The Dynamics of Corporate Leverage in Europe: Speed of Adjustment Across Macroeconomic States

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Abstract

Incorporating economic fluctuations into dynamic capital structure has proven to be predominantly relevant for understanding how these can influence firms' debt-equity choice. Recent events such as the Global Financial Crisis, the Eurozone Sovereign Debt Crisis, and the COVID-19 pandemic contributed to intensify volatility in equity markets, government bond yields and inflation, reinforcing the need to consider variations in macroeconomic states when determining firms' optimal leverage. Recent literature highlights that firms set leverage targets, to which managers realign debt-levels back at different paces, in response to macroeconomic conditions. This paper estimates the speed of adjustment (SOA) towards a target leverage for European firms across 25 countries from 2000 to 2022. Utilizing book and market debt ratios, the sample is divided into different economic states based on GDP growth, term spread, and inflation rate. Through an integrated partial-adjustment model, this study finds that European firms adjust their book-valued ratios faster compared with their market-leverage ratios. The outcomes also indicate that, when using market debt ratios, firms adjust faster during economic expansions marked by GDP growth. Accounting for the potential zero-leverage firms bias, this effect extends to the book-valued sample. The study also reveals that, with market-valued leverage, the SOA was slower during the Global Financial Crisis. Conversely, firms adjusted faster towards their target when employing book debt ratios during the COVID-19 pandemic. Additionally, a two-stage model, incorporating a quasi-maximum likelihood estimation method to determine the target leverage, suggests that, when using book debt ratios, firms adjust faster under inflationary pressure.

Keywords: speed of adjustment (SOA), macroeconomic conditions, dynamic capital structure, target leverage, target deviation

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Resumo

Incorporar flutuações económicas nos estudos sobre estruturas de capital dinâmicas permite compreender a sua influência na decisão entre dívida e capital próprio. A crise financeira global, a crise da dívida soberana da Zona Euro e a COVID-19 intensificaram a volatilidade nos mercados de capital, nos rendimentos das obrigações soberanas e na inflação, reforçando a importância das variações dos estados macroeconómicos na definição das estruturas de capital. Estudos recentes destacam que as empresas determinam um nível de dívida alvo, realinhando-o conforme as condições macroeconómicas. Este estudo analisa a velocidade de ajuste ao alvo em empresas de 25 países europeus, entre 2000 e 2022. Utilizando rácios de dívida contabilística e de mercado, a amostra é dividida em diferentes estados económicos baseando-se no crescimento do PIB, no *term spread* e na taxa de inflação. Implementando um modelo integrado de ajuste parcial, conclui-se que as empresas ajustam os seus rácios contabilísticos mais rapidamente do que os de mercado. Utilizando dívida de mercado, a velocidade de ajuste é maior durante expansões económicas marcadas pelo crescimento do PIB. Excluindo o potencial enviesamento introduzido pelas empresas sem dívida, este efeito estende-se à amostra com dívida contabilística. Durante a crise financeira global, a velocidade de ajuste da dívida de mercado revelou-se mais lenta. Contrariamente, as empresas ajustaram a dívida contabilística ao alvo mais rapidamente na pandemia de COVID-19. Adicionalmente, um modelo de duas etapas incorporando um método de quase-verosimilhança máxima para determinar a dívida alvo sugere que, utilizando dívida contabilística, as empresas ajustam-se mais rapidamente sob pressão inflacionária.

Palavras-chave: velocidade de ajuste, condições macroeconómicas, estrutura de capital dinâmica, alavancagem alvo, desvio do alvo

Título: A Dinâmica da Alavancagem Corporativa na Europa: Velocidade de Ajuste entre Estados Macroeconómicos

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Abbreviations

Abbreviation	Description
BD	Book Debt Ratio
CFO	Chief Financial Officer
GFC	Global Financial Crisis
ECB	European Central Bank
EU	European Union
GDP	Gross Domestic Product
LD	Long-term Debt
MD	Market Debt Ratios
MM	Modigliani and Miller
NUIP	Not Under Inflationary Pressure
OCDE	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
QMLE	Quasi-maximum Likelihood Estimation
R&D	Research and Development
SD	Short-term Debt
SOA	Speed of Adjustment
UIP	Under Inflationary Pressure
U.S.	United States of America
TA	Total Assets
TRBC	The Refinitiv Business Classification

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1. Introduction

Capital structure, a widely recognized topic in corporate finance, has been intensively studied since Modigliani and Miller introduced their seminal theory in 1958. Given its complexity and heterogeneity, a continuous stream of contemporary research questions arises, aiming to validate existing knowledge in the ever-evolving context of modern companies. Modigliani and Miller's trade-off theory, presented in 1963, suggested that firms consider the advantages and disadvantages of debt issuance to attain an optimal capital structure. However, the acknowledgement of the dynamic nature inherent in corporate frameworks emphasizes that optimal capital structures are susceptible to variations.

This study seeks to estimate the optimal debt level for European public firms, from 2000 to 2022, investigating whether managers actively conduct firms towards a target leverage and exploring potential variations in the adjustment speed under diverse macroeconomic states. The analysis employs an integrated dynamic partial-adjustment model proposed by Cook and Tang (2010) to assess the speed of adjustment in the capital structure for the entire sample and within contrasting economic states, determined by factors such as the GDP growth, the term spread, and the inflation rate.

The organizational framework of this paper unfolds as follows: Section 2 reviews the existing literature, going through the scholarly work on the subject. Section 3 provides clarity on the methodology employed, while Section 4 summarizes the data. In Section 5, the study presents and engages the results, subjecting them to robustness tests in Section 6. Subsequently, Section 7 outlines the study's limitations and proposes areas for further research. Lastly, Section 8 consolidates the findings and provides a conclusive viewpoint.

The notion of target leverage represents the optimal debt level that firms aim for within their operational framework. This metric is derived from evaluating the advantages and downsides associated with debt, aiming to identify the equilibrium that maximizes the firm's value. Over an extended period, the estimation of this unobservable parameter has relied on assessing the evolving individual characteristics of each company, along with the strategies and objectives set by the management (Flannery and Rangan, 2006). Although the majority of researchers have approached these frameworks introspectively, the increasing heterogeneity observed might be influenced by various external factors, such as macroeconomic conditions. The dynamic nature of these determinants leads to deviations from the optimal capital structure, potentially incurring costs for firms. However, aligning with the target, depending on the prevailing macroeconomic conditions, can also entail significant costs. Firms possess the flexibility to adjust their capital structures through various methods. In instances of overleveraged[1], a company can choose to either issue more equity or repay a portion of its debt. On the flip side, if a firm's debt level falls below the target, it has the option to either repurchase shares or issue a new amount of debt. Alternatively, firms can modify their leverage ratios by retaining earnings or distributing dividends (Drobetz et al., 2014). The speed of adjustment, described as the pace at which firms adjust towards their target leverage, serves as a metric to quantify the balance between the deviation costs and the costs of capital structure adjustments. Previous researchers have not reached consensus regarding the annual percentage of deviation that firms typically correct. Articles in this field, emerging in the early years of the current century, pointed out to speed of adjustments around 15% (Fama and French, 2002). However, more recent studies incorporating fixed effects reveal that this value doubles (Flannery and Rangan, 2006; Morais, Serrasqueiro, and Ramalho, 2022).

Prior to the Global Financial Crisis (GFC, hereafter), studies on capital structure decisions rarely incorporated the effects of macroeconomic conditions. However, potentialized by this event, researchers began integrating macroeconomic movements into various areas of corporate finance. Among these studies, it is important to emphasize the findings of Cook and Tang (2010), illustrating that US firms adjust their capital structures more rapidly towards the target during good economic states. Nevertheless, the repercussions of the Global Financial Crisis were not confined exclusively to the US economy. Since then, the European economy lived through periods of downturns and upswings. Commencing in 2010, the Eurozone Sovereign Debt Crisis had a profound impact on specific European nations. This balance-of-payments crisis was triggered by excessive public debt borrowing by several Eurozone countries, provoking a mistrust in their sovereign debt. Consequently, the crisis manifested in a strong increase in sovereign bond yields, heightened volatility in stock markets, and contractions in affected economies (Samarakoon, 2017). Despite the long-term repercussions on the European economy, marked by escalated debt levels and elevated unemployment rates, restorative measures implemented by the European Union, including initiatives like the European Stability Mechanism[2], facilitated a gradual recovery of confidence and stability in financial markets. From 2018 to 2020, a majority of European countries experienced a period

[1]In this study, an overleveraged firm is defined as a company whose debt level exceeds the target.
[2] Established in 2012, the European Stability Mechanism (ESM) is a permanent financial institution within the Eurozone, having the primary purpose to ensure and facilitate immediate access to financial assistance programs for member states experiencing financial challenges. The maximum lending capacity is €500 billion.

of economic prosperity, marked by historically low unemployment levels since the Global Financial Crisis and sustained low inflation. However, the onset of the COVID-19 pandemic in 2020 precipitated a severe downturn in European economic activity. The implementation of lockdowns and travel restrictions inflicted damage on businesses and households. At present (2023), Europe is confronting substantial inflationary pressure, leading the European Central Bank to raise interest rates to levels not witnessed since the GFC (ECB Data Portal). These fluctuations have spurred the examination of the speed of adjustment within the economic conditions of Europe during the 21st century.

2. Literature Review

2.1. Traditional Capital Structure Theories

Despite extensive research, the issue of explaining how a firm can decide on its optimal capital structure to ensure survival, growth, and development, remains both pertinent and unsolved. This challenge serves for ongoing discussions and sets the ground to illustrate different corporate leverage dynamics.

The modern capital structure theory (Modigliani and Miller, 1958) suggests that, in a perfect capital markets scenario without taxes, dividends, transaction costs, agency costs, and distress costs, the way each firm finances itself does not change its value. The authors argue in *Proposition I* that the market value of the cash flows generated by firms' total assets equals the total value of firms' securities (market value of common shares + market value of firms' debt). Therefore, according to the Law of One Price, the market value of firms' securities and assets should be the same and not influenced by the type of financing.

However, capital markets are not perfect, and MM[3] results are important to highlight that the effect of capital structure decisions on firms' value depends on market frictions and that under them, the theorem does not hold. To bridge this gap, the authors published a paper (Modigliani and Miller, 1963) revising their premature underestimation of the tax advantages of debt, since they found them to impact the estimation of a firm's value. Following this, three approaches arose: the tradeoff theory, the pecking order theory (Myers and Maljuf, 1984), and the market timing view (Baker and Wurgler, 2002).

The pecking order theory establishes a hierarchy in companies' financing choices, where there is a first preference to finance themselves with internal funds, debt, and only then equity.

[3] Modigliani and Miller

Following the *market for lemons* concept (Akerlof, 1970), managers typically hold better insights than investors about the risks and opportunities of the firm they are running. The losses incurred due to information asymmetries, termed adverse selection costs, are borne by creditors and investors. This happens because managers commonly issue risky securities when they perceive them as overpriced, and this is foreseen by investors which leads them to discount the new and old company's shares. To avoid these discounts and act in their old shareholders' best interests, sometimes managers renounce positive net present value investments when they need to issue equity (Myers and Maljuf, 1984). If a company has an outstanding opportunity that requires an expenditure that exceeds its financial slack[4], it should choose to invest in safe instead of risky debt and offer equity as the last resort (Myers, 1984). Myers and Maljuf (1984) stated that firms should accumulate financial slack by distributing fewer dividends and only issuing stock when the information asymmetries are minimal.

On the other hand, the static trade-off theory (Modigliani and Miller, 1963) suggests that firms tend to balance between the advantages and drawbacks of contracting debt, aiming at an optimal target leverage. The advantages of increased leverage encompass tax shields and the mitigation of manager-shareholder agency costs[5] (Jensen and Meckling, 1976; Jensen, 1986). Conversely, financial distress costs and shareholder-bondholder agency costs are the main drawbacks pointed out (Frank and Goyal, 2009; Graham and Leary, 2011; Modigliani and Miller, 1958). However, when debt is already in place, shareholders may incur debt overhang, generating some costs that will end up being borne by existing debtholders. As explained by the leverage ratchet effect (Admati et al., 2013), managers may have an incentive to increase debt even if it harms the firm's value and, contrarily, are unlikely to buy back debt even if it increases the company's value.

Nevertheless, firms' earnings can also be shielded through non-debt protection, by using expenses such as R&D or depreciations that can produce the same effect without increasing firms' default risk. Long and Malitz (1983) showed evidence that R&D expenditures and leverage ratios are negatively correlated because firms that face high growth opportunities are often unwilling to rely on debt due to moral hazard[6] issues, preferring the use of internal funds, as the pecking order theory states. Furthermore, by relying more on non-debt corporate tax

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[4] Financial slack is a concept that encompasses the financial resources or liquid assets that a company holds beyond what are its daily operations.

[5] Fearing being fired or replaced (management entrenchment), managers run the firm in their own best interest, and do so more efficiently under debt-payment obligations. (Corporate Finance, 4th edition, Jonathan Berk and Peter DeMarzo)

[6] In this context, moral hazard refers to the hypothesis of shareholders taking excessive risk if the negative consequences are carried by bondholders. (Corporate Finance, 4th edition, Jonathan Berk and Peter DeMarzo)

shields, companies reduce their taxable income and consequently lower their need to issue debt to achieve tax advantages (De Angelo and Masulis, 1980).

In 2001, Graham and Harvey conducted a survey with several CFOs and found that managers care about the advantages and disadvantages of debt and that about 71% of the firms consider a target debt range while 10% target a specific debt ratio when managing their leverage. Under the same discussion, Jalilvand and Harris (1984) conducted a study to examine how firms adjust their leverage based on size and market conditions. They discovered that leverage ratios are mean-reverting and companies often adjust their debt to long-term financial targets. In contrast, Baker and Wurgler (2002) counterargued that managers believe that the level of debt does not impact firms' value, and, for that reason, they do not proactively reverse debt to a target. The authors consider that firms focus on issuing equity when their stocks are overpriced by investors and that their observed capital structure is a direct repercussion of their market timing abilities. This theory is referred to as the market timing view and is pointed to as one of the reasons why sometimes companies within the same industry have such different capital structures.

