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ORIGINAL ARTICLE

Corporate Financing in the Deleveraging Era

An Exploratory Analysis for Italian Firms

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Abstract Our analysis focuses on understanding the financing behaviour of Italian firms during a period marked by a significant economic crisis and the resulting deleveraging process. The objective is to identify the determinants of Italian firms' leverage decisions during this deleveraging phase and to assess whether their financing behaviour is more consistent with the predictions of the Pecking Order Theory (PO) or the Trade-Off Theory (TO).

We consider the main determinants identified in the literature when selecting the independent variables, to control for factors that may simultaneously influence leverage. The analysis is based on a large longitudinal micro-dataset provided by the Italian National Statistical Institute, covering the years 2008–2015, and employs a Generalized Method of Moments (GMM) approach.

The GMM estimations were performed both on the full sample and on various subpopulations. The results suggest that explaining the financing behaviour of Italian firms solely through one of these two theoretical frameworks would not be realistic.

Keywords Corporate finance · Firm-level data · Deleveraging · GMM · Trade-off theory · Pecking order theory

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1 Introduction

The global financial crisis of 2008–2011 profoundly disrupted the business environment and severely constrained firms' access to credit. In response, companies adopted various strategies to maintain prudent liquidity levels and reduce leverage. Consequently, in the second decade of this century, Italian firms' corporate financing gradually shifted toward internal sources. This shift was driven by several factors, including the subprime and sovereign debt crises, the economic policies implemented during that period, and the evolving approaches to corporate financing among firms.

Following the 2011 sovereign debt crisis, firms were encouraged to deleverage their capital structures and rely more on equity financing, thereby strengthening their financial solidity. Nevertheless, deleveraging may also reflect growing difficulties in obtaining external funding—particularly for small and medium-sized enterprises. A crisis can further exacerbate financing challenges when a company's capacity to generate internal resources for investment declines. On the supply side, banks—facing the consequences of the crisis and the deterioration of firms' creditworthiness—may further restrict access to credit (Gatti and Chiarella 2014).

Firms have thus faced complex financing constraints, maintained liquidity at safe levels, and sought access to capital markets to offset the scarcity of bank financing. Companies caught in this credit crunch, and simultaneously affected by a crisis in their reference markets, may find themselves deprived of both internal and external financial resources. Another crucial aspect in assessing the soundness of corporate financing is the mismatch between short- and long-term debt. A debt maturity structure skewed toward short-term debt indicates suboptimal management practices and difficulties in financing long-term investments through current revenues. The 2009 economic crisis reduced firms' revenues and, consequently, their demand for working capital and short-term bank funding. The effects on long-term debt demand are more indirect: although declining revenues do not necessarily alter long-term investment plans, they can affect debt duration and repayment conditions. Adjusting debt maturity to meet repayment obligations may involve replacing long-term debt with increased equity (Mustilli et al. 2018).

The literature on capital structure originates from the seminal work of Modigliani and Miller (1958), who argued that, under perfect market conditions, debt and equity are equivalent in firms' financing preferences. However, market imperfections—such as taxation, bankruptcy costs, agency problems, and asymmetric information—distort this equivalence. The two most influential theories explaining firms' financing behaviour in real-world contexts are the Trade-Off Theory (TO) and the Pecking Order Theory (PO). According to PO theory, firms do not target a specific capital structure but rather follow a financing hierarchy: internal financing first, followed by debt, and lastly equity. Thus, firms prefer internal funds over external sources and, when external financing is required, they favour debt over equity (Myers 1984; Myers and Majluf 1984; De Socio and Nigro 2012). Conversely, TO theory posits that firms seek an optimal debt-to-equity ratio by balancing the tax advantages of debt against the costs of financial distress (Kraus and Litzenberger 1973).

This study pursues two main objectives. First, it aims to analyse the determinants of firms' financing choices during a period strongly characterised by deleveraging. Preliminary analyses are carried out to examine the impact of several variables influencing indebtedness levels (such as total debt, debt maturity, and leverage). For this purpose, we apply a partial adjustment model, which is widely employed in the capital structure literature (see, for instance, Gropp and Heider 2010; De Mooij and Keen 2012).

The second objective is to assess whether capital structure decisions—particularly those related to leverage—are more consistent with the assumptions underlying TO theory or those underlying PO theory, and whether these relationships differ by firm size and industry. To this end, we estimate a pooled OLS, a fixed-effects dynamic panel model, and a system GMM for specific subpopulations, namely small businesses and manufacturing firms. The analysis employs the Generalized Method of Moments (GMM), focusing on control variables that influence firms' leverage adjustments.

A distinctive feature of this study lies in the use of a large, multi-year panel database, which allows for an in-depth and disaggregated analysis of corporate financing choices across different firm sizes and industries. Another element of originality stems from the statistical methodology adopted (GMM estimators) and from the investigation of firms' behaviour during a period of deleveraging.

The remainder of the paper is structured as follows. Section 2 provides a literature overview, while Sect. 3 presents some stylised facts. Section 4 describes the variables that best capture the determinants of capital structure choices, and Sect. 5 outlines the data used in the analysis. Section 6 details the methodology employed, Sect. 7 reports the empirical results, Sect. 8 discusses the findings, and Sect. 9 concludes.

2 Literature Overview and Evidences from Different Countries

How can a deleveraging period influence corporate financing? Many studies have devoted attention to this issue. An analysis by Gatti and Chiarella (2014), conducted on a balanced panel of 437 European publicly listed non-financial firms over the period 2004–2013, identified significant changes in firms' financing behaviour following the crisis. In particular, the relative contributions of bank loans, corporate bonds, and retained earnings changed markedly. The post-crisis deleveraging process was largely driven by the repayment of bank debt and an increasing reliance on retained earnings. Moreover, a tendency towards disintermediation of corporate funding emerged, with a gradual shift from bank lending to corporate bond financing.

Another study by DeAngelo et al. (2018) examined which theoretical framework better explains corporate behaviour during deleveraging periods—specifically, whether firms act in accordance with the principles of the Trade-Off Theory (TO) or the Pecking Order Theory (PO). The authors found that trade-off models must incorporate non-distress-related motives for cash accumulation as additional explanations for deleveraging beyond financial distress costs. Among these motives, the most important is the need to prepare for unforeseen future financing requirements. Similarly, Botta (2020), analysing corporate financing among Eastern European firms

after the global financial crisis, highlighted the importance of maintaining a flexible capital structure. Firms may deliberately hold excess debt capacity (i.e., lower leverage) to better withstand adverse external shocks. Other research (Almeida et al. 2012) suggested that high leverage can compromise future investment capacity and thereby reduce firm value. Consequently, the anticipated decline in firm value may induce companies to maintain debt levels below the optimal targets predicted by traditional TO models.

Overall, these findings on deleveraging and earnings retention lend support to capital structure theories that emphasise the advantages of internally generated equity.

