
The Impact of Large Dividend Changes on a Company's Leverage:
The Euro Area Case

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Abstract

One of the ongoing and most discussed debates in economic theory is the type of signal that dividends convey to stakeholders. Following the work of Grullon et al. (2002), who concluded that the payment of dividends is correlated to the maturity (growth stage) of companies, Cooper and Lambertides (2017) hypothesized that large dividends changes might signal alterations in the capital structure of firms: if dividends and maturity (growth) are correlated, and growth and size are publicly available, it can ascertain that dividends might convey private information about the future investment and financing decisions of companies. In this study, we investigate if large dividend changes are followed by changes in the capital structure of firms in a way not predicted by standard variables. We start by computing a target debt ratio based on conventional capital structure drivers and compare it to the observed debt ratio over time. We then test the significance of several variables in explaining the changes verified on the capital structure. We found evidence that traditional capital structure determinants accurately predict changes in leverage and that firms tend to follow a target debt ratio that remains stable following large dividend changes. Moreover, companies experiencing larger stock returns or financial deficits (raise external financing) are associated to less leveraged capital structures. The same results are verified for market leverage.

Keywords: Capital structure; Dividends; Leverage; Signalling

JEL Codes: G32, G35

Impacto de Grandes Alterações da Política de Dividendos na Estrutura de Capitais das Empresas: O Caso da Zona Euro

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Sumário

Com base no estudo de Grullon et al. (2002), que concluiu que o pagamento de dividendos está relacionado com a maturidade das empresas, Cooper and Lambertides (2017), ponderaram se grandes variações na política de dividendos sinalizam alterações na estrutura de capitais das empresas: assumindo que os dividendos estão relacionados com a maturidade, se a fase de crescimento (maturidade) e a dimensão das empresas são informações disponíveis publicamente, é presumível que a distribuição de dividendos contenha informação privada sobre os investimentos e ações de financiamento futuras das empresas. Seguindo esta linha de pensamento, o presente estudo testa se mudanças significativas nos dividendos das empresas sinalizam alterações na estrutura de capitais não previsíveis com base nos modelos tradicionais de endividamento. Numa primeira fase, calculou-se um nível de endividamento objetivo que é, posteriormente, comparado com o observado ao longo do período em estudo. Seguidamente, testou-se a significância de várias variáveis (nomeadamente a diferença entre os níveis de endividamento objetivo e verificado) na explicação de alterações no nível de dívida observado (relativo ao total do ativo) ao longo do tempo. Concluiu-se que os determinantes tradicionais da estrutura de capitais preveem com precisão mudanças no rácio de endividamento e que as empresas tendem a seguir um nível de dívida objetivo. Além disso, o nível de endividamento objetivo não sofre alterações significativas após grandes alterações nos dividendos. As empresas com défices financeiros ou com elevada rentabilidade das ações apresentam, em média, estruturas de capitais menos alavancadas. Utilizando os valores de mercados, as conclusões do estudo mantêm-se.

Palavras-chave: Alavancagem; Dividendos; Endividamento; Estrutura de Capitais

JEL Codes: G32, G35

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1. INTRODUCTION

For a long time, there has been a debate about the signal given by dividend changes and several models were created and improved to forecast and explain the level of leverage of companies. In order to contribute positively to that discussion and to complement and expand the study undertaken by Cooper and Lambertides (2017), who showed that there is a significant increase in the level of leverage of firms in USA after a large increase of dividends, We have decided to analyze the behavior of the capital structure of European companies following considerable changes in the dividend policy: dividend increases, decreases and initiations. The main purpose of this study is to test if large changes in the dividend pay-out ratio of companies signal changes in their financing policy.

We start by reviewing the literature around dividends and by exposing to the reader the different theories and explanations to one of the most discussed puzzles in finance: why dividends are paid. This question arises primarily from the fact that dividends are taxed at higher rates than capital gains. Subsequently, we focus on signaling theories and, particularly, in what do dividends signal. From Modigliani and Miller (1961) to Miller and Rock (1985), there seems to be a support in favor of dividends as a signal of good prospects. However, we also present the work of other academics who found little or no predictive power of dividends as signals of future earnings. To conclude, we analyze the main capital structure theories and some of the most prominent empirical works on the traditional determinants of leverage – which later will be the base to compute the target debt-ratio of firms (such as size and uniqueness) and to explain the changes observed on leverage throughout the period.

In the following chapter, after a brief general conclusion about the literature review, we present our research hypothesis. Subsequently, we describe the criteria adopted to select the data and describe the main features of the methodology adopted. Section 5 describes our study results: the potential existence of a disparity between observed and target debt ratios, and the factors driving book leverage variations over the period under analysis. Section 6 tests the robustness of the model utilized by comparing the results verified under book figures to the ones under market values. Sections 7 and 8 conclude the paper and suggest future research extensions, respectively.

2. LITERATURE REVIEW

This section describes the ongoing debate about two of the major puzzles in finance and the different theories and explanations to them. We start by presenting potential reasons why dividends are distributed, given that investors pay higher tax rates on stock dividends than on capital gains. In the next step, we analyze the different theories about what do dividends signal. The final subsection exhibits a review of the traditional determinants of capital structure.

2.1 Why do companies pay dividends?

One of the main enigmas in finance is why do companies distribute a substantial portion of their earnings in the form of dividends. Generally, dividends are taxed at higher rates than capital gains, which are subjected to tax only when stocks are sold. Therefore, it would make sense for companies to reinvest their earnings and try to generate value for shareholders through the appreciation of the stock price, rather than to pay dividends.

In fact, there are several theories aiming to justify why dividends are distributed. For instance, some investors prefer stable income, which is generally the case of dividends. Small investors incur significant transaction costs when trading stocks, which might be a determinant obstacle to constantly realize capital gains. Additionally, as we will see further, investors might rely on dividends to formulate their expectations about the future cash flows of a company. As a result, one possible explanation is that dividends might be used as a signal.

Assuming perfect and efficient capital markets, Modigliani and Miller (1961) formalized a model where rational investors have no preference between dividends and capital gains. However, Gordon (1959 and 1962) presented evidence against the irrelevance theory proposed by Modigliani and Miller (1961) and proposed the *bird-in-hand theory*, which suggests that investors pursue high dividend-payout stocks, since they provide a more stable income and, hence, are perceived as less risky. Green and Feldstein (1983) reached an equilibrium to demonstrate why paying dividends maximizes the value of a company's stocks. The authors explanation leans on the shareholders desire to diversify their portfolio and on their different tax status. In addition, Fama and French (2001) found that the payment of dividends is correlated to the company's characteristics: more profitable, larger and with fewer growth opportunities companies, tend to pay larger amounts of dividends. Baker and Wurgler (2004) adapted the model proposed by Modigliani & Miller (1958), relaxed the assumption of

market efficiency and proposed the *Catering Theory*, which states that the decision to pay dividends depends on investor demand. In other words, managers set larger dividends when the investors reservation price for dividend-paying stocks is higher than for non-dividend stocks.

In addition, dividends might be used to align the interests of managers with those of shareholders and, consequently, reduce agency costs. This conflict arises because ownership and control are separated, and each party has different interests. While shareholders expect their share values to increase, the managers pretend to maximize their compensation (such as remuneration) and might undertake riskier projects, which could solely meet their benefits. By increasing dividend payout, not only a larger portion of the earnings goes directly to the shareholders, but also the managers have a smaller amount of earnings to invest in risky projects. Moreover, Easterbrook (1984) states that agency costs are reduced when managers raise capital. Therefore, as larger the amount of dividends paid (dividend payout), the lower the funds available and, *ceteris paribus*, the companies will have an increased need to raise capital in the market, reducing agency costs (since managers are monitored by Securities and Exchange Commissions when they decide to issue equity).

2.2 Signaling theory

The signaling theory arises due to the asymmetric information between two parties. The party who possesses the information might use it to signal a set of characteristics, which can influence the behavior and forecasts of the other party. This theory was firstly proposed by Spenser (1973), who used education as the factor to signal job candidates quality and, consequently, reduce information asymmetry. According to Stiglitz (2000), this asymmetry depends on two major types of information: awareness about the other entity characteristics and information about its future behavior. In a managerial and entrepreneurial context, the management of a company might adjust its characteristics in order to transmit its quality and prospects to the market. The signal might be of multiple types such as corporate governance characteristics (Sanders & Boivie, 2004) and the amount of debt in the capital structure (Ross, 1977), which appears to signal a higher quality of companies, in the sense that firms were able to borrow and meet the underlying debt service.

In addition, and since this study focuses on the signal given by dividends, we will zoom in the dividends signaling theories. There are several academic works which conclude that dividends signal positive prospects. For instance, Modigliani and Miller (in their reply to the 1958 article), came up with the hypothesis that dividends possess informational content, since the market value of a company is a function of its expected results, by assuming the managers set the dividends depending on their forecasts of future earnings. Bhattacharya (1980) generalized its labor market model to the capital markets and concluded that dividends signal larger future earnings. John and Williams (1985) reached a signaling equilibrium where companies with higher expected cashflows pay a larger amount of dividends and have larger capital gains depending on the internal demand for cash. Miller and Rock (1985) illustrated a signaling equilibrium under asymmetric information (managers are better informed about their companies expected earnings and investments than outside investors), where dividends should be used as mechanism to signal good news. Moreover, dividend initiations are reportedly associated to positive abnormal returns (Officer, 2011). There are two main explanations for these findings: initiations transmit to the market higher future earnings and reduce agency costs, since a portion of the cashflows goes directly to the shareholders (Jensen M. C., 1986).