While each theory highlights several broad patterns in observed capital structures, neither view has managed to provide comprehensive explanations for the diversity seen in capital structures, changes in leverage, or choices regarding security issuance.

2.2. Speed of Adjustment (SOA)

Empirical literature shows that it is crucial to look further into the factors that influence a firm's leverage speed of adjustment, and under which circumstances such speed varies. Even though plenty of researchers support the idea that companies adjust their leverage to a target, in synchronization with the trade-off theory, there are diverging views respecting the pace at which this process takes place.

Shyam-Sunder and Myers (1999) compared the static trade-off theory and the pecking order theory. Their study revealed that when both the target adjustment model and the pecking order model were jointly tested, the latter exhibited greater explanatory power. The authors also recognized that managers are not inclined to converge to a target, implying a relatively slow adjustment process. These findings are consistent with the survey by Graham and Harvey (2001), disclosing that achieving the target is not the managers' priority. Reinforcing these conclusions, Fama and French (2002) observed a slow-paced adjustment in dividend payers of

7-10% per year, while noting a rate of 15-18% for nonpayers. Similarly, Gaud, Jani, Hoesli, and Bender (2005) found a turtle-paced adjustment in Swiss firms, affirming that target deviations are not costly in Switzerland.

Diverging from the previously mentioned literature, Flannery and Rangan (2006) demonstrated, by incorporating firm fixed effects, that companies adjust their leverage towards their target by an average of 30% annually. Accordingly, Morais, Serrasqueiro, and Ramalho (2022) recently conducted a study, where they examined the SOA heterogeneity in European companies and revealed that leveraged firms' SOA is 27,6% annually, while zero-leverage firms adjust at a rate of 22,1% per year.

When revisiting the empirical literature published following 2005, Graham and Leary (2011) explicitly emphasized that firms' leverage tends to deviate from the optimal point due to shocks to asset values and short-term market timing opportunities. Consequently, given the absence of clear signs of recovery afterward such shocks, they assumed that managers do not proactively adjust firms' leverage to reach their initial target. However, Leary (2005) discussed how the influence of market timing variables on leverage smooths as the adjustment costs decline. This implies that in the absence of adjustment costs, companies would adjust their leverage to their target as quickly as possible, highlighting the crucial role that these costs may play in explaining the partial convergence towards the target over time (Fischer et al., 1989; Miguel and Pindado, 2001). Fischer's (1989) research has contributed to significant progress in this field, finding that even small adjustment costs can heavily impact the SOA, leading to large deviations from the optimal debt ratio. Nevertheless, deviating significantly from the leverage target also implies adverse consequences for companies, as they may incur deviation costs. To elucidate, surpassing the target may cause financial distress and bankruptcy costs, whereas firms operating below the target might make them miss the opportunity to take full advantage of tax shields. Consequently, companies with excessive leverage are generally more committed to re-establishing alignment with the target compared to under-leveraged firms (Morais, Serrasqueiro, and Ramalho, 2022). In summary, the relationship between a firm's leverage adjustments, external factors, and associated costs proves the complexity of managing corporate capital structures, alongside the fact that macroeconomic conditions should not be overlooked.

2.3. Macroeconomic Conditions

Historically, observed capital structure dynamics have predominantly been linked to firm-specific factors, ignoring the macroeconomic conditions that directly influence firms' financing choices (Gaud, Jani, Hoesli, and Bender, 2005). Over the years, the majority of the empirical literature has been centered around the development of traditional capital structure theories. Even when considering its relationship with macroeconomic factors, there has been limited analysis on whether different macroeconomic conditions influence the SOA (Cook and Tang, 2010), particularly within the European context. According to Hackbarth et al. (2006), neglecting the consideration of macroeconomic states in capital structure decisions is surprising, as economic rationale emphasizes the particularly important role of economic cycles in determining default risk and inevitably, the debt-equity choice. Furthermore, economic fluctuations bear a company's likelihood of default and the consequent losses given default. These factors, in turn, shape the financial challenges a company might encounter (distress costs) and the volume of cashflows, which affects its tax obligations. Consequently, different macroeconomic conditions suggest dynamic levels of optimal leverage ratios over time.

According to the pecking order theory, during periods of economic expansion, firms are expected to issue less debt since they possess more internal funds (Frank and Goyal, 2009). Backing this argument, Korajczyk and Levy (2003) found macroeconomic states significant for capital structure choice varying counter-cyclically with leverage. In opposition, Gertler and Gilchrist (1993) argued that when in expansion periods: markets are bullish, expected bankruptcy costs decrease and taxable income goes up, presuming that debt must be pro-cyclical.

Shleifer and Vishny (1992) established a relationship between the macroeconomic conditions and firms' debt capacity concurrently. The discovery enhances a 40% higher debt capacity in economic booms as opposed to recessions. Given their ability to issue more debt during economic upswings, Hackbarth et al. (2006) findings specify that firms should adjust their leverage more regularly and by inferior amounts in expansionary environments compared to when in contraction periods. Subsequently, Cook and Tang (2010) conducted a study to test Hackbarth's prediction. Using innovative measures to distinguish good and bad states, their results corroborated the findings of the earlier research.

When analyzing the corporate structure dynamics during the Global Financial Crisis, Dang et al. (2014) noted that firms registered a slower speed of leverage adjustment. In accordance, Morais, Serrasqueiro, and Ramalho (2022) revealed that, during the recent crisis, leveraged companies' SOA was inferior by nearly 1%. However, curiously, they also observe that zero-leverage companies have drastically increased their pace of adjustment to more than double during the same period. The authors link this event with the increase in deviation costs during the Global Financial Crisis and the lower adjustment costs that this type of firm might run into. Despite the results so far, there is still an open question about whether companies behaved similarly during the most recent pandemic.

3. Methodology

3.1. The Model

The purpose of this study is to analyze how macroeconomic fluctuations influence the dynamics of capital structure. As previously discussed, the adjustment costs are dependent on different economic conditions, emphasizing the importance of including them in the SOA estimation across different firms. Inspired by the methodologies of Cook and Tang (2010), and Korajczyk and Levy (2003), this study applied an integrated dynamic partial-adjustment capital structure model.

3.1.1. Integrated Dynamic Partial-adjustment Model

A dynamic partial-adjustment capital structure model (Hovakimian et al., 2001; Drobetz and Wanzenried, 2006) allows target debt ratios to vary both across firms and over time. It operates under the assumption that deviations are not necessarily quickly offset. In a two-stage process model (Cook and Tang, 2010), the initial stage involves estimating a proxy for the target leverage, illustrated through linear regression, as shown in equation 1:

$$D_{i,t}{}^{*} = \gamma FirmSpecific_{i,t-1} + \beta Macro_{i,t-1} \text{ (Equation 1)}$$

where $FirmSpecific$ and $Macro$ represent vectors of lagged firm-specific and macroeconomic target determinants, respectively.

$$D_{i,t} - D_{i,t-1} = \delta\left(D_{i,t}{}^{*} - D_{i,t-1}\right) + \varepsilon_{i,t} \text{ (Equation 2)}$$

where $D_{i,t}$ and $D_{i.t-1}$ are the observed debt levels for firm i in the current and previous period, correspondingly, while ${D_{i,t}}^*$ represents the target leverage.

In the second stage, the analysis involves examining the proportion of leverage deviation (δ) from the target closed between two consecutive years ($t-1$ and t). This movement, represented by the subtraction in parentheses, reflects the adjustment in leverage towards the predetermined target - a key parameter of this analysis. This parameter (δ) varies between 0 and 1, expressing the magnitude of the SOA. A value of 0 implies that firms' managers do not proactively adjust firms' leverage towards a target, while a value of 1 suggests that the gap between observed leverage in $t-1$ and the target is completely closed each year. As mentioned before, adjustment costs should delay this process and establish an inversely proportional relationship between debt adjustment and adjustment costs. Therefore, it is expected that δ will be less than 1, as a scenario without adjustment costs would be unrealistic, and $\delta = 0$ would suggest extremely high adjustment costs.

For several years, the existing literature has relied on the partial adjustment model. Nonetheless, the majority of the outcomes of this research indicate a slower pace than initially anticipated. Moreover, the long-term elasticity of the actual debt ratio to its target stands abnormally smaller (0.56) and significantly different from unity (Flannery and Rangan, 2006). Hence, following Cook and Tang's (2010) approach, the examination of the macroeconomic conditions' impact on SOA incorporated firm fixed effects and the partial adjustment model, in an integrated dynamic partial-adjustment capital structure model. In the study conducted by Miguel and Pindado (2001), both firm and time-fixed effects were employed. However, in accordance with Cook and Tang's (2010) methodology, only firm-fixed effects should be considered, as time-fixed effects may absorb the time-varying influence of macroeconomic conditions on capital structure. Upon substituting the Equation 1 into Equation 2, the resulting integrated model is presented in the Equation 3:

$$D_{i,t} = (1-\delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t} \text{ (Equation 3)}$$

3.2 Variables

3.2.1. Definitions of Leverage

Throughout history, a longstanding debate has revolved around the selection of either market debt or book debt-valued ratios when studying capital structure dynamics. Advocates

(Thies and Klock, 1992; Fama and French, 2002) defended that book value ratios should be the primary focus of capital structure research. They argued that book value ratios encompass factors solely under firms' control, making them the most accurate measure to be used in a firm's debt planning level. On the other hand, Welch (2004) supported the use of market-valued ratios since they capture more precisely the agency conflicts between shareholders and creditors. The author also believes that market-valued ratios assume great preponderance in WACC[7] calculations, a crucial measure for establishing a target debt level. In summary, both measures present advantages and limitations, which may imply that firms delineate their target leverage based on either one or both. To resolve this ambiguity, the study will adopt a methodology inspired by Cook and Tang (2010). This study will incorporate both measures in the estimations of target leverage ratios and SOA. Consequently, this strategy will lead to the creation of two distinct samples, facilitating a more comprehensive analysis offered by each valuation metric.

The book debt ratio is defined as follows:

$$BD_{i,t} = \frac{SD_{i,t} + LD_{i,t}}{TA_{i,t}}$$

while the market debt ratio is represented as:

$$MD_{i,t} = \frac{SD_{i,t} + LD_{i,t}}{SD_{i,t} + LD_{i,t} + S_{i,t}P_{i,t}}$$

where $SD_{i,t}$ and $LD_{i,t}$ represent the short-term and long-term book value of interest-bearing debt for firm i, in period t, respectively. $TA_{i,t}$ denotes the book value of firm i's total assets at time t. $S_{i,t}P_{i,t}$ represents the product of the firm i's number of common shares outstanding and firm i's share price at time t, defining the firm i's market value of equity.

3.2.2. Firm-specific Target Determinants

The selection of firm-specific variables in this study follows the precedent set by existing literature on target leverage determinants (Korajczyk and Levy, 2003; Flannery and Rangan, 2006; Cook and Tang, 2010; Morais, Serrasqueiro, and Ramalho, 2022). The

[7] WACC-Weighted Average Cost of Capital

subsequent description details these variables, emphasizing their relevance based on prior research and their connections to the theoretical framework.

The *MB* (market-to-book value of total assets) represents a firm's prospective growth opportunities. The ratio is calculated by dividing the sum between the market value of equity and the book value of debt by the book value of assets. Previous literature highlights a notably negative relationship between a high market-to-book ratio and a firm's target leverage (Flannery and Rangan, 2006). Throughout the years, this association has remained relatively unchallenged, with a scholarly focus on its economic interpretation, as investigated by Chen and Zao (2006). However, interpretations of this relationship vary. Some researchers have linked this negative association to active market timing, suggesting that companies may exhibit hesitancy in issuing equity when they perceive their shares as undervalued (Baker and Wurgler, 2002). Conversely, others link this relationship to the absence of a predetermined target leverage (Welch, 2004).

TANG is the abbreviation used in this study for tangibility, as its purpose is to analyze a firm's debt capacity. The underlying theory suggests that firms with greater tangible assets have lower bankruptcy costs and, thus, find it easier to access collateralized debt compared to those with fewer tangible assets (Hovakimian et al., 2004). The metric is determined by dividing the gross value of property, plant, and equipment by the company's total assets.

EBIT represents a profitability measure, holding significant importance in the ongoing discussion on how a company's profits impact leverage and the target debt ratio. Calculated by dividing the firm's earnings before interest and taxes by the book value of total assets, *EBIT* has been at the center of a debate initiated by Shyam-Sunder and Myers (1999). They proposed that the relationship between profitability and leverage aligns with the pecking order theory, suggesting that profitable companies issue less debt as they prefer to recur to internal funds. Companies with higher profitability should ideally issue more debt due to lower distress costs, which has not been observed. Although Fama and French (2002) agree with the pecking order theory consistency, they found leverage to be an offsetting response to transitions in earnings, implying that the profitability negative coefficient is largely due to changes in leverage rather than in the target.

DEP represents the ratio of depreciation to total assets. As previously mentioned, non-debt tax shields are anticipated to create a negative relationship with target leverage. This happens because firms with high depreciation expenses are less likely to require interest deductions in their taxable income (De Angelo and Masulis, 1980).

SIZE is denoted as the natural logarithm of a firm's total assets (Cook and Tang, 2010), expressing the size of the companies observed. According to Hovakimian, et al. (2004), larger firms tend to have more stable cashflows, granting them better access to financial markets. Consequently, these larger firms are less prone to financial distress. Regarding the trade-off theory, a positive correlation between leverage and size is expected.

RD, RDD, and *SE* serve as firm uniqueness proxies employed in this research. In line with Cook and Tang (2010), high R&D and selling expenses (*SE*) signify asset uniqueness and innovative development within a company. This could potentially lead to elevated bankruptcy costs, suggesting a tendency towards lower leverage. *RD* is computed by dividing the research and development expenses by the firm's book assets, while SE represents a firm's selling expenses to total sales. Additionally, *RD* includes a dummy associated (*RDD*) that takes the value 1 when a firm reports R&D expenses and equals 0 otherwise.