The debate between the Pecking Order Theory (PO) and the Trade-Off Theory (TO) has produced an extensive body of empirical literature, with findings often contingent upon institutional frameworks, the level of financial market development, and firm-specific characteristics. While both theories aim to explain firms' financing decisions, they rest on distinct premises. The TO highlights the trade-off between the tax benefits of debt and the expected costs of financial distress, whereas the PO focuses on asymmetric information, proposing a financing hierarchy whereby firms prefer internal funds first, followed by debt, and use equity only as a last resort. In the following section, we briefly compare evidence from Italy with that from countries with more developed capital markets, such as the United Kingdom and the United States.

Evidence from Italy Empirical studies on Italian firms generally reveal a hybrid financing behaviour rather than strict adherence to either theory. Bontempi (2002) finds that Italian companies display dynamics consistent with both frameworks: some converge towards a target leverage ratio, as predicted by TO, while others adjust in the short term according to internal cash flow availability, in line with PO. Later, Bontempi et al. (2005) proposed a modified version of the PO that encompasses TO elements, showing that tax-related variables play a significant role in determining capital structure choices.

Puopolo et al. (2014), analysing a long sample of listed Italian firms, provide further evidence against the strict PO hypothesis. Contrary to theoretical expectations, equity issues are frequently used to finance deficits, especially by smaller firms during the 2000s. This deviation can be partly explained by Italy's bank-centred financial system, where access to capital—particularly equity—markets remains limited for small and medium-sized enterprises (SMEs). Additionally, the favourable tax treatment of interest expenses has reinforced incentives for debt financing, consistent with TO, though this does not fully offset the PO-related dynamics driven by asymmetric information and financing constraints.

Evidence from the United Kingdom The UK context differs substantially due to its more developed capital markets and broader access to equity financing compared to Italy. Empirical evidence on UK firms often supports TO, particularly among large corporations with stable cash flows and tangible assets. For example, sectoral analyses of FTSE 350 companies (2001–2005) show that firms tend to adjust towards a target leverage ratio, consistent with TO predictions. However, during pe-

riods of heightened economic uncertainty—such as the global financial crisis—UK firms relied more heavily on internal financing, reflecting PO behaviour (Rahman et al. 2023; Alhajjeah and Besim 2024). Thus, UK evidence points to a conditional relevance of PO: it becomes more pronounced in crisis periods, while TO tends to dominate in stable macroeconomic conditions.

Evidence from the United States In the United States—where financial markets are the most advanced and diversified—the empirical evidence is similarly nuanced. Shyam-Sunder and Myers (1999) provided early support for PO, showing that financing deficits were predominantly met through debt issuance. However, later studies, such as Frank and Goyal (2003), questioned these findings, demonstrating that equity issues occur more frequently than PO predicts and that many firms behave consistently with TO by targeting an optimal leverage ratio. Large, profitable, and mature firms in the US typically exhibit behaviour consistent with TO, whereas smaller or more opaque firms facing information asymmetries tend to follow PO-like financing patterns.

When comparing these three contexts, several structural differences emerge. Italian firms operate within a bank-centred financial system with limited capital market depth, leading to financing patterns that deviate from a pure PO and partially align with TO due to the influence of taxation and long-term bank relationships. UK firms, benefiting from highly developed financial markets, display stronger conformity to TO predictions, though PO dynamics re-emerge during economic downturns. In contrast, US firms—operating in the most sophisticated financial environment—exhibit mixed evidence: TO tends to prevail among large and established firms, whereas PO remains relevant for smaller and more information-constrained ones.

Antoniou et al. (2006) demonstrate that bank-based systems generate leverage dynamics distinct from those observed in market-oriented ones. Moreover, differences in taxation and bankruptcy regulations shape the trade-off between debt benefits and costs (De Jong et al. 2008). Industrial structure and firm composition also play a role: Italy's high proportion of SMEs leads to aggregate financing patterns that diverge from those of the UK and the US, where large listed firms dominate.

These differences underscore the need for an in-depth analysis of the Italian corporate finance landscape, accounting for firm size and industry heterogeneity. Overall, the empirical literature suggests that no single theory can fully explain firms' financing behaviour. Rather, PO and TO coexist, with their relative explanatory power varying across institutional settings, firm characteristics, and economic conditions.

3 Some Stylized Facts

It is worth noting that a decline in leverage occurred at the international level as well. The global financial crisis represents a threshold separating two distinct periods: the first, characterised by easy access to credit, and the second, marked by a substantial credit crunch despite falling interest rates. Figure 1 illustrates the net debt-to-income ratio, after taxes, of non-financial corporations in the European Union, Italy, and the

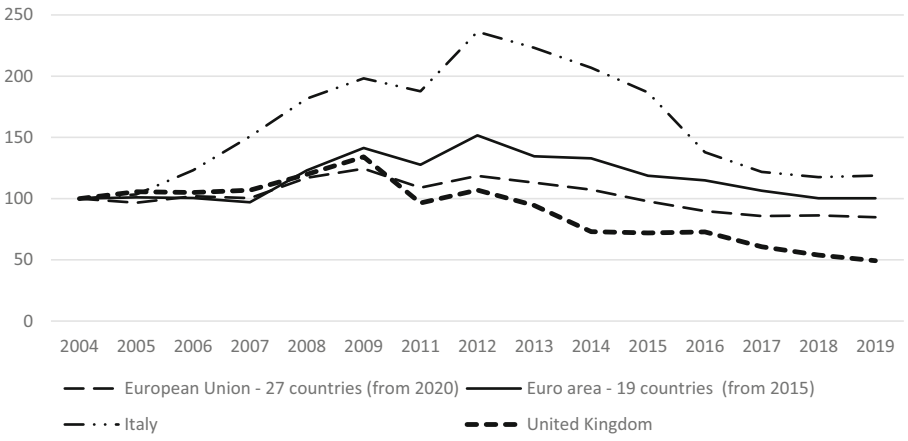

Fig. 1 Net debt-to-income ratio, after taxes, of non-financial corporations in European Union, Italy and United Kingdom in the period 2004–2019. *Source: Eurostat*

United Kingdom. A sharp decline in leverage ratios can be observed across all these economies following the crisis.

In Italy, in particular, there was a pronounced decline, bringing national leverage levels more closely in line with the European Union average. The aforementioned survey by Gatti and Chiarella (2014) provided evidence of a significant reorganisation of funding sources and a shift in firms' financing policies after the crisis. In the United States, by contrast, leverage among non-financial corporations remained largely stable (Bräuning and Wang 2020), with only a slight increase observed in 2014–2015. However, increases in leverage are also closely linked to a country's economic performance (de Almeida and Tressel 2020): strong economic growth tends to raise leverage and extend debt maturities, whereas a rise in short-term debt is typically associated with weak macroeconomic conditions.

