Endogenous and exogenous determinants of capital structure: a comprehensive analysis of the Italian firms

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Abstract

Empirical research on capital structure has recently focused on studies aimed to find out which of the predominant theories of capital structure - the tradeoff or the pecking order theory - best describes the financing strategies of enterprises.
Due to data availability, research is generally focused on listed companies, which well represent most Anglo-Saxon economies.
The stock market does not correctly represent the Italian economy for the small number of listed companies compared to the total, the distorted industrial composition of the Stock Market, and the typical structure of the Italian economy, characterized by small size firms often operating in industrial districts.
We focus on both listed and unlisted companies (the latter representing over 99% of our sample) and we consider a broad sample of firms, in order to take into account the Frank and Goyal argument (2002) that none of the predictions of the pecking order theory holds when a large number of firms is used. Due to the availability of continuous data in the sample, we test the short-term effect [as in the Fama & French (2002) model].
We survey over 55,000 Italian firms in order to find out:

- the effect of exogenous-structural determinants of financial leverage;
- the effect of endogenous-structural variables;
- the effect of performance/return variables;
- the effect of tax burden.

We find that all of the four models (and the overall model) used to explain the variance in financial leverage of Italian firms are statistically significant. The most important factors affecting the financial structure are found to be exogenous structural variables and in particular age and geographical localization of firms.
However, the share of variance accounted for is relatively low. These results are consistent with the hypothesis of a reduced financial flexibility due to the lack of a significant financial market.

1. Introduction

Empirical research on capital structure has recently focused on studies aimed to find out which of the predominant theories of capital structure - the tradeoff or the pecking order theory - best describes the financing strategies of enterprises.
Due to data availability, research is generally focused on listed companies, which well represent most Anglo-Saxon economies.
The stock market does not correctly represent the Italian economy for the following reasons:

1. the small number of listed companies compared to the total (listed firms in the Italian Stock Exchange are approximately 270, over about 540.000 limited liabilities companies; Italian companies listed in foreign stock market are irrilevant);
2. the distorted industrial composition of the listed Italian firms (still focused on the financial sector and few other industries);
3. the typical structure of the Italian economy, characterized by small size firms often operating in industrial districts.

In order to take into account the cited elements, we focus both on listed and unlisted companies (the latter representing over 99% of our sample) and we consider a broad sample of firms, in order to take into account the Frank and Goyal argument (2002) that none of the predictions of the pecking order theory holds when a large number of firms is used. Due to the availability of continuous data in the sample, we test the short-term effect [as in the Fama & French (2002) model].

The choice of analyzing Italian firms has an important role in shaping the logic, the hypothesis of the research and the interpretation of results. Italian firms are characterized by some specific features as:

- as previously stated, in most cases they are *non-listed* firms;
- they are in the great majority controlled by single entrepreneurs or families;
- they are small-medium firms with a low extent of diversification and vertical integration;
- they are characterized by a higher average financial leverage (as a system) than that of other developed Economies;
- a considerably high amount of short-term debt mainly provided by banks and a very low share of bonds.

Therefore, it's of clear evidence that firms analyzed in this paper are not subjected to the classical mechanism of financial markets control and to "market discipline", with reference to equity capital, but also to financial debts as market-traded bonds.
This remark is particularly important in reference to financial structure, since financing a firm through the market mechanism makes substantially limitless the amount of risk capital that a manager can rise. The function of financial markets, under this perspective, is to grant firms:

a) a major financial flexibility by selling shares or bonds on the market (and by mixing this source of capital with bank debt) in order to pursue a strategic target of financial structure;
b) a "qualitative" flexibility due to a major variety of financial tools (equity and debt) that a firm can sell on the market in order to optimize its financial structure.

On the other hand, small unlisted companies, like those analyzed in this paper, are characterized by:

- a limited amount of equity capital from entrepreneurs or families controlling the firms;
- the lack of an option to sell, for example, bonds "via financial market", being more strictly dependent on bank financing.

The result is a form of market discipline mainly developed by banks that can limit the absolute amount of debt capital to the firms or can set prices (interest rates) in order to extract part of the economic value created by the firm.

The specific aim of the research is to investigate the determinants of financial structure within Italian unlisted firms. It is important to remark that we use a cross-sectional approach, considering data for the year 2001. In dealing with capital structure we then followed the mainstream of empirical studies on the determinants of financial structure that is essentially based on the research of ex-post relationships between financial leverage indicators (the dependent variable) and quali-quantitative indexes expressive of specific features of firm structure-conduct-performance, business/industry, structure variabiles as, for example, composition of assets, fiscal variables and others.

The general structure of the proposed models are consistent with some of the major findings of the empirical literature on the determinants of financial leverage, but they also take into account variables that are not considered in other studies. According to Harris and Raviv (1991, page 334), the available studies "generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size and decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and uniqueness of the product."

To build our theoretical system of 4 models we considered that:

- with particular reference to Italian economic system, the financial structure of firms is particularly influenced by context (exogenous-structural) variables such as industry, size, geographic location and "age" of firms (firm size is, in fact, one of the variables found to be significant);
- variables such as fixed assets, advertising expenditures and research and development expenditures are influenced by the type of activity of the firm and in particular by the nature (tangible vs intangible) of capital investment;

- the variable "non-debt tax shields" has to do with the capacity of the firm to limit the tax burden and, consequently, the positive effect of financial debt and financial expenses in reducing the overall cost of capital;
- the variable "profitability" remarked by Harris and Raviv is clearly connected with performance and return on firm capital. Even if logic suggests that performance have a specific influence on financial structure and leverage, this relationship (negative according to Harris and Raviv) is somewhat ambiguous, as we will further state more precisely.

The 4 models tested are:

1) the effect of exogenous-structural determinants of financial leverage;
2) the effect of endogenous-structural variables;
3) the effect of performance/return variables;
4) the effect of tax burden.