However, contrasting with the signaling theory of dividends, Watts (1973) complemented Modigliani and Miller (1958), by showing that future earnings changes and unexpected

dividend changes are positively correlated. However, this relationship is weak, which suggests that the information provided by the dividends is not significant. Penman (1983) analyzed the power of the announcement of dividends and management earnings as tool to forecast earnings. The author concluded that if dividends do not adjust to the earnings forecast, they do not reflect the future value of a company. In their article, DeAngelo et al. (1996), showed that dividend increases are not followed by significant earnings growth, by underlining the managers behavior (such as over optimism about the future results) as the principal cause. The work of Benartzi et al. (1997) focuses on American listed companies and concludes that an increase in the dividend policy does not reflect higher earnings growth. In the same study, the authors also found that the magnitude of the dividend increase does not reflect any specific trend of the future earnings and that models including dividends do not outperform models which exclude dividends (thus, adding dividends to the model does not increase its explanatory power). Moreover, *The Firm Life Cycle Theory* (Subramanian, 2009) provides evidence against the signaling theory: a company has a greater propensity to pay dividends when it expects a decline in its growth and profitability.

Grullon et al. (2002) concluded that the increase of dividends is correlated to the maturity (growth phase) of a company. In other words, companies tend to increase the amount of earnings paid as dividends when they have fewer growth opportunities and less reinvestment and risk and, consequently, the increase of the dividends distributed does not signal future earnings growth. Hence, according to Grullon et al. (2002) and Cooper and Lambertides (2017), since the maturity (growth stage) and dimension of a company are publicly available, the increase in the dividends must reflect information (not anticipated by the remaining economics agents) about the future behavior of the firm. The authors, therefore, hypothesize that large changes in the dividends distributed forecast an alteration in the firm's investment strategy, which subsequently affects the capital structure of the company. This study concluded that large dividend increases in American listed companies signal a considerable increase of debt in the capital structure of companies. However, it is worth noting that there is no significant change in the capital structure when there are large dividend decreases.

2.3 Determinants of Capital Structure

This section aims to provide a summary of the key factors relevant to explain and forecast capital structure decisions. We will start by reviewing the traditional models: Trade-Off model and Pecking Order theory. Subsequently, we will analyze factors known to have a significant influence on leverage.

2.3.1 Main theories

Two of the most widely known schools of thought in what concerns the determinants of capital structure are the *Trade-Off models* and the *Pecking Order theory*.

According the *Trade-Off theory*, companies set their desired leverage level by trading off the benefits of borrowing debt against its disadvantages, trying to find a hypothetical optimal debt-equity mix. Modigliani and Miller (1958), proposed that the values of firms will remain unaffected by their capital structure if taxes are not taken into consideration. However, if we consider the later variable, firms will reach their optimal capital structure by maximizing their leverage (Modigliani and Miller, 1963). Later, Myers (1984), suggested that debt, besides creating benefits (tax deductibility), increases the probability of failure. Hence, one can expect that **profitable** companies will have a greater level of debt since they might benefit from tax advantages.

The trade-off model's primary objective is to reach an "optimal" debt-equity ratio. One thus can expect that the leverage ratio will be constantly adjusting towards the ideal target capital structure. In fact, Graham and Harvey (1999) queried the CFOs of 392 companies and observed that only 19% of the firms do not have a target debt ratio or range¹. Taggart (1977) also found evidence that capital structures tend to target ratios. The adjustments towards the targets depend, among other factors, on their long-term debt capacity. In fact, if firms reach excessive degrees of leverage, they will issue new equity in order to outweigh the surplus and rectify debt levels to their targets. Marsh (1989) examined the issuance of equity by British companies and, as well, found evidence of mean reversion towards the target, which is influenced mainly by size, bankruptcy costs and asset structure. According to this study, prior to any decision about debt and equity issuances, managers already have an idea of what the long and short terms leverage will be and, thus, those decisions are mainly taken depending on

¹ 37% of the firms stated that follow a flexible target

the current deviation from the target debt ratio. Jalilvand and Harris (1982) defended that firms decide the use of debt or equity depending on their current financing needs. However, leverage is partially adjusted depending on their long-term target debt ratios. In the same study, size appears to be positively correlated to the speed of that adjustment – large firms presented a faster convergence to the target debt ratio. Expectations about the future interest rates also weights in managers capital structure decisions: the forecast of increasing interest rates prompts short-term debt and equity financing. Based on the assumption that companies' capital structures converge to their target debt/equity mix, Hovakimian et al. (2001) found that the **leverage deficit** (difference between observed and predicted debt ratios) might help forecasting the future debt level. The logic behind is that if the capital structure tends to that estimated by tradeoff determinants, companies with debt ratios higher than their targets are prone to observe a decrease in their leverage (reversion). Consequently, **changes in the target** leverage level might also explain alterations in the capital structure.

The pecking Order Theory, which was initially proposed by Donaldson (1961) and later modified by Myers and Majluf (1984), proposes that companies prefer internal financing² (through retained earnings) to external (both debt and equity), since it is less costly. Therefore, if companies generate enough cash-flows, they will not need (*ceteris paribus*) to fund themselves with debt and, in last resort, with equity. There is no optimal debt ratio and the leverage verified at any moment is the cumulative result of the hierarchical financing decisions. Consequently, and as verified by Fama and French (2002), contrary to the trade-off models, one can agree that **profitability** and debt present a negative correlation.

Later, Shyam-Sunder and Myers (1999) tested the static *Trade-off theory* against the *Pecking Order theory* and found that the later has much higher explanatory power. To corroborate that the authors introduced the concept of **financial deficit**. Financial deficit represents the relationship between the investments made by the company and the cash-flows that it generates. If positive, the company did not create enough cash-flows to break-even with the investments made. Thus, companies facing large financial deficits are more likely to present a

² In their study, Fazzari, Hubbard and Petersen (1988) suggested that external financing is not a perfect substitute for funds generated internally. According to the authors, this “market imperfection” arises because of asymmetric information problems, which influence the cost of debt and equity financing.

more leveraged capital structure since they have to raise funds externally to fund their operating and investing needs.

Myers (2001) reviewed the Pecking Order, Trade-Off and Free Cash-Flow theories, and concluded that none of them, by its own, provides accurate general conclusions about the capital structure. He asserts that testing them on broad and heterogeneous samples is inefficient and that one should distinguish subsamples. In addition, the study suggests that capital formation is majorly formed by internal funds and that debt fills the largest portion of external financing. Fama and French (2002) confirmed that none of the models perfectly explains and predicts the capital structure behavior and identified what they think to be the main caveats of each one: trade-off model's relation between leverage and profitability and pecking order's prediction that small low-leveraged growth firms tend to issue large amounts of equity.

Agency theories have also been regarded as highly significant in explaining capital structure decisions. These theories arise from the conflict of interest among managers, shareholders and bondholders. Research suggests that the choice between equity and debt financing might mitigate agency costs. Managers of highly leveraged companies are, theoretically, better aligned with shareholders' interests – since the probability of bankruptcy rises and managers are afraid of losing their perks. Jensen and Meckling (1976) argued that firms possessing high relative levels of debt on their capital structure, are keener to invest in unduly risky projects. Managers, of low leveraged companies benefit from excessive privileges. Since external entities are aware of these angles when buying/selling securities, insiders bear all the costs. Thus, managers maximize their benefits by trading-off the two types of benefits and achieving an “optimal” capital structure. To minimize agency costs managers can also increase their stake on the company, by acquiring additional equity. According to Friend and Lang (1988), the stake of the company held by its managers is negatively related to the debt ratio – resulting in a higher risk (lower diversification) for managers. Distributing a larger portion of earnings in the form of dividends might also align all stakeholders' interests (Easterbrook, 1984). Not only shareholders get a higher remuneration, but also increases the probability of raising equity. When new capital is issued, corporate managers are monitored by several external parties (e.g. Exchange Commissions and Investment Banks), which will encourage them to adjust their behavior in favor of shareholders goals. Additionally, Bradley, Jarrell and Kim (1983), Crutchley and Hansen (1989) and Brailsford, Oliver and Pua (2002) illustrated a negative relation between earnings volatility and leverage. Greater volatility is associated to

higher risk, which, on its turn, increases bankruptcy and debt agency costs. To reduce these costs, companies tend to display less leveraged structures. Brailsford, Oliver and Pua (2002) also concluded that the presence of blockholders is positively related to leverage. These findings suggest that more concentrated ownership structures signal higher leverages, in the perspective that shareholders can better monitor managers actions, avoiding sub-optimal levels of debt “chosen” to reduce managers likelihood of unemployment.