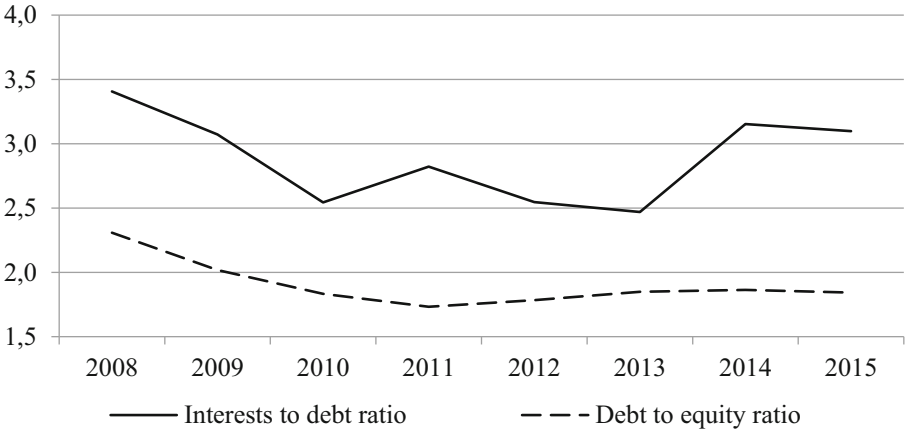

Fig. 2 Interest payment-to-debt and debt-to-equity ratios in the period 2008–2015 (sample data)

In Italy, the first decade of the 21st century was characterised by declining borrowing costs following the introduction of the euro. The downward trend in interest rates persisted throughout that period. Indeed, the interest payment-to-debt and debt-to-equity ratios displayed a steady decrease until 2014 (Fig. 2). Stimulated by the sustained low-interest-rate environment across the Eurozone, leverage—measured as the debt-to-equity ratio—rose to relatively high levels (greater than 2) during the early 2000s. However, our data indicate that the subprime and sovereign debt crises triggered a pronounced deleveraging process beginning in 2008–2010 (Fig. 2). After 2011, leverage continued to decline (or at least stabilised), reflecting both rising debt costs and tighter credit conditions in debt and equity markets.

Furthermore, in 2011, measures were introduced to strengthen firms' equity financing through a tax reform aimed at restoring fiscal balance and encouraging corporate capitalisation. The key policy initiative was the Aiuto alla Crescita Economica (ACE; Aid for Economic Growth). Its main objectives were to stimulate Italy's economic growth by reducing firms' tax liabilities and improving their capital structures (Masserini et al. 2021; Zeli 2018).

As previously mentioned, the crisis marks a clear turning point between two phases, and Italian firms' corporate financing structures reflect this transformation—from a predominance of debt financing to an increasing reliance on internal and equity financing (Fig. 3).

In this context, it becomes essential to examine the financing behaviour of Italian enterprises during the deleveraging period and, within the framework of the consolidated literature, to determine which capital structure model best explains their financing choices.

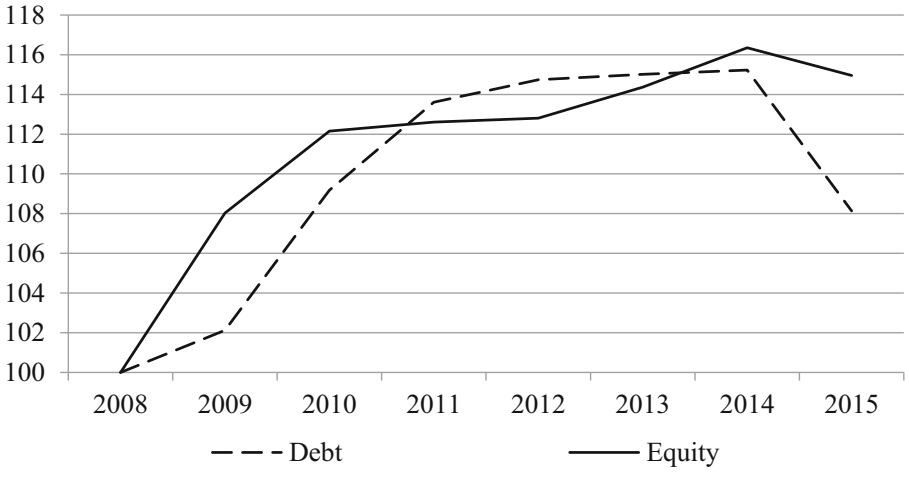

Fig. 3 Debt and equity trends in the period 2008–2015 (sample data)

4 Determinants of Firms' Capital Structure Choices

Corporate governance can be defined as the mechanism through which firms are directed and controlled. In other words, it refers to a set of practices implemented by shareholders to protect and enhance their interests (Bhat et al. 2018; Grove et al. 2011). It can thus be conceived as a system designed to ensure the correct allocation of resources among different stakeholders while fostering sound relationships among them. Moreover, corporate governance facilitates the formulation and planning of firms' objectives and the strategies to achieve them, as well as the establishment of an ex post framework for evaluation and assessment. Within this framework also fall firms' capital structure decisions.

The aim of this study was to assess the impact of various determinants on leverage and to examine whether firms' financing behaviour during a period of deleveraging is better explained by the Trade-Off Theory (TO) or by the Pecking Order (PO) theory. To conduct the analysis, we developed an econometric model incorporating recent contributions from the international literature (Serrasquiero and Caetano 2015; Mustilli et al. 2018). The selection of independent variables—intended to control for factors that could simultaneously affect leverage—was based on the key determinants identified in prior studies (Rajan and Zingales 1995; Ozkan 2001; Alworth and Arachi 2001; Brounen et al. 2005; Frank and Goyal 2009; Graham and Leary 2011; and, for Italy, Bontempi 2002).

In line with the TO theory, we included firm size as a control variable. Since the TO framework posits that firms choose their capital structures to balance the benefits of debt financing against the costs of financial distress, size is commonly used as an inverse proxy for default risk. Larger firms tend to exhibit higher optimal leverage, as their greater stability makes bankruptcy less likely. Size was measured as the natural logarithm of total assets.

A similar rationale applies to asset tangibility. Firms with more tangible assets generally possess higher debt capacity. Tangibility was defined as the ratio of tangible fixed assets to total assets.

According to the TO theory, firms have an incentive to use debt to benefit from tax shields. Several studies have found a positive relationship between leverage and the effective tax rate (ETR) (DeAngelo and Masulis 1980; Fama and French 2002). The ETR was computed as the ratio of taxes paid to profits before taxes.

We also included non-debt tax shields (NDTS), as predicted by the TO model. The presence of NDTS reduces the tax advantage of debt-related interest deductions. Firms with higher depreciation expenses face a diminished need for debt-financing tax shields (DeAngelo and Masulis 1980). NDTS was measured by the ratio of depreciation and amortisation to total assets.

Profitability was also considered, since the PO theory predicts that more profitable firms are less leveraged than less profitable ones, as they can rely on internal funds to finance investments. Profitability was measured using the return on assets (ROA) index. Lower leverage may also result from higher retained earnings, which automatically reduce the leverage ratio. Conversely, the TO model predicts that firms with higher earnings place a greater value on the tax shield benefits of debt.

The *Aiuto alla Crescita Economica* (ACE) provision contributed to deleveraging by providing fiscal advantages to firms that increased their capitalisation. Under the ACE regime, a notional return was applied to reinvested profits, deductible from corporate taxable income, while any excess was subject to taxation. The ACE was calculated on an incremental basis to minimise the reduction in tax revenues (Zeli 2018). We therefore also included the amount of ACE allowance benefits to evaluate their impact on leverage.