The first model tested is the role of exogenous-structural variables that is to say, how the variables describing the particular context in which a firm operates influence its financial structure and the level of financial leverage. This variables are considered "structural" because they define the influence of the external environment on the firm and on its financial structure.
Having to deal with categorical variables, this study employs a simple analysis of variance framework that allows to focus directly on the existence, and importance, of industry (cluster), size, geographic area and "age" of the firm.

The second model tested is the role of endogenous-structural variables. In this case we deal with the asset structure of the firm as a determinant of financial structure. In particular, we investigate the role of structural asset variable in determining the strategic choices of coverage of financial needs arising from industrial activity of the firm.
The general idea is that the different composition of invested capital (long term/short term assets, tangible/intangible…) can have a strong influence on shaping the financial structure of the firm under the internal (the managerial and the shareholders') and external (banks and debtholders) perspective.

The third model we develop is based on the relationship between degree of leverage profitability. As previously remarked, one of the most explanatory variables with reference to the degree of financial leverage is profitability. What seems to emerge from empirical literature is that the relationship between profitability and financial leverage is negative: a higher level of profitability leads to a lower level of financial leverage.[1]

[1] See the review of the literature on section 2.

The logical explanation of this relationship is straightforward: higher levels of firm profitability bring to sharper cash flows that reduce the need of the firm to raise debt in order to finance its assets. This is also the principal statement of the pecking order theory (Myers, 1984); if the cash flow generated through operating activity is higher than the cash outflow for capital investment the firm pays back its debt or invests in short term financial activities, reducing (in any case) the net financial leverage.
Besides the predictions of the pecking order theory, a higher profitability could lead to a lower level of leverage also because the shareholders do not find investment opportunities as they can keep money within the firm.
On the other side, this relationship is somehow ambiguous, since the "debt capacity" theory of capital structure implies a completely opposite view: a higher return on investments means a lower risk for debtholders and a different shape of the curve of cost of debt capital that implies a higher sustainable level of financial leverage.

The last model tested is the effect of tax shields on the degree of financial leverage. This is the simplest model and investigate the relationship between the degree of financial leverage and the existence of a tax shield. The analysis follows the traditional theory of capital structure and states that the tax shield on debt tends to increase the degree of leverage since the net cost of capital decreases and the condition of value maximization implies a higher degree of debt within the financial structure of the firm.

We find that all of the four models (and the overall model) used to explain the variance in financial leverage of Italian firms are statistically significant. The most important factors affecting the financial structure are found to be exogenous structural variables and in particular age and geographical localization of firms.
However the share of variance accounted for is relatively low. These results are consistent with the hypothesis of a reduced financial flexibility due to the lack of a significant financial market.

2. Related research

The theory of capital structure has been dominated by the search for optimal capital structure. Optimums normally require a tradeoff, for example between the tax advantages of borrowed money and the costs of financial distress when the firm finds it has borrowed too much.
This static tradeoff theory quickly translates to empirical hypotheses. For example, it predicts reversion of the actual debt ratio towards a target or optimum, and it predicts a cross-sectional relation between average debt ratios and asset risk, profitability, tax status and asset type.

Empirical research on capital structure has broadly investigated which of the predominant theories of capital structure, the tradeoff or the pecking order theory, best describes the financing strategies of enterprises.

The tradeoff theory of capital structure predicts that firms will choose their mix of debt and equity financing to balance the costs and benefits of debt. The tax benefits of debt and control of free cash flow problems push firms to use more debt financing, while bankruptcy costs and other agency problems provide firms with incentives to use less. The theory describes a firm's optimal capital structure as the mix of financing that equates the marginal costs and benefits of debt financing. One of the main empirical predictions of the tradeoff theory is that debt ratios will tend to be mean reverting as firms use the external capital markets strategically to keep themselves at or close to their optimums.

There is evidence in favor of the static tradeoff and optimal capital structure. Several authors, such as Schwartz and Aronson (1967), have documented evidence of strong industry effects in debt ratios, which they interpret as evidence of optimal ratios. Long and Malitz (1985) show that leverage ratios are negatively related to research and development expenditures, which they use as a proxy for intangible assets. Smith and Watts (1992) also document a negative relation between growth opportunities and debt ratios. Mackie-Mason (1990) reports evidence that firms with tax loss carry forwards are less likely to issue debt. This conclusion is consistent with Miller and Modigliani (1966), who detected the positive effects of interest tax shields in the market values of electric utilities.

Bradley et al. (1984) give an excellent review and synthesis of some of the earlier theoretical and empirical literature on optimal capital structure, and conclude that their findings 'support the modern balancing [tradeoff] theory of capital structure'. More recently, however, Titman and Wessels (1988), using a latent variables approach, have found only mixed evidence for the role of the factors predicted by the static tradeoff theory.

Other studies provide more direct evidence that firms adjust toward a target debt ratio. Taggart (1977), Marsh (1982), Auerbach (1985), Jalilvand and Harris (1984) and Opler and Titman (1994) find mean reversion in debt ratios or evidence that firms appear to adjust toward debt targets. Marsh (1982), using a logit model, finds that the probabilities of debt and equity issues vary with the deviation of the current debt ratio from the target, which he estimates as the observed average over his sample period. Opler and Titman (1994), who also use a logit model but estimate the target by a cross-sectional model, come to broadly similar conclusions. Taggart (1977) and Jalilvand and Harris (1984) estimate target-adjustment models and find significant adjustment coefficients, which they interpret as evidence that firms optimize debt ratios. Auerbach (1985) also estimates a target-adjustment model, but allows for firm-specific and time-varying targets. He also

interprets the significant adjustment coefficients as support for target-adjustment behavior.

However, other evidence is inconsistent with the optimal debt ratios or can be interpreted differently. First, as pointed out by Myers (1984), the negative valuation effects of equity issues or leverage-reducing exchange offers - see Masulis (1980) -do not support the tradeoff story. If changes in debt ratios are movements towards the top of the curve, both increases and decreases in leverage should be value enhancing. Second, Kester (1986), Titman and Wessels (1988) and Rajan and Zingales (1995) find strong negative relationships between debt ratios and past profitability. Models based on the tradeoff of the tax benefits of debt and the costs of financial distress predict a positive relation.'