2.3.2 Major determinants

Another determinant of the capital structure is **assets tangibility**. Tangible assets might serve as collateral (reducing agency costs for debtholders) and retain more value in case of liquidation. Rajan and Zingales (1995) analyzed data from 31 different countries and reached the conclusion that assets tangibility and leverage are positively correlated in every country. Frank and Goyal (2009) also uncovered a positive relation between tangibility and leverage, arising from lower expected costs of distress (tangible assets are easier for outsiders to value) and from reduce agency problems – it is tougher to substitute low risk assets for high-risk ones. Moreover, their study suggests that tangibility is more significant for low market-to-book firms. However, some academics found evidence of a negative correlation. Grossman and Hart (1982) based their conclusions on the premise that managers consume more than the optimal level of perquisites. In highly leveraged firms, this tendency will be shortened since debtholders will constantly monitor them. As lower the assets’ tangibility, as higher the monitoring costs – hence, these firms will present more debt in order to control managers behavior. Koralun-Bereźnicka (2013) studied how assets determine the capital structure of European countries and found a negative correlation between the two variables. This conclusion does not apply to every industry and country, suggesting that the way assets are structured and thus, how it impacts leverage, is both industry and country dependent.

Profitability is also a variable that has a different impact on leverage, depending on the theoretical approach analyzed. For example, on one hand, as we have seen before, according to the *Trade-Off theory*, profitability seems to be positively correlated to debt since companies maximize their debt-tax shield by increasing leverage. On the other hand, the *Pecking Order theory* supports the opposite relation: higher profitability ratios are associated with less leveraged capital structures. If companies generate larger amounts of profit, they will not resort as much to debt, since internal funds are the preferred option in the hierarchy of financing

types. Most several empirical works corroborate the relation forecasted by the *Pecking-Order theory*, namely, Kester (1986), Friend and Lang (1988), Titman and Wessels (1988), Rajan and Zingales³ (1995), Wald (1999) and Myers (2001).

Each firm has a specific set of characteristics, which is largely determined by its products and business model (e.g. companies belonging to certain industries display larger operational margins or higher needs to invest in research and development). One can thus conclude that this **uniqueness** associated to each corporation is an important determinant of its capital expenditures and, consequently, its capital structure. Long and Malitz (1985), investigated how investment opportunities influence the capital structure of firms. They concluded that intangible growth opportunities are financed with lower amounts of debt than tangible investments (such as equipment) – intangible investments convey less information and, hence, are perceived as riskier. **Research and development** (R&D) is a type of intangible investment, which is directly linked to a firm's uniqueness. Consequently, R&D is theoretically negatively correlated to leverage. Titman (1984) studied how the capital structure influences liquidation decisions and illustrated another important angle where uniqueness plays a role. When deciding about liquidating a company, decision makers consider important the costs imposed to all stakeholders (customers, suppliers and workers). An increase in the level of debt, increases entities' probability of bankruptcy, which by its turn, worsens the **liquidation costs**. These costs are highly correlated with the type of operational activities run by firms. Hence, uniqueness should display a negative correlation to leverage.

One can argue that the **industry** in which a firm operates indirectly determines its capital structure since it influences the composition of a company's assets: risk, tangibility and requirements for external funds. MacKay and Phillips (2005) found that leverage levels depend not only on the industry in which a firm operates, but also in its position within the industry. Leverage decreases as closer companies are from their industries' median capital-labor ratio. This finding is in line with the concept of natural hedge used by Maksimovic & Zechner (1991), where firms at the technological core of an industry are exposed to lower cash-flow risk and incur less debt than the remaining. However, both MacKay and Phillips (2005) and

³ The authors found international significant evidence for the negative correlation between profitability and leverage: United States, Japan and Canada

concluded that firm specific characteristics are more determinant to the capital structure than industry specific aspects.

Empirical studies strongly suggest that **size** and leverage are positively correlated. In fact, larger companies are more diversified and have easier access to debt. Nevertheless, there is a diversified panoply of possible explanations. Fama and French (2002) found a positive relationship between size and leverage. They hypothesized that the positive correlation derives from the lower volatility on the net cash-flows of large companies. Unstable earnings are perceived as riskier and, thus, as larger the volatility of net cash-flows, as lower the leverage. Brailsford, Oliver and Pua (2002) suggested that larger firms present increased debt ratios: higher liquidation costs reduce managerial ownership in controlling agency costs, thus causing firms to prefer debt financing. Similarly, Kurshev and Strebulaev (2015) used a dynamic financing model and reached the same conclusion, condition on the presence of unlevered firm, i.e. size and leverage exhibit a positive relation if not controlled for the existence of unlevered firms. Cooper and Lambertides (2017), study in which this article is based on, concluded that larger firms verified changes of greater magnitude on their leverage. However, some authors found the opposite effect on leverage and relate it to the costs of equity financing. For example, Titman and Wessels (1988), reviewed the traditional determinants of the capital structure and concluded that short-term leverage is negatively to firm size. They justify this relation by asserting that the transaction costs associated with issuing equity is relatively higher for smaller firms.

Several authors found a significant correlation between **assets liquidity** and the level of debt in the capital structure and formulated different explanations about how it affects leverage (both positively and negatively). For instance, Myers and Rajan (1998) introduced the *Paradox of Liquidity* and suggested that as more liquid assets are, as less committed are firms to a specific objective, which might difficult their collection of external funds. However, extremely liquid firms increase their likelihood of getting financing, in the sense that are better positioned to get financing to fund illiquid projects. Williamson (1988) argued that the choice between debt and equity financing lays principally on the characteristics of the assets. Particularly, firms tend to finance redeployable assets (which according to the authors have high liquidation values) with debt and non-redeployable ones with equity. The reasoning behind it is based on the assets' alternative uses: if managers are not properly exploiting the assets

and are unable to pay the debt, creditors will take them away and redeploy them. Sibilkov (2009) found evidence that U.S. public companies with greater liquid assets present further leveraged capital structures. Since illiquidity and liquidation costs are substantial compared to the benefits of debt, when managers have disposition over firms' assets, debt tends to be adjusted to reduce the probability of incurring liquidation costs (sell the assets at discount). Similarly, lower asset liquidity is linked to decreases in leverage in order to reduce the probability of costly default.

Baker and Wurgler (2002) suggested that capital structure is the development of managers attempts to time the equity market (in other words, issuing shares at high⁴ prices and repurchase them when their price decreased). If companies successfully time the market, they increase the likelihood of having less debt. Hence, **market timing** seems to influence the capital structure. Kayhan and Titman (2007) defended that despite being influenced by their past values, capital structures tend to adjust towards target debt ratios and created two timing measures based on the former findings, that relate the type of financing (particularly, the amount of external capital raised) used by companies to their stock price: yearly timing (YT) and long-term timing (LT). The former equals the covariance between the financial deficit (total external financing) and the market-to-book ratio (M/B) and brings to the model the assumption that firms raising capital when their stock price is high⁵, tend to decrease their leverage. The long-term timing is the product between the average M/B and the average financial deficit over time. On one perspective, this measure can be used by managers to analyze how their companies' stocks are relatively to all firms. High market-to-book ratios might be an indicator of overvalued shares, which pose an opportunity to issue equity at a lower cost. One can conclude that long-term timing is, thus, negatively correlated to leverage.

Stock returns are an important determinant of capital structure: besides being an indicator of the market sentiment about companies, they also influence financing decisions. Theoretically, some theories do not match. For example, according to the *Trade-Off theory*, high stock prices are associated to lower market debt ratios (everything constant) because of the direct

⁴ Managers try to exploit the benefits of companies being overvalued in the short-term

⁵ Managers determine if stock prices are low or high by comparing the current Market-to-book ratio with the same variable in the previous years

effect of market capitalization on the capital structure. If these firms are underleveraged comparatively to the “optimal” capital structure, managers will raise debt in order to adjust towards the target debt ratio. One can, thus, conclude that high stock returns are positively correlated to changes on leverage. However, market timing theories (Baker and Wurgler, 2002) predict the opposite. For instance, when stock prices are high, managers decide to issue equity in order to benefit from firms’ temporary overvaluation. By surveying the CFOs of companies, Graham and Harvey (2001), found a negative correlation between the level of the **stock price** and the debt ratio. Indeed, the executives decide about issuing equity depending on the dilution of the earnings per share and the stock price performance. Welch (2004) analyzed how U.S. firms react to the variation of stock prices and concluded that managers do not try to offset the impact caused on capital structure. The author also discovered that stock returns justify roughly 40% of changes in capital structure over a 5-year period and that this explanatory power is greater in the long-term (approximately 60%). In addition, Welch argues that stock returns probably are the only confirmed cause of changes in market debt ratios.

