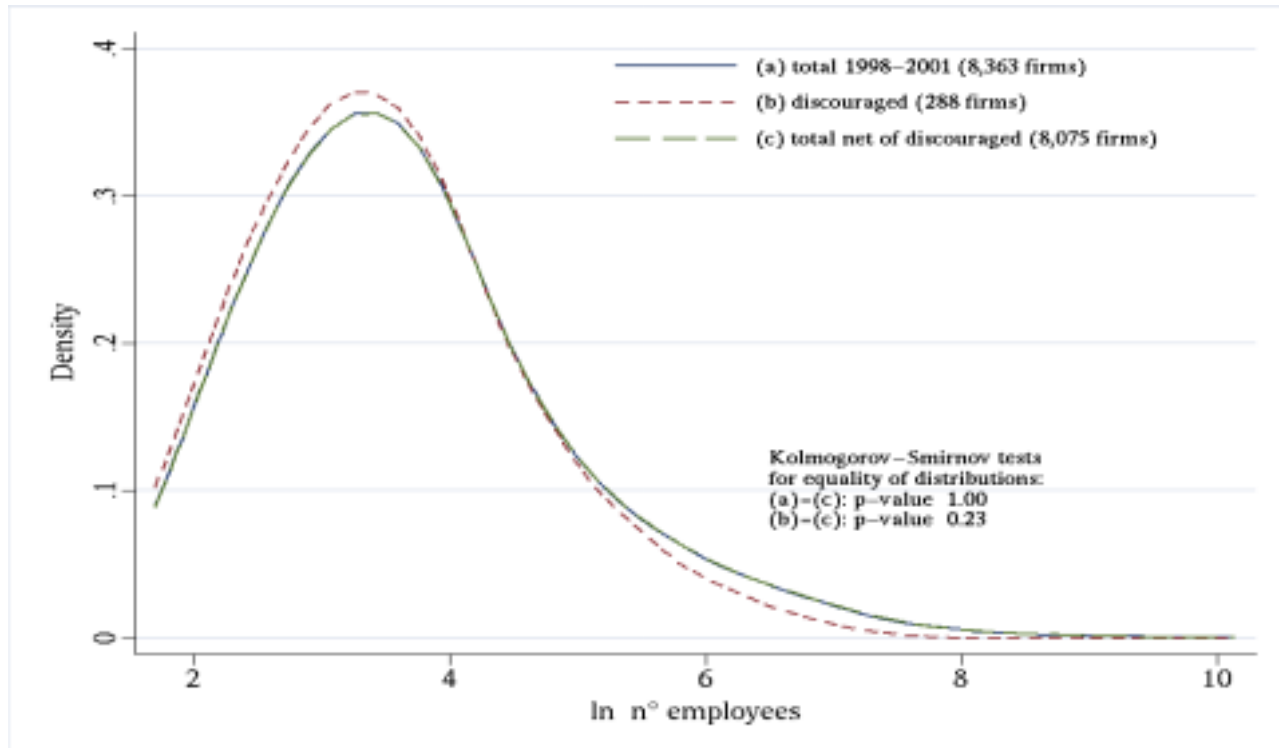
#### (2) Young firms (age up to 6 years)



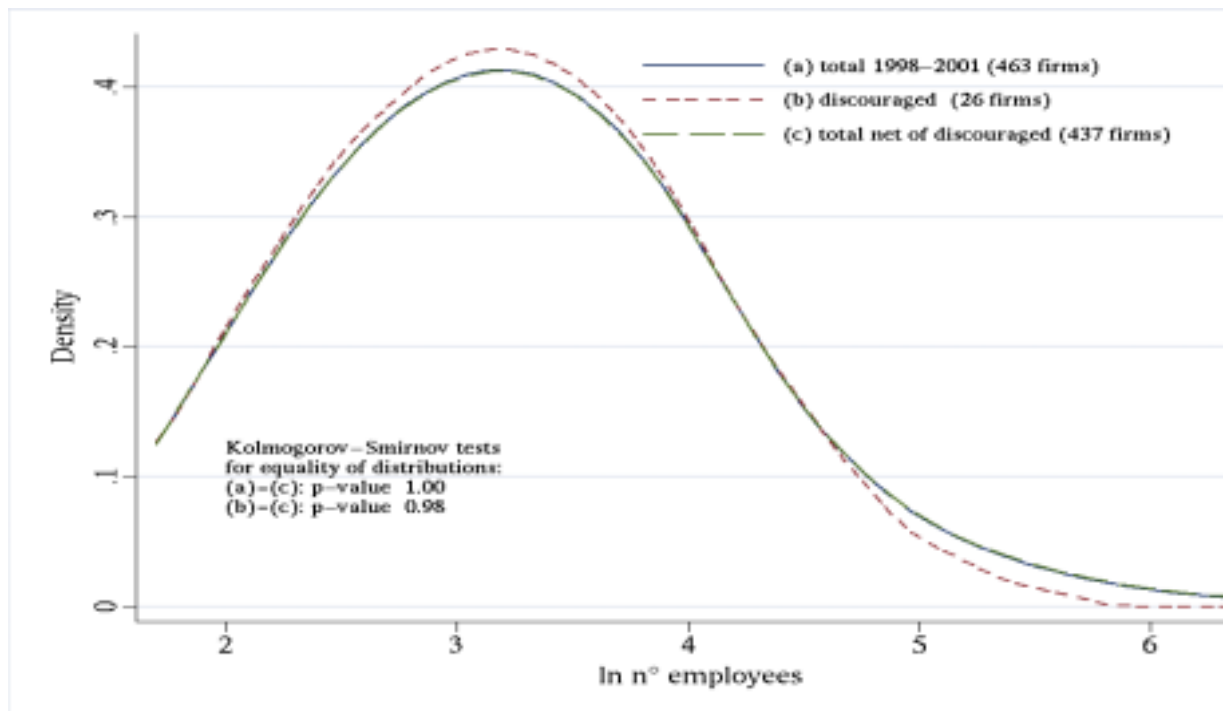
(\*) We test for equality of FSD (c) vs. that of the balanced sample (not shown) because the former is computed using the balanced sample.