As reported by Hovakimian, et al. (2004), the industry median debt ratio (*IND_MED*) should be included in the analysis to mitigate the impact of omitted variables, capturing industry characteristics that may not be explained by the remaining independent variables. However, there is no consensus in the literature regarding whether a company's debt ratio tends to revert to the industry median or the specific direction of the correlation between these variables. Nonetheless, it is presumed that the industry median provides a useful indicator, albeit a noisy one. In this study, following the approach outlined by Cook and Tang (2010), the industry median was computed based on the Fama French 49 industry definition extracted from WRDS Compustat. Regardless, it is important to note that this definition primarily originates from NYSE, AMEX, and NASDAQ stocks and may not have the same explanatory power when adapted to the European context, which could represent a limitation in the study.

In accordance with Cook and Tang (2010), the dummy variable *LEV_DUMMY* is incorporated to assess the impact of existing leverage levels compared to the target. It assumes a value of 1 when the firm-year observation is considered overleveraged (i.e., $D_{i,t-1} - D_{i,t-1}^* > 0$), and 0 otherwise.

3.2.3. Macroeconomic Target Determinants

Extensive empirical research has highlighted the influence of macroeconomic conditions on a firm's target leverage, particularly in the aggregated distribution of wealth between managers and outside shareholders (Kiyotaki and Moore, 1997). Moreover, Korajczyk and Levy (2003) established an association between managers' compensations and the fluctuations between corporate profits and equity performance. According to these findings and guided by Cook and Tang's (2010) methodology, this study encompasses two macroeconomic target determinants that aim to capture the distribution effect and that were employed alongside the previously described firm-specific variables.

MRET represents the annual market return of a key index within the stock exchange of each economy included in the sample.

NOS stands for net operating surplus in percentage of the value added, which means the aggregate domestic non-financial corporate profit net from depreciations, in each economy. It is a profitability measure that shows the business income after subtracting the employees' compensations, taxes on production and imports, and depreciations. Non-financial corporations encompass both private and public corporate entities engaged in the production of goods or the provision of non-financial services in the market.

3.2.4. Macroeconomic States Determinants

To comprehensively analyze how companies adjust their debt levels to meet specific targets across diverse macroeconomic conditions, it is crucial to establish clear criteria for distinguishing between favorable and unfavorable economic states. This study draws upon a selection of macroeconomic indicators, including key metrics used by Cook and Tang (2010) and some others that would be interesting to include regarding the European framework. The chosen variables encompass the GDP growth rate, term spread, and inflation rate. While conducting this research, economic states were classified as good, intermediate, and bad, based on GDP growth rate and term spread, using terciles. Regarding the inflation rate, the top tercile refers to it as under inflationary pressure, while the bottom as not under inflationary pressure. The same method is replicated for the economic indicators, country by country with a one-year lag, as they have the highest predictive power (Cook and Tang, 2010).

Historically, Gross Domestic Product (GDP) has served as a reliable metric for assessing economic activity and holds a fundamental role in measuring the overall health of an economy. The identification of a recession, characterized by two or more consecutive quarters of negative GDP growth, underscores its importance. De Jong, Kabir, and Nguyen (2008) have established a relationship between GDP growth and a country's capital structure. The authors argued that in economies that present a higher GDP growth rate, firms are more willing to use debt to finance their investments. This happens because a growing economy needs increased external financing for investments, leading to firms altering their capital structures more often during economic expansions. This observation is reinforced by De Haas and Peters (2006) in the European context, stating that real GDP growth accelerates the adjustment speed of capital structures in European transition economies. Given the above, it is expected that a high GDP growth rate signals a high SOA towards the target leverage.

In this study, the term spread is computed by subtracting the three-month money market rates from the 10-year government bond rates for each country, serving as an effect of market expectations regarding future economic conditions. Fama (1990) established a powerful association between the term spread and both the current and expected costs of borrowing. Hence, following the idea that adjustment costs play a crucial role in the SOA (Fischer et al., 1989), the term spread is expected to be inversely correlated with the pace at which firms adjust their debt to the desired level. Conversely, Cook and Tang (2010) rely on the predictive power of the term spread for economic conditions to indicate that a high (low) term spread is anticipating an expansionary (contractionary) environment. Thus, the authors expect a positive relationship between the term spread and the leverage SOA.

Several researchers have found evidence suggesting that inflationary environments tend to reduce the real cost of debt (De Angelo and Masulis, 1980), having a positive impact on firms' debt ratios. However, Schall (1984) insists that under high inflation, firm bonds' attractiveness is held back in comparison to shares for investors, influencing the debt-equity choice. In summary, these dynamics likely alter companies' capital structures, revealing a positive relationship between inflation rates and the SOA towards the target.

4. Data

The data collection for this study began by extracting firm-specific variables from all publicly listed European companies between 2000 and 2022 from the Thomson Reuters database. This approach aimed to maximize the diversity of country variations in the analysis, as well as cover various economic periods within this century, highlighting important events such as the Global Financial Crisis and the COVID-19 pandemic. Following previous literature on this topic, both financial firms and utilities (based on TRBC[8]) were excluded from the original sample since being subject to particular regulatory environments may interfere with

[8] TRBC is The Refinitiv Business Classification

their capital structure choice (Fama and French, 2002; Korajczyk and Levy, 2003; Cook and Tang, 2010). Additionally, firms without two consecutive years of data were excluded to avoid inhibiting the study of target adjustment as well as within-firm variation (Flannery and Rangan, 2006). In contrast, macroeconomic data was retrieved from two different data sources. Regarding the macroeconomic target determinants, index returns were extracted from the Refinitiv Datastream, while the net operating surplus was obtained from the OECD database. In determining the economic states, all variables were extracted from the OECD website. After cleaning the data according to the criteria described above and considering only the observations where all variables were available, the sample consists of 3,109 firms from 25 European countries, resulting in 29,991 firm-year observations for market leverage definition and 29,993 firm-year observations for book leverage definition. This data is labeled as unbalanced panel data because observations vary across firms and over time, with not every firm having observations for every year.

4.1. Summary Statistics

Table 1 provides summary statistics for the independent variables in book- and market-valued samples, represented in Panels A and B, respectively. With an approximately equal number of observations in both samples, the disparities in their summary statistics are minimal, as anticipated.

Table 1 - Target Determinants Summary Statistics by Sample
Panel A shows summary statistics for the target determinants in the book-valued sample and Panel B in the market-valued sample. All the variables presented were winsorized at the 1% and 99% levels, excluding TANG, which was confined to values between 0 and 1.

Panel A: Book-valued Sample								
	Obs.	**Mean**	**p25**	**Median**	**p75**	**Std.**	**Min**	**Max**
MB	29993	1.859	0.525	0.866	1.525	4.115	0.082	32.78
TANG	29993	0.382	0.132	0.329	0.602	0.285	0.001	1
EBIT	29993	0.043	0.021	0.058	0.098	0.124	-0.597	0.307
DEP	29993	0.038	0.017	0.031	0.048	0.033	0	0.203
SIZE	29993	19.741	18.127	19.604	21.233	2.200	15.102	25.09
RD	29993	0.013	0	0	0	0.049	0	0.528
RDD	29993	0.203	0	0	0	0.402	0	1
SE	29993	0.357	0.137	0.236	0.390	0.542	0.016	4.580
IND_MED	29993	0.517	0.453	0.524	0.581	0.105	0.179	1.097
MRET	29993	0.034	-0.109	0.058	0.184	0.208	-0.673	1.119
NOS	29993	25.603	20.636	24.971	29.291	9.292	6.536	68.345

Panel B: Market-valued Sample

MB	29991	1.859	0.525	0.866	1.525	4.115	0.082	32.78
TANG	29991	0.382	0.132	0.329	0.601	0.285	0.001	1
EBIT	29991	0.043	0.021	0.058	0.098	0.124	-0.597	0.307
DEP	29991	0.038	0.017	0.031	0.048	0.033	0	0.203
SIZE	29991	19.741	18.127	19.604	21.234	2.200	15.102	25.09
RD	29991	0.013	0	0	0	0.049	0	0.528
RDD	29991	0.203	0	0	0	0.402	0	1
SE	29991	0.357	0.137	0.236	0.390	0.542	0.016	4.580
IND_MED	29991	0.517	0.453	0.524	0.581	0.105	0.179	1.097
MRET	29991	0.034	-0.109	0.058	0.184	0.208	-0.673	1.119
NOS	29991	25.602	20.636	24.963	29.291	9.292	6.536	68.345

Even if the firm-specific and macroeconomic variables exhibit minimal differences in both samples, Table 2 shows a clear difference in the dependent variable when applying two different leverage measures. When comparing the average leverage ratios across each year, the results align with the existing literature. In column 2, the market-valued sample statistics reveal that market debt ratios are, on average, 40% higher than those in the book-valued sample, presented in column 1. Additionally, the observed market debt ratios are revealed to be more volatile than the book debt ratios. Consistent with previous literature, this disparity can be attributed to market-valued debt ratios being more susceptible to non-controllable firm factors, resulting in increased fluctuations when compared to book-valued debt ratios (Cook and Tang, 2010).

Upon examining both samples, the average book-valued leverage ratio is 0.175, while the average market-valued leverage ratio is 0.245 (0.07 units of difference). Notably, during the analyzed period, the most substantial disparity between the samples occurred in 2009, coinciding with the period where both ratios reached their peaks at 0.188 for book-valued debt and 0.332 for market-valued debt. This difference could potentially be influenced by the decline in interest rates in Europe during that timeframe. In contrast, the smallest difference was observed in 2007, representing the second-lowest value registered for book-valued ratios (0.160) and the lowest for market-valued ones (0.185). This analysis holds particular interest as both periods fall within the most critical period for the European economy in this century, aligning with the idea that firms may prefer to issue debt when stock markets are underperforming. The average standard deviation for book-valued debt ratios is 0.149, whereas market-valued ratios record 0.252.

Table 2 - Leverage Summary Statistics
Columns 1 and 2 present the annual mean and standard deviation of observed book and market leverage, respectively, from 2000 to 2022. The book-valued debt ratio is (long-term debt + short-term debt)/total assets. The market-valued debt ratio is (long-term debt + short-term debt)/ (long-term debt + short-term debt + stock price * number of shares outstanding).

			(1)			(2)
	Book-valued sample			Market-valued sample		
	Obs.	**Mean**	**Std.**	**Obs.**	**Mean**	**Std.**
2000	535	0.171	0.141	535	0.219	0.231
2001	688	0.169	0.144	688	0.226	0.235
2002	746	0.173	0.145	746	0.254	0.241
2003	787	0.179	0.151	787	0.297	0.259
2004	785	0.175	0.153	785	0.258	0.247
2005	884	0.166	0.147	884	0.231	0.232
2006	1039	0.160	0.142	1039	0.204	0.219
2007	1171	0.163	0.141	1171	0.185	0.206
2008	1348	0.173	0.150	1348	0.206	0.219
2009	1412	0.188	0.161	1411	0.332	0.279
2010	1378	0.182	0.157	1378	0.274	0.258
2011	1460	0.171	0.154	1460	0.253	0.258
2012	1414	0.174	0.156	1413	0.289	0.272
2013	1345	0.169	0.149	1345	0.263	0.257
2014	1393	0.171	0.146	1393	0.235	0.246
2015	1403	0.174	0.149	1403	0.245	0.258
2016	1429	0.179	0.147	1429	0.242	0.256
2017	1457	0.177	0.145	1457	0.238	0.255
2018	1563	0.178	0.142	1563	0.220	0.246
2019	1769	0.179	0.142	1769	0.256	0.260
2020	1952	0.177	0.147	1952	0.241	0.255
2021	2058	0.183	0.150	2058	0.239	0.257
2022	1977	0.177	0.149	1977	0.225	0.255
Total	29993	0.175	0.149	29991	0.245	0.252

Table 3 displays the outcomes of univariate tests assuming unequal variances, examining leverage across different macroeconomic conditions defined by each determinant (GDP growth rate, term spread, and inflation rate). In these tests, means are reported for contrasting states with the corresponding differences between them, for both book- and market-valued samples.

The results are in accordance with Cook and Tang's (2010) similar test and report the p-values for every sub-sample. Except when states are defined by term spread using market debt ratios, leverage is significantly higher in bad states and not under inflationary pressures. This goes in line with Korajczyk and Levy (2003) and Hackbarth et al. (2006), both of whom found debt moving countercyclically. Regarding the inflation rate, the outcomes support the theory that under high inflation, investors prefer to invest in stocks rather than bonds, impacting firms' debt ratios negatively (Schall, 1984).

Table 3 - Mean Differences in Leverage across States
This table outlines the differences in means for both book- and market-leverage across states. Column 1 presents the results when states are defined by GDP growth rate, Column 2 by the term spread and column 3 by the inflation rate. ***, **, and * indicate 1%, 5%, and 10% significance levels respectively.

	(1)		(2)		(3)	
	GDP growth rate		Term Spread		Inflation Rate	
	Book	Market	Book	Market	Book	Market
Good	0.173	0.225	0.173	0.272		
Bad	0.178	0.265	0.177	0.228		
G vs. B	-0.005	-0.40	-0.004	0.044		
UIP					0.170	0.232
NUIP					0.177	0.255
UIP vs. NUIP					-0.007	-0.023
p-value	0.019**	0.000***	0.066*	0.000***	0.003***	0.000***

5. Results

5.1. Target Leverage and Leverage Deviation

To assess the influence of leverage on the SOA, the target was estimated for all firms within book- and market-valued samples. The outcomes are presented in Table 4. When analyzing the impact of firm-specific and macroeconomic variables on book-value leverage (Column 1), only *EBIT*, *SIZE* (natural logarithm of total assets) and *MRET* (annual returns of European stock indexes) exhibit significance (all at 1% significance level), confirming the anticipated effects. The coefficients for *EBIT* and *MRET* reveal a negative association, aligning with theories previously discussed. Following the pecking order theory (Myers and Maljuf, 1984), profitable firms are expected to utilize growing internal funds for project financing, possibly leading to a decrease in debt issuance. In line with the market timing view (Baker and Wurgler, 2002), firms may issue less debt during thriving equity markets. In contrast, large firms tend to have more debt capacity, justifying the positive relationship between *SIZE* and leverage. In the market-valued sample (Column 2), all variables are significant for at least 10% significance level, except *DEP* (depreciations to total assets) and *RDD* (R&D dummy). Besides the findings for the book-valued sample, the results once again align with expectations. Specifically, *MB* (market-to-book), *RD* (R&D expenses to total assets), *IND_MED* (industry median leverage), *SE* (selling expenses to total sales), and *NOS* (net operating surplus) show a negative relationship with leverage, while *TANG* (PP&E to total assets) presents a positive coefficient. These results reinforce that firms tend to issue less debt when perceiving lucrative investment opportunities (*MB*), corporate profits negatively impact firms' debt levels (*NOS*), and firms with more tangible assets have better access to debt (*TANG*). Furthermore, the negative coefficient of *RD* may indicate that firms operating in research-intensive businesses may have a higher proportion of intangible assets, leading to a decrease in their leverage ratios.