This empirical literature has been guided almost exclusively, though sometimes implicitly, by the assumption of an optimal debt ratio. In Myers's (1984) and Myers and Majluf's (1984) pecking order model there is no optimal debt ratio. Instead, because of asymmetric information and signaling problems associated with external funding, firms' financing policies follow a hierarchy, with a preference for internal over external finance, and for debt over equity. A strict interpretation of this model suggests that firms do not aim at any target debt ratio; instead, the debt ratio is just the cumulative result of hierarchical financing over time. Firms that face a financial deficit will first resort to debt, and will be observed later at higher debt ratios. This reasoning could readily explain the negative relation between past profitability and debt ratios.

This theory is based upon costs derived from asymmetric information between managers and the market and the idea that tradeoff theory costs and benefits to debt financing are of second order importance when compared to the costs of issuing new securities. The development of a pecking order based upon costs of adverse selection requires an ad hoc specification of the manager's incentive contract (see Dybvig and Zender (1991)) and a limitation on the types of financing strategies that may be pursued (see Brennan and Kraus (1987)). Despite these theoretical criticisms, the pecking order theory remains one of the predominant theories of incremental financing choice. In a recent set of papers, tests designed to distinguish between these competing theories have been considered.

Shyam- Sunder and Myers (1999) provide evidence, using a simple model and a sample of 157 U.S. firms, suggesting the pecking order theory is a good first-order description of the financing behavior of these firms. Chirinko and Singha (2000) use three examples to illustrate potential problems with using the Shyam-Sunder and Myers test to evaluate the pecking order theory. Frank and Goyal (2002) argue that none of the predictions of the pecking order theory hold when a broad sample of firms and a longer time series is used. Fama and French (2002) find that short term variation in earnings and investment is mostly absorbed by debt, as predicted by the pecking order, but that the pecking order has other failings (namely significant equity issues by small growth firms).

Understanding more clearly what drives these contrasting findings and what sort of financing behavior drives the results these studies present is important for furthering our understanding of capital structure and financing choices by firms. Lemmon and Zender (2002) provide evidence in an attempt to reconcile some of these findings by focusing on the role of debt capacity. This is an idea considered in Myers (1984) and is an important, but often ignored, element of the pecking order hypothesis, particularly in empirical tests.

Lemmon And Zender (2002) present several results that show firms follow a pecking order in incremental financing choice and offer substantial support for the pecking order theory introduced in Myers(1984) by explicitly recognizing the role of debt capacity in the theory. They show that controlling for cross-sectional differences in debt capacity is vital when applying the Shyam-Sunder and Myers (1999) framework to examine the pecking order theory for a broad sample of firins. Their main finding is that the pecking order provides a good description of financing behavior in subsamples of firms when the empirical predictions are adjusted according to whether debt capacity is expected to be a concern. Firms unconstrained by debt capacity primarily use debt to fill their financing deficit while constrained firms (e.g., small, high-growth firms) exhibit a heavy reliance on external equity financing.

Lemmon And Zender also provide evidence concerning differences in the costs associated with asymmetric information across groups of firms. Frank and Goyal (2002) argue that firms with the greatest potential for asymmetric information will have the greatest incentive to follow the pecking order. They conclude that finding large, mature firms (rather than small, high-growth firms) perform "best" in the Shyam-Sunder and Myers test is contrary to the pecking order theory (see also Fama and French (2002)). Evidence from announcement effects for new equity issues shows that small/young, high-growth firms actually face lower adverse selection costs, in the sense of Myers and Majluf (1984), than do large mature firms when issuing equity. Finding that young, high growth firms are the predominant issuers of equity is, therefore, not contrary to the pecking order hypothesis.

Lemmon And Zender do, however, report several results that remain difficult to explain within the pecking order theory. As in Frank and Goyal (2002) they find that the fit of the pecking order regressions is worse in the 1990s, even after controlling for firm specific factors associated with debt capacity. This finding appears to be at least partially driven by the fact that in the 1990s there are many smaller, high growth firms; firms likely to be concerned with debt capacity. There were also, however, significant repurchases of equity by older firms financed by new debt issues during this period. Within the pecking order theory there is no explanation for why firms would issue debt to repurchase equity.

As our attempt, several studies analyzed the specific characteristics of firms and industries that determine leverage ratios (Bradley, et al (1984, Castanias (1983), Long and Malitz (1985), Kester (1986), Marsh (1982), and Titman and Wessels (1988). These studies generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size and decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and uniqueness of the product.

Academic research on the determinants of capital structure of the Italian companies is limited: Bigelli, Mengoli, and Sandri (2001), Bonato and Faini (1990), Lazzari (1998), Sapienza (1997), Venanzi (1999) are the more relevant.
Findings generally show negative correlation between profitability, risk, and leverage [Bonato and Faini (1990)].
Our study is related to Bigelli, Mengoli, and Sandri (2001), suggesting that industry determinants and tax are relevant variables in explaining leverage. However, the sample of these studies is generally small and they focus on listed companies [Bigelli, Mengoli, and Sandri (2001)]. Our study is therefore a first attempt to overcome such limits.

As previously stated, we are attempting to frame or test a general model of capital structure choices. As Harris and Raviv's (1991) review article demonstrates, the causes and circumstances that could determine those choices seem nearly uncountable. In dealing with capital structure we then followed the mainstream of empirical studies on the determinants of financial structure that is essentially based on the research of ex-post relationships between financial leverage indicators (the dependent variable) and quali-quantitative indexes expressive of specific features of firm structure-conduct-performance, business/industry, structure variables as, for example, composition of assets, fiscal variables and others.
The general structure of the proposed models are consistent with some of the major findings of the empirical literature on the determinants of financial leverage, but they also consider variables that are not considered in other studies.

