Laboratory of Economics and Management
Sant'Anna School of Advanced Studies
Piazza Martiri della Libertà, 33 - 56127 PISA (Italy)
Tel. +39-050-883-343 Fax +39-050-883-344
Email: lem@sssup.it Web Page: http://www.lem.sssup.it/

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Financial Structure and Corporate Growth: Evidence from Italian Panel Data

Silvia Giannangeli[a,b]
Giorgio Fagiolo[b]
Massimo Molinari[b,c]

[a] Unicredit Group, Milan, Italy
[b] LEM-Scuola Superiore Sant'Anna, Pisa, Italy
[c] University of Bristol, Department of Economics, Bristol, UK

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Silvia Giannangeli[a,b]

Giorgio Fagiolo[b,°]

Massimo Molinari[b,c]

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[a] Unicredit Group, Milan, Italy.

[b] Laboratory of Economics and Management, Sant'Anna School of Advanced Studies, Pisa, Italy.

[c] University of Bristol, Department of Economics, Bristol, U.K..

[°] Corresponding Author. Address: Laboratory of Economics and Management, Sant'Anna School of Advanced Studies, Piazza Martiri della Libertà, I-56127 Pisa, Italy. Email: giorgio.fagiolo@sssup.it. Phone: +39-050-883356. Fax: +39-050-883344.

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ABSTRACT

We study the relationships between firm financial structure and growth for a large sample of Italian firms (1998-2003). We expand upon existing analyses testing whether liquidity constraints affect firm performance by considering among growth determinants also firm debt structure. Panel regression analyses show that more liquid firms tend to grow more. However, firms do not use their capital to expand, but rather to increase debt. We also find that firm growth is highly fragile as it is positively correlated with non-financial liabilities and it is not sustained by a long-term debt maturity. Finally, quantile regressions suggest that fast-growing firms are characterized by higher growth/cash-flow sensitivities and heavily rely on external debt, but seem to be less bank-backed than the rest of the sample. Overall, our findings suggest that the link between firms' investment and expansion decisions is far more complicated than postulated by standard tests of investment/cash-flow sensitivities.

Keywords: Firm growth; Financial structure; Cash flow; Financial constraints; Gibrat law; Quantile regressions.

JEL Codes: L11, G30, D2

1. Introduction

In the last two decades, a rapidly growing research has investigated the relationship between corporate growth and financial structure[1]. Considerable attention has been paid to the hypothesis that firms are constrained in their expansion process by the lack of appropriate financial resources. The "financial constraints hypothesis" proposed by Fazzari, Hubbard and Petersen (1988) states that there is a wedge between the cost of internal and external funds because of asymmetric information problems between the firm and her external financiers. Capital market failures may eventually lead to the financial rationing of firms and, therefore, to a reduction of their investment spending capacity.

A rich empirical literature has tested this hypothesis by focusing on the impact of cash flow on firms' investment decisions and growth (see, among others, Carpenter and Petersen, 2002; Fagiolo and Luzzi, 2006; Oliveira and Fortunato, 2006; Musso and Schiavo, 2008). This empirical strategy is based on observing that, in perfect capital markets, the availability of cash flow should not be decisive for firm investment decisions as firms do not pay any "lemon" premium (Myers and Majluf, 1984) for accessing external finance. Nevertheless, problems of asymmetric information might raise the cost of external finance and lead to credit rationing. In this case, the ability to generate cash flow becomes important for financing investment.

A different approach is endorsed by Kaplan and Zingales (1997; 2000), who shed some scepticism on the interpretation of positive investment/cash-flow sensitivities as an evidence of financing constraints. Their results suggest that investment may react positively to cash-flow fluctuations even in the absence of financial constraints, as firms enjoy considerable degrees of freedom in choosing their preferred way to finance investment. According to this view, managerial behaviour and, more generally, the rules of corporate governance are important in explaining not only the use of cash in investment decisions but, more generally, the whole financial strategy of the firm.

[1] See, among others, Fazzari et al. (1988), Whited (1992), Rajan and Zingales (1998), Demirguc-Kunt and Maksimovic (1998).

A rich stream of research in the corporate governance literature has emphasized how different dimensions of corporate finance may be affected by institutional factors such as tax and bankruptcy law, investors' protection rules, legal efficiency, or the role of banks in the economic system (see, among others, Rajan and Zingales, 1995; La Porta et al., 1998). These studies have also emphasized that the type of financial strategy chosen by the firm is not neutral for firm's future expansion decisions, as it importantly shapes managers/entrepreneurs incentives.

The present study investigates whether and how a plurality of financial dimensions impact firm growth using a large sample of Italian manufacturing firms. We employ panel regression analysis in order to control for firms' specific factors and quantile regression to capture the relationship between firms' financial structure and growth at different points of its distribution. We find that, on average, more liquid firms tend to grow more. However, firms do not use their capital in order to expand, but tend to increase their debt. Moreover, we find that growth is, on average, highly fragile as it is positively correlated with the increase of non financial liabilities, and not sustained by a long-term debt maturity. The relation among financial variables and growth is not constant across the distribution of growth rates: firms that grow more are characterized by higher growth/cash-flow sensitivities and heavily rely on external debt.