**Fig. 4: FSD and financial constraints: Discouraged borrowers**  
(Mediocredito dataset; pooled 1998 and 2001 surveys)

(1) Entire sample

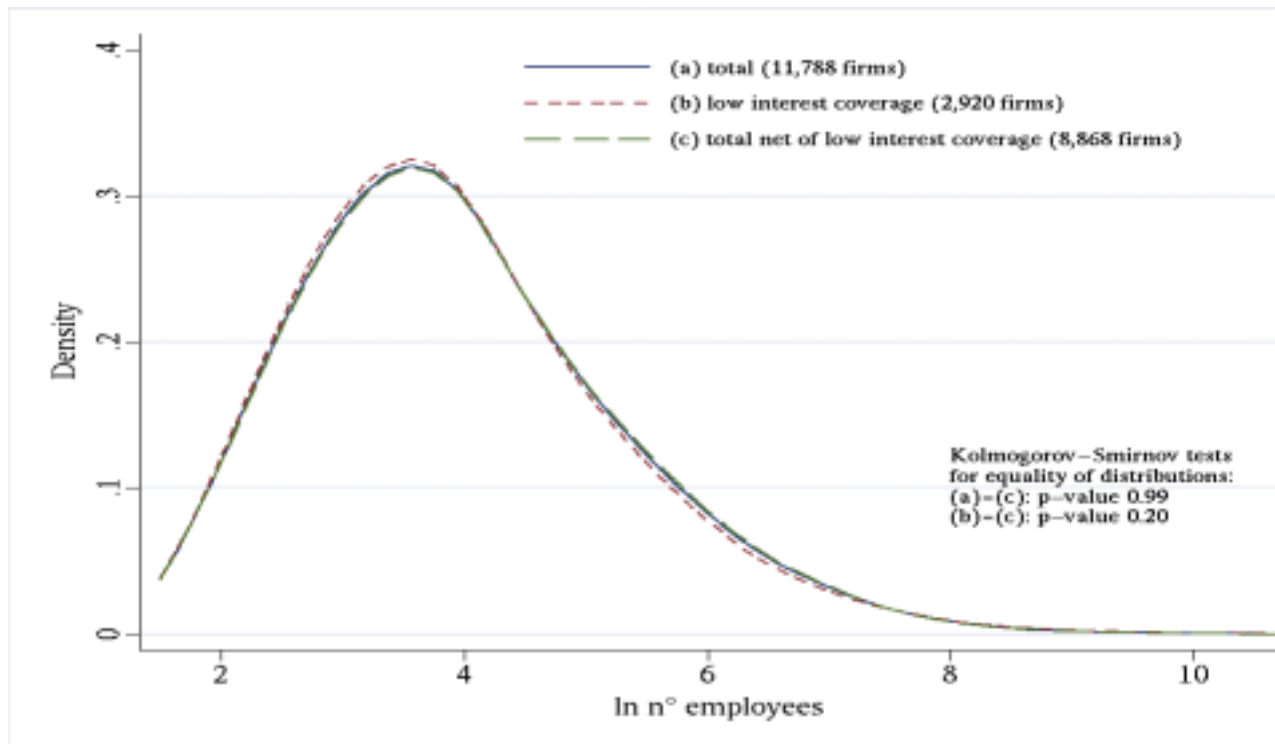


(2) Young firms (age up to 6 years)