Financial crises have also been associated to changes in the capital structure particularly due to the reduction of credit supply. Voutsinas and Werner (2011) examined the capital structure of Japanese firms, which faced extreme variations on the supply of debt financing and demonstrated that after economic depression periods (burst of land value bubble and financial crises of 1998) firms displayed less debt (relative to total assets) in their capital structure. Zeitun, Temimi and Mimouni (2016) found that companies debt ratios diminished due to the lack of debt supply experienced during the 2008 crisis. The authors also suggest that this crisis altered the main drivers of debt: before 2008 leverage was mainly determined by demand, while, after it, supply had a core role in shaping financing decisions. In addition, debt ratios adjust at a slower pace towards their “optimal” target capital structure. This was also verified by Dang, Kim and Shin (2012) who observed US firm before and after the subprime crises and registered a slower adjustment towards target debt ratios. Besides these findings, Fosberg (2012) found contrary evidence for the 2008 crisis: the disruption of the financial markets resulted in a temporary⁶ average increase of leverage.

⁶ Leverage ratios reversed to their before-crisis levels until the end of 2010

3. RESEARCH HYPOTHESIS

As just shown, there are several studies about the role of dividends as a signal to the market. From the “*informational content of dividends*” proposed by Modigliani and Miller to the Firm Life Cycle Theory (Bulan & Subramanian 2009), several authors tried to demystify this puzzle. However, the wide range of conclusions suggests that there is not a consensus among academics. Following the work of Grullon et al. (2002), who concluded that the payment of dividends is correlated with the maturity (growth stage) of companies, this study will focus on measuring the relationship between large dividend changes and the capital structure of companies. As hypothesized by Cooper and Lambertides (2017), large dividends changes might signal alterations in the capital structure of firms. In fact, if dividends and maturity (growth stage) are correlated, and growth and size are publicly available, it is agreeable that dividends might convey private information about the future actions of the company. The authors theorized that large changes in the dividends reflect changes in the investment policy and, thus, in the capital structure of companies.

With this paper, we intend to contribute for the ongoing debate about the signaling role of dividends and assess if the magnitude of the change in the dividends paid is a factor worth to take into consideration when predicting the future capital structure of companies. To that end, we will adopt and adapt Cooper and Lambertides (2017) and Kayhan and Titman (2007) methodology and apply it to the Euro area case. Potential differences to the latter study conclusions might arise from, for example, distinct cultural backgrounds and/or corporate governance models.

Hence, the research hypotheses are the following:

Hypothesis 1: large dividend increases are followed by an increase in leverage in a way not predicted by standard models and not related to predictable firm maturity variables.

The null hypothesis states that changes in the leverage policy are explained by standard models or reflect the expected maturity of companies.

Hypothesis 2: large dividend decreases are followed by a reduction in leverage according to standard theories.

The null hypothesis states that changes in leverage following dividend decreases are not explained by standard theories.

Hypothesis 3: dividend initiations are followed by an increase in leverage in a way not predicted by standard models and not related to predictable firm maturity variables.

As seen before, dividend initiations have a more significant impact than dividend increases.

Concluding, in this study we will test if large dividend changes (increases, decreases and initiations) can be predicted using the standard capital structure variables and if debt adjusts towards a target leverage ratio.

4. DATA DESCRIPTION AND METHODOLOGY

4.1 Data description

The data was extracted from *Thomson Reuters Eikon* and consists of firms listed in countries belonging to the Euro area, between 1996 and 2017. The companies selected must have at least five years of data following the change in the dividend policy, in order to analyze the impact on the capital structure. We did not include firms dedicated to the provision of utilities, nor financial companies. Moreover, the entities selected must present a Market-to-book ratio between -10 and 10 and a Book value of assets above € 10 million.

We adapted the procedure used by Cooper & Lambertides (2017): instead of considering yearly relative changes of the Dividend Payout, we opted to base our analysis on absolute changes on the former variable. The intent of this approach is to remove potentially insignificant observations (e.g. if a company increases the dividend payout from 2% to 3%, there is a relative change of 50% but an absolute change of only 1%).

$$(4.1) \Delta DIV Payout_{i,t} = \Delta DIV Payout_{i,t} - \Delta DIV Payout_{i,t-1}$$

Therefore, the dividend changes must meet the following criteria:

- a) The stocks underlying the dividends distribution are ordinary common stocks.
- b) The increase in the dividend pay-out must be between 12.5% and 500% in order to exclude potential outliers.
- c) In the case of dividends cuts, the decrease must be of at least -12.5% and -100% (where the later boundary represents a null dividend pay-out ratio)
- d) Similarly, the initiation of dividends must be reflected by a dividend pay-out ratio of, at the minimum, 12.5%.

The conditions stated above culminated in a sample of 531 observations: 189 increases, 257 decreases and 85 initiations. We can find some descriptive statistics about the mentioned samples in Table 1.

4.2 Methodology

In order to test the hypotheses proposed, we will start by computing a proxy for firms' target debt ratio for the firms who experience a large dividend change at year 0⁷. The same ratio will be estimated for year 5. To estimate the two ratios, we employed Cooper & Lambertides (2017) augmentation of the standard model of leverage targets with partial adjustment designed by Kayhan and Titman (2007). We decided to include an additional variable in the former model's stage 1 – the Current ratio –, in order to account for the liquidity of each firm's assets.

In the 2nd phase, we will regress the changes verified in the book debt ratio against several factors, in order to assess which fundamentals signal changes of leverage and if the capital structure adjust towards a hypothetical target debt-equity mix.

To summarize, the methodology is divided into two phases: the first step is to estimate a target debt ratio, which will be used at a later stage to determine which factors display significant statistical power to explain the observed changes in firms' capital structures.

4.2.1 Proxy for the target debt ratio

4.2.1.1 Dependent variable

This stage consists in calculating a proxy for the target leverage of firms, based on variables empirically known to have an impact on the capital structure. At a later stage, this target debt ratio will be compared to the observed debt ratio, in order to test if, in fact, large dividend changes signal alterations on leverage that can't be predicted using traditional capital structure models. Therefore, if we observe significant differences between the target and the observed debt ratios, one might conclude that large dividend changes are followed by a change in the capital structure in a way not predicted by standard leverage models. This will be done using a Tobit regression⁸ on the following model:

$$(4.1) \quad L_t = \alpha_0 + \beta_1 MtB_{t1} + \beta_2 Tangible\ assets_{t1} + \beta_3 * Profitability_{t1} + \beta_4 SE_{t1} + \beta_5 R\&D_{t1} + \beta_7 (R\&D\ dummy)_{t1} + \beta_7 \log Net\ sales_{t1} + \beta_8 * Current\ ratio_{t1} + \beta_9 * Dummy\ Div_{t1} + \beta_{10} * Dummy\ Industry + \varepsilon_i$$

⁷ Year 0 refers to the year at which the change of the dividend pay-out ratio occurred

⁸ The intent of using this type of regression is to censor observations that according to the outputted model present book debt ratios below 0% and above 100%

4.2.1.2 Independent variables

a) Market-to-Book Ratio (MtB)

As seen before, market-to-book ratio might help to explain the market timing of a company. For instance, firms might tend to issue equity (thus, reduce the debt ratio), when the market-to-book ratio is high (Baker and Wurgler, 2002).

b) Assets tangibility (Tangible assets)

This variable refers to the net property, plant and equipment held by the company, scaled by its net sales. It is closely associated to higher leverage levels since tangible assets increase firms' borrowing capacity and reduce information asymmetry (Rajan and Zingales, 1995; Frank and Goyal, 2009).

c) Profitability

In this model, profitability is measured by EBITD (earnings before interest, taxes and depreciation) scaled by total assets. On one hand, if a company has a greater ability to generate profit, it might be perceived as less risky and, consequently, borrow larger amounts (maximizing its tax shelter) and at lower interest rates (*Trade-Off theories*). On the other hand, firms with better capacity to create funds internally will resort less to external financing (Kester, 1986; Friend and Lang, 1988; Rajan and Zingales, 1995; Wald, 1999; Myers, 2001).

d) Selling expense (SE)

This variable is related to the company's cost to distribute and market its products and, along with the Research and Development expenses, tries to capture the singularity of the company's products. It will be scaled by net sales.

e) Research and Development (R&D)

There are two variables for R&D. The first one is the amount of R&D expenses (scaled by net sales) incurred by the company. Since some companies do not undertake this type of investments, the model also includes a dummy variable for R&D, in order to account for the uniqueness of each firm (Long and Malitz, 1985).

f) Size

In this model, size represents the logarithm of net sales. Most academic studies assert that size should have a positive impact on leverage (Fama and French, 2002; Brailsford, Oliver and Pua, 2002), since larger companies have a smoother access to markets (due to, for example, lower earnings volatility). Nevertheless, one should not exclude the possibility of finding the opposite relation (e.g. smaller firms have relatively higher costs to issue equity and, thus, prioritize debt financing) (Titman and Wessels, 1988).

g) Current ratio

Current ratio brings to the model the relation between current assets and short-term liabilities. With this, we intend to include an additional variable theoretically known to have an impact on capital structure (albeit there is not a consensus about the direction of this relation – Williamson, 1988; Myers and Rajan, 1998; Sibilkov, 2009).

h) Dividend paying firms dummy

The inclusion of this dummy aims to control the relationship between the payment of dividends and capital structure. Several empirical studies found a significant relationship between firms that pay dividends and their leverage (Cooper and Lambertides, 2017).

i) Industry

The model includes 25 industry dummy variables, in order to consider the different characteristics underlying each industry. With the purpose of avoiding multicollinearity, we consider the industry with the most observations, as the omitted category (automobiles and parts). Therefore, the coefficients for the remaining industries presented on Table 3, represent relative changes over the automobiles and parts sector (MacKay, 2005).