The rest of the paper is organized as follows. In section 2 we discuss the background literature. In Section 3 we present the dataset and explain how we measure the relevant dimensions of firm capital structure. Section 4 focuses on the empirical analysis. Panel and quantile regressions are adopted to identify the relation between firm financial structure and growth at different points of the growth distribution. Further robustness checks are accomplished by adopting investment rate instead of firm employment growth as a dependent variable. Section 5 summarizes the main results and concludes.

2. Theory and related literature

Since the formulation of the Modigliani-Miller Irrelevance Proposition (Modigliani and Miller, 1958), several theoretical and empirical models have demonstrated that in imperfect capital markets both firm value and investment decisions are strongly affected by their capital structure. The starting point of this literature is the observation that capital markets are far from being perfect, but rather are characterized by hidden information and hidden action problems (Arrow, 1979): entrepreneurs/managers have information that investors do not have, and investors do not observe all the actions taken by entrepreneurs/managers.

Asymmetric information can generate a "lemon" problem (Akerlof, 1970) in both risk and debt capital markets. External financiers, who have a limited and incomplete information about firms' project quality and return prospects, may charge a premium to firms issuing new shares or asking for new debt. Myers and Majluf (1984) have applied this concept to the problem of equity finance, where external investors are unable to identify the quality of firms and therefore ask for a premium to purchase the shares of good firms in order to offset the losses arising from funding lemons. A similar argument applies in debt financing, where credit institutions may charge an extra price on new debt issuance or even ration applicant firms.

Agency problems between entrepreneurs/manager and external investors arise whenever the former undertake opportunistic behaviour in contrast with the interests of external financiers. Jensen and Meckling (1976) have argued that interests of entrepreneurs and managers may diverge in several important ways from the interests of creditors. Managers may prefer riskier projects, have an incentive to issue a new debt senior to the existing one, by therefore increasing the risk for existing creditors. External investors, due to the impossibility to design complete insurance contracts against managers' opportunistic behaviour so to offset moral hazard problems, may ask firms a higher price for the issuing of risk as well as debt capital.

These considerations stand at the core of the "pecking order" or "financial hierarchy" models, which have postulated that the combination of internal and external funds is the product of firms' financial strategies. According to these theories, companies adopt a hierarchical order of financial preferences, where internal funds are given preference over external ones in financing investment.

The capital structure of firms is important in shaping managers' incentives and affects the expansion patterns of firms. As argued by Jensen (1986), it should not be ignored that different forms of debts entail different governance effects, by providing different motivations to managers, and therefore influence real decisions of firms. There are several dimensions of firms' financial structure that have been thought to be importantly associated with firm value and growth by different strands of theoretical and empirical research.

A rich literature has tackled the issue of how the mix between internal and external funds is linked with firm real performance. According to the financial constraints and pecking order hypotheses, the availability of internal liquidity is a key determinant of firms' ability to invest and accomplish the desired expansion plans (among the most recent contributions, see Almeida et al., 2004; Faulkender and Petesen, 2006; Pàl and Ferrando, 2006). A similar view is proposed by the trade-off theory put forward by Acharya et al. (2005), which stresses that the dependence of investment on cash or debt largely depends on whether the firm is facing an income shortage or, conversely, a high income state. The authors highlight that there is an interplay between firms' cash and debt policies as cash holdings have a significant effect on financing capacity and investment spending in low cash-flow states, while debt reductions are a particularly effective way of boosting investment in high cash-flow states. A different approach to the issue of the relationship between firm financial policy and performance has been adopted by the corporate finance literature. In this view, external debt can be considered as an effective way to reduce the agency cost problems that may lead to the underperformance of firms (Jensen, 1986). Especially when cash flow is high, indeed, conflicts of interests may cause managers to undertake unprofitable investment or waste internal liquidity on organisational inefficiencies. In these circumstances, resorting on external financiers may provide managers the right incentives to avoid cash wasting policies, and thus finally result in firm better performances.

Similarly, debt maturity should by no means be considered as neutral in terms of incentives for managers and entrepreneurs. In particular, short term debt has been considered to reduce agency problems between the firms and external financiers, as it entails a deeper commitment of entrepreneurs/managers not to distort investment (Myers, 1977). Moreover, short-term finance allows to pursue projects with positive net present value, while suspending unprofitable ones (Barclay et al., 2003). Conversely, a short maturity may also have a negative effect, by impeding the planning and implementation of long-term investment. Consistently with this hypothesis, Schiantarelli and Sembenelli (1997) find that debt maturity positively impacts investment, profitability and growth of a sample of UK and Italian firms.