3. Data Collection and design of the research

We developed the research with reference to a large sample of unlisted Italian firms. It's important to remark that within the Italian industrial system, the ratio of listed to unlisted firms is extremely low (approximately 270 on a total population of about 570.000 limited liabilities firms) and, consequently, an investigation about the determinants of financial structure in listed firms leads to equally low significance.
In order to cope with this problem we developed an analysis on 55.483 firms. The data are focused on the year 2001.
The composition of the *initial* sample by industry is the following:
Manufacturing: **24.921** firms (from code 15 to code 37 ATECO classification);

Construction: **4.771** firms (from code 40 to code 45 ATECO classification);
Services: **25.791** firms (from code 50 to code 93 ATECO classification).

As previously stated, the choice of analyzing Italian firms has an important role in shaping the logic, the hypothesis of the research and the interpretation of results. Italian firms are characterized by some specific features as:

- are non-listed firms;
- they are in the great majority controlled by single entrepreneurs or families;
- they are small-medium firms with a low extent of diversification and vertical integration;
- they are characterized by an average financial leverage (as a system) that is higher than in other developed Economies;
- a considerably high amount of short-term debt mainly provided by banks and a very low share of bonds.

Therefore, it's of clear evidence that firms analyzed in this paper are not subjected to the classical mechanism of financial markets control and to "market discipline" with reference to equity capital but also to forms of financial debt as market-traded bonds.
This remark is particularly important in reference to financial structure because financing a firm through the market mechanism render substantially limitless the amount of risk capital that a manager can rise. The function of financial markets, under this perspective, is to grant firms:

c) a major financial flexibility by selling shares or bonds on the market (and by mixing this source of capital with bank debt) in order to pursue their strategic targets of financial structure;
d) a "qualitative" flexibility due to a major variety of financial tools (equity and debt) that a firm can sell on the market in order to optimize its financial structure.

On the other hand, small unlisted companies, like the ones analyzed in this paper, are characterized by:

- a limited amount of equity capital from entrepreneurs or families that control the firms;
- the lack of an option to sell, for example, bonds "via financial market", being more strictly dependent on bank financing.

The result is a form of market discipline mainly developed by banks that can limit the absolute amount of debt capital to the firms or can set prices (interest rates) in order to extract part of the economic value created by the firm.

The specific aim of the research is to investigate the determinants of financial structure within Italian unlisted firms. It is important to remark that we use a cross-sectional approach, considering data for the year 2001. In dealing with capital structure we then

followed the mainstream of empirical studies on the determinants of financial structure[2] that is essentially based on the research of ex-post relationships between financial leverage indicators (the dependent variable) and quali-quantitative indexes expressive of specific features of firm structure-conduct-performance, business/industry, structure variabiles as, for example, composition of assets, fiscal variables and others.

The general structure of the proposed models are consistent with some of the major findings of the empirical literature on the determinants of financial leverage, but they also consider variables that are not considered in other studies. According to Harris and Raviv (1991, page 334), the available studies "generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size and decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and uniqueness of the product."

To build our theoretical system of 4 models we consider that:

- with particular reference to Italian economic system, the financial structure of firms is particularly influenced by context (exogenous-structural) variables such as industry, size, geographic location and "age" of firms (firm size is, in fact, one of the variables found to be significant);
- variables such as fixed assets, advertising expenditures and research and development expenditures are influenced by the type of activity of the firm and in particular by the nature (tangible vs intangible) of capital investment;
- the variable "non-debt tax shields" has to do with the capacity of the firm to limit the tax burden and to avoid the positive effect of financial debt and financial expenses in reducing the overall cost of capital;
- the variable "profitability" remarked by Harris and Raviv is clearly connected with performance and return on firm capital. Even if logic suggests that performance have a specific influence on financial structure and leverage, this relationship (negative according to Harris and Raviv) is somewhat ambiguous, as we will state more precisely in the research.

[2] Agrawal-Jayaraman 1990; Agrawal-Nagarajan 1990; Alderson-Betker 1995; Ang-Peterson 1986; Antoniou-Guney-Paudyal 2002; Balakrishnam-Fox 1993; Barclay-Smith-Watts 1995; Barton-Gordon 1988; Baskin 1989; Bayless-Diltz 1994; Berger-Ofek-Yermack 1997; Bigelli-Mengoli-Sandri 2001; Bonato-Faini 1990; Bradley-Jarrel-Kim 1984; Buttignon-De Leo 1994; Castanias 1983; Chung 1993; Fama-French 1998; Ferri-Jones 1979; Fisher-Heinkel-Zechner 1989; Friend-Hasbrouck 1988; Friend-Lang 1988; Givoly-Hayn-Ofer-Sarig 1992; Graham 1996; Griner-Gordon 1995; Gutierrez-Tribo 2002; Homaifair-Zeitz-Benkato 1994; Houston-James 1996; Jensen-Solberg-Zorn 1992; Johnson 1997; Kim-Sorensen 1986; Lazzari 1998; Mackie-Mason 1990; Marsh 1982; Mehran 1992; Petersen-Rajan 1994; Rajan-Zingales 1995; Sapienza 1997; Shenoy-Koch 1996; Thies-Klock 1992; Titman-Wessels 1988; Welch 2002.

4. Hypotheses and expected results

In order to follow the general statements proposed by empirical literature and to apply them to Italian firms we then developed and tested a multiple model whose structure can be written as:

FINANCIAL LEVERAGE (net or gross) (dipendent variable)			
EXOGENOUS VARIABLES	**ENDOGENOUS VARIABLES**		
Effect of exogenous-structural variables	**Effect of endogenous-structural variables**	**Effect of performance/return variables**	**Effect of tax burden**
• Industry/Cluster (qual.) • Size (qual.) • Geographic localization (qual.) • "Age" (qual.)	• Capital intensity (quant.) • Net working capital/Net invested capital (quant.) • Long term net tangible assets/ Net invested capital (quant.) • Net intangible assets/ Net invested capital (quant.) • Long term financial assets/ Net invested capital (quant.) • Liquidity (Cash and cash equivalents)/ Net invested capital (quant.)	• ROA (quant.) • ROE (quant.) • EBITDA/Invested capital (quant.)	• Taxes/EBT (quant.)
Effect of exogenous variables	**Effect of endogenous-structural variables**	**Effect of performance/return variables**	**Effect of tax burden**
Analysis of the variance	**GLM model**	**GLM model**	**GLM model**

The 4 models tested are: [3]

- the effect of exogenous-structural determinants of financial leverage;
- the effect of endogenous-structural variables;
- the effect of performance/return variables;
- the effect of tax burden.