4.2.2 Leverage deficit variable

4.2.2.1 Dependent variable

In the second phase, the dependent variable will be the change in observed book leverage verified between year 0 and year 5. The main goal of this regression is to determine the principal factors that drive the variation of the capital structure over time. This will be done using a linear regression in the following model:

$$(4.2) L_t - L_{t-5} = \alpha_0 + \beta_1 FD_{[t,t-5]} + \beta_2 YT_{[t,t-5]} + \beta_3 LT_{[t,t-5]} + \beta_4 r_{[t,t-5]} + \beta_5 EBITD_{[t,t-5]} + \beta_6 Ldef_{t-5} + \beta_7 \Delta Target_{t-5} + \beta_8 DIV\ Increase\ dummy + \beta_9 DIV\ Decrease\ dummy + \beta_{10} Financial\ crises\ dummy + \varepsilon_t$$

4.2.2.2 Independent variables

a) Financial deficit (FD)

This variable represents the relation between the investments made and the cash-flows generated. It is the sum of investments (I), dividends (D) and working capital needs (ΔWC) less the cash-flows generated (CF). A dummy was included to control for the companies that required external financing: if financial deficit is positive, the dummy will assume the value 1 (Shyam-Sunder and Myers, 1999; Baker and Wurgler 2002; Kayhan and Titman, 2007).

$$(4.3) Financial\ Deficit = \Delta WC + I + D - CF$$

b) Yearly timing (YT)

Yearly timing represents the covariance between financial deficits and market-to-book ratios, throughout the 5-year period. It captures the assumption that firms issuing equity when their stock price is high, tend to decrease their leverage (Baker and Wurgler, 2002; Kayhan and Titman, 2007).

$$(4.4) Yearly\ Timing\ (YT) = \frac{(\sum_{h=0}^4 FD_h * (\frac{M}{B})_h)}{t} - \overline{FD} * \frac{M}{B}$$

c) Long-term timing (LT)

This measure is the product between the average Market-to-Book ratio and the average Financial Deficit over the period under analysis. The main intent of this variable is to analyze if managers make financing decisions by weighting their companies' stock performance against the ones verified on other corporations (Baker and Wurgler, 2002; Kayhan and Titman, 2007).

$$(4.5) \text{ Long – term Timing (LT)} = \left(\frac{\left(\sum_{h=0}^4 \left(\frac{M}{B} \right)_h \right)}{t} \right) * \left(\frac{\sum_{h=0}^4 FD_h}{t} \right)$$

d) Stock returns (r)

This variable represents the cumulative logarithm return companies' stocks over the 5 years following the large dividend change. Although there is not a consensus about the impact of this measure on capital structure, some studies showed that the performance of stock prices is the strongest predictive factor of the variation of leverage (Welch, 2004)⁹.

e) Profitability (EBITD)

This variable represents the cumulative sum of the EBIT' (scaled by initial firm value) over the five years following the large dividend change. The purpose of this factor is to test if internal financing is the main financing vehicle utilized (Friend and Lang, 1988; Myers, 2001)

f) Changes in the target debt ratio (Δ Target)

There is evidence that capital structures adjust towards a target debt-ratio. We intend to compare the variation of the observed and target debt ratios to investigate if, in fact, there is a constant convergence of capital structures to a desired proportion (Jalilvand and Harris, 1982; Graham and Harvey, 1999; Taggart 1977; Marsh, 1989.)

⁹ 40% of the change on debt ratios during the first 5 years is explained by stock prices performance

g) Leverage deficit (Ldef)

This variable refers to the difference between observed and predicted leverage. If this ratio shortened significantly over time, one might argue that companies converge to a certain debt ratio (Jalilvand and Harris, 1982; Taggart 1977; Marsh, 1989; Hovakimian et al., 2001).

h) Dividend pay-out increase and decrease dummies

These two dummy variables were inserted in order to capture the relation between the type of variation occurred in the dividend pay-out ratio and the change in leverage. With the intent of avoiding multicollinearity (also known as “dummy trap”), we omitted the dividend initiations dummy. Therefore, the coefficients shown in table 3 for the former dummies, represent changes relatively to the dividend initiation observations (Cooper and Lambertides, 2017).

i) Financial crises dummy

We added this variable to the original model, primarily to examine the relation between the change in leverage during the 5 years and the time at which the alteration occurred. To that end, we divided the period under analysis into two categories: stable and recession/crises periods. If the change in the pay-out ratio happened during an economic slowdown (particularly, the burst of the *dotcom bubble* and the *European sovereign debt crisis*), the dummy will assume the value 1 (Voutsinas and Werner, 2011; Dang, Kim and Shin, 2012; Fosberg, 2012; Zeitun, Temini and Mimouni, 2016).

5. EMPIRICAL RESULTS

5.1 Observed leverage and variation over time

As we can infer from Table 1's panels 1A and 1B, companies that presented significant decreases in the dividend pay-out ratio, displayed, on average, a considerably more leveraged profile than the firms that increased or initiated the payment of dividends – during year 0 dividend decreasing entities verified a book (market) leverage of 58% (51%), while dividend increasing 54% (45%) and initiation 53% (47%). This tendency is particularly expressive in terms of market figures and it occurs in both years 0 and 5. This result was expected since companies tend to decrease dividends when they are struggling financially (e.g. negative results reduce the level of equity relative to debt).

The dividend increasing, decreasing and initiations samples behave differently throughout the period changing their book (market) debt ratios 1.1% (0.4%), -1.3% (-2.4%) and 1.5% (-1.7%), respectively. In the case of dividend decreasing companies, the level of debt relative to assets is shortened throughout the period, which might indicate that companies that decrease significantly the dividends paid (as a portion of earnings), experience a reduction on their leverage in the long run.

Companies initiating the payment of dividends hold, on average, a lower fraction of tangible assets, which is consistent with the lower leverage level presented (fewer tangible assets to utilize as a collateral and, thus, less keen are the debtholders to grant loans). Moreover, these firms show a significantly higher component of current assets (as compared to current liabilities), which corroborates Myers and Rajan (1998), who found a positive correlation between leverage and liquidity.

The three sets of observations experienced a large increase in the Market-to-Book ratio and in their net sales (represented by size). Moreover, on average, companies invested the same portion of their net sales in Research and Development.

5.2 Target leverage

Table 2 summarizes our estimations of the Target Debt ratios. Dividend increasing companies were forecasted to present slightly larger book and market debt ratios: these figures yield a difference of -1.5% and -1.9% compared to the observed debt levels at year 0. By examining Table 2, one can assess that, from the moment when the variation of the pay-out ratio took place until the end of the 5 year-period, the dividend increasing sample experienced an increase in the book (market) debt ratio marginally above the predictions of our model – observed leverage increased 1.1% (0.4%), while our expectations were around 0.3% and (-0.5%) –, shortening (the already short) leverage deficit. This suggests that the model employed accurately forecasts capital structure and that the verified leverage seems to partially adjust towards the targets computed: the leverage deficit (difference between target and observed ratios) decreased from -1.5% (-1.9%) to 0.7% (0.9%). Therefore, one could **reject** Hypothesis 1: “following significant increases in the dividends distributed, leverage changes in way not predicted by the traditional variables”.

According to the model’s output, the dividend decrease observations should exhibit a slightly less leveraged capital structure (1.1% and 0.9%). The same conclusions can be deducted from this sample, since the observed book leverage decreased 1.3% and we were forecasting an average variation of -0.3%. Market leverage was in line with our expectations: both observed and target leverages changed -2.3%. Again, there is no large disparity between the observed and target leverages, which might signal that traditional models can accurately predict the variation in leverage. Additionally, we verified a decrease in the leverage deficit over the 5 years, suggesting that observed leverage levels tend to converge to their target ratios. Consequently, we **do not reject** our second hypothesis: “large dividend decreases are followed by an alteration in leverage according to standard theories”

Lastly, the dividend initiation sample presented a slightly different behavior. Initially, the book leverage deficit was almost null. However, after five years there was an increase in the average book leverage of 1.5%, augmenting the leverage deficit to 0.5% (still displaying a very low value). Consequently, since leverage deficits are small, it appears that standard variables can predict companies’ capital structure. At year 0, market leverage was, on

average, roughly 47% and decreased 1.7%, which reduced the deficit verified to -0.5%. We hypothesized that “dividend initiations are followed by an increase in leverage in a way not predicted by standard models and not related to predictable firm maturity variables” and, according to our first model, we can **reject** it.

The tree types of dividend changes have an additional feature in common: target debt ratios did not change significantly between years 0 and 5, suggesting that large dividend changes do not signal alterations in the “desired” capital structure of firms.

5.3 Book leverage ratio variation: explanatory variables

Table 4 contains a summary of the descriptive statistics of the variables used to explain the changes observed in the leverage ratio over the 5 years.

Table 5 summarizes how the explanatory variables used in the model are correlated to the dependent variable: changes in book leverage. The existence of financial deficit, cumulative stock return, leverage deficit and variation in the target debt ratio are the most significant variables to explain the changes in **book** leverage.