A long and rich research has addressed the question of how the development of financial intermediaries, and especially banks, relates with the growth and innovation activity of firms. Rajan and Zingales (1998) use industry level data to show that industries with the greater need of external finance, grow faster in more financially developed countries. Guiso, et al. (2004) use firm level data to show that smaller firms benefit more than large ones from financial development. Demirgüç-Kunt and Maksimovic (1998) show that firms grow at a faster rate, relative to a benchmark growth rate that would hold in the absence of external finance, in countries with a more developed financial system. Benfratello et al. (2006) use firm level data on Italian manufacturing firms and show that bank development fosters the innovation activity particularly for small firms and firms in high tech-sectors. Aghion et al. (2004) observe on the contrary that, in the case of U.K. publicly-traded firms, the most innovative firms barely rely on bank debt, but rather prefer other type of financing tools, such as new equity issuance. A more articulated view is proposed by Stulz (2001), who suggests that staged financing may be effective in reducing asymmetric information and opportunistic behaviour of financed firms. Banks do actually provide staged finance in the form of loans that may be renewed and expanded as entrepreneurs/managers ask for a broader financing. According to this view, the use of this type of debt can reduce information problems and thus improve the access of firms to external finance and increase their overall investment spending capacity (Semenov, 2006). As a matter of fact, the relevance of bank loans on the liabilities side of firms' balance sheet can be either high or low depending on a number of factors both on the demand and supply side. Firms may choose to have a low (or null) bank debt or may be limited by the supply side, especially if the firm has a low risk ranking. The relation between the amount of bank debt and firm growth is interesting in that it reveals the role played by banks into the dynamics of manufacturing firms. A less developed issue in the literature is the link between firm performance and non financial liabilities. Among these, a considerable importance can be attributed to trade debt which, although not responding to specific firm financing strategies, may be important in relaxing firms' financial constraints and expanding their spending capacity (Ferris, 1981; Emery, 1984; Brennan et al. 1988; Petersen and Rajan, 1996; Demirgüç-Kunt and Maksimovic; 2001; Boissay and Gropp, 2007).

3. The financial structure of Italian firms: data, measurement issues and descriptive statistics

We employ balance sheet-data of Italian manufacturing firms in 1998-2003 collected by Centrale dei Bilanci (CEBI)[2]. In order to discard from the analysis all the phenomena related with self-employment, we remove from the sample firms with less than two employees[3]. In order to avoid panel-attrition

[2] The database contains balance sheet and asset structure variables for a large sample of Italian business firms operating in all economic sectors. Data refer only to limited firms whose accounting books, by the rule of Italian legislation, must be made publicly available at the Chambers of Commerce. CEBI collects the information, organizes them and perform preliminary data cleaning. In particular, only balance sheets complying with to the IV EEC directive are considered. For further information, see www.centraledeibilanci.com (in Italian).
[3] Bottazzi et al. (2006) show that firms with one employee radically differ from firms with two or more employees in terms of production structure.

problems, we use a balanced panel of firms continuously operating over the observation period[4]. Table A1 summarizes the industry composition of the final sample.

There are many ways of measuring firm capital structure and, ultimately, the usefulness of each measure will depend on the purpose of the investigation. As the present study aims to assess how the dimensions of firm financial structure discussed in section 2 impact on firm real business activity, some proxies of firm liquidity, reliance on external debt, debt maturity and dependence upon bank are worked out from the available balance sheet data.

In the first place, cash flow is adopted as a flow measure of firm internal liquidity. Firms' cash flow has been calculated by the balance sheet collector (Centrale dei Bilanci), on the basis of detailed information on different flow items[5]. Since cash flow is highly correlated with all proxies of firm size (the correlation coefficient between cash flow and value added, sales or employment equals, respectively, 0.83, 0.60 and 0.54) the ratio between cash flow and sales (SCF) is used throughout the analysis.

Second, the ratio between equity and firm total assets (EQ) is employed as a stock measure of firm propensity toward self-financing or, conversely, reliance on external debt. Firms' equity is mainly composed by own capital and retained earnings. Hence, the ratio between equity and assets is a proxy for the importance of a firm own resources in financing firm investment.

In order to account for different sources of debt in the firm liability structure we build several indicators. Firm "total debt" is defined to be equal to the sum of all liability items except from equity.

4 We drop from the dataset firms that exhibited a yearly growth rate of employees lower than −200% or larger than 200% in any of the observed years, in order to weaken the problems that misreported data may introduce in the analysis. As a result, 150 firms have been removed from the sample. The number of available observations in the balanced panel is 9315 per year.

5 Cash flow shows a correlation larger than 0.90 with a simpler proxy obtained by summing up firms net profits, depreciation costs and the "Trattamento di Fine Rapporto" (TFR). The TFR is a fund where firms, by law, regularly set aside provisions that will be finally transferred to employees in the form of a "bonus" at their dismissal. We intentionally disregard the TFR at this stage of the analysis because, even if these provisions may be considered like a "debt" of the firm toward her employees (around 9% of total debt on average in our sample), their magnitude does not respond to any specific (either financial or commercial) strategy of the firm, but just mirrors the age distribution of employees as well as their turnover.

The relative importance of financial debt, FD, is measured by the ratio between financial debt (defined as the sum of debts toward credit institutions, bonds and other financial debts) and total debt. The relative importance of bank debt in firm financial debt is captured by the share of bank over total financial debt (BD). Finally, the debt maturity structure is measured through the share of short-term over total financial debt (SFD)[6].

Table 1 summarizes the definition of the financial indicators discussed so far.

[Table 1 about here]

Table 2 reports the mean value and the dispersion (as measured by the variation coefficient) of the distributions of SCF, EQ, FD, BD and SFD in different years of the sample period.

[Table 2 about here]

The descriptive statistics confirm some well-known features of the Italian industrial system (Vermeulen, 2002). For instance, debt accounts, on average, for more than two times firm equity in financing firm assets[7]. Further, a very large share of debt has a non financial source. Third, Italian firms are largely dependent on bank debt, amounting on average to 77% of total financial debt. Finally, the maturity structure of firm financial debt, largely shifted toward short-term liabilities, may reveal a potential problem of un-balance of firm assets and liability maturity structure.