In order to test a major number of possible relations and to identify the real "form" of the variables to keep into account we used two different measures of financial leverage:

- Financial Leverage = Financial debt/(financial debt + Equity)

[3] The analysis were performed through the statistical program SAS rel.8.

- Net Financial Leverage = (Financial debt-liquidity)/(financial debt – liquidity + Equity)

Due to the fact that Industrial classification of activities does not fully reflect a direct relation with financial conditions of firms (as they do with technology or production) we also developed an alternative analysis based on the classification of firms within 2 clusters, obtained starting from 3-digit ATECO classification, classified by high leverage and low leverage industries.

Even if we tested all of the four different combinations (net and gross financial leverage and ATECO industries and clusters) the results presented in the paper are relative to the: *net financial leverage/cluster case*.

In order to avoid any distortion in the analysis we neglected the few consolidated financial statements in the sample. We also neglected firms with a value of revenues lower than 0,5 million Euros, negative net invested capital and all the firms with observable anomalies in the values emerging from balance sheets and financial statements.

Besides, we "forced" some values in order to correct potential distortions in the observations:

Net financial leverage

Condition	Value
If net financial debt<0 and Equity >0	Net financial leverage=0 (the firm is wholly financed through equity capital)
If net financial debt>0 and Equity <0	Net financial leverage=1 (the firm is wholly financed through debt capital)
If net financial debt<0 and Equity <0	The case has been eliminated

Financial leverage

Condition	Value
If financial debt>0 and Equity <0	Net financial leverage=1 (the firm is wholly financed through debt capital)

Taxes/EBT ratio

Condition	Value
If net taxes <0	Taxes/EBT=0
If net taxes <0 and EBT<0	Taxes/EBT=1

5. The exogenous-structural determinants of financial leverage

The first model tested is the role of exogenous-structural variables that is to say, how the variables describing the particular context in which a firm operates influence its financial structure and the level of financial leverage. This variables are considered "structural" because they define the influence of the external environment on the firm and on its financial structure.
Having to deal with categorical variables, this study employs a simple analysis of variance framework that allows to focus directly on the existence, and importance of industry, size, geographic area and "age" of the firm. The basic descriptive model we are assuming in the first stage of the research can be specified as:

$$FL_{i,j,l,k,r} = \mu + I_l + S_j + G_l + A_k + \varepsilon_{i,j,l,k,r} \qquad [1]$$

where:
FL_i is the degree of financial leverage of firm *r*, I are industry effects, S are size effects, G are geographic location effects, and A are effects connected to the "age" of the firm.
One of the advantages due to analyzing firms within the Italian system is that, due to the low extent of diversification (that comes mainly through "group" structures) and to the little number of merger & acquisition carried on through incorporation (once again group structures are preferred to "internal" solutions) is that is possible to identify the industry (we used the 2-digt ATECO code), the size, the geographic location of firms (the great majority of firms are based on a single plant or on multiple plants that are located in the same geographic area) and, most important, the "age" of the firm.
In the

Due to the large number of industry segments in ATECO 3 or 4 DIGIT codes, we decide to use the 2 DIGIT classification. See appendix 1 for a deeper insight in ATECO 2 DIGIT.
Size and Age variables were rendered categorical through classification of firms in classes:

Variable	Classes
ATECO-2Dgt/cluster*	Manufacturing (codes): 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 Construction (codes): 40 41 45 Services (codes): 50 51 52 55 60 61 62 63 64 65 66 67 70 71 72 73 74 75 80 85 90 91 92 93
SIZE (3)[4] [Value of capital investment (financial debt+Equity)]	**Small size**: ≤ 5 Mln Euro **Medium size**: > 5 Mln Euro; ≤ 25 Mln Euro **Big size**: > 25 Mln Euro

[4] Size classes have been defined through a study of the distribution of firms by value of capital investment (financial debt+Equity). The reasons for creating a specific classification are:

LOCATION (3)	Firms located in the **North** of Italy Firms located in the **Center** of Italy Firms located in the **South** of Italy
AGE (5)	**-1959**: firms which started activity before 1960 **1960-1969**: firms which started activity between 1960 and 1970 **1970-1979**: firms which started activity between 1970 and 1980 **1980-1989**: firms which started activity between 1980 and 1990 **1990-**: firms which started activity from 1990 on

Table 1, 2 and 3 summarize the results of the analysis of variance model for manufacturing, building and services.

Table 1- results of the analysis of variance model on exogenous-structural determinants: manufacturing

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	30	66,33	2,21	31,95	<0,0001
Error	18671	1292,10	0,07		
Corrected Total	18701	1358,43			
	R-Square	Coeff Var	Root MSE	FL Mean	
	0,05	45,99	0,26	0,57	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	22	14,83	0,67	9,74	<0,0001
Age	4	30,70	7,67	110,90	<0,0001
Size	2	6,40	3,20	46,23	<0,0001
Geographic	2	14,40	7,20	104,05	<0,0001

Table 2 - results of the analysis of variance model on exogenous-structural determinants: Building

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	21,28	2,13	32,25	<0,0001
Error	3254	214,71	0,07		
Corrected Total	3264	235,99			
	R-Square	Coeff Var	Root MSE	FL Mean	
	0,09	38,74	0,26	0,66	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	2	11,44	5,72	86,65	<0,0001
Age	4	8,70	2,17	32,96	<0,0001
Size	2	0,15	0,08	1,16	0,314
Geographic	2	0,99	0,50	7,52	0,001

Table 3 - results of the analysis of variance model on exogenous-structural determinants: Services

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

- dealing with capital structure, the use of capital investment was more affordable in determining the relevant size of the firm (more than the use of the classical classification variables such as revenues or number of employees);
- employing a measure of capital investment we necessarily excluded standard size classifications such as the ones used, for example, by EUROSTAT;
- given the characteristics of Italian firms, the use of standard European size classifications would not reflect the real "size" of the firm (in the sense relative to Italian system).