Table 4 - Target Leverage Estimation

Estimation of the target leverage ($D_{i,t}{}^{*}$) using lagged firm characteristics ($FirmSpecific_{i,t-1}$) and macroeconomic variables ($Macro_{i,t-1}$) for both book- and market-valued samples. The independent variables are as follows: *BD/MD* represents the lagged debt ratio for both book and market-valued samples, respectively. *MB* symbolizes the market to book value. *TANG* is the ratio of gross property, plant and equipment to total assets. *EBIT* equals the ratio of earnings before interest and taxes to total assets. *DEP* equals the depreciation expenses to total assets. *SIZE* is computed as the natural logarithm of firms' total assets. *RD* equals the total R&D expenses to total assets. *RDD* is a dummy variable that assumes the value of 1 if firms report R&D expenditure and 0, otherwise. *IND_MED* is the median of debt ratio of the firm's correspondent industry based on the Fama and French 49 industry definition. *SE* equals the selling expenses to firms' total sales. *MRET* represents the annual returns of the most relevant stock exchange of each country included in the sample. *NOS* denotes for the net operating surplus in percentage of the value added in each economy, which is the aggregate domestic non-financial corporate profit net from depreciations.The sample is reduced to 3025 European firms due to lags. ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

	Book-valued sample	**Market-valued sample**
	(1)	**(2)**
MB	0.0005	-0.0078***
	(0.0007)	(0.0009)
TANG	0.0147	0.0544***
	(0.0107)	(0.0137)
EBIT	-0.1395***	-0.2454***
	(0.0169)	(0.0217)
DEP	-0.0887	-0.0396
	(0.0540)	(0.0686)
SIZE	0.0170***	0.0326***
	(0.0029)	(0.0038)
RD	0.0724	-0.1183*
	(0.0780)	(0.0634)
RDD	-0.0068	-0.0104
	(0.0062)	(0.0093)
IND_MED	-0.0041	-0.0157**
	(0.0046)	(0.0062)

SE	-0.0078	-0.1122***
	(0.0230)	(0.0310)
MRET	-0.0141***	-0.1140***
	(0.0027)	(0.0043)
NOS	-0.0001	-0.0018***
	(0.0004)	(0.0006)
Constant	-0.1489**	-0.2706***
	(0.0594)	(0.0753)
Fixed-effects	*Yes*	*Yes*
Observations	25,254	25,253
R-squared	0.0214	0.0791
Number of firms	3,025	3,025

After estimating the target leverage, it is crucial to establish a comparison between the predicted value and the actual leverage. The leverage deviation was computed by subtracting the target leverage from the observed debt level in the same year ($D_{i,t} - D^*{}_{i,t}$). Having computed these metrics, the book-valued sample comprises 10,623 overleveraged and 14,631 underleveraged observations. Likewise, in the sample based on market-value debt, there are 9,048 overleveraged and 15,841 under-leveraged observations. Table 5 outlines the percentages of overleveraged firms in each macroeconomic state when using both book and market debt ratios. The results suggest that, regardless of the division criterion, there is a notably lower prevalence of overleveraged firms compared to under-leveraged ones. This observation aligns with Myers (1984), suggesting that firms prioritize mitigating the costs associated with excessive debt over potential tax benefits.

Table 5 - Overleveraged Firms across States

This table presents the differences in the percentage of overleveraged firms across states for both book- and market-valued samples. The states are determined by GDP growth in Column 1, by term spread in Column 2 and by the inflation rate in Column 3. A firm is characterized as overleveraged if ($D_{i,t} - D^*{}_{i,t} > 0$). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively.

	(1)		**(2)**		**(3)**	
	GDP growth rate		**Term Spread**		**Inflation Rate**	
	Book	**Market**	**Book**	**Market**	**Book**	**Market**
Good	41.41%	35.31%	41.47%	42.11%		
Bad	43.12%	40.58%	43.11%	34.86%		
G vs. B	-1.71%	-5.27%	-1.64%	7.25%		
UIP					41.02%	36.49%
NUIP					41.80%	37.62%
UIP vs. NUIP					-0.78%	-1.13%
p-value	0.026**	0.000***	0.032**	0.000***	0.306	0.135

As observed in the pattern of actual leverage ratios, market debt targets and their deviations also exhibit higher volatility compared to their book-valued counterparts. Nevertheless, the estimations of target leverage demonstrate lower volatility compared to the actual debt ratios. While breaking down the evolution of target deviation throughout this century, both leverage measures have shown oscillations between positive and negative until the GFC (see Figure 1). Notably, during the crisis, they peaked, attaining the highest values in 2010. Following this zenith, leverage deviation decreased to approximately 0% in the subsequent year (see Figure 2). From 2011 to 2013, the market-valued sample witnessed a resurgence in this deviation, whereas the book-valued sample remained relatively stable, hovering around 17%, leading to minimal average leverage deviations until 2022. On the flip side, the average market leverage displayed fluctuations, ascending significantly at the onset of the COVID-19 pandemic in 2019. Subsequently, it gradually decreased, consistently avoiding positive target deviations until 2022.

Figure 1 - Book Debt (BD), Target Book Debt (Target BD), Market Debt (MD), Target Market Debt (Target MD), (2001-2022)
The figure illustrates both book (BD) and market debt (MD) ratios, along with their corresponding targets (Target BD and Target MD), from 2001 to 2022.

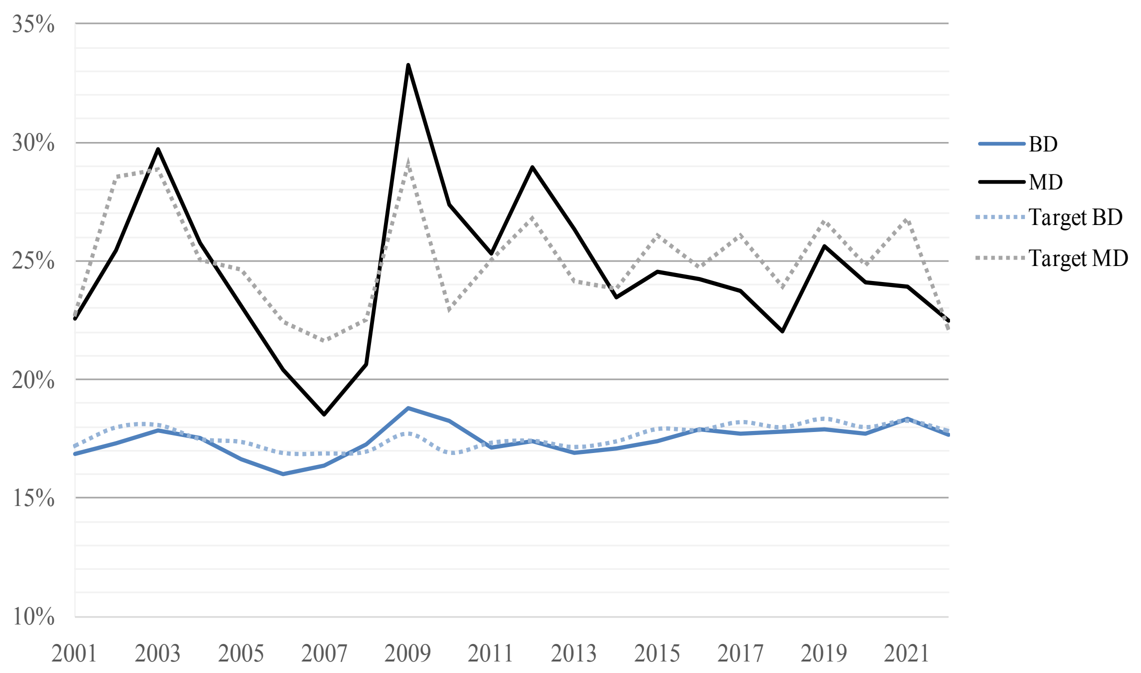
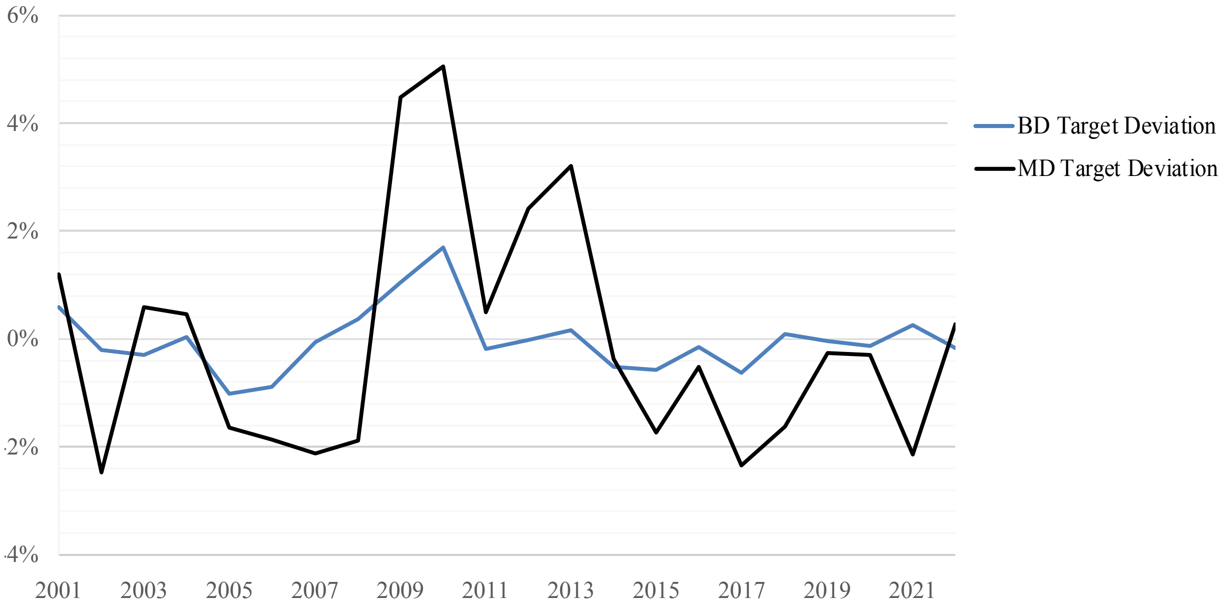


Figure 2 - Book-Debt (BD) Target Deviation, Market-Debt (MD) Target Deviation, (2001-2022)
The figure presents the evolution of target leverage deviations both in book- and market-valued samples, from 2011 to 2022. These deviations are computed as follows: $(D_{i,t} - D^*{}_{i,t})$.



5.2. Speed of Adjustment (SOA)

5.2.1. Whole Sample

After computing the target deviation, all the tools were consolidated to determine the SOA. This was carried out by calculating one minus the lagged leverage coefficient, as uncovered in Equation 3, for the entire sample in an initial phase. Table 6 presents the results of this regression for book- (Column 1) and market-valued (Column 2) samples. For the entire data sample, when using book leverage, the SOA stands at 53.73%, contrasting with 42.15% when employing market leverage. This translates to an estimated half-life[9] of the leverage deviation of 0.90 years for the book-valued sample and 1.27 years for the market-valued sample (Morais, Serrasqueiro, and Ramalho, 2022). The observed rate in this time span suggests that European firms adjust at a slightly faster pace compared to the findings in both Flannery and Rangan (2006), and Morais, Serrasqueiro, and Ramalho (2022) studies. This could possibly be a consequence of recent turbulent periods, such as the Global Financial Crisis and the COVID-19 pandemic, included in this study's sample. These peculiar events might have had a profound

[9] Discovered by Ernest Rutherford in 1907, the half-life is used as a metric to better access the life of a decaying substance, in this case, the gap between leverage and target leverage. It should be interpretated as the time that companies need to close half of this gap. It is computed as log(0.5)/log(1-SOA).

impact on European firms, pushing them to adjust their leverage more frequently to comply with economic volatility. It is also interesting to emphasize that the market-valued sample exhibits a comparatively slower SOA compared to the book-valued sample. This fact aligns with Yin and Ritter's (2019)[10] evidence and may be attributed to the typically larger deviation between market-debt ratios and their corresponding target leverage. To investigate whether overleveraged firms adjust at a distinct speed compared to underleveraged ones, an interaction term was incorporated by multiplying the leverage dummy (*LEV_DUMMY*) by the lagged debt ratio[11]. In the book-valued sample, this variable presents a positive and significant coefficient at the 1% significance level. This may imply that overleveraged firms adjust at a slower pace, providing support for the pecking order theory, which assumes that firms may be reluctant to issue equity over external debt.

Table 6 - Results from the Whole Sample

The table reports the results from of the integrated model, showing the outcomes from the OLS regression (Equation 3) $D_{i,t} = (1-\delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. The regression was run on both full book- (Column 1) and market-valued (Column 2) samples. It is also included a leverage dummy (*LEV_DUMMY*) that takes 1 if a firm is overleveraged and 0 otherwise. An interaction term between this variable and the lagged debt ratio (*LEV_DUMMY*BD/MD*) was incorporated to assess the impact of being above the target on the speed of adjustment (SOA). The SOA is calculated by taking 1 minus the coefficient of book- or market-debt leverage (*BD/MD*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

	(1)	(2)
	Book-valued sample	**Market-valued sample**
SOA	53.73%	42.15%
BD/MD	0.4627***	0.5785***
	(0.0197)	(0.0184)
MB	0.0006	-0.0014**
	(0.0005)	(0.0006)
TANG	-0.0028	0.0112
	(0.0070)	(0.0092)
EBIT	-0.0494***	-0.0676***
	(0.0150)	(0.0176)
DEP	-0.0874**	-0.1564***
	(0.0441)	(0.0556)

[10] The researchers observed a 60% faster speed of adjustment when employing book leverage compared to market leverage.