[6] Short-term financial debt is composed by short-term bank loans and other types of short-term financial resources.
7 International comparisons show that Italian firms have considerably lower equity-to-assets ratios than firms from other European countries (database BACH, European Commission).

4. Empirical analysis

In the vein of the post-Gibrat literature (Gibrat, 1931), we investigate the relation between firm financial structure and employment growth by estimating an "augmented" Gibrat-like regression (Fagiolo and Luzzi, 2006), where the financial indicators discussed in Section 3 are included among regressors.

Table 3 shows the correlation matrix among the selected financial variables in 2002 (correlation matrices turn out to be relatively stable across time).

[Table 3 about here]

The econometric specification we start from includes a quadratic term on firm size in order to capture possible non-linearities in the size-growth relationship, time dummies to get rid of the trend components (D_{time}), sectoral dummies, defined as the first two digits in ATECO classification[8] (D_{sector}) and firm localization (by adopting a set of dummy variables, D_{loc}, corresponding to geographical macro areas North–East, North–West, Center and South of Italy).

In order to account for possible delayed effects, the model contains lagged values of (scaled) cash flow. Hence the saturated model reads:

$$\begin{aligned}\mathrm{GROWTH}_{i,t} = {} & \beta_1 \log(\mathrm{EMP}_{i,t-1}) + \beta_2 \log^2(\mathrm{EMP}_{i,t-1}) + \beta_3 \log(\mathrm{AGE}_{i,t-1}) + \beta_4 \log^2(\mathrm{AGE}_{i,t-1}) + \\ & + \beta_5 \mathrm{SCF}_{i,t-1} + \beta_6 \mathrm{SCF}_{i,t-2} + \beta_7 \mathrm{SCF}_{i,t-3} + \beta_8 \mathrm{EQ}_{i,t-1} + \beta_9 \mathrm{FD}_{i,t-1} + \beta_{10} \mathrm{BD}_{i,t-1} \\ & + \beta_{11} \mathrm{SFD}_{i,t-1} + \beta_{12} \mathrm{D}_{time} + \beta_{13} \mathrm{D}_{sector} + \beta_{14} \mathrm{D}_{loc} + v_{i,t}\end{aligned} \quad (1)$$

where the growth rate of employees has been computed as:

[8] The ATECO sector classification mirrors to a great extent the NACE one.

$$\text{GROWTH}_{i,t} = \frac{\text{EMP}_{i,t} - \text{EMP}_{i,t-1}}{\text{EMP}_{i,t-1}}$$

The specification of the final model has been selected starting from the saturated model and following a general-to-specific strategy wherein non-significant regressors were removed according to likelihood-ratio tests (see, e.g., Hendry, 1995)[9].

4.1. Panel regressions

Table 4 reports the pooled OLS, random and fixed effects estimation results of the final regression model, that takes the following form:

$$\begin{aligned}\text{GROWTH}_{i,t} = {} & \beta_1 \log(\text{EMP}_{i,t-1}) + \beta_2 \log^2(\text{EMP}_{i,t-1}) + \beta_3 \log(\text{AGE}_{i,t-1}) + \beta_4 \text{SCF}_{i,t-1} + \\ & + \beta_5 \text{SCF}_{i,t-2} + \beta_6 \text{EQ}_{i,t-1} + \beta_7 \text{FD}_{i,t-1} + \beta_8 \text{BD}_{i,t-1} + \beta_9 \text{SFD}_{i,t-1} + \\ & + \beta_{10} \text{D}_{time} + \beta_{11} \text{D}_{sector} + \beta_{12} \text{D}_{loc} + v_{i,t}\end{aligned} \tag{2}$$

where the error term $v_{i,t}$ may contain both unobservable individual effects, (c_i), and idiosyncratic error, ($u_{i,t}$), that is: $v_{i,t} = c_i + u_{i,t}$. Pooled OLS estimation is motivated by the weaker exogeneity assumptions made on the idiosyncratic error term: both random and fixed effects estimation use the strong exogeneity assumption that the unobservable component $u_{i,t}$ is in each period uncorrelated with explanatory variables in each other period. However, pooled OLS turn out to be inefficient if the error term in equation 2 does contain unobserved individual components[10]. Indeed, Breusch and Pagan test statistic calculated after random effects estimation does reject the hypothesis of absence of individual

[9] A similar approach was employed in Fagiolo and Luzzi (2006). Detailed results for the selection procedure are available from the Authors upon request.
[10] We will further discuss the issues related with the possible presence of time-varying endogeneity in the concluding section.

unobserved effects. Both random and fixed effects account for the presence of c_i in the model. Although Hausman test suggests that fixed effects estimation has to be preferred, random effect results are also reported. Indeed, fixed effect estimation may lead to imprecise estimates due to the low variations over time of the book "stock" variables EQ, FD, BD and SFD (Woolridge, 2002)[11].

[Table 4 about here]

The estimation results show a negative relationship between firm size and growth. The relation is not monotonic. Rather, the negative relation tends to vanish as the size increases (the coefficient of the quadratic term $\log^2(EMP_{i,t-1})$ is significantly different from zero in all the estimated specifications). Second, we do not find very consistent results on the relationship between firms' age and growth. While the results obtained through the pooled and fixed effect estimations point out a negative relation, the within, fixed effect estimation detects a positive one.

More interesting for our analysis, we find that the amount of cash flow is positively correlated with firm growth. This is in line with previous results by Fagiolo and Luzzi (2006).