Companies that needed to raise funds externally (positive financial deficit) displayed, on average a 3.4% less leveraged capital structure. However, the magnitude of the financial deficit seems to not add significant explanatory power to the model. Contrary the *Pecking Order theory*, companies that did not generate enough cash flows to finance their activities (positive FD), seem to be less leveraged. According to this theory, one would expect that these firms financed their operations, at a first stage, with debt – which would increase the debt ratio.

The cumulative stock return displayed, as predicted by Graham and Harvey (2001) and Welch (2004), a negative correlation with debt. In fact, a one percentage point increase in the cumulative stock return is linked with an average 5.6 percentage points less leveraged capital structure.

Leverage deficit was significantly negatively correlated to the change in book leverage. Since, leverage deficit was defined as the difference between the observed and the target leverages when the large dividend change occurred, capital structure seems to change in a way predicted by traditional variables. If, for example, there is a 1% leverage deficit at year 0 (i.e. observed leverage is one percentage point greater than the estimated target), book leverage will partially adjust towards the target debt ratio. The average change on book leverage throughout the period was 43.8% of the deficit verified at the beginning.

The last highly significant variable is the variation verified on the target debt ratio. This is, the difference between the target ratios computed for year 5 and year 0. Once more, book leverage shows signals that can be predicted by traditional variables. Book leverage

seems to follow changes in the target debt ratio. In other words, if the estimated target increases 1 percentage point over the 5-year period, book leverage will change, on average, 0.67 percentage points in the same direction. These results corroborate the existence of a target debt ratio, as verified by Taggart (1977), Jalilvand and Harris (1992), Graham and Harvey (2001) and Hovakimian (2001).

6. ROBUSTNESS TESTS

According to our model, **changes in market leverage** assume, to some extent, a similar behavior to changes in book leverage. In this case, the highly significant explanatory factors were the existence of financial deficit, the cumulative stock returns, the leverage deficits, the changes in the target market debt ratio and the year at which the large dividend changes occurred (particularly, if firms were in the face of a financial crisis).

In this case, the existence of financial deficits signals a lower leverage in circa 4.1 percentage points. Despite still not being highly significant, the magnitude of financial deficits shows a stronger relation with changes in the market debt ratio than with the previous dependent variable.

Cumulative stock returns have a greater correlation in terms of market values. For example, the dividend decreasing and initiation samples, which experienced larger stock returns, displayed a greater decrease in market leverage. This result was expected since there is a direct relationship between both variables – appreciation of the stock prices leads to an increase in the market capitalization and, thus, a reduction in the market debt ratio. Additionally, if a company adopted a large dividend change in years marked by financial crises it displayed, on average, a 4 percentage points lower debt ratio. One explanation to this finding is the less smooth access to capital markets faced by firms during recession periods. This variable was practically insignificant in explaining changes in book leverage. The reason behind it might lay in the depreciation of stocks during these periods, which is directly reflected in market capitalization and, consequently, in the market level of debt.

Similarly to book leverage, market leverage presented the same direction of change, but in different degrees, to **variations in leverage deficits** and **book targets**. Assuming everything constant, an independent change of one percentage point in each one of the former variables yielded, on average, a change in market leverage of -0.47 and 0.55 percentage points, respectively. Consequently, we can conclude that market leverage also adjusts towards a target debt ratio. Particularly, observed leverage follows, on average, 55% of the change on the target capital structure. Additionally, target market debt ratios did not experience significant changes over the 5-year period.

7. CONCLUSION

Cooper and Lambertides (2017) hypothesized that dividends might convey private information about the future investment and financing decisions of companies, arguing that if dividends and maturity are correlated (Grullon et al., 2002), and growth and size are publicly available (maturity), it can be inferred that large dividend changes might signal alteration in the capital structure of firms.

We studied the Euro area case between 1996 and 2017 and concluded that large dividend changes are not followed by significant variations on the book leverage of companies. In fact, the target debt ratios estimated using traditional capital structure determinants were, on average, close estimates of the observed leverage. Additionally, the leverage deficits shortened over the 5 year-period, suggesting that book leverage tends to adjust towards a target capital structure – changes in book leverage followed approximately 70% of the variation verified in the target debt ratio. Furthermore, the small variation of the target debt ratio throughout the period, suggests that large dividend changes do not signal alterations in the target capital structure of firms.

The existence of Financial Deficit, the cumulative stock returns, the leverage deficits and the variation of the target debt ratio between years zero and five were the only significant factors to explain the observed changes on book capital structure. As predicted by several academics the need for external funds and the stock returns display a negative relation with book leverage.

Companies that decreased significantly their pay-out ratios show, on average, higher debt ratios, while companies initiating the payment of dividends are the least leveraged category. One might hypothesize that these large dividend changes are part of a mechanism to revert to the target capital structure.

The same conclusions hold for market leverage and the predictive power of the model is higher (adjusted R-squared equal to 79.4%). The financial crises dummy is also highly significant, illustrating that companies changing dividends during slowdown periods, experience a decrease in their market debt ratios.

8. MAIN LIMITATIONS AND FUTURE EXTENSIONS

The main limitation of this study was the data-intensive feature of the model. In fact, we did not include several companies that experienced large dividend changes because of missing values for one or more variables. Additionally, despite recognizing the importance of agency relations, we did not incorporate any ownership structure or corporate governance variables, which could have increased the explanatory power of the model.

Consequently, to further research this topic, one could assess if companies experiencing large dividend changes can, in fact, align all stakeholders' interests (Easterbrook, 1984) and reduce agency costs. This could be done, for example, by analyzing if companies with more volatile earnings (Brailsford, Oliver and Pua, 2002; Bradley, Jarrell and Kim, 1983; Crutchley and Hansen, 1989) tend to diverge (or converge at a slower pace) towards their target debt ratio. Other variables important to take into consideration are the concentration of the ownership structure (including the presence of blockholders) and the stake of the company held by managers (Friend and Lang, 1988).

Academics such as DeAngelo and Masulis (1980) found that non-tax debt shields (e.g. depreciation costs, investments tax credits) had an impact on the target debt ratio. In future studies, one could analyze if these alternative tax shelters present the same explanatory power in the capital structure of companies that experienced large dividend changes.

Lastly, the financial crises dummy was only significant to explain changes on leverage, measured in market values. It would be interesting to assess if this result was the simple impact of stock price decreases during financial crises or if there is a deeper mechanism underlying its roots.

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10. APPENDIX

Table 1: Descriptive statistics of the data used to estimate the Target Debt ratios

This table describes the variables used to calculate the Target Debt ratios, by type of change (increase, decrease or initiation). The Book leverage is the amount of debt in the book value of assets, while the Market leverage represents the proportion of total liabilities in the market value of assets (total liabilities + market capitalization). The Market-to-Book ratio (M/B) is the quotient between Market Capitalization and Book value of equity. Asset tangibility illustrates the parcel of the total assets referent to Property, Plant and Equipment (PPE). Selling expense (SE) and Research and Development (R&D) reflect the percentual amount of net sales/revenues used to cover all the costs related to the selling process and to invest in R&D, respectively. The firms' size is incorporated into the model by the logarithm of the net sales/revenues. The current ratio is the division between the current assets and the total assets.

Panel 1A: Description of the data referent to Year 0 (year at which the dividend pay-out ratio suffered a significant change)

	Dividend increase sample (189)		Dividend decrease sample (257)		Dividend initia- tions sample (85)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Book leverage	0,54	0,17	0,58	0,18	0,53	0,19
Market leverage	0,45	0,20	0,51	0,22	0,47	0,22
Market-to-Book	1,81	1,21	1,72	1,29	1,70	1,23
Asset tangibility	0,26	0,15	0,27	0,15	0,21	0,16
Asset profitability	0,13	0,05	0,12	0,08	0,13	0,05
Selling expense	0,21	0,13	0,20	0,14	0,23	0,15
R&D	0,04	0,05	0,03	0,04	0,04	0,05
Size	9,09	0,96	8,98	1,00	8,69	1,01
Current ratio	1,81	1,12	1,76	1,41	1,92	1,41

Panel 1B: Description of the data referent to Year 5

	Dividend increase sample (189)		Dividend decrease sample (257)		Dividend initia- tions sample (85)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Book leverage	0,55	0,16	0,57	0,17	0,55	0,20
Market leverage	0,45	0,22	0,49	0,23	0,45	0,23
Market-to-Book	2,01	1,54	1,89	1,50	1,96	1,33
Asset tangibility	0,25	0,15	0,25	0,15	0,20	0,15
Asset profitability	0,13	0,08	0,12	0,08	0,09	0,15
Selling expense	0,24	0,15	0,24	0,16	0,26	0,16
R&D	0,04	0,06	0,03	0,05	0,05	0,06
Size	9,17	0,95	9,06	1,01	8,79	1,02
Current ratio	1,67	0,81	1,67	0,87	1,82	1,09

Table 2: Target Debt ratios estimated by type of change

In this table we can find the leverage observed at Year 0 (Leverage) in terms of book and market values. The following column (Target), presents the Target debt ratios estimated for both measures of leverage. The third column displays the difference between the two former variables. The column “ Δ Leverage”, reflects the historical change in the leverage between Year 0 and Year 5. Lastly, Δ Target illustrates the change in the Target debt ratios throughout time (Target debt ratio Year 5 – Target debt ratio Year 0).