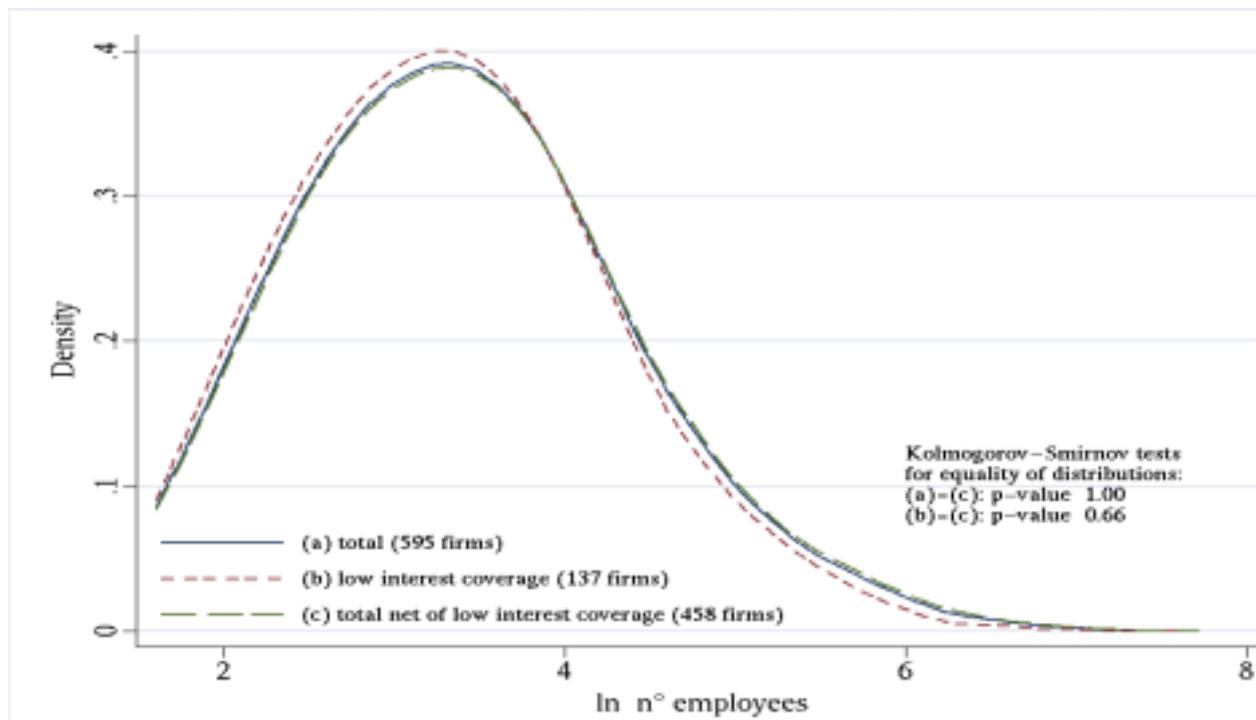


**Fig. 5: FSD and financial constraints: Firms with low interest coverage<sup>(\*)</sup>**  
 (Mediocredito dataset; pooled 1992, 1995, 1998 and 2001 surveys)

(1) Entire sample



(2) Young firms (age up to 6 years)

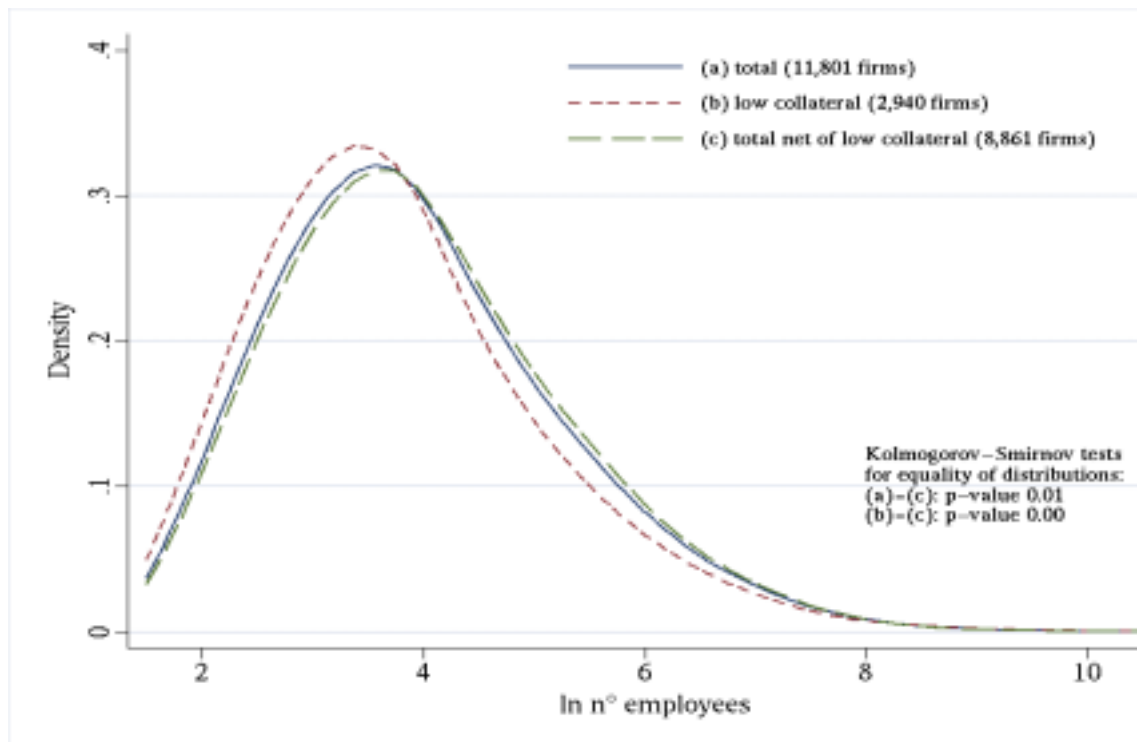


<sup>(\*)</sup> The number of observations is lower than in figure 2 since for some firms balance sheet data are unavailable.