Notice, however, that the positive and significant relationship detected in the data by all estimation procedures might not mirror actual liquidity constraints to firm growth. Indeed, firms that grow more may be those endowed with larger cash flows, but it could well be the case that the causal relation runs the other way round than postulated by standard tests on the presence of financial constraints. The evidence of a positive relation between cash flow and growth can be better interpreted when accounting for other effects, captured through capital structure "stock" variables. Interesting enough, the estimated coefficient of equity-to-assets ratio is negative in the pooled and random effects

[11] The first-order autocorrelation of these variables is higher than 0.90.

estimations, suggesting that firms that grow more are less reliant on self financing, and rise more external funds, relative to their assets, than low growth firms do[12].

As to the different types of debt, it is interesting to notice that the share of financial debt (FD) is negatively related with growth. This result confirms that non financial debt, such as firms' provisions for pensions and other social obligations, as well as trade debt, give firms a valuable buffer of resources for financing growth. On the contrary, we find a positive relation between the share of bank debt (BD) and growth. Combined with the results on EQ and SCF, this might suggest that firms in our sample tend to use bank debt in order to expand, possibly using the amount of liquidity as a guarantee of firm solvency. Almost no role is found to be played by debt maturity structure on firm growth: if any, the relation between firms' debt maturity and growth is positive (even though very weak).

Overall, our empirical findings seem to suggest that firms do not use their equity capital to finance their expansion. Rather, firms that decide to grow do so by creating new debt. Our results also emphasize that the growth profile of Italian Manufacturing firms is, on average, highly fragile: on one hand, it is positively correlated with the increase of non financial liabilities; on the other hand, it is not sustained by a long-term debt maturity. This may be the due compensation between the two counteracting forces discussed in section 2, i.e., the positive relation between maturity and the implementation of long-term investment vs. the negative effect of maturity on agency costs.

4.2 Quantile regression analysis

Panel regression analysis estimates the relation between the mean value of the dependent variable (firm growth) and variations in the explanatory variables. It is possible, however, that marginal effects of changes in some of the variables in (2) are not equal across the whole distribution of firm growth. In other words, the estimated coefficients in Table 4 may be a poor estimate of the relation between some

[12] The negative relation between equity-to-assets ratio and growth, although not supported by the within, fixed-effect estimation, may suggest that firms that decide to grow do not face a cost of debt as high as to dampen its exploitation.

of the explanatory variables and firm growth, at different quantiles of its distribution. Quantile regression, introduced by Koenker and Bassett (1978), is a useful way to overcome this problem, by providing estimates of the regression coefficients at different quantiles of the dependent variable. Quantile regression amounts to estimating the following equation:

$$y_i = x_i'\beta_\tau + u_{\tau i} \qquad (3)$$

where τ stands for the τ^{th} quantile of the distribution of y. The distribution of the error term $u_{\tau i}$ is left unspecified and the only assumption made is $Quant_\tau (u_{\tau i} \mid x_i) = 0$, which allows to write the conditional quantiles of y as a function of explanatory variables and parameters only: $Quant_\tau(y_i \mid x_i) = x_i'\beta_\tau$. The estimate $\hat{\beta}_\tau$ of parameters in 3 is found by minimizing with respect to β the quantity: $\sum_i |u_{\tau i} h_i|$, where the function h_i is defined as:

$$h_i = \begin{cases} 2\tau & \text{if } u_{\tau i} > 0 \\ 2(1-\tau) & \text{otherwise} \end{cases} \qquad (4)$$

The estimate of the τ^{th} conditional quantile is therefore given by $\widehat{Quant}_\tau(y_i \mid x_i) = x_i'\hat{\beta}_\tau$. Quantile's coefficient $\beta_{\tau k}$ can be interpreted as the partial derivative of the conditional quantile of y with respect to one of the k^{th} explanatory variable, $\frac{\delta Quant_\tau(y_i \mid x_i)}{\delta x_k}$. This derivative quantifies the marginal change in the τ^{th} conditional quantile due to marginal change in the k^{th} element of x (Buchinsky, 1998).

Table 5 reports the results of quantile estimation. A sequence of quantile regressions was estimated for the 0.05, 0.25, 0.50, 0.75 and 0.95 quantiles of the growth rate distribution and tests for equality of coefficients across quantiles were performed[13].

The estimation results are interesting: first of all, we find that the relation between cash flow and growth is not the same across the whole distribution of growth rates. In particular, the cash-flow sensitivity of growth is significantly different for firms growing less or growing more than the median firm in the sample[14]. Firms growing more than the median value (50th percentile) show a significantly larger sensitivity to cash flow. This result is consistent with different, but opposites stories: on one hand, one could interpret the result by saying that firms with higher growth opportunities are also riskier from an external investors' viewpoint, and therefore they may incur in credit rationing with higher probability than low growth firms. This will force high growth firms to use their internal cash flow in order to finance new investments. On the other hand, the result can be interpreted as a support to the view that cash flow contains information about investment, profit and growth opportunities of a firm: detecting a positive relation between growth and cash flow is therefore not a symptom of the presence of financial constraints to firm decision to expand but, rather, a signal that a virtuous selection mechanism is at play in the market.