[11] Given that the coefficient for the lagged debt ratio is 1-δ and the speed of adjustment (SOA) is defined by δ, a positive (negative) relationship in the interaction term between the leverage dummy and the preceding debt ratio would suggest that overleveraged firms adjust slower (faster) than underleveraged ones.

SIZE	0.0082***	0.0199***
	(0.0017)	(0.0023)
RD	0.0370	-0.0075
	(0.0689)	(0.0572)
RDD	-0.0022	0.0047
	(0.0041)	(0.0062)
IND_MED	-0.0121	-0.0931***
	(0.0148)	(0.0190)
SE	-0.0002	-0.0068
	(0.0044)	(0.0055)
MRET	-0.0178***	-0.1424***
	(0.0027)	(0.0047)
NOS	-0.0001	0.0007**
	(0.0003)	(0.0003)
LEV_DUMMY	-0.0082	-0.0010
	(0.0054)	(0.0062)
LEV_DUMMY*BD/MD	0.0882***	-0.0160
	(0.0256)	(0.0208)
Constant	-0.0617*	-0.2439***
	(0.0352)	(0.0458)
Fixed-effects	*Yes*	*Yes*
Observations	20,803	20,802
R-squared	0.2988	0.3628
Number of Firms	2,681	2,681

5.2.2. Across Macroeconomic States

The primary focus of this study is to understand the variation in the speed of adjustment within different macroeconomic states. These states are determined based on terciles classifications (see Section 3.2.4) within each country, with their limits expressed in percentages as outlined in Table 7.

Table 7 - Limits for Different States
The Table shows the thresholds for the macroeconomic states by country, assessed through GDP growth, term spread and the inflation rate. All the values are expressed as percentages. States with high GDP growth and term spread are categorized as good states, while low GDP growth and term spread are considered bad states. High inflation rate represents UIP (under inflationary pressure) whereas low inflation rate represents NUIP (not under inflationary pressure).

	GDP growth %		**Term Spread %**		**Inflation Rate %**	
Country	**Bad, below**	**Good, above**	**Bad, below**	**Good, above**	**NUIP, below**	**UIP, above**
Austria	1.27	2.74	0.77	1.79	1.61	2.35
Belgium	1.27	2.55	0.86	1.85	1.65	2.47

Czech Republic	2.35	4	0.71	1.66	1.86	3.16
Denmark	0.91	2.67	0.63	1.18	1.15	2.34
Estonia	3.01	7.25	1.05	2.03	2.78	4.44
Finland	1.14	3.17	0.74	1.62	0.88	2.51
France	1.1	2.29	0.73	1.8	1.11	1.92
Germany	0.96	2.68	0.54	1.22	1.42	1.98
Greece	-0.35	3.92	1.7	6.72	1.12	3.37
Hungary	1.87	4.48	-0.78	2.28	3.34	5.65
Ireland	3.01	8.47	1	1.97	0.49	3.93
Italy	0.25	1.67	1.59	2.82	1.22	2.54
Latvia	2.57	7.04	0.7	1.23	2.26	4.37
Lithuania	3.54	6.57	0.7	2.47	1.16	3.74
Luxembourg	1.65	3.76	0.39	1.25	1.73	2.66
Netherlands	1.42	2.36	0.7	1.57	1.28	2.49
Norway	1.11	2.69	0.12	0.91	1.88	2.77
Poland	2.95	5.04	0.13	1.33	1.94	3.7
Portugal	0.77	2.51	1.2	3.38	0.99	2.85
Slovakia	2.51	5.28	0.6	1.73	1.94	4.48
Slovenia	2.77	4.36	0.5	3.02	1.74	3.66
Spain	1.4	3.65	1.13	2	1.68	3.2
Sweden	1.99	3.44	0.95	1.37	0.89	2.16
Switzerland	1.58	2.81	0.69	1.37	0.23	0.94
United Kingdom	1.77	2.56	0.13	1.09	1.5	2.6

Table 8 displays regression results using the integrated dynamic partial-adjustment model across three panels, labeled A to C. In Panel A, the results are presented with states defined by GDP growth rate, while Panel B utilizes term spread, and Panel C incorporates inflation rate as the determinant. For GDP growth rate and term spread determinants, states are categorized as good or bad, enabling a direct comparison between these two sub-samples (Cook and Tang, 2010). In the case of the inflation rate, states are defined as under inflationary pressure or not under inflationary pressure, and a pooled sub-sample analysis is conducted as well. In each panel, columns 1 to 3 showcase results for book-valued debt, maintaining a consistent structure that extends to columns 4 to 6 for the market-valued sample.

For a more accurate and robust comparison of the SOA between good and bad states, as well as between inflationary and non-inflationary environments, another interaction term has been incorporated into the regressions for pooled sub-samples. This term is computed by multiplying the lagged debt ratio by a dummy variable (*GOOD_DUMMY/UIP_DUMMY*) that takes on a value of 1 when the observation belongs to a good (inflationary) state and 0 otherwise.

In the marked-valued sample, when macroeconomic states were determined by GDP growth (Panel A, column 6), the outcomes from the integrated dynamic partial-adjustment model (Equation 3) uncovered an SOA of 43.18% in good states and 42.18% in bad states. However, this was the only sample where the coefficient of the interaction term between the lagged debt ratio and the good state dummy proved to be significant (at 1% significance level). Being negative, this coefficient[12] confirms that when in good states, for this sub-sample, firms tend to adjust faster towards their target. This observation aligns with previous literature finding a higher adjustment speed in economic booms compared to contractionary environments (Hackbarth et al., 2006; Cook and Tang, 2010).

When assessing states with term spread, all sub-samples demonstrate a faster SOA compared to the GDP growth rate benchmark. Across both book- and market-valued samples, the observed SOA is notably higher in good states. However, this evidence is not supported by the interaction term with significance in any of the pooled sub-samples (Panel B, columns 3 and 6). A similar pattern is observed when considering the inflation rate as a state determinant, revealing a higher SOA when economies are not under inflationary pressure. Nevertheless, the interaction term fails to confirm this observation for any leverage measure.

Following the results for the entire sample, it is observable that when the interaction term involving the lagged debt ratio and the leverage dummy is statistically significant, it exhibits positive coefficients in sub-samples based on book debt and negative coefficients in those based on market debt. This pattern suggests that, for book-valued samples, the pecking order theory holds, considering that overleveraged firms adjusting slower may be attributed to their aversion to issuing equity, deciding on external debt[13].

Table 8 - Results across States

The table reports the results from of the integrated model across different macroeconomic states (Panels A to C), showing the outcomes from the OLS regression (Equation 3) $D_{i,t} = (1 - \delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. Panels A, B, and C respectively present results with GDP growth, term spread, and the inflation rate defining macroeconomic states. Columns 1, 2 and 3 of each panel present the SOA estimation when using book-debt, while Columns 4, 5 and 6 use market-debt. A leverage dummy (*LEV_DUMMY*) is included taking the value of 1 if a firm is overleveraged and 0 otherwise. The interaction term between this variable and the lagged debt ratio (*LEV_DUMMY*BD/MD*) assesses the impact of being above the target on the SOA. A dummy variable that takes the value of 1 if the observation belongs to good (inflationary) state is included in the pooled sub-samples (Columns 3 and 6) of each panel (*GOOD_DUMMY* and

[12] A negative coefficient in the interaction term between lagged debt ratio and good states dummy represents a higher SOA because lagged debt ratio coefficient is (1-δ), representing δ, the proportion adjusted over one year.

[13] The positive interaction between lagged debt ratio and leverage dummy reduces the adjustment speed. This happens because it enhances the magnitude of the negative coefficient associated to the lagged debt ratio (-δ).

UIP_DUMMY). The inclusion of interaction terms with the lagged debt ratio (*GOOD_DUMMY*BD/MD* and *UIP_DUMMY*BD/MD*) is aimed at testing the robustness and significance of the variations in SOA across distinct economic states. The SOA is calculated by taking 1 minus the coefficient of book- or market-valued leverage (*BD/MD*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

Panel A: States defined by GDP growth rate						
	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Good	Bad	G vs. B	Good	Bad	G vs. B
SOA	51.02%	59.22%	52.98%	43.18%	42.19%	39.14%
BD/MD	0.4898***	0.4078***	0.4702***	0.5682***	0.5781***	0.6086***
	(0.0383)	(0.0365)	(0.0259)	(0.0339)	(0.0366)	(0.0246)
MB	0.0008	-0.0006	-0.0000	-0.0018*	-0.0041***	-0.0027***
	(0.0009)	(0.0011)	(0.0007)	(0.0011)	(0.0011)	(0.0007)
TANG	0.0022	0.0115	-0.0012	0.0042	0.0552***	0.0160
	(0.0122)	(0.0120)	(0.0084)	(0.0167)	(0.0167)	(0.0110)
EBIT	-0.0441*	-0.0404	-0.0584***	-0.0126	-0.0779**	-0.0695***
	(0.0251)	(0.0310)	(0.0198)	(0.0323)	(0.0322)	(0.0224)
DEP	-0.0852	-0.0985	-0.0713	-0.1088	-0.2440**	-0.1185*
	(0.0909)	(0.0777)	(0.0580)	(0.1025)	(0.1091)	(0.0707)
SIZE	0.0076**	0.0109***	0.0085***	0.0138***	0.0285***	0.0209***
	(0.0030)	(0.0029)	(0.0021)	(0.0032)	(0.0046)	(0.0028)
RD	-0.0217	0.2250	0.0907	0.0717	-0.0003	0.0165
	(0.0954)	(0.1519)	(0.0897)	(0.0652)	(0.1404)	(0.0830)
RDD	-0.0028	-0.0059	-0.0061	0.0025	0.0160	0.0053
	(0.0070)	(0.0082)	(0.0050)	(0.0098)	(0.0108)	(0.0074)
IND_MED	-0.0128	-0.0118	-0.0049	-0.0021	-0.1022***	-0.0953***
	(0.0255)	(0.0240)	(0.0178)	(0.0325)	(0.0329)	(0.0234)
SE	0.0030	-0.0053	0.0003	-0.0066	-0.0085	-0.0056
	(0.0092)	(0.0064)	(0.0047)	(0.0092)	(0.0082)	(0.0066)
MRET	-0.0161***	-0.0152***	-0.0162***	-0.0651***	-0.1700***	-0.1339***
	(0.0055)	(0.0044)	(0.0032)	(0.0073)	(0.0074)	(0.0053)
NOS	-0.0007*	0.0005	-0.0002	0.0009*	0.0009*	0.0011***
	(0.0004)	(0.0004)	(0.0003)	(0.0005)	(0.0005)	(0.0004)
LEV_DUMMY	-0.0080	-0.0034	-0.0069	-0.0201	0.0213*	0.0073
	(0.0110)	(0.0096)	(0.0066)	(0.0130)	(0.0109)	(0.0077)
LEV_DUMMY*BD/MD	0.0646	0.0808*	0.0773**	0.0602	-0.0768**	-0.0437*
	(0.0496)	(0.0442)	(0.0307)	(0.0426)	(0.0364)	(0.0261)
GOOD_DUMMY			0.0025			-0.0063***
			(0.0026)			(0.0024)
GOOD_DUMMY*BD/MD			-0.0235			-0.0305***
			(0.0148)			(0.0092)
Constant	-0.0393	-0.1239**	-0.0688*	-0.1939***	-0.4126***	-0.2707***
	(0.0587)	(0.0569)	(0.0413)	(0.0640)	(0.0926)	(0.0555)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,119	7,833	13,952	6,119	7,832	13,951
R-squared	0.3067	0.2509	0.2887	0.3992	0.3382	0.3618
Number of firms	2,252	2,193	2,567	2,252	2,193	2,567

Panel B: States defined by Term Spread

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Good	**Bad**	**G vs. B**	**Good**	**Bad**	**G vs. B**
SOA	69.55%	62.05%	55.83%	52.85%	49.96%	42.86%
BD/MD	0.3045***	0.3795***	0.4417***	0.4715***	0.5004***	0.5714***
	(0.0411)	(0.0385)	(0.0252)	(0.0402)	(0.0338)	(0.0244)
MB	-0.0027**	0.0021*	0.0007	-0.0041***	-0.0008	-0.0011*
	(0.0011)	(0.0011)	(0.0007)	(0.0011)	(0.0008)	(0.0006)
TANG	0.0017	0.0044	0.0074	0.0123	0.0320*	0.0233*
	(0.0141)	(0.0130)	(0.0086)	(0.0207)	(0.0192)	(0.0119)
EBIT	-0.0300	-0.0499	-0.0335*	-0.0403	-0.0972***	-0.0487**
	(0.0254)	(0.0362)	(0.0183)	(0.0334)	(0.0377)	(0.0218)
DEP	-0.0935	-0.0848	-0.1105**	-0.2373**	-0.0983	-0.2319***
	(0.0696)	(0.0891)	(0.0514)	(0.0926)	(0.1452)	(0.0705)
SIZE	0.0154***	0.0052	0.0097***	0.0345***	0.0141***	0.0218***
	(0.0044)	(0.0033)	(0.0022)	(0.0066)	(0.0052)	(0.0031)
RD	0.1459	0.2048*	0.1000	0.1369	0.0365	0.0584
	(0.1733)	(0.1216)	(0.1050)	(0.1531)	(0.0798)	(0.0827)
RDD	0.0001	0.0011	-0.0077	0.0102	0.0199	0.0060
	(0.0099)	(0.0079)	(0.0057)	(0.0148)	(0.0131)	(0.0084)
IND_MED	-0.0032	-0.0224	-0.0132	-0.0021	-0.0523	-0.0575**
	(0.0335)	(0.0258)	(0.0180)	(0.0497)	(0.0358)	(0.0247)
SE	-0.0094	-0.0006	-0.0025	-0.0233	-0.0041	-0.0101
	(0.0078)	(0.0085)	(0.0048)	(0.0153)	(0.0118)	(0.0083)
MRET	-0.0201***	-0.0303***	-0.0198***	-0.1562***	-0.1209***	-0.1487***
	(0.0042)	(0.0096)	(0.0033)	(0.0075)	(0.0128)	(0.0058)
NOS	0.0002	0.0001	0.0000	0.0002	0.0011*	0.0014***
	(0.0005)	(0.0005)	(0.0003)	(0.0007)	(0.0006)	(0.0004)
LEV_DUMMY	-0.0030	-0.0143	-0.0083	0.0089	-0.0120	0.0027
	(0.0102)	(0.0096)	(0.0065)	(0.0125)	(0.0129)	(0.0081)
LEV_DUMMY*BD/MD	0.0782	0.1470***	0.1003***	-0.0889**	0.0324	-0.0361
	(0.0494)	(0.0468)	(0.0307)	(0.0426)	(0.0434)	(0.0268)
GOOD_DUMMY			-0.0009			0.0078**
			(0.0027)			(0.0032)
GOOD_DUMMY*BD/MD			-0.0083			0.0054
			(0.0146)			(0.0102)
Constant	-0.1874**	0.0045	-0.0934**	-0.5080***	-0.1611	-0.3175***
	(0.0878)	(0.0683)	(0.0450)	(0.1343)	(0.1072)	(0.0636)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,782	6,883	13,665	6,782	6,883	13,665
R-squared	0.1659	0.2628	0.2873	0.2256	0.2970	0.3574
Number of firms	1,786	2,131	2,450	1,786	2,131	2,450