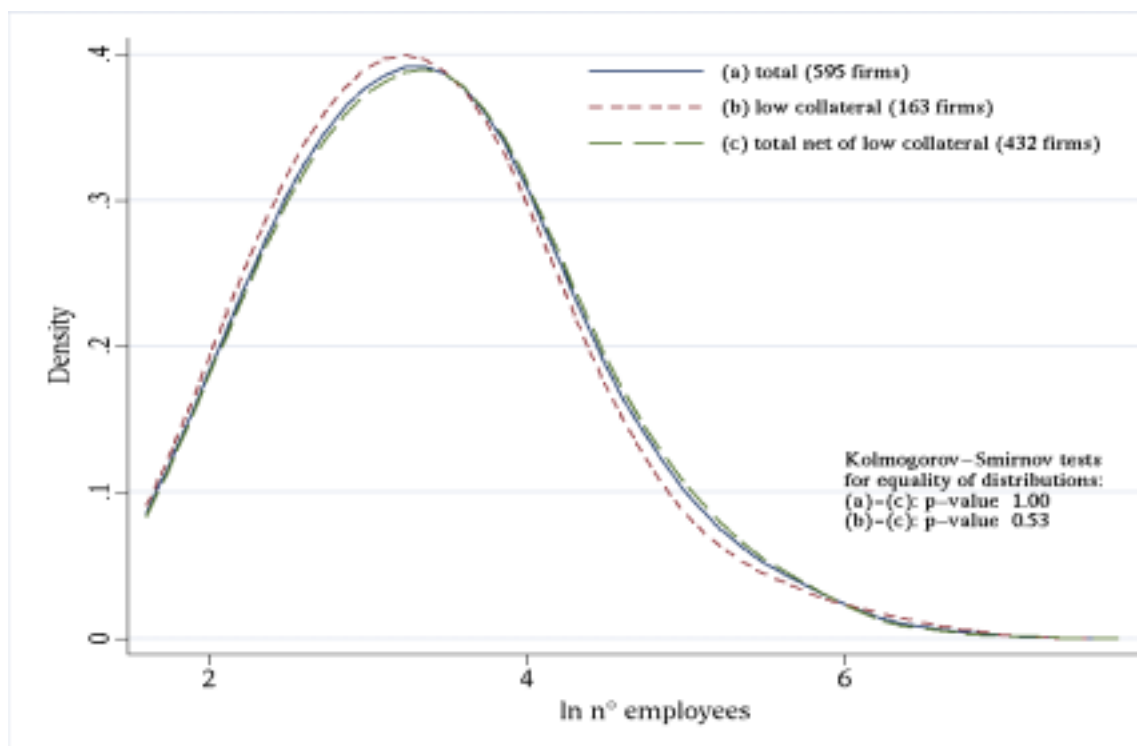
**Fig. 6: FSD and financial constraints: Firms with low collateral<sup>(\*)</sup>**

(Mediocredito dataset; pooled 1992, 1995, 1998 and 2001 surveys)

**(1) Entire sample**



**(2) Young firms (age up to 6 years)**



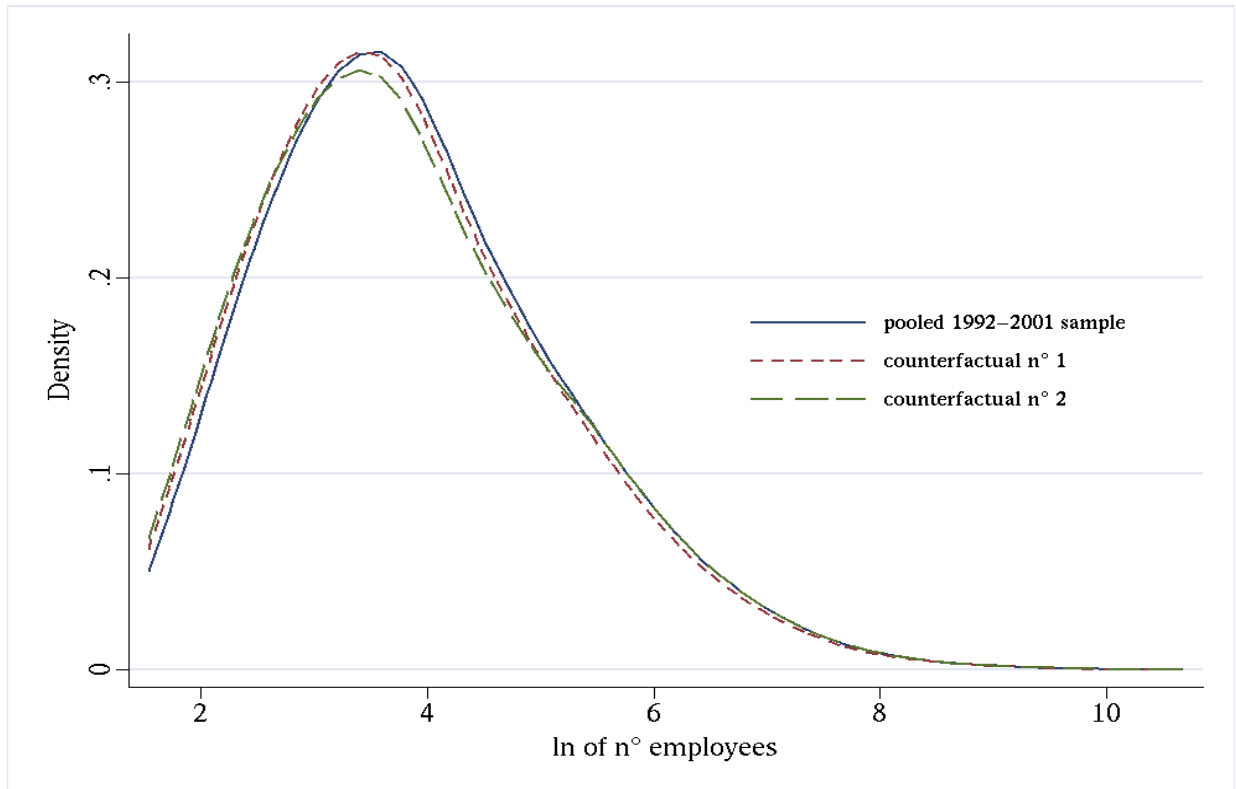
<sup>(\*)</sup> The number of observations is lower than in figure 2 since for some firms balance sheet data are unavailable.