[Table 5 about here]

Second, the coefficient on EQ is not constant across quantiles of the growth rates distribution: in the case of equity-to-assets ratio, the coefficient at any of the growth rate quantiles are found to be

[13] All elaborations were performed using `Stata10`®. The command `sqreg` was used to perform quantile regression and standard errors were calculated using the bootstrapping method suggested by Gould (1997), with 100 replications. Scripts and data are available from the Authors upon request.

[14] F tests fail to reject the null hypothesis that the SCF coefficient at the 5% or 25% percentile are equal to the 50% percentile at conventional significance levels (respectively, F test values are equal to 1.31 and 2.82). Similarly, no significant difference is found between coefficients at the 75% and 90% percentile.

statistically different from any other quantile. In particular, the relationship between firms' propensity toward self finance and growth is positive and significant for firms in the 5th percentile, meaning that firms that are more reliant on own funds are those that grow less. As the growth rate increases, firms are found to use more and more debt.

As for the type of debt the firm is using, we find that the negative relation already detected on the whole sample between the share of financial debt and growth is significant at all but the 95th percentiles, suggesting that in firms that grow the most, contrary to what happens in the rest of the sample, the increase in the amount of financial debt relative to other types of debt is associated with an increase in firm growth rate[15].

Some differences across the distribution are also found in the relation between growth and the share of bank debt: interestingly, at the 95th percentile of the growth rates distribution there is no association between growth and bank debt.

It is worth noting that the maturity of financial debt is positively related with growth in the first quartile of the distribution. No significant relation between the share of short-term financial debt, relative to total, and growth is found at upper percentiles.

Finally, some differences are found in the relation between firm growth and the share of bank debt at different quantiles of the growth rate distribution: the most interesting result is that at the 95th percentile of the growth rates distribution there is no association between growth and bank debt. As for the maturity structure of debt, it is interesting to notice that shrinking firms are those for which the more the term structure of debt is short, the less they grow. No significant relation between the share of short-term financial debt, relative to total, and growth is found at upper percentiles.

[15] F test reject the hypothesis that the coefficients of FD at 5th and 25th percentiles are equal, while this is not the case for upper quantiles.

4.3. Robustness checks: the relation between financial structure and investment

Let us now turn to the last piece of analysis, by studying the relation between firms' financial structure and investment. It is possible indeed that the fluctuations in the financial items that compose the liabilities structure of a firm do not have any sizeable impact on firms' growth process as measured in previous section, and that firms' employment growth is not an appropriate indicator to capture the impact of financial variables on firms' real performance. We therefore focus on a "intermediate" indicator, i.e. investment rate, that is in principle more likely to respond to variations in the financial structure of the firm. We do so by estimating a different version of equation (2), where now firms investment rate in tangible assets[16] is included as the dependent variable instead of employment growth.

The regression equation is therefore the following:

$$\begin{aligned} \mathrm{INV}_{\mathrm{i,t}} = {} & \beta_1 \log(\mathrm{EMP}_{\mathrm{i,t\text{-}1}}) + \beta_2 \log^2(\mathrm{EMP}_{\mathrm{i,t\text{-}1}}) + \beta_3 \log(\mathrm{AGE}_{\mathrm{i,t\text{-}1}}) + \beta_4 \mathrm{SCF}_{\mathrm{i,t\text{-}1}} + \\ & + \beta_5 \mathrm{SCF}_{\mathrm{i,t\text{-}2}} + \beta_6 \mathrm{EQ}_{\mathrm{i,t\text{-}1}} + \beta_7 \mathrm{FD}_{\mathrm{i,t\text{-}1}} + \beta_8 \mathrm{BD}_{\mathrm{i,t\text{-}1}} + \beta_9 \mathrm{SFD}_{\mathrm{i,t\text{-}1}} + \\ & + \beta_{10} \mathrm{D}_{\mathrm{time}} + \beta_{11} \mathrm{D}_{\mathrm{sector}} + \beta_{12} \mathrm{D}_{\mathrm{loc}} + v_{\mathrm{i,t}} \end{aligned} \qquad (5)$$

where investment rate is defined as:

$$\mathrm{INV}_{\mathrm{i,t}} = \frac{\text{fixed tangible assets}_{\mathrm{i,t}} - \text{fixed tangible assets}_{\mathrm{i,t\text{-}1}}}{\text{fixed tangible assets}_{\mathrm{i,t\text{-}1}}}$$

Results reported in Table 6 do not differ significantly from those shown in Table 4 as for the sign and significance of coefficients on cash flow, equity-to-assets ratio, and the share of financial debt.

[16] We disregard investment in immaterial assets due to the noisy measurement of the highly heterogeneous components of this type of assets.

[Table 6 about here]

Firm investment is financed through debt. However, as already discussed, it seems that investment is supported by a particularly rudimental and fragile financial structure, with investment being positively correlated with the growth of non-financial debt items. Differently from the results on firms' employment growth, the share of bank debt over total financial debt held by the firm is not found to affect investment.

5. Conclusions

This paper is an attempt to extend the analysis of the links between firm financial structure and performance, beyond the traditional tests on financial constraints based on estimated investment cash-flow sensitivities. In particular, the purpose of the analysis is to shed some light on several aspects that obtained very little attention in the literature, namely the relation between the liability structure, the sources of debt and the debt maturity on one side, and firm growth on the other.