Model	31	51,52	1,66	23,64	<0,0001
Error	17055	1199,12	0,07		
Corrected Total	17086	1250,64			
	R-Square	Coeff Var	Root MSE	FL Mean	
	0,04	42,58	0,27	0,62	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	23	12,96	0,56	8,02	<0,0001
Age	4	35,02	8,75	124,52	<0,0001
Size	2	0,12	0,06	0,86	0,42
Geographic	2	3,42	1,71	24,33	<0,0001

6. The endogenous-structural determinants of financial leverage

The second model we tested is the role of endogenous-structural variables. In this case we dealt with the asset structure of the firm as a determinant of financial structure. In particular, we investigated the role of structural asset variable in determining the strategic choices of coverage of financial needs arising from industrial activity of the firm.
The general idea is that the different composition of invested capital (long term/short term assets, tangible/intangible..) can have a strong influence on shaping the financial structure of the firm under the internal (the managerial and the shareholders') and external (banks and debtholders) perspective.

Considering that all of the variables considered are quantitative, we developed a linear regressive model with the form:

$$FL_i = \alpha + \beta_1 CIN\_F_i + \beta_2 NWC_i + \beta_3 TFA_i + \beta_4 IFA_i + \beta_5 FFA_i + \varepsilon_i \qquad [2]$$

where:
FL_i is the degree of financial leverage of firm *i*, CIN_F is the ratio of Net invested capital (CIN) to Revenues, NWC is the ratio of Net Working Capital to Net invested capital, TFA is the ratio of Tangible Fixed Capital to Net invested capital, IFA is the ratio of Intangible Fixed Capital to Net invested capital, FFA is the ratio of Financial Fixed Capital to Net invested capital.

Table 4 to 6 summarizes the results of the regressive model on endogenous-structural determinants:

Table 4 - results of the linear regression model on endogenous-structural determinants: Manufacturing

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	9,60	1,92	26,62	<0,0001
Error	18696	1348,83	0,07		
Corrected Total	18701	1358,43			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,269	0,572	46,960	0,007	0,007
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,449	0,138	3,25	0,001
CIN_F	1	0,001	0,000	-1,66	0,096
NWC	1	0,127	0,138	0,92	0,356
TFA	1	0,112	0,138	0,81	0,417
IFA	1	0,253	0,139	1,82	0,069
FFA	1	0,075	0,138	0,54	0,588

Table 5 - results of the linear regression model on endogenous-structural determinants: Building

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	5,64	1,13	15,96	<0,0001
Error	3259	230,35	0,07		
Corrected Total	3264	235,99			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,266	0,663	40,095	0,024	0,022
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,11	0,36	0,3	0,761
CIN_F	1	0,00	0,00	0,9	0,371
NWC	1	0,58	0,36	1,62	0,105
TFA	1	0,49	0,36	1,38	0,168
IFA	1	0,63	0,36	1,77	0,077
FFA	1	0,59	0,36	1,66	0,097

Table 6 - results of the linear regression model on endogenous-structural determinants: Services

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	9,94	1,99	27,36	<0,0001
Error	17081	1240,71	0,07		
Corrected Total	17086	1250,64			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,270	0,623	43,283	0,008	0,008
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,530	0,060	8,88	<0,0001
CIN_F	1	0,000	0,000	-1,25	0,212
NWC	1	0,098	0,060	1,64	0,102
TFA	1	0,091	0,060	1,52	0,128
IFA	1	0,145	0,061	2,39	0,017
FFA	1	0,026	0,060	0,43	0,670

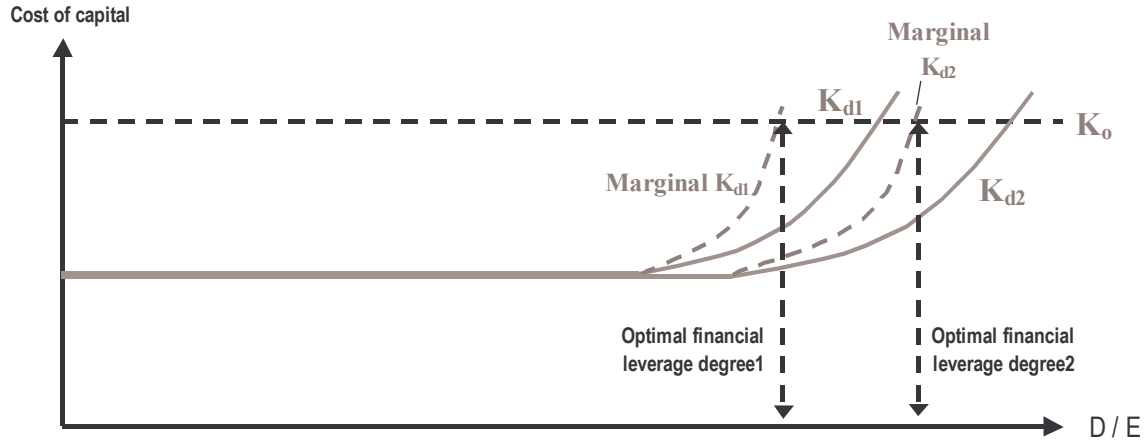
7. Effect of performance/return variables on financial leverage

The third model we develop is based on the relationship between degree of leverage profitability. As previously remarked, one of the most explanatory variables with reference to the degree of financial leverage is profitability. What seems to emerge from empirical literature is that the relationship between profitability and financial leverage is negative: a higher level of profitability leads to a lower level of financial leverage.[5]

The logical explanation of this relationship is straightforward: higher levels of firm profitability bring to sharper cash flows that reduce the need of the firm to raise debt in order to finance its assets. This is also the principal statement of the pecking order theory (Myers, 1984); if the cash flow generated through operating activity is higher than the cash outflow for capital investment the firm pays back its debt or invests in short term financial activities, reducing (in any case) the net financial leverage.