**Table 2: Dependent variable: Percentage change in n° employees between  $t$  and  $t - 1$  <sup>(\*)</sup>**  
(Mediocredito dataset;  $t$  represents years; OLS regressions)

	Definitions of financially constrained firm									
	Baseline definition of fc		Discouraged borrowers		Desiring more credit		Firm has low collateral		Firm has low interest coverage	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Between $t$ and $t-1$ firm is:										
- financially constrained	-0.9**	-0.05	-0.2	0.1	-0.7**	0.2	-0.4*	0.1	-0.9**	-0.8**
	(0.3)	(0.5)	(0.5)	(0.7)	(0.2)	(0.3)	(0.2)	(0.3)	(0.2)	(0.3)
- young and financially constrained	0.1	0.5	-2.3	-2.3	-1.2	-1.2	-0.3	-0.1	-0.5	-0.5
	(1.5)	(1.5)	(2.7)	(2.7)	(1.1)	(1.1)	(0.6)	(0.6)	(0.7)	(0.7)
- small and financially constrained	-	-1.6**	-	-0.4	-	-1.0*	-	-0.9**	-	-0.2
	-	(0.6)	-	(0.9)	-	(0.4)	-	(0.3)	-	(0.3)
$Ln(\text{total assets at } t-1)$	0.03	0.01	0.19**	0.19**	0.18*	0.15*	0.03	-0.02	0.03	0.03
	(0.05)	(0.05)	(0.07)	(0.07)	(0.1)	(0.1)	(0.05)	(0.06)	(0.05)	(0.06)
$Ln(\text{age at } t)$	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**	-1.3**
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
ROA at $t-1$	0.11**	0.11**	0.11**	0.11**	0.10**	0.10**	0.11**	0.11**	0.10**	0.10**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N° observations	12,541	12,541	7,458	7,458	7,458	7,458	12,539	12,539	12,523	12,523
R <sup>2</sup>	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04

<sup>(\*)</sup> The various definitions of financially constrained firms are discussed in Section 2 and in the appendix. Small firms are those with less than 50 employees. Young firms are those not older than 6 years. OLS estimates. Regressions in columns (a)-(b) and (g)-(j) are estimated over the entire 1992-01 pooled sample, those in columns (c)-(f) over the 1998-01 pooled sample. Extreme outliers were dropped. Each equation includes time and industry dummies and a constant, whose coefficients are not reported. Heteroskedasticity-robust standard errors are reported in parenthesis below coefficients. One or two asterisks indicates significance at the 5 and 1 percent level, respectively.