Our results suggest that Italian manufacturing firms, on average, do not use their own capital to finance their expansion. Rather, firms decide to grow by creating new debt. Our results also emphasize that the growth profile of Italian manufacturing firms is, on average, highly fragile: on one hand, it is positively correlated with the increase of non financial liabilities, on the other hand, it is not sustained by a long-term debt maturity.

Interestingly enough, we find that the relationship among financial variables and growth is not constant across the distribution of growth rates: firms that grow more are characterized by higher growth cash flow and heavily rely on external debt, although growth in these firms seems not to be associated with an increase in non-financial debt, nor to be fostered by bank loans or credit lines.

We believe that the contribution of the study is twofold: on the methodological side, we attempted to overcome the standard empirical approach aiming to work out the relationship between finance and growth only through average marginal effects, such as those estimated through standard panel techniques. A remark is in order: the analysis presented in the paper applies fixed- and random-effect estimation, disregarding potential problems of time-varying endogeneity which might not be appropriately captured by the adopted estimation methodologies[17]. The conventional way to overcome the problem is to rely upon GMM-type estimation. We followed this approach and estimated our model adopting (both difference and system) GMM. Unfortunately, while the estimated coefficients did not change sizably with respect to fixed-effect estimation, Hansen-Sargan tests clearly rejected the hypothesis of instruments validity, shedding some light on the capability of variables such as cash flow to proper instrument their own future values.

Second, on the content side, our findings suggest that the link between firms' investment and expansion decisions is far more complicated than postulated by standard tests of investment cash-flow sensitivities. Important factors, such as the characteristics of the banking system and the development of financial markets may play a role. Firm heterogeneity should also be accounted for when investigating the finance-growth relationship at the micro level, since considerable differences in liquidity, capital and debt structure might be the outcome of specific financing strategies of firms, but cal also be determined by particular forms of governance, or by the characteristics of the market the firm is serving. In either case, these factors may importantly shape firms' ability to expand in a way that might not be fully captured by the simple relationship between a firm's cash flow and its investment.

[17] As suggested by the autoregressive growth model adopted in Oliveira and Fortunato (2006), and firstly proposed by Goddard et al (2002), firm growth might entail a slow adjustment process. Moreover, it is possible that a more general problem of time-varying endogeneity affects our estimates, stemming from the presence of some time-varying confounding factor (such as, for instance, unanticipated investment and profit opportunities) possibly affecting both firm growth and cash-flow.

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Table1. Financial indicators adopted in the analysis

Variable	**Construction**
SCF	$\frac{\text{Cash Flow}}{\text{Sales}}$
EQ	$\frac{\text{Equity}}{\text{Total Assets}}$
FD	$\frac{\text{Financial Debt}}{\text{Total Debt}}$
BD	$\frac{\text{Bank Debt}}{\text{Financial Debt}}$
SFD	$\frac{\text{Short-term Financial Debt}}{\text{Financial Debt}}$

Table2. Mean and variation coefficient of financial variables in 1998, 2000 and 2002

	Mean			Variation Coefficient		
Variable	1998	2000	2002	1998	2000	2002
SCF	0.069	0.071	0.068	0.922	0.955	1.136
EQ	0.238	0.249	0.262	0.609	0.609	0.621
FD	0.412	0.399	0.401	0.462	0.478	0.490
BD	0.785	0.797	0.786	0.374	0.366	0.392
SFD	0.674	0.683	0.684	0.435	0.423	0.428

Table 3.Correlation matrix in 2002

	$\log(EMP_{i,t-1})$	$\log(AGE_{i,t-1})$	$SCF_{i,t-1}$	$EQ_{i,t-1}$	$FD_{i,t-1}$	$BD_{i,t-1}$	$SFD_{i,t-1}$
$\log(EMP_{i,t-1})$	*						
$\log(AGE_{i,t-1})$	0.150	*					
$SCF_{i,t-1}$	0.154	0.023	*				
$EQ_{i,t-1}$	0.118	0.133	0.441	*			
$FD_{i,t-1}$	-0.032	-0.035	-0.149	-0.369	*		
$BD_{i,t-1}$	-0.076	0.010	-0.140	-0.181	0.084	*	
$SFD_{i,t-1}$	-0.117	-0.060	-0.197	-0.184	0.026	0.229	*

Note: all correlation coefficients turn out to be statistically different from zero at conventional confidence levels

Table 4. Panel regression results. Dependent variable: GROWTH $_{it}$.

Variable	Pooled OLS	Random Effects	Fixed Effects
$\log(EMP_{i,t-1})$	-0.051 ***	-0.054 ***	-0.788 ***
	(0.006)	(0.004)	(0.064)
$\log^2(EMP_{i,t-1})$	0.004 ***	0.005 ***	0.024 ***
	(0.001)	(0.001)	(0.008)
$\log(AGE_{i,t-1})$	-0.015 ***	-0.015 ***	0.076 ***
	(0.001)	(0.001)	(0.019)
$SCF_{i,t-1}$	0.198 ***	0.197 ***	0.141 ***
	(0.029)	(0.016)	(0.033)
$SCF_{i,t-2}$	0.063 ***	0.064 ***	0.076 ***
	(0.020)	(0.017)	(0.027)
$EQ_{i,t-1}$	-0.037 ***	-0.036 ***	-0.004
	(0.008)	(0.007)	(0.021)
$FD_{i,t-1}$	-0.028 ***	-0.028 ***	-0.047 ***
	(0.005)	(0.005)	(0.012)
$BD_{i,t-1}$	0.012 ***	0.012 ***	0.024 ***
	(0.003)	(0.003)	(0.006)
$SFD_{i,t-1}$	-0.003	-0.003	-0.008 *
	(0.003)	(0.003)	(0.005)
D_{time}	Yes	Yes	Yes
D_{sector}	Yes	Yes	
D_{loc}	Yes	Yes	
Number of obs.	37260	37260	37260
F test	22.98 ***	–	161.99 ***
Wald test	–	1222.65 ***	–

Note: All estimation procedures account for heteroskedasticity at the firm level and autocorrelation of the error term.