Firm age is closely linked to reputation. Older firms have demonstrated their ability to remain in the market, which enhances their access to credit. Hence, a positive relationship between firm age and leverage can be expected. Age was measured as the logarithm of the number of years since establishment.

According to the TO theory, growth opportunities exert a negative influence on leverage, as they tend to reduce agency costs. Firms with stronger growth prospects prefer equity financing to avoid the constraints associated with debt. Conversely, firms with limited growth opportunities may use debt to discipline managerial behaviour. Following prior literature, we measured growth opportunities as the logarithm of the ratio of intangible assets to total assets.

Higher risk increases the probability of bankruptcy, thereby raising the cost of debt. Moreover, under the TO framework, if a firm deviates from its optimal debt ratio, it will adjust leverage to the level where bankruptcy costs equal the tax benefits. Consequently, a negative relationship between risk and leverage is expected. Consistent with the literature, we used two measures of risk: Altman's Z-score (Altman 1968) as an instrumental variable in the Generalized Method of Moments (GMM) estimation, and the absolute value of the percentage change in earnings before interest, taxes, and depreciation. Debt maturity—measured as the ratio of long-term debt to total debt—was also included as an instrumental variable in the GMM.

Regarding the dependent variable, we used the debt ratio, representing leverage. A detailed description of all variables and indicators included in the model is provided in the Appendix (Table 8). The selected determinants are widely recognised in the existing literature (Mustilli et al. 2018; González and González 2012; Serrasquiero and Caetano 2015).

5 Data and Variables

Reengineering business statistics processes can enhance the information available while simultaneously addressing the needs of national statistical institutions (NSIs) to reduce data production costs and minimize respondent burden. A new-generation dataset can be created by integrating firm-level information from multiple surveys and administrative sources. The availability of longitudinal data is a critical factor in economic research. To provide such data efficiently, combining optimal data collection practices with the increasing availability of statistical information, the Italian NSI (ISTAT) redesigned its data-provision processes.

ISTAT has recently developed a longitudinal dataset that merges business microdata from diverse sources, including the Statistical Business Register, corporate events and company group records, financial statements from the Chamber of Com-

Table 1 Summary statistics—Averages (sample data)

	Leverage	Tangibility	NDTS	ROA	Debt maturity	Growth opportunities	z	Size
2008	0.659	0.274	0.034	0.041	0.238	0.182	1.700	28.123
2009	0.651	0.277	0.033	0.032	0.261	0.189	1.539	28.165
2010	0.642	0.258	0.033	0.036	0.247	0.184	1.588	28.216
2011	0.639	0.250	0.032	0.035	0.234	0.184	1.610	28.233
2012	0.627	0.243	0.032	0.028	0.245	0.184	1.576	28.242
2013	0.622	0.240	0.031	0.028	0.238	0.186	1.562	28.249
2014	0.622	0.235	0.032	0.027	0.233	0.187	1.552	28.257
2015	0.607	0.229	0.030	0.031	0.242	0.183	1.583	28.209

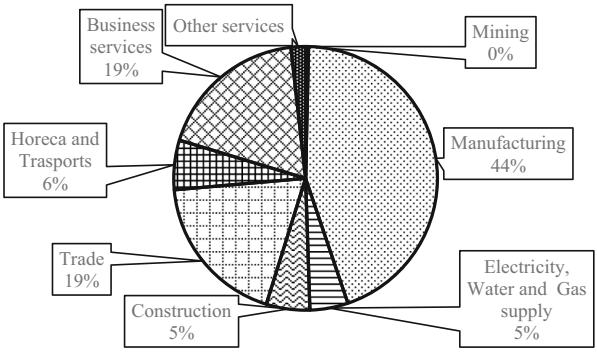

Fig. 4 Share of deductions granted by economic macro-sectors in the period 2011–2015. *Source: Fiscal data*

merce, surveys on the economic accounts of large enterprises, and foreign trade data. The dataset currently spans the years 2001 to 2015. It is an unbalanced panel, containing numerous financial statements from enterprises with at least one employee and covering sectors B–N of the NACE (Rev. 2.2) classification. The panel comprises approximately 5.8 million records, corresponding to an annual average of 400,000 firms.

Various consistency checks and dynamic validations were performed to ensure data reliability, addressing issues such as invalid entries, matching errors, and abnormal changes over time. These checks involved multiple indicators, including employment figures and per-capita variables such as turnover, value added, shareholder funds, fixed assets, and total assets. For the analysis, we included only firms present in the panel for at least five years during 2008–2015, resulting in a reduced dataset of approximately 1.5 million observations, representing roughly 210,000 firms per year. Table 1 presents the summary statistics.

The data confirm a decline in leverage, accompanied by a gradual shortening of debt maturity, indicating an increase in short-term debt despite some variability in the trend. Average firm size remained relatively stable, while asset tangibility declined, reflecting reduced investment during this period. Profitability exhibited a marked decrease, with only a slight recovery in the final year. The correlation matrix (not reported here) revealed no values exceeding 30%, suggesting the absence of significant multicollinearity.

Following the introduction of the Aiuto alla Crescita Economica (ACE) in 2011, the use of this allowance increased over time. During 2011–2015, nearly half of all deductions were granted to manufacturing firms, as illustrated in Fig. 4.

Given the significance of small businesses and manufacturing firms in the Italian economy, and their prominence as beneficiaries of the ACE, we also estimated a Generalized Method of Moments (GMM) model specifically for these two groups.

6 Methodology

As noted above, we conducted a preliminary analysis of the determinants of debt and leverage. The dependent variables in our study include the total net financial

position (tot_debt), the net financial position (NFP)—calculated as the ratio of bank debt minus liquidity to total assets—and the debt ratio, which represents leverage. This selection aligns with recent advances in the literature (Welch 2007), which critique traditional variable choices in empirical capital structure research. Welch also highlights concerns regarding survivorship bias; in our panel, approximately 10–15% of records are unbalanced (i.e., firms present in fewer than seven years).

Our analysis also aimed to identify the determinants of firms' leverage decisions during a period of deleveraging and to assess whether their financing behaviour was consistent with the predictions of Pecking Order (PO) theory or Trade-Off Theory (TO). To this end, we developed an econometric model based on a large dataset, incorporating the determinants described in Sect. 3.

For the preliminary analysis, we employed a partial adjustment model, widely used in the capital structure literature (e.g., Gropp and Heider 2010; De Mooij and Keen 2012). The underlying assumption of this model is that leverage is persistent over time, a feature confirmed by empirical studies (e.g., Shyam-Sunder and Myers 1999). Following the literature, our empirical specification includes the lagged dependent variable to capture the persistent nature of leverage, along with other explanatory variables (Bond et al. 2016). At this stage, we estimated modified fixed-effects versions of the model (Eq. 1).