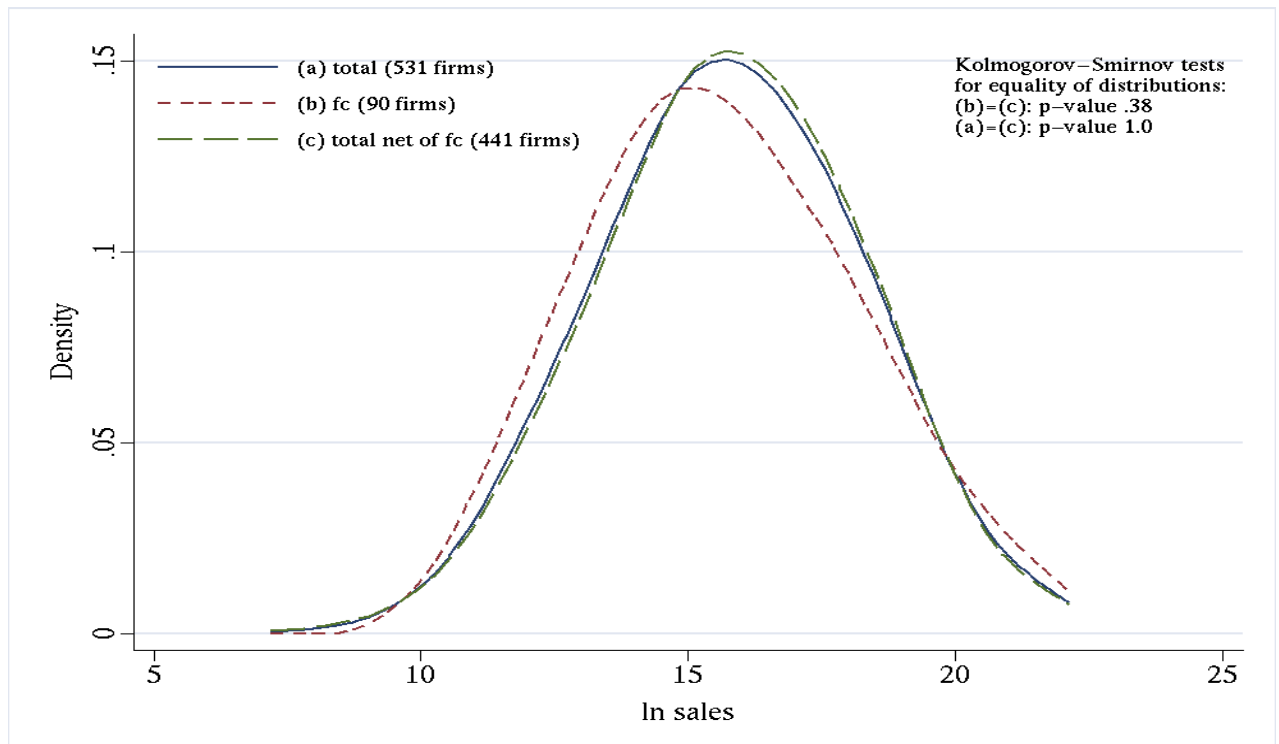
**Fig. 7: Results of two counterfactual exercises on the Mediocredito dataset (\*)**



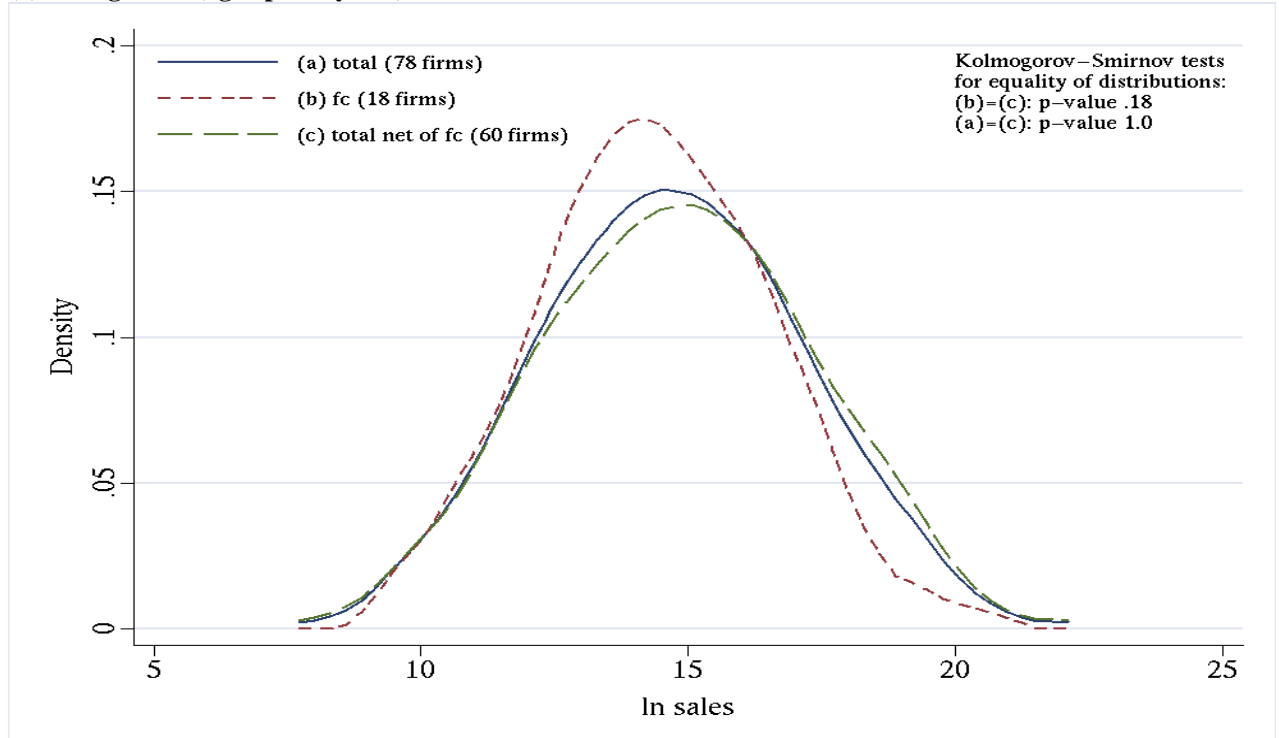
(\*) The FSD labeled counterfactual n° 1 was computed over the entire 1992-2001 sample after reducing each firm's size by 7 percent. This simulates the effect of a 0.9 percent lower annual growth due to financial constraints (from table 2, specification (a)) protracted for 7 years. Counterfactual n° 2 was computed over the entire 1992-2001 sample, after reducing the size of each firm below 50 employees by 12 percentage points. This simulates the effect of a 1.6 percent lower annual growth for small constrained firms (table 2, specification (b)) protracted for 7 years.