Table 5. Quantile regression results. Figures in round brackets below the quantile percentages represent the value taken by the dependent variable at each of the quantiles shown in the table.

Variable	5% (-0.161)	25% (-0.037)	50% (0.000)	75% (0.067)	95% (0.250)
$\log(EMP_{i,t-1})$	0.083 ***	0.007	0.003 **	-0.056 **	-0.275 ***
	(0.016)	(0.044)	(0.001)	(0.004)	(0.036)
$\log^2(EMP_{i,t-1})$	-0.008 ***	-0.001 *	-0.001 ***	0.004 ***	0.025 ***
	(0.002)	(0.0004)	(0.0001)	(0.001)	(0.004)
$\log(AGE_{i,t-1})$	0.004	-0.006 ***	-0.009 ***	-0.020 ***	-0.045 ***
	(0.004)	(0.001)	(0.001)	(0.001)	(0.006)
$SCF_{i,t-1}$	0.198 ***	0.167 ***	0.145 ***	0.230 ***	0.297 ***
	(0.027)	(0.010)	(0.010)	(0.027)	(0.068)
$SCF_{i,t-2}$	0.092 ***	0.025 **	0.022 *	0.035	0.055
	(0.025)	(0.012)	(0.012)	(0.027)	(0.062)
$EQ_{i,t-1}$	0.048 ***	-0.007	-0.022 ***	-0.066 ***	-0.161 ***
	(0.016)	(0.006)	(0.003)	(0.006)	(0.023)
$FD_{i,t-1}$	-0.059 ***	-0.029 **	-0.012 ***	-0.022 ***	-0.020
	(0.013)	(0.004)	(0.002)	(0.003)	(0.014)
$BD_{i,t-1}$	0.015 **	0.010 ***	0.008 ***	0.014 ***	0.011
	(0.006)	(0.002)	(0.001)	(0.002)	(0.008)
$SFD_{i,t-1}$	-0.023 ***	-0.005 **	-0.002	-0.003	0.014
	(0.005)	(0.002)	(0.001)	(0.002)	(0.010)
D_{time}	Yes	Yes	Yes	Yes	Yes
D_{sector}	Yes	Yes	Yes	Yes	Yes
D_{loc}	Yes	Yes	Yes	Yes	Yes
Observations	37260	37260	37260	37260	37260
Pseudo R^2	0.039	0.017	0.009	0.034	0.067

Table 6. Panel regression results on investment rate. Fixed effect estimation.

Variable	Pooled OLS		Random Effects		Fixed Effects	
$\log(EMP_{i,t-1})$	-0.041		-0.041		-0.015	
	(0.032)		(0.014)		(0.246)	
$\log^2(EMP_{i,t-1})$	0.004		0.004		-0.019	
	(0.003)		(0.003)		(0.027)	
$\log(AGE_{i,t-1})$	-0.032	***	-0.032	***	-0.087	
	(0.005)		(0.005)		(0.072)	
$SCF_{i,t-1}$	0.185	***	0.177	**	-0.063	
	(0.055)		(0.054)		(0.071)	
$SCF_{i,t-2}$	0.127	**	0.129	***	0.036	
	(0.051)		(0.051)		(0.074)	
$EQ_{i,t-1}$	-0.121	***	-0.117	***	-0.481	***
	(0.023)		(0.022)		(0.095)	
$FD_{i,t-1}$	-0.092	***	-0.088	***	-0.302	***
	(0.017)		(0.015)		(0.017)	
$BD_{i,t-1}$	0.006		0.006		-0.006	
	(0.012)		(0.010)		(0.028)	
$SFD_{i,t-1}$	0.004		0.004		0.021	
	(0.011)		(0.010)		(0.024)	
D_{time}	Yes		Yes		Yes	
D_{sector}	Yes		Yes		Yes	
D_{loc}	Yes		Yes		Yes	
Observations	24748		24748		24748	
F test	19.70	***	–		50.56	***
Wald test	–		749.69	***	–	

APPENDIX

Table A1. Industry composition of the sample

NACE code	Industry	Number of firms
15-16	Food beverages and tobacco	1030
17	Textiles	820
18	Wearing apparel and dressing	273
19	Tanning	368
20	Wood products	210
21	Pulp and paper	256
22	Publishing and printing	232
23	Coke petroleum and nuclear fuels	33
24	Chemicals	551
25	Rubber and plastic	602
26	Other non-metallic mineral products	548
27	Basic metals	394
28	Fabricated metal products	1098
29	Machinery and equipment	1351
30	Office machinery and computers	21
31	Electrical machinery	347
32	Radio and TV	123
33	Medical precision and optical instruments	210
34	Motor vehicles, trailers and semi-trailers	194
35	Other transport equipment	90
36	Furniture	564
	Total	9315