We applied the Generalized Method of Moments (GMM), focusing on control variables that influence firms' leverage adjustments. The GMM estimator allows the elimination of firm-specific effects through differencing and better control for potentially endogenous variables, a method previously applied in corporate finance research (Ozkan 2001). Specifically, we used the Arellano and Bover (1995) GMM estimator, which exploits moment conditions derived from both first-difference and level equations. This approach provides more consistent estimates and reduces finite sample bias in the coefficient of the lagged dependent variable (Bond et al. 2016), making it particularly suitable for panels with a small number of time periods (T) and a large number of firms (N). As noted by Arellano and Bond (1991), this framework can account for leverage adjustments in response to changes in factors such as tangibility, profitability, and risk. The model is specified as follows:

$$\begin{aligned} Lev_{it} = {} & \lambda Lev_{it-1} + \beta_1 ETR_{it} + \beta_2 Size_{it} + \beta_3 Tangibility_{it} + \beta_4 NDTS_{it} \\ & + \beta_5 Profitability_{it} + \beta_6 GO_{it} + \beta_7 Age + \beta_8 Risk_{it} + \beta_9 ACE \\ & + \theta_t + \eta_i + \varepsilon_{it} \end{aligned} \tag{1}$$

In addition to the internal instruments generated by the GMM procedure (lagged regressors), we included two external instruments: the share of long-term debt on total debt (debmat) and the Altman Z-score (Z). The rationale for their selection is grounded in both theoretical and empirical considerations.

First, debmat captures the maturity structure of debt, reflecting strategic financing choices and long-term constraints rather than short-term shocks to overall leverage. Prior studies indicate that debt maturity is influenced by institutional factors, credit availability, and agency considerations rather than contemporaneous leverage changes (Barclay and Smith 1995; Stohs and Mauer 1996). Therefore, debmat is

plausibly correlated with leverage decisions while remaining largely exogenous to short-term shocks, making it a valid external instrument.

Second, the Altman Z-score is a widely recognized measure of default risk and overall financial health (Altman 1968; Altman and Hotchkiss 2006). The Z-score affects firms' access to credit and the terms of financing, yet it is not directly manipulated contemporaneously with leverage adjustments. In capital structure studies, the Z-score has been treated as an exogenous determinant of credit conditions (Frank and Goyal 2009; de Jong et al. 2008). Its inclusion as an instrument captures exogenous variation in financing constraints without being confounded by short-term leverage dynamics.

By combining these external instruments with the internal lagged instruments from the GMM framework, we mitigate concerns related to instrument proliferation (Roodman 2009) and strengthen the identification strategy. This approach follows best practices in dynamic panel estimation, where carefully selected external instruments enhance the robustness and validity of the estimation.

Equation 1 allows for the persistence of the leverage ratio. The lagged dependent variable captures this persistence, while the year fixed effects (θ_t) account for common shocks across years, firm-specific effects (η_i) control for time-invariant heterogeneity, and ϵ_{it} represents the error term. The speed of adjustment (α) can be estimated as $\alpha = 1–\lambda$, where a higher α indicates a faster adjustment of the actual leverage ratio toward the firm's optimal debt level.

7 Results

In the following sections, the results of the preliminary estimations (partial adjustment model) and of the GMM estimations are presented. The availability of a comprehensive dataset on Italian firms allows for an in-depth examination of specific categories that are particularly relevant in the Italian context—namely, manufacturing firms and small businesses (defined as firms employing fewer than 20 persons). Separate estimations are therefore conducted for these sub-populations.

7.1 Preliminary Results

We first estimate a modified version of Model (1) and Model (2) for all industries (manufacturing, services, etc.) and for Small Business, using data covering the period 2008–2015. Following the partial adjustment framework commonly adopted in the literature, the lagged dependent variable is included on the right-hand side of the specification. Table 2 reports the estimated coefficients for the dependent variable Total Bank NFP.

Column (1) presents the estimated determinants of Total Bank NFP. Most coefficients are statistically significant, except for ndts, which exhibits a negative sign. The variable debt maturity (debmat, defined as the ratio of long-term debt to total debt) is then introduced in Model (2). When debt maturity is included (column 2), it displays a negative sign, suggesting a tendency for firms to borrow primarily

Table 2 Results for model 1 and model 2—2008–2015—Dependent: total bank nfp

	(1)	(2)	(3)
VARIABLES	Model 1 All sample FE	Model 2 All sample FE	Model 2 Small business FE
Tot_bank_{t-1}	0.333***	0.318***	0.313***
	(0.00249)	(0.0155)	(0.00241)
Size	0.00979***	0.0107***	0.00948***
	(0.00292)	(0.00293)	(0.00230)
Tang	0.171***	0.174***	0.175***
	(0.00733)	(0.00749)	(0.00712)
Ndts	–0.109	–0.105	–0.208
	(0.179)	(0.180)	(0.157)
Roa	–0.183***	–0.181***	–0.236***
	(0.0655)	(0.0661)	(0.0264)
Ace	–0.0107***	–0.0110***	–0.0110***
	(0.000680)	(0.000714)	(0.000450)
Debmat	–	–0.0119***	–0.00607***
	–	(0.00252)	(0.00162)
North-West	0.00393	0.00390	0.00592
	(0.00346)	(0.00349)	(0.00458)
North-East	0.00961**	0.00983**	0.0110**
	(0.00381)	(0.00384)	(0.00514)
Center	–0.00182	–0.00152	–0.00185
	(0.00291)	(0.00294)	(0.00385)
Constant	–0.143***	–0.154***	–0.138***
	(0.0420)	(0.0418)	(0.0337)
Observations	1,449,831	1,445,983	1,137,506
R-within	0.308	0.303	0.390
Number of firms	215,051	215,042	179,172

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

to manage short-term financial mismatches rather than to finance new investment projects. The latter are likely funded through retained earnings.

The results for small businesses (fewer than 20 employees), reported in column (3), are broadly consistent with those obtained for the overall sample, indicating no major structural differences between these groups.

Regarding geographical factors, only firms located in the North-East show a positive and statistically significant differential relative to the South, which serves as the reference region.

To further investigate the relationship between leverage and corporate financing determinants, we re-estimate Model (1) and Model (2) using leverage as the dependent variable, again within a partial adjustment framework. The results are reported in Table 3. The model is estimated both for small businesses and for the full sample, and subsequently re-estimated including debt maturity (Model 2).