Besides the predictions of the pecking order theory, a higher profitability could lead to a lower level of leverage also because the shareholders do not find investment opportunities as they can keep money within the firm.

On the other side, this relationship is somehow ambiguous, since the "debt capacity" theory of capital structure implies a completely opposite view: a higher return on investments means a lower risk for debtholders and a different shape of the curve of cost of debt capital that implies a higher sustainable level of financial leverage.



In order to test this hypothesis, we developed a linear regressive model with the form:

$$FL_i = \alpha + \beta_1 ROA_i + \beta_2 ROE_i + \beta_3 EBITDA\_CIN_i + \varepsilon_i \qquad [3]$$

[5] See the review of the literature on section 2.

where:
FL_i is the degree of financial leverage of firm *i*, ROA is the return on assets, ROE is the return on equity and EBITDA_CIN is the ratio of EBITDA to net invested capital.

Table 7 to 9 summarize the results of the linear model on endogenous-structural determinants:

Table 7 - results of the linear regression model on performance/return variables: Manufacturing

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	37,12	12,37	175,3	<0,0001
Error	18683	1318,57	0,07		
Corrected Total	18686	1355,68			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,266	0,572	46,475	0,027	0,027
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,5954	0,0025	242,95	<0,0001
ROA	1	0,0504	0,0146	3,45	0,0006
ROE	1	-0,0006	0,0002	-2,73	0,0063
EBITDA_CIN	1	-0,1734	0,0158	-10,98	<0,0001

Table 8 - results of the linear regression model on performance/return variables: Building

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0,429	0,143	1,98	0,1148
Error	3261	235,559	0,072		
Corrected Total	3264	235,988			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,269	0,663	40,533	0,002	0,001
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,664	0,005	140,8	<0,0001
ROA	1	-0,009	0,008	-1,09	0,274
ROE	1	0,000	0,001	-0,5	0,618
EBITDA_CIN	1	0,003	0,005	0,59	0,555

Table 9 - results of the linear regression model on performance/return variables: Services

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	11,35	3,78	52,2	<0,0001
Error	17064	1236,59	0,07		
Corrected Total	17067	1247,94			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,269	0,622	43,261	0,009	0,009
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,6264	0,002	282,49	<0,0001
ROA	1	0,0000	0,010	0	0,9971
ROE	1	0,0001	0,000	0,37	0,71
EBITDA_CIN	1	-0,0276	0,010	-2,64	0,0084

8. Effect of tax burden on financial leverage

The last model tested is the effect of the existence of tax shields on the degree of financial leverage. This is the simplest model tested and investigate the relationship between the degree of financial leverage and the existence of a tax shield. The analysis follows the traditional theory of capital structure and states that the tax shield on debt tends to increase the leverage degree because the net cost of capital decreases and the maximization condition of the value of the firm implies a higher degree of debt within the financial structure of the firm.
In order to identify the existence of a tax-shield effect we adopted a proxy represented by the ratio of taxes to earning before taxes. This ratio approximates the effective tax rate of the firm. The lower is the effective tax rate, the lower is the tax shield for the firm given by a more intense use of the debt. The logical consequence of this type of behavior is that a higher effective tax rate should be in direct relation with a higher degree of financial leverage.

In order to test this last relation, we adopted a linear regressive model whose form is:

$$FL_i = \alpha + \beta_1 TAX\_EBT_i + \varepsilon_i \qquad [4]$$

where:
FL_i is the degree of financial leverage of firm *i* and TAX_EBT is the ratio of Taxes to earning before taxes.

Table 4 summarizes the results of the model:

Table 10 - results of the linear regression model on tax burden effect: Manufacturing

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2,03	2,03	27,98	<0,0001
Error	18661	1352,90	0,07		
Corrected Total	18662	1354,93			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,27	0,57	47,10	0,0015	0,0014
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,569	0,002	281,71	<0,0001
TAX_EBT	1	0,002	0,000	5,29	<0,0001

Table 11 - results of the linear regression model on tax burden effect: Building

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1,68	1,68	23,5	<0,0001
Error	3250	232,72	0,07		
Corrected Total	3251	234,41			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq

	0,27	0,66	40,40	0,007	0,007
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,653	0,005	129,4	<0,0001
TAX_EBT	1	0,009	0,002	4,9	<0,0001

Table 12 - results of the linear regression model on tax burden effect: Services

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	3,62	3,62	49,57	<0,0001
Error	17024	1242,30	0,07		
Corrected Total	17025	1245,92			
	Root MSE	Dependent Mean	Coeff Var	R-Square	Adj R-Sq
	0,27	0,62	43,41	0,003	0,003
Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0,618	0,002	284,06	<0,0001
TAX_EBT	1	0,005	0,001	7,04	<0,0001

9. The results of the "complete" model, major findings and future research agenda

In order to evaluate the simultaneous effect of all of the previously mentioned variables, we tested an "overall" model. The results of the model are shown in exhibits 13 to 15. The results are not substantially different from the ones shown in the single models, but it is possible, here, to evaluate the explanatory power of the single variables on the level of net financial leverage.

The results are strongly consistent with the ones reached in the four models considered separately.