**Fig. 8: FSD and financial constraints in the WBES dataset: OECD countries <sup>(\*)</sup>**

**(1) Entire sample**



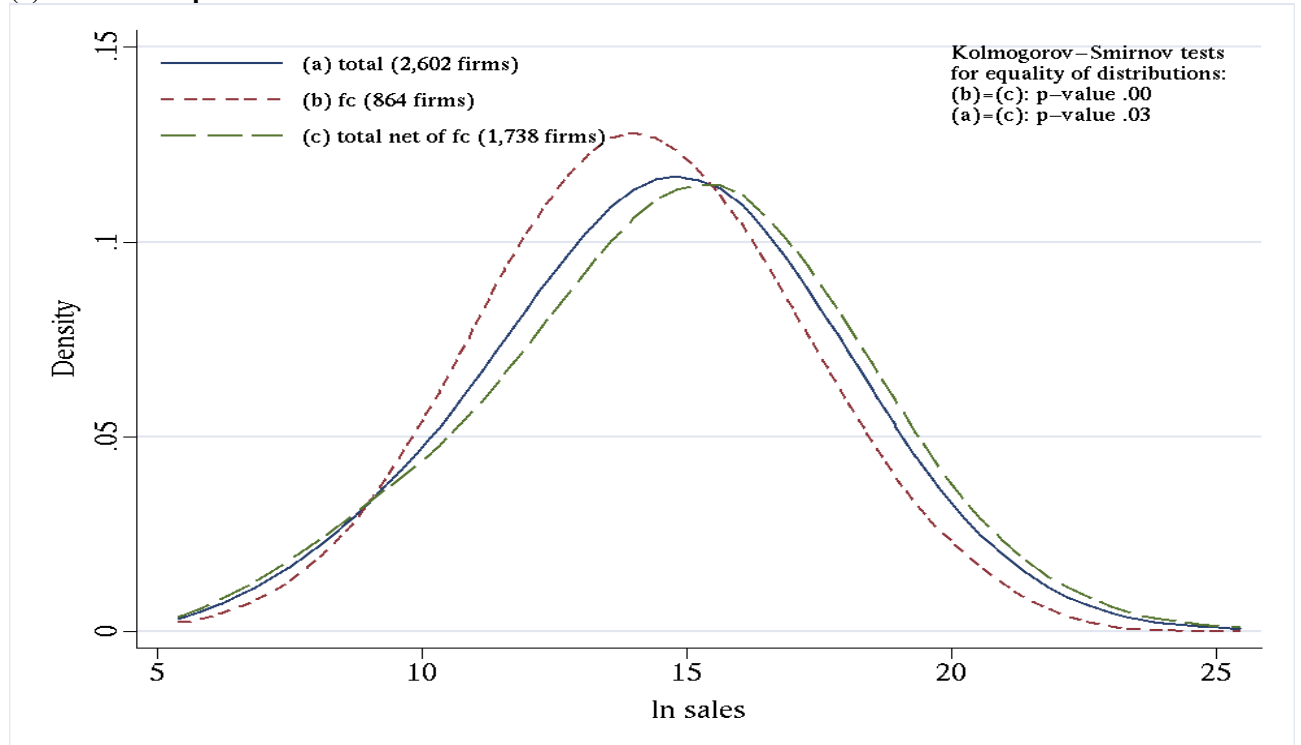
**(2) Young firms (age up to 6 years)**



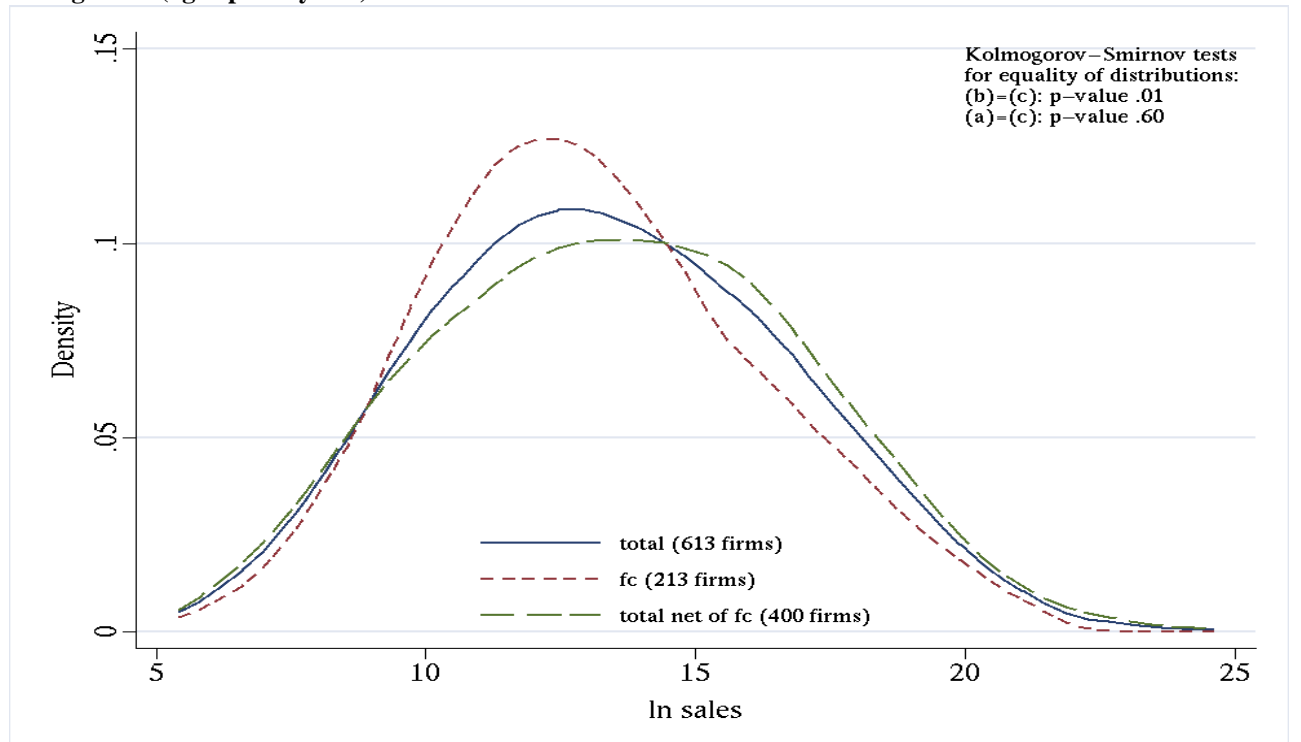
<sup>(\*)</sup> Firm size is measured by the log of the annual dollar value of sales. Firms with missing values for age or sales, or with zero value for sales were dropped.

**Fig. 9: FSD and financial constraints in the WBES dataset: Non OECD countries<sup>(\*)</sup>**

**(1) Entire sample**



**(2) Young firms (age up to 6 years)**



<sup>(\*)</sup> Firm size is measured by the log of the annual dollar value of sales. Firms with missing values for age or sales were dropped. A sizeable number of firms reporting annual sales of less than 1,000 dollars were also dropped.



## Appendix: definitions of financially constrained firms

<b>Mediocredito surveys</b>		
<u>1992</u>	<u>1995</u>	<u>1998 and 2001</u>
<p><b><u>Questions</u></b></p> <p>1. “The firm encountered difficulties in financing the last investment project? (multiple answers are allowed, with an intensity ranking from 1 to 3):</p> <p>a. Insufficient cash flow or risk capital b. Insufficient collateral c. Insufficient long-term finance d. High cost of debt e. Other.”</p> <p><b><u>Financially constrained firms (baseline definition)</u></b> Answered with a “3” to at least one of the prompts a. through d.</p>	<p><b><u>Questions</u></b></p> <p>1. “In 1994 the firm wanted more credit, asked for it and was turned down by the bank.” 2. “To obtain more credit the firm would have accepted either to pay a higher loan rate or to pledge more collateral.”</p> <p><b><u>Financially constrained firms (baseline definition)</u></b> Answered “yes” to question 1.</p> <p><b><u>Discouraged borrowers</u></b> (*) Answered “no” to question 1 and “yes” to question 2.