The results obtained for small businesses (columns 1 and 2) and for the full sample (columns 3 and 4) are largely consistent. The main distinction is that larger

Table 3 Results for model 1 and model 2—2008–2015—Dependent: leverage

VARIABLES	(1) FE model 1 small	(2) FE model 2 small	(3) FE model 1 All sample	(4) FE model 2 All sample
Lev_{t-1}	0.388***	0.387***	0.409***	0.409***
	(0.00292)	(0.00284)	(0.00249)	(0.00243)
Etr	0.00433***	0.00423***	0.00357***	0.00351***
	(0.000205)	(0.000196)	(0.000168)	(0.000162)
Ndts	–0.175***	–0.179***	–0.180***	–0.183***
	(0.0112)	(0.0110)	(0.0102)	(0.0101)
$Tang_{t-1}$	0.0273***	0.0236***	0.0266***	0.0231***
	(0.00236)	(0.00231)	(0.00201)	(0.00198)
Roa	–0.225***	–0.228***	–0.237***	–0.239***
	(0.0200)	(0.0203)	(0.0168)	(0.0170)
Size	0.0882***	0.0874***	0.0787***	0.0780***
	(0.00104)	(0.00103)	(0.000954)	(0.000948)
Age	–0.0439***	–0.0453***	–0.0463***	–0.0478***
	(0.00112)	(0.00108)	(0.000965)	(0.000933)
Go	0.00204***	0.00202***	0.00214***	0.00211***
	(0.000119)	(0.000115)	(0.000102)	(9.96e-05)
Debmat	–	0.0267***	–	0.0248***
	–	(0.00250)	–	(0.00220)
$Risk_{t-1}$	8.40e-09	7.34e-09	3.76e-10**	3.72e-10**
	(8.33e-09)	(8.20e-09)	(1.56e-10)	(1.53e-10)
Ace_{t-1}	–0.00348***	–0.00344***	–0.00301***	–0.00296***
	(6.07e-05)	(5.90e-05)	(4.38e-05)	(4.27e-05)
North-West	0.00547	0.00537	0.00692	0.00577
	(0.00618)	(0.00596)	(0.00432)	(0.00422)
North-East	0.00713	0.00526	0.00637	0.00413
	(0.00640)	(0.00624)	(0.00470)	(0.00463)
Center	–0.00719	–0.0105**	–0.00512	–0.00786**
	(0.00564)	(0.00511)	(0.00379)	(0.00355)
Constant	–0.730***	–0.716***	–0.648***	–0.633***
	(0.0145)	(0.0141)	(0.0134)	(0.0132)
Observations	653,529	651,765	885,996	884,046
R-within	0.305	0.326	0.314	0.332
Number of firms	151,662	151,577	188,100	188,019

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

firms appear to exhibit greater leverage-related risk. Since larger firms typically have access to a wider range of financing options, those that rely more heavily on debt may face specific financial constraints, thereby increasing their overall risk exposure.

The debt maturity coefficient is positive and statistically significant in these estimations (columns 2 and 4). Unlike the previous model—where Total Bank Debt

(NFP) was the dependent variable—the leverage model encompasses all sources of debt. Consequently, long-term debt is found to be positively associated with leverage.

Geographical location does not appear to exert a significant influence on leverage, except for firms located in the Central area when debt maturity is included in Model (2). In this specification, the Central region exhibits a slightly negative differential relative to the South (the benchmark area). This negative coefficient, once debt maturity is accounted for, likely indicates that firms in the Central region are more inclined to rely on bank borrowing when planning new investments.

7.2 GMM Estimation Results *(All Sample)*

We first estimated the model for all industries, using data for the period 2008–2015. Following the partial adjustment approach widely adopted in the literature, the lagged dependent variable was included on the right-hand side of Eq. 1. Table 4 presents the estimated parameters obtained from the OLS, fixed effects (FE), and system GMM estimations, with leverage (debt ratio) as the dependent variable.

The coefficient of the one-period lagged dependent variable in the OLS estimation was very high (approximately 0.9), although it is likely to be upwardly biased. Conversely, in the FE estimation, the coefficient decreased substantially to 0.409, as expected, since the FE estimator tends to produce a downward bias for lagged dependent variables. The final column reports the results of the system GMM estimation, where the debt maturity index and Altman's Z-score were employed as instruments.

The Arellano-Bond test for AR(2) confirmed the absence of second-order serial correlation in the differenced residuals, and the Sargan test indicated that the null hypothesis of instrument validity could not be rejected. The estimated coefficient of the lagged dependent variable under the system GMM model (0.855) lies between the OLS and FE estimates, consistent with theoretical expectations (Bond et al. 2001, 2016). In particular, the GMM coefficient was higher than the FE estimate but lower than the OLS estimate, confirming the expected pattern. The estimated coefficient implies a high degree of leverage persistence, with a relatively low speed of adjustment (0.145).

The estimated effects of the explanatory variables are broadly consistent with theoretical predictions and previous empirical findings, except for the Effective Tax Rate (ETR). In line with the literature, a lower ETR is typically associated with a reduced incentive to increase debt. Tangibility shows a positive and significant coefficient, consistent with the notion that tangible assets can serve as collateral, thereby facilitating access to credit. Conversely, Non-Debt Tax Shields (NDTS) exert a negative influence on debt levels, as they offer an alternative means of reducing the tax burden.

Profitability is negatively associated with leverage, reflecting the tendency of more profitable firms to rely on internal financing. Although the coefficient is only weakly significant, this pattern aligns with theoretical expectations. Given the relatively small average firm size in Italy, the negative sign of the Size coefficient is consistent with findings from comparable studies on Spanish firms (González and González

Table 4 Model estimation results for the period 2008–2015 (all sample)

Independent variables	OLS	FE	Sys-GMM
Lev_{t-1}	0.89561 *** (0.00092)	0.40900 (0.00249)***	0.85505 *** (0.11715)
ETR	0.00658 *** (0.00014)	0.00357 (0.00017)***	–0.12013 *** (0.03600)
NDTS	–0.18411 *** (0.00544)	–0.17975 (0.01016)***	–1.29220 *** (0.23470)
$Tang_{t-1}$	0.00001 (0.00075)	0.02657 *** (0.00201)	0.26289 *** (0.04606)
Profitability	–0.19851 *** (0.00846)	–0.23742 *** (0.01676)	–0.24546 * (0.13088)
Size	0.00226 *** (0.00010)	0.07869 *** (0.00095)	–0.10910 *** (0.02479)
Age	–0.00684 *** (0.00019)	–0.04630 *** (0.00096)	0.18064 *** (0.03980)
GO	0.00146 *** (0.00005)	0.00214 *** (0.00010)	0.01904 (0.01310)
$Risk_{t-1}$	–0.00001 (0.00001)	0.00004 ** (0.00002)	0.00011 (0.00009)
ACE_{t-1}	–0.00140 *** (0.00003)	–0.00301 *** (0.00004)	–0.01217 *** (0.00250)
Const.	0.05291 *** (0.00242)	–0.64456 *** (0.01302)	0.88923 *** (0.30431)
Adj-R^2	86.8	–	–
R^2 within	–	31	–
AB test for AR1 *Pr>z*	–	–	–5.68 *0*
AB test for AR2 *Pr>z*	–	–	–1.41 *0.159*
Sargan test *Pr>X^2*	–	–	0.02 *0.896*

The values in parentheses are standard errors. ***Statistically significant at the 0.01 level; **significant at the 0.5 level; *significant at the 0.1 level. Robust estimations, standard errors corrected for clustering at the firm level. Year dummies included

2012), which observed a negative impact of firm size and positive effects of growth opportunities (GO) and tangibility.