Panel 2A: Target debt ratios at Year 0

Dividend increase					
	Leverage	Target	Difference	Δ Leverage	Δ Target
Book Value	54,0%	55,5%	-1,5%	1,1%	0,3%
Market value	44,8%	46,7%	-1,9%	0,4%	-0,5%

Dividend decrease					
	Leverage	Target	Difference	Δ Leverage	Δ Target
Book Value	58,2%	57,1%	1,1%	-1,3%	-0,5%
Market value	51,2%	50,3%	0,9%	-2,3%	-2,3%

Dividend Initiation					
	Leverage	Target	Difference	Δ Leverage	Δ Target
Book Value	53,2%	53,1%	0,1%	1,5%	1,0%
Market value	46,6%	45,2%	1,3%	-1,7%	0,2%

Panel 2B: Target debt ratios at Year 5

Dividend increase			
	Leverage	Target	Difference
Book Value	55,1%	55,8%	-0,7%
Market value	45,3%	46,2%	-0,9%

Dividend decrease			
	Leverage	Target	Difference
Book Value	56,9%	56,6%	0,3%
Market value	48,9%	48,1%	0,8%

Dividend Initiation			
	Leverage	Target	Difference
Book Value	54,7%	54,1%	0,6%
Market value	44,9%	45,4%	-0,5%

Table 3: Tobit regressions output

Panels 3A to 3D illustrate the output of the Tobit regressions. We calculated the target book and market debt ratios for year and year 5. The first column presents the average expected change in the dependent variable following a unitary change on the explanatory variables. The standard error describes the average distance that each observation falls from the regression line. T-statistic and p-value are statistics used to test the significance of variables.

Panel 3A: Dependent variable – target book debt ratio at year 0

	Year 0			
	Coefficient	Std. Error	z-Statistic	p-value
Market-to-Book	0,0289	0,0048	5,9684	0,0000
Tangibility	-0,0403	0,0368	-1,0955	0,2733
Profitability	-0,5783	0,0969	-5,9652	0,0000
R&D	-1,0305	0,1488	-6,9239	0,0000
R&D Dummy	-0,0718	0,0379	-1,8960	0,0580
Selling Expenses	-0,0651	0,0474	-1,3736	0,1696
Size	0,0368	0,0059	6,2260	0,0000
Current ratio	-0,0515	0,0041	-12,6025	0,0000
Dividend Paying Firms Dummy	-0,0174	0,0159	-1,0919	0,2749
Aerospace and Defense	0,0497	0,0462	1,0777	0,2812
Alternative Energy	-0,1283	0,0507	-2,5277	0,0115
Chemicals	-0,0884	0,0255	-3,4691	0,0005
Construction and Materials	-0,1162	0,0278	-4,1824	0,0000
Electronic and Electrical Equipment	-0,1593	0,0287	-5,5473	0,0000
Fixed Line Telecommunications	-0,0998	0,0386	-2,5837	0,0098
Food and Drug Retailers	-0,0475	0,0762	-0,6225	0,5336
Food Producers	-0,1394	0,0272	-5,1249	0,0000
General Industrials	-0,0761	0,0237	-3,2046	0,0014
General Retailers	-0,1334	0,0514	-2,5971	0,0094
Health Care Equipment and Services	-0,1642	0,0251	-6,5348	0,0000
Household Goods and Home Construction	-0,1501	0,0321	-4,6777	0,0000
Industrial Engineering	-0,0873	0,0217	-4,0332	0,0001
Industrial Metals and Mining	-0,0667	0,0232	-2,8791	0,0040
Industrial Transportation	-0,1451	0,0640	-2,2670	0,0234
Leisure Goods	-0,1624	0,0762	-2,1304	0,0331
Media	-0,2037	0,0379	-5,3760	0,0000
Mining	0,1056	0,0781	1,3527	0,1762
Oil Equipment and Services	-0,1659	0,0303	-5,4740	0,0000
Personal Goods	-0,1240	0,0317	-3,9154	0,0001
Pharmaceuticals and Biotechnology	-0,0970	0,0283	-3,4238	0,0006
Software and Computer Services	-0,1716	0,0281	-6,1136	0,0000
Support Services	-0,1789	0,0324	-5,5241	0,0000
Technology Hardware and Equipment	-0,0949	0,0230	-4,1202	0,0000
Travel and Leisure	-0,0388	0,0324	-1,1967	0,2314
c	0,5229	0,0631	8,2864	0,0000

Panel 3B: Dependent variable – target book debt ratio at year 5

	Year 5			
	Coefficient	Std. Error	T-Statistic	p-value
Market-to-Book	0,0082	0,0038	2,1366	0,0326
Tangibility	-0,1259	0,0360	-3,4970	0,0005
Profitability	-0,2458	0,0577	-4,2613	0,0000
R&D	-0,7300	0,1118	-6,5322	0,0000
R&D Dummy	-0,0072	0,0266	-0,2701	0,7871
Selling Expenses	0,0287	0,0425	0,6754	0,4994
Size	0,0294	0,0059	4,9493	0,0000
Current ratio	-0,1055	0,0059	-17,9546	0,0000
Dividend Paying Firms Dummy	-0,0706	0,0128	-5,5162	0,0000
Aerospace and Defense	0,0693	0,0440	1,5752	0,1152
Alternative Energy	-0,0637	0,0493	-1,2923	0,1963
Chemicals	-0,0665	0,0242	-2,7439	0,0061
Construction and Materials	-0,0817	0,0267	-3,0622	0,0022
Electronic and Electrical Equipment	-0,1389	0,0275	-5,0466	0,0000
Fixed Line Telecommunications	-0,0709	0,0358	-1,9830	0,0474
Food and Drug Retailers	-0,0369	0,0733	-0,5037	0,6145
Food Producers	-0,1082	0,0262	-4,1251	0,0000
General Industrials	-0,0528	0,0227	-2,3278	0,0199
General Retailers	-0,1025	0,0503	-2,0392	0,0414
Health Care Equipment and Services	-0,1257	0,0246	-5,1090	0,0000
Household Goods and Home Construction	-0,1590	0,0312	-5,0886	0,0000
Industrial Engineering	-0,0662	0,0211	-3,1362	0,0017
Industrial Metals and Mining	-0,0505	0,0222	-2,2762	0,0228
Industrial Transportation	-0,0727	0,0603	-1,2051	0,2281
Leisure Goods	-0,0894	0,0732	-1,2207	0,2222
Media	-0,1623	0,0362	-4,4789	0,0000
Mining	0,0628	0,0740	0,8488	0,3960
Oil Equipment and Services	-0,1125	0,0289	-3,8935	0,0001
Personal Goods	-0,1265	0,0307	-4,1154	0,0000
Pharmaceuticals and Biotechnology	-0,0665	0,0274	-2,4217	0,0154
Software and Computer Services	-0,1542	0,0273	-5,6460	0,0000
Support Services	-0,1554	0,0307	-5,0638	0,0000
Technology Hardware and Equipment	-0,0629	0,0220	-2,8579	0,0043
Travel and Leisure	-0,0299	0,0307	-0,9722	0,3310
c	0,6704	0,0644	10,4112	0,0000

Panel 3C: Dependent variable – target market debt ratio at year 0

	Year 0			
	Coefficient	Std. Error	z-Statistic	p-value
Market-to-Book	-0,0643	0,0058	-11,1445	0,0000
Tangibility	-0,0134	0,0438	-0,3048	0,7607
Profitability	-0,4852	0,1155	-4,1996	0,0000
R&D	-1,0325	0,1774	-5,8213	0,0000
R&D Dummy	-0,0675	0,0451	-1,4953	0,1355
Selling Expenses	-0,0136	0,0564	-0,2408	0,8098
Size	0,0325	0,0070	4,6127	0,0000
Current ratio	-0,0433	0,0049	-8,8932	0,0000
Dividend Paying Firms Dummy	-0,0703	0,0190	-3,7024	0,0002
Aerospace and Defense	0,0469	0,0550	0,8529	0,3941
Alternative Energy	-0,1160	0,0605	-1,9183	0,0556
Chemicals	-0,1349	0,0304	-4,4428	0,0000
Construction and Materials	-0,1272	0,0331	-3,8416	0,0001
Electronic and Electrical Equipment	-0,1595	0,0342	-4,6591	0,0000
Fixed Line Telecommunications	-0,1485	0,0460	-3,2254	0,0013
Food and Drug Retailers	-0,0506	0,0909	-0,5566	0,5781
Food Producers	-0,1359	0,0324	-4,1936	0,0000
General Industrials	-0,1051	0,0283	-3,7158	0,0002
General Retailers	-0,1785	0,0612	-2,9162	0,0037
Health Care Equipment and Services	-0,1523	0,0299	-5,0866	0,0000
Household Goods and Home Construction	-0,1525	0,0383	-3,9854	0,0001
Industrial Engineering	-0,1053	0,0258	-4,0819	0,0001
Industrial Metals and Mining	-0,0523	0,0276	-1,8919	0,0591
Industrial Transportation	-0,1736	0,0763	-2,2760	0,0233
Leisure Goods	-0,1851	0,0909	-2,0370	0,0422
Media	-0,2459	0,0452	-5,4463	0,0000
Mining	0,0069	0,0930	0,0741	0,9410
Oil Equipment and Services	-0,1955	0,0361	-5,4122	0,0000
Personal Goods	-0,0769	0,0377	-2,0370	0,0422
Pharmaceuticals and Biotechnology	-0,1182	0,0338	-3,4999	0,0005
Software and Computer Services	-0,1999	0,0335	-5,9735	0,0000
Support Services	-0,1939	0,0386	-5,0242	0,0000
Technology Hardware and Equipment	-0,1264	0,0274	-4,6053	0,0000
Travel and Leisure	-0,0531	0,0387	-1,3730	0,1704
c	0,6622	0,0752	8,8043	0,0000