Table 13 - results of the GLM model (Net financial leverage) on all (qualitative and quantitative) variables: Manufacturing

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	39	122,10	3,13	47,36	<0,0001
Error	18.608	1230,1	0,1		
Corrected Total	18.647	1352,2			
	R-Square	Coeff Var	Root MSE	Mean	
	0,09	45,00	0,26	0,57	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	22	14,54	0,66	10,0	<0,0001
Age	4	30,20	7,55	114,2	<0,0001
Size	2	6,25	3,12	47,2	<0,0001
Geographic	2	14,17	7,09	107,2	<0,0001
CIN_F	1	0,13	0,13	2,0	0,158
NWC	1	0,36	0,36	5,5	0,019
TFA	1	0,01	0,01	0,2	0,692
IFA	1	3,66	3,66	55,4	<0,0001
FFA	1	0,11	0,11	1,6	0,205
ROA	1	34,05	34,05	515,1	<0,0001

ROE	1	0,47	0,47	7,1	0,008
EBITDA_CIN	1	16,15	16,15	244,3	<0,0001
TAX_EBT	1	2,01	2,01	30,4	<0,0001

Table 14 - results of the GLM model (Net financial leverage) on all (qualitative and quantitative) variables: Building

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	26,35	1,3869175	21,54	<0,0001
Error	3.232	208,1	0,1		
Corrected Total	3.251	234,4			
	R-Square	Coeff Var	Root MSE	Mean	
	0,112	38,3	0,254	0,662	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	2	11,368	5,684	88,3	<0,0001
Age	4	8,529	2,132	33,1	<0,0001
Size	2	0,158	0,079	1,2	0,294
Geographic	2	0,999	0,499	7,8	0,0004
CIN_F	1	0,300	0,300	4,7	0,031
NWC	1	0,001	0,001	0,0	0,889
TFA	1	2,446	2,446	38,0	<0,0001
IFA	1	0,338	0,338	5,3	0,022
FFA	1	0,343	0,343	5,3	0,021
ROA	1	0,238	0,238	3,7	0,0545
ROE	1	0,056	0,056	0,9	0,350
EBITDA_CIN	1	0,004	0,004	0,1	0,8007
TAX_EBT	1	1,572	1,572	24,4	<0,0001

Table 15 - results of the GLM model (Net financial leverage) on all (qualitative and quantitative) variables: Services

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	40	73,82	1,845464	26,77	<0,0001
Error	16.967	1169,5	0,069		
Corrected Total	17.007	1243,4			
	R-Square	Coeff Var	Root MSE	Mean	
	0,060	42,22	0,2622	0,622	
Source	DF	Type I SS	Mean Square	F Value	Pr > F
Industry	23	12,88	0,56	8,1	<0,0001
Age	4	34,82	8,71	126,3	<0,0001
Size	2	0,11	0,06	0,8	0,44
Geographic	2	3,48	1,74	25,3	<0,0001
CIN_F	1	0,00	0,00	0,0	0,86
NWC	1	0,12	0,12	1,7	0,19
TFA	1	0,01	0,01	0,1	0,71
IFA	1	5,44	5,44	78,9	<0,0001
FFA	1	0,01	0,01	0,2	0,67
ROA	1	12,23	12,23	177,5	<0,0001
ROE	1	0,01	0,01	0,2	0,67

EBITDA_CIN	1	0,24	0,24	3,4	0,06
TAX_EBT	1	4,45	4,45	64,6	<0,0001

The research confirmed some of the hypotheses previously anticipated with specific regard to the Italian firms. According to some authors (Venanzi 1999) the total percentage of variance explained by the 4 models is limited, even if the whole models showed to be significant in 11 cases over 12 (four models by three sectors).
If the logic of the models seems to hold, there are important factors inducing a variance in the financial behavior of firms that cannot simply be explained by theory. One of the findings emerging from the results is that, within Italian firms, exogenous structural variables are the most important factors in explaining differences in financial structures. In particular, the most relevant variables affecting the capital structure are the "age" of firms and the geographic area in which they are localized. As previously remarked the "local" dimension of firms, the lack of a significant financial market allowing firms to undertake specific financial strategies, and the strong dependence of Italian firms from outside financing, in particular from bank sources, produce a direct effect on the supply of financial capital at a local level, in the form of debt financing (from banks) and equity financing (based on the availability of capital to single entrepreneurs and families).
At the same time, the age of the firm is a good proxy for evaluating the financial reliability and the risk of a firm. However, in accordance with the results of our research, the success of a firm over a long period of time allows, through profit retention and accumulation, to build a capital structure less dependent on debt financing.

Endogenous-structural variables, although the results of the three whole models (by sector) are significant, do not lead to identify the role of specific variables in shaping the financial structure of firms.
In the case of profitability the most significant variable is the ratio of EBITDA to net invested capital (in the manufacturing and services sector, the whole model is not significant for building sector). The sign of the coefficient is - as expected – negative Actually, a higher value of EBITDA/NIC leads to a lower level of financial leverage because the cash flow generated from operating industrial limits the use of debt in firm financing.
In the case of tax burden effect, the three models are significant and the coefficient of the variable TAX/EBT is always positive as expected. When the firms bear a higher effective tax rate, they use financial debt in order to exploit tax shields. Nevertheless the absolute value of the coefficients are low and the share of variance explained by this specific effect is negligible.
The general explanation emerging from the model is that, within Italian firms, as we discussed before, the system seems to play a crucial role in the level of financial

leverage. Actually, all of the four models used are significant but, apart from the case of the exogenous structural model, the share of the overall variance explained is low.

Financial leverage/Cluster – R squared for the different models

	Model1	Model2	Model3	Model4	Overall Model
	R-sq	Adj R-Sq	Adj R-Sq	Adj R-Sq	R-sq
Manufacturing	5,0%	0,4%	1,5%	0,2%	7,2%
Building	10,1%	1,2%	0,3%	1,1%	12,7%
Services	4,1%	0,5%	1,3%	0,2%	5,9%

According to the results of the research, the financial structure of the firms is influenced by all of the variables considered in the model but, the reduced financial flexibility due to the lack of a financial markets leads small-medium firms to an extreme difficulty to fit a significant and stable financial strategy. Following these findings, future research agenda suggests to further investigate the role of internal generated cash flow in shaping the financial structure of Italian firms.

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