Panel C: States defined by Inflation Rate

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	UIP	NUIP	UIP vs. NUIP	UIP	NUIP	UIP vs. NUIP
SOA	51.36%	55.23%	50.40%	38.17%	41.84%	37.88%
BD/MD	0.4864***	0.4477***	0.4960***	0.6183***	0.5816***	0.6212***
	(0.0395)	(0.0335)	(0.0251)	(0.0349)	(0.0357)	(0.0239)
MB	0.0012	-0.0006	0.0004	-0.0009	-0.0013	-0.0006
	(0.0010)	(0.0008)	(0.0005)	(0.0008)	(0.0013)	(0.0007)
TANG	-0.0077	-0.0028	-0.0014	0.0035	0.0253	0.0157
	(0.0150)	(0.0121)	(0.0083)	(0.0167)	(0.0169)	(0.0103)
EBIT	-0.0162	-0.0498**	-0.0398**	-0.0236	-0.0791***	-0.0581***
	(0.0303)	(0.0232)	(0.0168)	(0.0298)	(0.0294)	(0.0190)
DEP	-0.1939**	-0.0178	-0.1005*	-0.2266**	-0.1237	-0.1941***
	(0.0786)	(0.0670)	(0.0513)	(0.1020)	(0.0991)	(0.0690)
SIZE	0.0046*	0.0076**	0.0057***	0.0117***	0.0178***	0.0167***
	(0.0028)	(0.0032)	(0.0020)	(0.0033)	(0.0050)	(0.0027)
RD	0.1789	0.1769	0.1775**	0.0823	0.0892	0.0730
	(0.2163)	(0.1164)	(0.0905)	(0.1384)	(0.0799)	(0.0554)
RDD	-0.0091	-0.0102	-0.0063	0.0121	0.0042	0.0063
	(0.0094)	(0.0077)	(0.0050)	(0.0109)	(0.0079)	(0.0063)
IND_MED	-0.0217	-0.0114	-0.0180	-0.0514*	-0.1310***	-0.0860***
	(0.0243)	(0.0239)	(0.0161)	(0.0275)	(0.0341)	(0.0201)
SE	0.0111	0.0081	0.0038	0.0111	-0.0019	-0.0018
	(0.0068)	(0.0095)	(0.0063)	(0.0087)	(0.0075)	(0.0069)
MRET	-0.0113*	-0.0172***	-0.0131***	-0.0923***	-0.1537***	-0.1234***
	(0.0061)	(0.0047)	(0.0034)	(0.0096)	(0.0084)	(0.0059)
NOS	-0.0002	0.0001	0.0001	0.0008	0.0008	0.0009**
	(0.0005)	(0.0005)	(0.0003)	(0.0006)	(0.0006)	(0.0004)
LEV_DUMMY	0.0030	-0.0092	-0.0070	0.0000	-0.0003	-0.0059
	(0.0108)	(0.0095)	(0.0065)	(0.0115)	(0.0120)	(0.0075)
LEV_DUMMY*BD/MD	0.0620	0.1042**	0.0956***	-0.0207	-0.0456	-0.0192
	(0.0517)	(0.0439)	(0.0314)	(0.0390)	(0.0384)	(0.0255)
UIP_DUMMY			-0.0013			-0.0033
			(0.0023)			(0.0025)
UIP_DUMMY*BD/MD			-0.0156			-0.0096
			(0.0125)			(0.0089)
Constant	-0.0162	-0.0207	-0.0230	-0.1493**	-0.1061	-0.1986***
	(0.0535)	(0.0640)	(0.0403)	(0.0686)	(0.0961)	(0.0530)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,078	7,559	13,637	6,078	7,559	13,637
R-squared	0.3359	0.2919	0.3370	0.4033	0.3177	0.3762
Number of firms	2,350	2,053	2,594	2,350	2,053	2,594

6. Robustness Checks

6.1. Excluding Zero-leverage Firms

Prior research highlights that an error takes place when assuming that the decision to choose the type of financing is equivalent to determining how much of that financing to use (Cook, Kieschnick, and McCullough, 2008). This study addresses a potential distortion in adjustment speed estimates resulting from the inclusion of zero-leverage firms. In accordance, Morais, Serrasqueiro, and Ramalho (2022) noted significant divergences in the SOA between zero-leverage firms and leveraged ones, with the last mentioned generally demonstrating a faster adjustment of their capital structure.

Accordingly, it is particularly important to re-estimate the SOA, excluding firms with zero debt, employing the integrated dynamic partial-adjustment capital structure model. The results of this re-estimation are reported in Table 9. To clarify the analysis, the coefficients of target determinants were not reported. The findings demonstrate consistency with the integrated model when considering all firms.

Moreover, when exclusively examining debt-issuing companies, the interaction term featuring the good states dummy and the lagged debt ratio demonstrates significance for both the book- and the market-valued samples, particularly when using the GDP growth rate as the state determinant. The negative coefficient observed using both measures underscores, following previous literature, that leveraged firms adjust faster in good macroeconomic states (Hackbarth et al., 2006; Cook and Tang, 2010).

In summary, the exclusion of zero-leverage firms contributes to the understanding that adjustment speed increases in favourable macroeconomic conditions, when these are based on GDP growth.

Table 9 - Results across States excluding Zero-Leverage Firms

The table reports the results from of the integrated model across different macroeconomic states (Panels A to C) excluding zero-leverage firms, showing the outcomes from the OLS regression (Equation 3) $D_{i,t} = (1-\delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. Panels A, B, and C respectively present results with GDP growth, term spread, and the inflation rate defining macroeconomic states. Columns 1, 2 and 3 of each panel present the SOA estimation when using book-debt, while Columns 4, 5 and 6 use market-debt. A leverage dummy (*LEV_DUMMY*) is included taking the value of 1 if a firm is overleveraged and 0 otherwise. The interaction term between this variable and the lagged debt ratio (*LEV_DUMMY*BD/MD*) assesses the impact of being above the target on the SOA. A dummy variable that takes the value of 1 if the observation belongs to good (inflationary) state is included in the pooled sub-samples (Columns 3 and 6) of each panel (*GOOD_DUMMY* and *UIP_DUMMY*). The inclusion of interaction terms with the lagged debt ratio (*GOOD_DUMMY*BD/MD* and *UIP_DUMMY*BD/MD*) is aimed at testing the robustness and significance of the variations in SOA across distinct economic states. The SOA is calculated by taking 1 minus the coefficient of book- or market-valued leverage (*BD/MD*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

Panel A: States defined by GDP growth rate, excluding zero-leverage firms

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Good	**Bad**	**G vs. B**	**Good**	**Bad**	**G vs. B**
SOA	47.16%	54.52%	48.5%	40.22%	38.65%	35.63%
BD/MD	0.5284***	0.4548***	0.5150***	0.5978***	0.6135***	0.6437***
	(0.0391)	(0.0349)	(0.0253)	(0.0335)	(0.0339)	(0.0234)
LEV_DUMMY	-0.0017	0.0007	-0.0018	-0.0163	0.0206*	0.0069
	(0.0109)	(0.0089)	(0.0064)	(0.0127)	(0.0107)	(0.0075)
LEV_DUMMY*BD/MD	0.0235	0.0479	0.0430	0.0452	-0.0904**	-0.0564**
	(0.0487)	(0.0427)	(0.0303)	(0.0423)	(0.0356)	(0.0255)
GOOD_DUMMY			0.0040			-0.0077***
			(0.0025)			(0.0024)
GOOD_DUMMY*BD/MD			-0.0350**			-0.0297***
			(0.0137)			(0.0089)
Constant	-0.0321	-0.1117**	-0.0567	-0.1984***	-0.4133***	-0.2713***
	(0.0555)	(0.0554)	(0.0394)	(0.0660)	(0.0931)	(0.0561)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	5,813	7,466	13,279	5,813	7,466	13,279
R-squared	0.3250	0.2814	0.3144	0.4285	0.3638	0.3892
Number of firms	2,171	2,122	2,486	2,171	2,122	2,486

Panel B: States defined by Term Spread, excluding zero-leverage firms						
	Book-valued sample			**Market-valued sample**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Good	**Bad**	**G vs. B**	**Good**	**Bad**	**G vs. B**
SOA	65.85%	56.04%	51.98%	50.1%	45.31%	39.57%
BD/MD	0.3415***	0.4396***	0.4802***	0.4990***	0.5469***	0.6043***
	(0.0396)	(0.0375)	(0.0246)	(0.0387)	(0.0329)	(0.0237)
LEV_DUMMY	-0.0003	-0.0012	-0.0011	0.0120	-0.0093	0.0035
	(0.0101)	(0.0095)	(0.0063)	(0.0126)	(0.0125)	(0.0079)
LEV_DUMMY*BD/MD	0.0540	0.0713	0.0564*	-0.1052**	0.0094	-0.0484*
	(0.0498)	(0.0467)	(0.0305)	(0.0429)	(0.0424)	(0.0265)
GOOD_DUMMY			-0.0023			0.0080**
			(0.0025)			(0.0031)
GOOD_DUMMY*BD/MD			-0.0016			0.0008
			(0.0135)			(0.0099)
Constant	-0.0963	0.0121	-0.0609	-0.4851***	-0.1609	-0.3071***
	(0.0810)	(0.0686)	(0.0441)	(0.1393)	(0.1111)	(0.0641)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,473	6,577	13,05	6,473	6,577	13,05
R-squared	0.1833	0.2824	0.3077	0.2450	0.3326	0.3827
Number of firms	1,73	2,057	2,381	1,73	2,057	2,381

Panel C: States defined by Inflation Rate, excluding zero-leverage firms						
	Book-valued sample			**Market-valued sample**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	UIP	**NUIP**	**UIP vs. NUIP**	**UIP**	**NUIP**	**UIP vs. NUIP**
SOA	47.27%	52.41%	46.94%	34.96%	39.62%	35.24%
BD/MD	0.5273***	0.4759***	0.5306***	0.6504***	0.6038***	0.6476***
	(0.0391)	(0.0325)	(0.0244)	(0.0354)	(0.0344)	(0.0232)
LEV_DUMMY	0.0061	-0.0100	-0.0031	0.0053	-0.0012	-0.0047
	(0.0105)	(0.0093)	(0.0062)	(0.0115)	(0.0120)	(0.0074)
LEV_DUMMY*BD/MD	0.0302	0.0915**	0.0644**	-0.0468	-0.0541	-0.0343
	(0.0501)	(0.0435)	(0.0307)	(0.0391)	(0.0387)	(0.0258)
UIP_DUMMY			-0.0028			-0.0043*
			(0.0023)			(0.0026)
UIP_DUMMY*BD/MD			-0.0085			-0.0057
			(0.0118)			(0.0086)
Constant	0.0117	-0.0532	-0.0100	-0.1407*	-0.2027**	-0.2029***
	(0.0576)	(0.0668)	(0.0404)	(0.0740)	(0.0988)	(0.0548)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	5,771	7,245	13,016	5,771	7,245	13,016
R-squared	0.3526	0.3044	0.3550	0.4260	0.3286	0.3922
Number of firms	2,253	1,992	2,513	2,253	1,992	2,513

6.2. Two-stage Dynamic Partial-adjustment Model

Although the traditional partial-adjustment model has been overshadowed in recent literature, it was the predominant method for investigating capital structure adjustments for several years (Hovakimian et al., 2001; Drobetz and Wanzenried, 2006). Therefore, given the emphasis on the most recent European sample in this investigation, employing this method to estimate SOA becomes particularly relevant. This approach facilitates a comparison between the current results and earlier findings in the field.

In previous literature, the estimation of target leverage (Equation 1) was mostly dependent on the use of linear predictions. However, Papke and Wooldridge (1996) highlighted that linear models face difficulties in recovering the regression function for fractional variables. To address these issues, the authors suggested a quasi-likelihood method, assuming a fractional dependent variable. Consistent with the model, this robustness test employs a quasi-maximum likelihood estimation method (QMLE) to determine the proxy for target leverage. Table 10 displays the outcomes for the second-stage regression (Equation 2) in panels A, B, and C, with states defined by GDP growth rate, term spread, and inflation rate, respectively.

As expected, the application of this technique (QMLE) generally indicates slower adjustments compared to the integrated model (Flannery and Rangan, 2006). When GDP growth is used as a state determinant, the interaction term between good states and the lagged debt ratio shows significance, consistent with the evidence provided by the market-valued sample in the integrated model. This variable presents a negative coefficient, corroborating that, for this sample, firms adjust faster in economic booms. Additionally, when testing the SOA across different levels of inflation, the two-stage model also reveals that firms adjust significantly faster under inflationary pressure when using book debt. However, the results of the remaining sub-samples were not confirmed by any of the interaction terms included in the pooled sub-samples.

The interaction term involving the leverage dummy and the lagged debt ratio consistently mirrors the pattern observed in the integrated model. When this variable presents significance, the coefficient is positive for the book-valued sample and negative for the market-valued sample.