</p>	<p><b><u>Questions</u></b></p> <p>1. “In the previous year the firm wanted more loans at the prevailing market conditions.” 2. “The firm asked for more credit but was turned down by the bank.” 3. “To obtain more credit the firm would have accepted to pay a slightly higher loan rate.”</p> <p><b><u>Financially constrained firms (baseline definition)</u></b> Answered “yes” to questions 1 and 2.</p> <p><b><u>Discouraged borrowers</u></b> (*) Answered “yes” to questions 1 and 3 and “no” to question 2.</p> <p><b><u>Firms desiring more credit</u></b> Answered “yes” to question 1</p>
<p><b>World Business Environment Survey (WBES) (**)</b></p> <p><b><u>Questions</u></b></p> <p>“Please judge on a four point scale how problematic are the following factors for the operation and growth of your business. (Please do not select more than 3 obstacles as “major” (4)) and please circle the single most important obstacle:”</p> <p>a. Financing: No obstacle (1); Minor obstacle (2); Moderate obstacle (3); Major obstacle (4). b. Infrastructure: ..... .....</p> <p><b><u>Financially constrained firms</u></b> Answered with a “4” to item “financing”</p>		

(\*) Discouraged borrowers from the 1995 Mediocredito survey were not used in the analysis, because the wording of the questions is slightly different relative to the 1998 and 2001 surveys. However, pooling discouraged borrowers from all three surveys does not qualitatively alter the results.

(\*\*) The complete list of factors affecting firm operation and growth prompted by the WBES is the following: a. Financing; b. Infrastructure (e.g. telephone, electricity, water, roads, land); c. Taxes and Regulations; d. Policy instability/uncertainty; e. Inflation; f. Exchange Rate; g. Functioning of the judiciary; h. Corruption; i. Street crime/theft/disorder; j. Organized Crime/Mafia; k. Anti-competitive practices by government or private enterprises; l. Other.

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