The Allowance for Corporate Equity (ACE) variable also shows a significant negative relationship with leverage, as expected. The ACE provision is designed to promote recapitalization by incentivizing firms to increase retained earnings, thus offering an alternative to long-term debt. Beneficiaries of the ACE scheme therefore enjoy advantages in both tax and debt dimensions, which may also explain the observed negative relationship between debt and the ETR. Finally, Risk and Growth Opportunities do not exhibit statistically significant effects in this specification.

Table 5 Model estimation results for the period 2008–2015 (manufacturing)

Independent variables	OLS	FE	Sys-GMM
Lev_{t-1}	0.90212 *** (0.00106)	0.42944 *** (0.00407)	0.63794 *** (0.07704)
ETR	0.00463*** (0.00022)	0.00227 *** (0.00025)	0.11250 *** (0.01482)
NDTS	–0.20342 *** (0.00721)	–0.25079 *** (0.01622)	–1.95850 *** (0.34792)
$Tang_{t-1}$	0.00546 *** (0.00101)	0.03105 *** (0.00329)	0.34826 *** (0.04827)
Profitability	–0.23528 *** (0.00390)	–0.29375 *** (0.00785)	0.35081 *** (0.04341)
Size	0.00164 *** (0.00014)	0.08281 *** (0.00212)	–0.03428 (0.02465)
Age	–0.00640 *** (0.00026)	–0.05075 *** (0.00169)	0.14423 *** (0.04000)
GO	0.00183*** (0.00008)	0.00223 *** (0.00016)	0.04672 *** (0.00779)
$Risk_{t-1}$	–0.00009 (0.00013)	0.00003 ** (0.00001)	0.00936 (0.00472)
ACE_{t-1}	–0.00193 *** (0.00004)	–0.00412 *** (0.00007)	–0.00525 *** (0.00087)
Const.	0.03147 *** (0.00218)	–0.73431 *** (0.02967)	–0.17848 (0.18550)
Adj-R^2	88.4	–	–
R^2 within	–	34.2	–
AB test for AR1 *Pr>z*	–	–	–10.36 *0*
AB test for AR2 *Pr>z*	–	–	–1.24 *0.216*
Sargan test *Pr>X^2*	–	–	0.02 *0.894*

The values in parentheses are standard errors. ***Statistically significant at the 0.01 level; **significant at the 0.5 level; *significant at the 0.1 level. Robust estimations, standard errors corrected for clustering at the firm level. Year dummies included

7.3 GMM Results for Manufacturing and Small Businesses

As discussed above, the GMM estimation was also applied to the manufacturing sector and to the small business subpopulation.

Table 5 reports the results for firms operating in the manufacturing sector. The dependent variable is the leverage. Arellano-Bond test for AR(2) confirmed the absence of serial correlation in the residuals, while the Sargan test supported the validity of the chosen instruments. The estimated coefficient of the lagged dependent variable (0.638) lies between the OLS and FE estimates, consistently with theoretical expectations.

The estimated speed of adjustment (0.362) is higher than that obtained for the full sample, suggesting that manufacturing firms exhibit a faster leverage adjustment

Table 6 Model estimation results for the period 2008–2015 (small business)

Indipendent Variables	(1)	(2)	(3)
	OLS	FE	Sys-GMM
Lev_{t-1}	0.888***	0.388***	0.734***
	(0.000505)	(0.00289)	(0.174)
ETR	0.00749***	0.00440***	–0.0735
	(0.000126)	(0.000205)	(0.0610)
NDTS	–0.172***	–0.170***	–1.261**
	(0.00339)	(0.0111)	(0.588)
$Tang_{t-1}$	–0.00348***	0.0275***	0.109***
	(0.000631)	(0.00236)	(0.0387)
Profitability	–0.192***	–0.224***	–0.198
	(0.00117)	(0.0199)	(0.186)
Size	0.00451***	0.0879***	–0.0218
	(0.000116)	(0.00103)	(0.0598)
Age	–0.00799***	–0.0547***	0.0327
	(0.000169)	(0.000945)	(0.0670)
GO	0.00144***	0.00204***	0.000816
	(5.18e-05)	(0.000119)	(0.0114)
$Risk_{t-1}$	–0.00000928	0.0000813	–0.333***
	(–0.0000675)	(–0.0000826)	(–0.119)
ACE_{t-1}	–0.00181***	–0.00377***	–0.00816**
	0.0243***	–0.691***	0.380
Const.	(0.00150)	(0.0135)	(0.670)
Adj-R^2	0.861	–	–
R^2 within	–	0.304	–
AB test for AR1	–	–	2.94
Pr>z	–	–	*0.003*
AB test for AR2	–	–	0.3
Pr>z	–	–	*0.767*
Sargan test	–	–	10.93
Pr>X^2	–	–	*0.206*

The values in parentheses are standard errors. ***Statistically significant at the 0.01 level; **significant at the 0.5 level; *significant at the 0.1 level. Robust estimations, standard errors corrected for clustering at the firm level. Year dummies included

process. This implies that leverage dynamics are more pronounced in manufacturing, where deleveraging appears stronger compared with service and tertiary sectors. The ACE variable continues to exert a negative and significant effect on leverage, indicating that this fiscal incentive effectively promotes internal financing.

Most explanatory variables are statistically significant and display the expected signs. However, Size and Risk do not show significant effects. Non-Debt Tax Shields do not appear to encourage additional borrowing; rather, their statistical significance indicates that firms capable of obtaining tax deductions tend to reduce their reliance on debt. The positive and significant coefficient for ETR—together with the negative coefficient for NDTS—suggests that firms' financing choices are consistent with

the predictions of Trade-Off Theory (TO). Similarly, the positive and significant coefficient for Profitability (ROA) supports the TO hypothesis more than the Pecking Order (PO) Theory.

In particular, more profitable firms seem to prefer financing their operations through internal funds and retained earnings, exploiting tax advantages such as the ACE, before turning to external debt. Tangibility maintains a positive and significant relationship with leverage, confirming its crucial role in facilitating access to credit. Finally, Age shows a positive and significant coefficient, consistent with the idea that older firms, benefiting from stronger reputations and established banking relationships, enjoy better credit access.

Table 6 presents the results for small businesses (firms employing fewer than 20 persons). The Arellano-Bond and Sargan tests again confirm the absence of serial correlation and the validity of the instruments. The GMM coefficient for the lagged dependent variable (0.734) lies between the OLS and FE estimates, as expected.

The corresponding speed of adjustment (0.266) is higher than in the full sample, indicating that small businesses adjust their leverage ratios more rapidly. As a result, smaller firms appear to engage in stronger deleveraging behaviour than larger enterprises. Once again, the ACE variable exhibits a significant negative impact on leverage.

The Risk coefficient is positive and significant, suggesting that only financially stronger small firms are able to access credit markets. For small businesses, only Risk, ACE, NDTS, and Tangibility are statistically significant. The negative effect of ACE provisions confirms their relevance even for smaller firms, while the Tangibility coefficient—though positive and significant—is smaller than that observed for the full sample. This indicates that firms with fewer tangible assets face more limited borrowing capacity, consistent with the collateral-based nature of credit access.