Table 10 - Results from the Two-Stage Model across States

The table presents the results from the second stage of the two-stage dynamic partial-adjustment model across different macroeconomic states (Panels A to C), showing the outcomes from the OLS regression (Equation 2) $D_{i,t} - D_{i,t-1} = \delta(D_{i,t}{}^{*} - D_{i,t-1}) + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. Panels A, B, and C respectively present results with GDP growth, term spread, and the inflation rate defining macroeconomic states. Columns 1, 2 and 3 of each panel present the SOA estimation when using book-debt, while Columns 4, 5 and 6 use market-debt. A leverage dummy (*LEV_DUMMY*) is included taking the value of 1 if a firm is overleveraged and 0 otherwise. The interaction term between this variable and the lagged debt ratio (*LEV_DUMMY*BD/MD*) assesses the impact of being above the target on the SOA. A dummy variable that takes the value of 1 if the observation belongs to good (inflationary) state is included in the pooled sub-samples (Columns 3 and 6) of each panel (*GOOD_DUMMY* and *UIP_DUMMY*). The inclusion of interaction terms with the lagged debt ratio (*GOOD_DUMMY*BD/MD* and *UIP_DUMMY*BD/MD*) is aimed at testing the robustness and significance of the variations in SOA across distinct economic states. In this model, the SOA is represented by the target coefficient (BD^{*}/MD^{*}). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

Panel A: States defined by GDP growth rate

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Good	**Bad**	**G vs. B**	**Good**	**Bad**	**G vs. B**
BD/MD	-0.4942***	-0.5786***	-0.5159***	-0.4487***	-0.4576***	-0.4220***
	(0.0377)	(0.0356)	(0.0254)	(0.0332)	(0.0362)	(0.0244)
BD*/MD*	0.2766***	0.2588**	0.2920***	0.2322***	0.6822***	0.4747***
	(0.1042)	(0.1260)	(0.0794)	(0.0351)	(0.0443)	(0.0293)
LEVDUMMY	-0.0063	-0.0036	-0.0065	-0.0225*	0.0265**	0.0088
	(0.0111)	(0.0096)	(0.0066)	(0.0130)	(0.0114)	(0.0080)
LEVDUMMY*BD/MD	0.0493	0.0770*	0.0690**	0.0691	-0.0851**	-0.0415
	(0.0501)	(0.0441)	(0.0304)	(0.0429)	(0.0379)	(0.0269)
GOOD_DUMMY			0.0010			-0.0187***
			(0.0025)			(0.0024)
GOOD_DUMMY*BD/MD			-0.0231			-0.0268***
			(0.0148)			(0.0091)
Constant	0.0320*	0.0502**	0.0346**	0.0355***	-0.0356***	0.0062
	(0.0183)	(0.0216)	(0.0137)	(0.0092)	(0.0122)	(0.0078)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,119	7,833	13,952	6,119	7,832	13,951
R-squared	0.2265	0.2428	0.2279	0.2245	0.2671	0.2526
Number of firms	2,252	2,193	2,567	2,252	2,193	2,567

Panel B: States defined by Term Spread

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Good	**Bad**	**G vs. B**	**Good**	**Bad**	**G vs. B**
BD/MD	-0.6828***	-0.6063***	-0.5429***	-0.6082***	-0.5014***	-0.4791***
	(0.0406)	(0.0383)	(0.0246)	(0.0393)	(0.0339)	(0.0243)
BD*/MD*	0.2978***	0.2435*	0.2541***	0.6425***	0.3049***	0.4716***
	(0.1150)	(0.1342)	(0.0760)	(0.0493)	(0.0442)	(0.0311)
LEV_DUMMY	-0.0022	-0.0140	-0.0074	0.0093	-0.0145	0.0022
	(0.0103)	(0.0096)	(0.0065)	(0.0133)	(0.0134)	(0.0086)
LEV_DUMMY*BD/MD	0.0704	0.1388***	0.0897***	-0.0691	0.0355	-0.0229
	(0.0501)	(0.0468)	(0.0306)	(0.0452)	(0.0445)	(0.0279)
GOOD_DUMMY			0.0002			0.0152***
			(0.0026)			(0.0030)
GOOD_DUMMY*BD/MD			-0.0109			0.0031
			(0.0146)			(0.0105)
Constant	0.0574***	0.0547**	0.0434***	0.0129	0.0447***	0.0008
	(0.0196)	(0.0236)	(0.0133)	(0.0148)	(0.0112)	(0.0082)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,782	6,883	13,665	6,782	6,883	13,665
R-squared	0.2998	0.2350	0.2297	0.3825	0.2322	0.2661
Number of firms	1,786	2,131	2,450	1,786	2,131	2,450

Panel C: States defined by Inflation Rate

	Book-valued sample			Market-valued sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	UIP	**NUIP**	**UIP vs. NUIP**	**UIP**	**NUIP**	**UIP vs. NUIP**
BD/MD	-0.5121***	-0.5451***	-0.5380***	-0.4002***	-0.4717***	-0.4145***
	(0.0390)	(0.0335)	(0.0240)	(0.0349)	(0.0360)	(0.0239)
BD*/MD*	0.0942	0.1928**	0.2454***	0.2355***	0.4621***	0.3396***
	(0.1272)	(0.0948)	(0.0767)	(0.0381)	(0.0444)	(0.0277)
LEV_DUMMY	0.0011	-0.0086	-0.0068	-0.0052	0.0020	-0.0065
	(0.0108)	(0.0097)	(0.0065)	(0.0117)	(0.0123)	(0.0078)
LEV_DUMMY*BD/MD	0.0681	0.0999**	0.0869***	-0.0014	-0.0382	-0.0083
	(0.0512)	(0.0446)	(0.0306)	(0.0402)	(0.0401)	(0.0263)
UIP_DUMMY			0.0017			-0.0090***
			(0.0024)			(0.0025)
UIP_DUMMY*BD/MD			-0.0358**			-0.0056
			(0.0140)			(0.0090)
Constant	0.0591***	0.0541***	0.0446***	0.0373***	0.0143	0.0281***
	(0.0219)	(0.0169)	(0.0133)	(0.0097)	(0.0128)	(0.0077)
Fixed-effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	6,078	7,559	13,665	6,078	7,559	13,637
R-squared	0.2197	0.2191	0.2309	0.2141	0.2632	0.2228
Number of firms	2,350	2,053	2,450	2,350	2,053	2,594

6.3. Alternative Methods for Measuring Economic States

In this study, the GDP growth rate and the term spread were selected in accordance with existing literature, and the inflation rate served as an innovative measure when testing SOA. However, macroeconomic states can be measured through various methods and by considering multiple indicators.

Given that this sample encompasses two of the most critical periods in the European economy, isolating them through a dummy variable could prove useful in examining whether, during crises, companies adjust their capital structures more quickly or slowly to adapt to adverse macroeconomic conditions. Building on this topic, two dummy variables were included in the whole sample regression. The first represents the Global Financial Crisis (*DUMMY_CRISIS*), taking the value of 1 if the observation falls within the years 2007-2009 and 0 otherwise. The second represents the influence of the COVID-19 pandemic on capital structure dynamics (*DUMMY_COVID*), assuming a value of 1 if the observation is between 2020 and 2022 and 0 otherwise. Additionally, interaction terms between each of these dummy variables and the lagged debt ratio were introduced to better assess the impact of these periods on the SOA. The regression results of Equation 3, incorporating the dummy for the crisis and pandemic years, are reported in Tables 11 and 12, respectively.

Examining the outcomes in Table 11, in both the book- and market-valued samples, the dummy variable for GFC years displays significance at 1% level. However, only in the market-valued sample, the interaction term reached significance. Demonstrating a positive relationship with the lagged debt ratio, the GFC dummy negatively influences the speed of adjustment, aligning with Dang et. al (2014) findings.

In Table 12, the dummy variable for pandemic years only showed significance (at 5% significance level) in the market-valued sample. Conversely, the interaction term was significant only for the book-valued sample, revealing a negative coefficient that indicates a higher speed of capital structure adjustment in European firms during COVID-19 pandemic, in accordance with Vo et al. (2022).

Table 11 - Alternative Macroeconomic Conditions: Global Financial Crisis

The table presents the results from the integrated model using the Global Financial Crisis to measure states, showing the outcomes from the OLS regression (Equation 3) $D_{i,t} = (1 - \delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. To isolate this economic event, a dummy for GFC years (2007-2009) was included (*DUMMY_CRISIS*). To assess if this event, denoted as a bad state, exhibits significant variations in SOA compared to other years in the sample, an interaction term between the dummy for crisis and the lagged debt ratio was also included (*DUMMY_CRISIS*BD/MD*). The SOA is calculated by taking 1 minus the coefficient of book- or market-valued leverage (*BD/MD*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

	(1)	(2)
	Book-valued sample	**Market-valued sample**
SOA	45.69%	44.21%
BD/MD	0.5431***	0.5579***
	(0.0124)	(0.0110)
MB	0.0007	-0.0011*
	(0.0005)	(0.0006)
TANG	0.0027	0.0243***
	(0.0062)	(0.0082)
EBIT	-0.0582***	-0.0771***
	(0.0126)	(0.0156)
DEP	-0.0649*	-0.1048**
	(0.0392)	(0.0499)
SIZE	0.0057***	0.0180***
	(0.0016)	(0.0021)
RD	0.0062	-0.0425
	(0.0524)	(0.0445)
RDD	-0.0015	0.0004
	(0.0037)	(0.0053)
IND_MED	0.0069	-0.0594***
	(0.0133)	(0.0170)
SE	0.0019	-0.0038
	(0.0036)	(0.0042)
MRET	-0.0121***	-0.1275***
	(0.0027)	(0.0043)
NOS	-0.0004	-0.0004
	(0.0003)	(0.0003)
DUMMY_CRISIS	0.0086***	0.0182***
	(0.0028)	(0.0033)
DUMMY_CRISIS*BD/MD	0.0071	0.0361***
	(0.0148)	(0.0133)
Constant	-0.0246	-0.2000***
	(0.0333)	(0.0415)
Fixed-effects	*Yes*	*Yes*
Observations	25,254	25,252
R-squared	0.3049	0.3654
Number of firms	3,025	3,025

Table 12 - Alternative Macroeconomic Conditions: COVID-19 Pandemic

The table presents the results from the integrated model using the COVID-19 pandemic to measure states, showing the outcomes from the OLS regression (Equation 3) $D_{i,t} = (1 - \delta)D_{i,t-1} + \delta\gamma FirmSpecific_{i,t-1} + \delta\beta Macro_{t-1} + \varepsilon_{i,t}$ with firm-fixed effects and robust standard errors. To isolate this economic event, a dummy for COVID-19 years (2020-2022) was included (*DUMMY_COVID*). To assess if this event, denoted as a bad state, exhibits significant variations in SOA compared to other years in the sample, an interaction term between the dummy for COVID-19 and the lagged debt ratio was also included (*DUMMY_COVID*BD/MD*). The SOA is calculated by taking 1 minus the coefficient of book- or market-valued leverage (*BD/MD*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively, and robust standard errors are reported in parenthesis below.

	(1)	(2)
	Book-valued sample	**Market-valued sample**
SOA	44.76%	44.48%
BD/MD	0.5524***	0.5552***
	(0.0127)	(0.0111)
MB	0.0008*	-0.0009
	(0.0005)	(0.0006)
TANG	0.0019	0.0243***
	(0.0063)	(0.0083)
EBIT	-0.0565***	-0.0749***
	(0.0126)	(0.0156)
DEP	-0.0689*	-0.1072**
	(0.0394)	(0.0503)
SIZE	0.0062***	0.0197***
	(0.0017)	(0.0022)
RD	0.0144	-0.0298
	(0.0525)	(0.0450)
RDD	-0.0017	0.0008
	(0.0037)	(0.0054)
IND_MED	0.0111	-0.0461***
	(0.0133)	(0.0173)
SE	0.0018	-0.0044
	(0.0036)	(0.0043)
MRET	-0.0139***	-0.1324***
	(0.0027)	(0.0043)
NOS	-0.0001	0.0004
	(0.0002)	(0.0003)
DUMMY_COVID	0.0035	-0.0087**
	(0.0029)	(0.0037)
DUMMY_COVID*BD/MD	-0.0477***	-0.0266
	(0.0154)	(0.0164)
Constant	-0.0423	-0.2532***
	(0.0358)	(0.0446)
Fixed-effects	*Yes*	*Yes*
Observations	25,254	25,252
R-squared	0.3049	0.3626
Number of firms	3,025	3,025

6.4. Firm Size Impact

Previous literature has warned that a firm's size directly impacts its capability to correct deviations from target leverage ratios (Drobetz and Wanzenried, 2006; Cook and Tang, 2010). This theory can be explained by the fact that large firms may find it easier to access public debt markets and incur lower adjustment costs than their smaller counterparts. In accordance, this study consistently supports a positive relationship between firm size and leverage. Noteworthy, the notable findings linked to macroeconomic states may be due to the prevalence of larger firms in specific state sub-samples. To test this hypothesis, means values for the natural logarithm of firms' total assets (*SIZE*) were compared across different macroeconomic states.

The results outlined in Table 13 showcase that the mean differences between bad and good states are statistically significant only when determined by the term spread. Additionally, there is no consistent observable pattern regarding which states tend to accommodate larger firms. However, when states are determined based on the inflation rate, the results remain significant, indicating that firms tend to be larger in economies that are not confronting inflationary conditions. The OLS regressions conducted earlier suggest that, whether determined by term spread or inflation rate, both book- and market-valued exhibit faster adjustment in good states and when not subject to inflationary stress. Contrasting these prior findings with the significant outcomes from this test, there is a lack of consensus with the anticipated outcomes outlined by Drobetz and Wanzenried (2006), as each macroeconomic state determinant indicates a distinct direction for the relationship between firms' size and the SOA. In summary, there is no indication that the observed quicker adjustments can be solely attributed to the presence of larger firms in sub-samples.

Table 13 - Mean Differences in Firms' Size

The table presents the differences in the means of firms' size across states for both book- and market-valued samples. The states are determined by GDP growth in column 1, by term spread in Column 2 and by the inflation rate in Column 3. In this study, a firm's size is measured by the natural logarithm of firm's total book assets (*SIZE*). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively.

		(1)		**(2)**		**(3)**
	GDP growth rate		**Term Spread**		**Inflation Rate**	
	Book	**Market**	**Book**	**Market**	**Book**	**Market**
Good	19.719	19.719	19.502	19.502		
Bad	19.673	19.673	19.82	19.82		
G vs. B	0.046	0.046	-0.318	-0.318		
UIP					19.683	19.683
NUIP					19.833	19.833
UIP vs. NUIP					-0.15	-0.15
p-value	0.145	0.146	0.000***	0.000***	0.000***	0.000***

6.5. Distance Away from Target

Drobetz and Wanzenried (2006) also established a connection indicating that firms located farther from their target leverage ratios tend to exhibit a heightened speed of adjustment towards those ratios. However, discerning this relationship proves challenging when analyzing data presented in Figures 1 and 2 in Section 5.1. This controversy arises because, on average, book debt ratios tend to be closer to their targets than market debt ratios. Furthermore, consistently in this study, the adjustment speed is higher within the book-valued sample. Nonetheless, to assess whether significant disparities in SOA between states are influenced by the size of the deviations, the study explores the differences in the mean absolute value of target deviations between good and bad states. The distance between the actual and the target debt ratio was calculated using the following:

$$DIS_{i,t} = \left|D_{i,t}{}^{*} - D_{i,t}\right|$$

where $D_{i,t}{}^{*} = \gamma FirmSpecific_{i,t-1} + \beta Macro_{i,t-1}$, $Firm\,Specific$ and $Macro$ represent vectors of lagged firm-specific and macroeconomic target determinants, respectively. The variable $D_{i,t}$ designates either book or market debt ratio.

Table 14 expresses the results that emphasize a contrast between good and bad state determinants. Specifically, when states are characterized by GDP growth rate, the sub-sample of good states shows, on average, smaller deviations, consistent with the earlier evidence presented. It is noteworthy, however, that the difference that is considered to be statistically significant is observed in the market-value sample. Conversely, when states are determined by the term spread, deviations appear to be larger in good states, demonstrating that they are significant for both debt measures and aligning with previous literature. Regarding inflation measurement states, the outcomes are only significant for market-valued sub-samples, pointing towards a larger deviation in non-inflationary environments.

As a result, a clear trend linking faster adjustment and a larger gap cannot be conclusively established in the book-valued sample but is evident when debt is measured using market values. Moreover, these differences are more pronounced within the market- than in the book-valued sample. This observation is in accordance with the pattern presented in Figure 1, illustrating lower volatility in both actual and target book leverage.

Table 14 - Mean Differences in Distance from the Target Leverage
The table presents the differences in the means of firms' distance from the target across states for both book- and market-valued samples. The states are determined by GDP growth in Column 1, by term spread in Column 2 and by the inflation rate in Column 3. In this study, the distance from the target is computed as the absolute value of target deviation ($DIS_{i,t} = |D_{i,t}{}^{*} - D_{i,t}|$). ***, **, and * indicate 1%, 5%, and 10% significance levels respectively.

	(1)		(2)		(3)	
	GDP growth rate		Term Spread		Inflation Rate	
	Book	Market	Book	Market	Book	Market
Good	0.111	0.179	0.114	0.193		
Bad	0.113	0.190	0.111	0.178		
G vs. B	-0.002	-0.111	0.003	0.015		
UIP					0.113	0.180
NUIP					0.112	0.190
UIP vs. NUIP					0.001	0.01
p-value	0.13	0.000***	0.081*	0.000***	0.846	0.000***

7. Limitations and Suggestions for Further Research

When estimating target leverage, it is important to note that the chosen variables may not follow a universal truth, and opting for alternative target determinants could potentially yield divergent outcomes.

Unlike Cook and Tang's (2010) focus on U.S. firms, this research is centred on European firms. As a result, slight adaptations were made to the macroeconomic target determinants due to the unavailability of precisely identical measures in European data sources. Nonetheless, these metrics were meticulously selected to replicate the effects observed in existing literature, enabling a direct comparison with previous research findings. Moreover, Cook and Tang (2010) concentrated exclusively on US firms, limiting their macroeconomic data collection to a single economy. In contrast, this study analyzes firms from 25 distinct countries, significantly increasing the heterogeneity of macroeconomic conditions. This diversity extends to macroeconomic state determinants, which vary within each country in the sample. Nevertheless, all firm-specific variables align with the authors' approach and were calculated uniformly.

The study encompasses a constrained timeframe of 23 years, with data from 2000 to 2022. This choice enables data extraction from more recent and less developed economies, resulting in a more diverse sample for analysis. However, this does present a limitation, as a longer period would permit to capture more movements and enhance the robustness of the evidence. Nevertheless, the study accommodates three crucial events for the European economy: namely, the Global Financial Crisis, the Eurozone Sovereign Debt Crisis, and the COVID-19 pandemic. This deliberate inclusion allows for the observation of substantial macroeconomic movements, offering a clear distinction between good and bad states.

The primary objective of this study was to assess the speed of adjustment among all European public firms whenever both the designated macroeconomic target and state determinants were available for data collection. However, this implies including countries with recently established stock exchanges (eg., OMX Tallinn, Nasdaq Riga, Nasdaq Vilnius, etc.). This also implies variations in monetary policies and regulations across the economies analyzed in this research. This paper covers Eurozone founding members, entrants, and countries outside the scope of the European Central Bank's policies. In this context, the European Central Bank has the authority to adjust interest rates to achieve its policy objectives, including the control of inflation and the stimulation of the economy, heavily impacting the cost of capital within a subset of this study's sample. Consequently, this heterogeneity in monetary policy may affect the speed of adjustment estimations (Jiang, 2020) between Eurozone members and non-members. For further research, it is suggested to isolate the Eurozone members to analyze if the results show consistency with the evidence provided.

To enhance the robustness of the model, additional tests could also be conducted using alternative leverage (eg., short-term debt or long-term debt) and size measures (eg., logarithm of total sales). Exploring the results with industry-fixed effects would also provide valuable insights, unveiling the industries most affected by various economic conditions.

8. Conclusion

While several studies have explored the relationship between macroeconomic conditions and firms' capital structure decisions (Korajczyk and Levy, 2003; Gertler and Gilchrist, 1993), there is a notable lack of research on how such conditions specifically influence firms' speed of adjustment, which is what this study investigates. Additionally, whereas majority of the existing literature has mostly concentrated on U.S. firms or other specific individual countries (eg. Drobetz and Wanzenried, 2006, focusing on Swiss firms, and Miguel and Pindado, 2001, presenting evidence from Spain), this study contributes to the literature by exploring a broader cross-country sample – the European market, – using data from the latest century.

The approach targets European publicly traded firms from 2000 to 2022 and covers both book-valued and market-valued leverage. This study uses GDP growth, term spread, and the inflation rate as the determinants of economic conditions. The inclusion of the inflation rate represents an innovative approach, given the uncertainty and scarcity of previous research on how inflation impacts the speed of adjustment.

Hence, the macroeconomic states were delineated by categorizing each country's observed indicators into terciles, where the top tercile represents good states when macroeconomic conditions are defined by GDP growth and term spread, and under-inflationary-pressure (UIP) when the determinant is the inflation rate. Conversely, the bottom tercile represents bad states and non-inflationary environments.

The outcomes of this study do not perfectly align with Cook and Tang's (2010) findings in the U.S. or with the theoretical model of Hackbarth et al. (2006). Here, when measuring economic conditions based on GDP growth and term spread, overall adjustment speeds tend to be higher in good states. This general tendency, however, only proves to be statistically significant in the pooled sub-sample when GDP growth determines the state of the economy and market debt ratios are used to calculate leverage. In other words, when market debt ratios are considered, European firms tend to adjust their capital structures faster in periods of economic expansion within their respective countries.

When assessing states determined by inflation, a significant difference between inflationary and non-inflationary environments was only observable when employing the two-stage partial adjustment model. In the book-valued sample, this model reveals that firms adjust more rapidly under inflationary pressure, supporting the theory that these environments reduce the real cost of debt and influence investor behavior, creating dynamics in capital structures that amplify the SOA (De Angelo and Masulis, 1980; Schall, 1984).

The robustness tests performed in Section 6.5 suggest that results might be influenced by firms' distance from the target leverage within the market-valued sample. This leverage measure reveals significant differences in average absolute deviations across states, with greater deviations corresponding to higher adjustment speeds, as noted by Drobetz and Wanzeried (2006).

To correct the inherent bias arising from not accounting for the possibility that some firms may choose not to issue debt, the study was repeated excluding zero-leverage observations. The results of the integrated model, without this specification error, show that regardless of the debt measure employed, the speed of adjustment is faster during expansion periods as measured by GDP growth.

The outcomes from isolating critical periods in the European economy indicate a slower adjustment speed during the Global Financial Crisis when using market debt ratios, consistent with previous literature (Dang et al., 2014; Morais, Serrasqueiro, and Ramalho, 2022). Moreover, as outlined by Vo et al. (2022), following the breakout of COVID-19, European firms adjusted their capital structures faster towards the target, which is particularly evinced when employing book debt values.

As this thesis does not always yield identical results to those extracted when researching U.S. firms in previous studies, it encourages further investigation on possible differences between the two regions.

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Appendix

Table 15 - Matrix of Correlations

Table 15 shows the correlations matrix between all the target determinants used in this study. The p-values are reported in parenthesis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) BD	1.000												
(2) MD	0.605	1.000											
	(0.000)												
(3) MB	-0.024	-0.261	1.000										
	(0.000)	(0.000)											
(4) TANG	0.030	0.068	-0.040	1.000									
	(0.000)	(0.000)	(0.000)										
(5) EBIT	-0.065	-0.074	-0.053	0.104	1.000								
	(0.000)	(0.000)	(0.000)	(0.000)									
(6) DEP	-0.048	-0.041	0.024	0.327	-0.184	1.000							
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
(7) SIZE	0.200	0.223	-0.155	0.113	0.307	-0.107	1.000						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
(8) RD	-0.013	-0.114	0.076	-0.065	-0.311	0.031	-0.056	1.000					
	(0.028)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)						
(9) RDD	-0.026	-0.102	0.025	0.034	-0.047	0.034	0.187	0.536	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)					
(10) SE	-0.047	-0.102	0.126	-0.122	-0.510	0.042	-0.272	0.252	0.049	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
(11) IND_MED	0.069	0.104	-0.046	0.047	0.036	0.034	0.100	-0.131	-0.208	-0.058	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(12) MRET	0.007	0.024	-0.005	0.004	-0.016	0.029	-0.009	0.011	0.019	0.002	-0.013	1.000	
	(0.229)	(0.000)	(0.380)	(0.471)	(0.005)	(0.000)	(0.107)	(0.066)	(0.001)	(0.794)	(0.020)		
(13) NOS	0.015	0.024	-0.054	0.064	0.036	-0.018	-0.047	-0.023	-0.029	-0.058	-0.005	0.020	1.000
	(0.009)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.434)	(0.000)	

Table 16 - Firms and Observation by Country
This table displays the count of firms and observations from each economy included in this study.

	Firms		Observations	
Country	**Frequency**	**%**	**Frequency**	**%**
Austria	37	1.19	399	1.33
Belgium	70	2.25	744	2.48
Czech Republic	4	0.13	21	0.07
Denmark	71	2.28	750	2.50
Estonia	8	0.26	91	0.30
Finland	87	2.80	828	2.76
France	435	13.99	5062	16.88
Germany	387	12.45	3951	13.17
Greece	104	3.35	842	2.81
Hungary	14	0.45	106	0.35
Ireland	49	1.58	606	2.02
Italy	182	5.85	1645	5.48
Latvia	3	0.10	31	0.10
Lithuania	12	0.39	89	0.30
Luxembourg	40	1.29	319	1.06
Netherlands	80	2.57	799	2.66
Norway	108	3.47	938	3.13
Poland	262	8.43	2107	7.02
Portugal	15	0.48	49	0.16
Slovakia	4	0.13	17	0.06
Slovenia	6	0.19	34	0.11
Spain	106	3.41	879	2.93
Sweden	278	8.94	2339	7.80
Switzerland	148	4.76	1711	5.70
United Kingdom	599	19.27	5636	18.79
Total	3109	100.00	29993	100.00

Table 17 - Firms and Observations by Industry

This table displays the count of firms and observations from each industry included in this study. This classification is based on the Fama French 49 industry definition extracted from WRDS Compustat.

	Firms		Observations	
Industry	**Frequency**	**%**	**Frequency**	**%**
Agriculture	32	1.03	320	1.07
Apparel	52	1.67	608	2.03
Automobiles and Trucks	71	2.28	766	2.55
Beer & Liquor	34	1.09	445	1.48
Business Services	420	13.51	3767	12.56
Business Supplies	26	0.84	260	0.87
Candy & Soda	7	0.23	53	0.18
Chemicals	165	5.31	1372	4.57
Coal	5	0.16	26	0.09
Communication	95	3.06	838	2.79
Computer Software	134	4.31	1087	3.62
Computers	31	1.00	322	1.07
Construction	193	6.21	2174	7.25
Construction Materials	42	1.35	363	1.21
Consumer Goods	84	2.70	874	2.91
Defense	33	1.06	405	1.35
Electrical Equipment	92	2.96	1002	3.34
Electronic Equipment	97	3.12	1016	3.39
Entertainment	46	1.48	497	1.66
Food Products	112	3.60	1302	4.34
Healthcare	30	0.96	241	0.80
Machinery	184	5.92	2183	7.28
Medical Equipment	118	3.80	1053	3.51
Non-Metallic and Industrial Metal Mining	83	2.67	790	2.63
Personal Services	51	1.64	310	1.03
Petroleum and Natural Gas	96	3.09	818	2.73
Pharmaceutical Products	87	2.80	849	2.83
Precious Metals	13	0.42	63	0.21
Printing and Publishing	41	1.32	491	1.64
Real Estate	254	8.17	2423	8.08
Recreation	78	2.51	629	2.10
Restaurants, Hotels, Motels	48	1.54	368	1.23
Retail	105	3.38	1094	3.65
Shipbuilding, Railroad Equipment	4	0.13	26	0.09
Shipping Containers	88	2.83	674	2.25
Textiles	17	0.55	133	0.44
Tobacco Products	3	0.10	34	0.11
Transportation	33	1.06	271	0.90
Wholesale	5	0.16	46	0.15
Total	3109	100.00	29993	100.00