8 Discussion

To summarize the estimates obtained for all industries, the manufacturing sector, and small businesses in light of the assumptions underlying the Trade-Off (TO) and Pecking Order (PO) theories, Table 7 provides a comparison between the expected and the observed relationships.

For the full-sample estimates, the interpretation of the signs of the observed relationships between leverage and the explanatory variables is not straightforward. Some results are more consistent with the Pecking Order hypothesis, while others align more closely with the Trade-Off framework. However, the introduction of the Allowance for Corporate Equity (ACE) provision may have affected these relationships by strongly encouraging self-financing, particularly through retained earnings. This influence appears to be more pronounced in the full-sample estimates than in those restricted to the manufacturing sector.

As discussed earlier and supported by previous studies, firms' financing behaviour in Italy tends to deviate from a pure PO pattern and partially align with the TO framework, owing to the significant role of taxation and bank-firm relationships. This is particularly evident in the manufacturing sector, where firms are generally

Table 7 Expected and observed relationships between leverage and independent variables

Independent variables	Expected relationship		Observed relationship		
	PO theory	TO theory	All industries	Manufacturing	Small Business
ETR	–	Positive	*Negative*	*Positive*	*Not significant*
NTDS	–	Negative	*Negative*	*Negative*	*Negative*
GO	Positive	Negative	*Not significant*	*Positive*	*Not significant*
TANG	Positive	Positive	*Positive*	*Positive*	*Positive*
PROF	Negative	Positive	*Negative*	*Positive*	*Not significant*
SIZE	Positive or negative	Positive	*Negative*	*Not significant*	*Not significant*
AGE	Negative	Positive	*Positive*	*Positive*	*Not significant*
RISK	–	Negative	*Not significant*	*Not significant*	*Positive*

larger and more structurally sophisticated. In this context, the signs of the estimated relationships between leverage and the explanatory variables are more consistent with TO theory than with PO theory. This suggests that firms evaluate their financing strategies by balancing the costs and benefits of debt against those of retained earnings. During the observed period of deleveraging, when firms faced multiple financing options, they tended to avoid increasing debt exposure.

In contrast, small businesses display a larger number of statistically insignificant parameters. Nevertheless, the presence of some coefficients inconsistent with the TO predictions points to a behaviour more closely aligned with PO theory.

The estimated speed of adjustment of current leverage toward the target leverage ratio was relatively high (0.362), which is consistent with the TO hypothesis that firms possess a long-term target capital structure—where tax benefits of debt are balanced against expected bankruptcy costs—to which they adjust over time. Similar findings were reported by Ozkan (2001), who showed that the existence of a long-term leverage target leads to relatively rapid adjustment dynamics.

9 Conclusions

This study examined firms' financing behaviour during a period marked by a severe economic downturn and widespread deleveraging. The analysis aimed to identify the main determinants of leverage choices and to assess whether firms' financial behaviour was more consistent with the Pecking Order (PO) or the Trade-Off Theory (TO).

A key contribution of this paper lies in the use of a comprehensive database covering Italian firms over the 2008–2015 period, which enables detailed analyses of distinct subpopulations, such as manufacturing firms and small businesses. Preliminary estimates indicate a general tendency to reduce bank indebtedness and to finance investment primarily through retained earnings, both in the aggregate sample and among small firms. The leverage model provides a good overall fit, with only limited influence from geographical factors. Furthermore, the estimates for small businesses are broadly comparable to those obtained for the full sample, suggesting structural consistency across firm size categories.

The GMM estimations revealed strong persistence in leverage over time, consistent with findings from previous empirical studies employing the partial adjustment framework (Bond et al. 2016). For the manufacturing sector, evidence of mean reversion was detected, suggesting that although policy measures may temporarily alter firms' capital structures, leverage ratios tend to converge toward their long-term equilibrium levels. Similar dynamics have been documented in other contexts—for instance, Guo et al. (2018) found that Chinese listed companies exhibited behaviour consistent with TO theory, with an acceleration of leverage adjustment following capital market reforms. Comparable patterns can be observed among Italian firms, particularly following the introduction of the ACE, which—although moderate in its overall impact—appears to have facilitated faster leverage adjustment within the manufacturing sector by promoting a rebalancing of financing instruments.

Overall, the findings point to a pronounced shift toward self-financing and deleveraging. The estimated relationships suggest that firms' capital structure choices are more consistent with the TO framework than with the PO model, especially within the manufacturing sector. Nevertheless, the introduction of the ACE may have partially biased these results by incentivizing equity accumulation. Depending on firm-specific characteristics, financial behaviour in practice may reflect a hybrid of the two theoretical frameworks. Indeed, PO and TO theories should not be viewed as mutually exclusive, as numerous empirical studies have demonstrated.

For instance, López-Gracia and Sogorb-Mira (2008), analyzing Spanish SMEs, found that both PO and TO theories contribute to explaining firms' financing behaviour, though their evidence leaned toward the TO hypothesis. Adair and Adasku (2015), using French firm data, reported inconclusive results when testing both frameworks, while Cotei and Farhat (2009), studying U.S. firms, observed that financing decisions may align with PO theory in the short term and TO theory in the long term.

Like France and Spain, Italy presents an economic environment characterized by strong institutional and structural heterogeneity. Firms differ not only in size and sector but also in ownership structures, capital market access, credit constraints, and intra-group financing practices. In line with earlier studies on Italian companies (e.g., Bontempi 2002), our findings confirm that Italian firms can be broadly classified into two groups: those whose behaviour is consistent with PO theory and those that conform more closely to TO theory—particularly in the manufacturing sector. Hence, describing Italian corporate financing patterns through only one of these two frameworks would be overly simplistic.

This conclusion is consistent with the broader literature on corporate finance. As Frank and Goyal (2009) noted,

> We are not aware of any current model that is capable of simultaneously accounting for the main stylized facts, but it would be nice to have one.

Similarly, DeAngelo et al. (2018) argued that

> traditional trade-off and pecking-order theories both fail as stand-alone models of capital structure, and that researchers should focus on elements of each that help explain financing decisions.

Our results therefore suggest the need for further research—particularly comparative studies across countries with similar institutional frameworks—to better understand how contextual factors shape firms' financing behaviour and adjustment dynamics.

10 Appendix

Table 8 Description of variables

Variable	Unit	Description	Source
Lev	%	Total debt on total assets	Istat panel
NDTS (non-debt tax shield)	%	Depreciations on total assets	Istat panel
ETR (Effective tax rate)	%	Log of income tax paid on profits before taxes and after interests	Istat panel
Size	Log	Log of total assets	Istat panel
Tangibility	%	Tangibles assets on total assets	Istat panel
Profitability	%	Gross operative income on total assets (ROA)	Istat panel
Growth opportunities (GO)	%	Log of intangible assets on total assets	Istat panel
Age	Log	Log of number years of firm in existence	Istat panel
Risk	%	Absolute value of percentage change of earning before interests, taxes and depreciation	Istat panel
Altman' Z	–	(1.2*working capital + 1.4*retained earning + 3.3*Operating Income + 0.999*sales)/total assets	Istat panel
ACE	Log	The amount of ACE allowances benefited	Tax files

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