Panel 3D: Dependent variable – target market debt ratio at year 5

	Year 5			
	Coefficient	Std. Error	T-Statistic	p-value
Market-to-Book	-0,0686	0,0047	-14,7278	0,0000
Tangibility	-0,0386	0,0436	-0,8848	0,3767
Profitability	-0,3096	0,0699	-4,4290	0,0000
R&D	-0,6527	0,1354	-4,8200	0,0000
R&D Dummy	0,0741	0,0322	2,2996	0,0219
Selling Expenses	0,0421	0,0515	0,8170	0,4143
Size	0,0248	0,0072	3,4469	0,0006
Current ratio	-0,0860	0,0071	-12,0707	0,0000
Dividend Paying Firms Dummy	-0,1262	0,0155	-8,1296	0,0000
Aerospace and Defense	0,1286	0,0533	2,4145	0,0161
Alternative Energy	-0,0324	0,0597	-0,5434	0,5871
Chemicals	-0,1248	0,0294	-4,2481	0,0000
Construction and Materials	-0,0650	0,0323	-2,0095	0,0450
Electronic and Electrical Equipment	-0,1056	0,0334	-3,1653	0,0016
Fixed Line Telecommunications	-0,0701	0,0433	-1,6182	0,1063
Food and Drug Retailers	0,0065	0,0889	0,0727	0,9421
Food Producers	-0,0811	0,0318	-2,5516	0,0110
General Industrials	-0,0608	0,0275	-2,2117	0,0274
General Retailers	-0,0824	0,0609	-1,3527	0,1768
Health Care Equipment and Services	-0,1133	0,0298	-3,8000	0,0002
Household Goods and Home Construction	-0,1541	0,0379	-4,0701	0,0001
Industrial Engineering	-0,0825	0,0256	-3,2283	0,0013
Industrial Metals and Mining	-0,0250	0,0269	-0,9301	0,3528
Industrial Transportation	-0,1216	0,0731	-1,6640	0,0967
Leisure Goods	-0,1451	0,0887	-1,6356	0,1026
Media	-0,2016	0,0439	-4,5913	0,0000
Mining	-0,0345	0,0897	-0,3847	0,7006
Oil Equipment and Services	-0,0904	0,0350	-2,5821	0,0101
Personal Goods	-0,0765	0,0372	-2,0535	0,0406
Pharmaceuticals and Biotechnology	-0,0756	0,0333	-2,2724	0,0235
Software and Computer Services	-0,1598	0,0331	-4,8291	0,0000
Support Services	-0,1269	0,0372	-3,4105	0,0007
Technology Hardware and Equipment	-0,0859	0,0267	-3,2181	0,0014
Travel and Leisure	-0,0095	0,0372	-0,2555	0,7984
c	0,7584	0,0780	9,7194	0,0000

Table 4: Descriptive statistics of the leverage changes drivers

The dependent variables are the changes in Book and Market leverage between Year 0 and Year 5. The first explanatory variable is Financial Deficit (FD), which represents the total external financing obtained during the period and equals the difference between cash outflows (working capital needs, capital expenditures and dividends) and inflows (net cash flows from financing, operating and investing activities). The number of observations with FD represent the number of companies that did not generate enough cash-flows to, at least, breakeven with the capital needed to fund their operations. Yearly timing reflects the covariance between Financial Deficit and Market-to-Book ratio, over the 5-year period. Additionally, Long-term Timing is the product between the average of the Financial deficit and the M/B ratio. The Cumulative Stock Return reflects the simple average return yielded by a portfolio of an investor that held stocks in these companies during the respective 5 years. The cumulative profitability corresponds to the quotient between the cumulated EBITD generated by each firm over the 5 years and their Enterprise value at Year 0. Leverage deficits (Book and Market) refer to the difference verified between the observed leverage at Year 0 and the Target debt ratio estimated for the same year. Changes in target (Book and Market) summarize the change in the forecasted target from Year 0 to Year 5.

	Dividend increase sample		Dividend decrease sample		Dividend initiations sample	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Change in Book Leverage	1,1%	11,8%	-1,4%	11,8%	1,7%	11,5%
Change in Market Leverage	0,4%	19,9%	-2,5%	20,4%	-1,3%	15,7%
Financial Deficit (€ millions)	-4,33	15,59	-4,47	17,38	-3,31	8,64
# of observations with positive FD	46		55		13	
Yearly Timing (YT) (€ millions)	0,17	3,54	-0,02	1,36	0,01	0,30
Long-term Timing (LT) (€ millions)	-1,49	5,30	-1,27	4,81	-1,12	2,79
Cumulative Stock Return (r)	5,8%	40,3%	9,3%	43,1%	10,3%	43,6%
Cumulative Profitability	141,9%	284,4%	124,8%	129,0%	13,3%	1060,7%
Book Leverage Deficit	-1,5%	9,6%	0,9%	10,9%	-0,1%	9,8%
Δ Book Target (Year 5 - Year 0)	0,0%	9,1%	-0,7%	9,6%	1,2%	9,6%
Market Leverage Deficit	-1,9%	11,3%	0,8%	12,7%	1,1%	11,1%
Δ Market Target (Year 5 - Year 0)	-0,5%	15,1%	-2,5%	16,5%	0,5%	16,8%
# of observations under financial crises	127		171		55	

Table 5: Leverage change regression and main drivers

We can find the summary output of our regressions. The first column presents the average expected change in the dependent variable following a unitary change on the explanatory variables. The standard error describes the average distance that each observation falls from the regression line. T-statistic and p-value are statistics used to test the significance of variables. Significant for $\alpha = ***1\%$; $**5\%$; $*10\%$.

PANEL Z1: Dependent variable – change in book leverage

	Coeffi- cient	Std. Error	T-Sta- tistic	p-value	Coeffi- cient	Std. Error	T-Sta- tistic	p-value	Coeffi- cient	Std. Error	T-Sta- tistic	p-value
Financial Deficit	0,0001	0,0004	0,1688	0,8660	0,0001	0,0004	0,1380	0,8903	0,0001	0,0004	0,1714	0,8640
Financial Deficit dummy	-0,0335	0,0090	-3,7179	0,0002 ***	-0,0336	0,0091	-3,7129	0,0002 ***	-0,0340	0,0091	-3,7318	0,0002 ***
Yearly Timing	0,0020	0,0017	1,2230	0,2219	0,0020	0,0017	1,1994	0,2309	0,0020	0,0017	1,2016	0,2301
Long-term Timing	0,0000	0,0013	-0,0009	0,9993	0,0000	0,0013	0,0241	0,9808	0,0000	0,0013	0,0146	0,9883
Cumulative stock return	-0,0567	0,0088	-6,4724	0,0000 ***	-0,0567	0,0088	-6,4652	0,0000 ***	-0,0557	0,0092	-6,0872	0,0000 ***
Cumulative profitability	-0,0010	0,0008	-1,2357	0,2171	-0,0009	0,0008	-1,1939	0,2331	-0,0009	0,0008	-1,2016	0,2301
Leverage Deficit	-0,4426	0,0356	-12,4253	0,0000 ***	-0,4385	0,0359	-12,2192	0,0000 ***	-0,4377	0,0360	-12,1715	0,0000 ***
Δ Target Debt ratio	0,6813	0,0401	16,9753	0,0000 ***	0,6776	0,0403	16,8231	0,0000 ***	0,6771	0,0403	16,7888	0,0000 ***
Dividend increase					-0,0024	0,0110	-0,2201	0,8259	-0,0023	0,0110	-0,2081	0,8352
Dividend decrease					-0,0104	0,0105	-0,9873	0,3240	-0,0103	0,0105	-0,9815	0,3268
Financial Crises dummy									-0,0033	0,0081	-0,4073	0,6840
c	0,0136	0,0044	3,0726	0,0022 ***	0,0195	0,0093	2,0954	0,0366 **	0,0217	0,0107	2,0215	0,0437 **
Adjusted R-Squared	51,1993%				51,1512%				51,0722%			

PANEL Z2: Dependent variable – change in market leverage

	Coeffi- cient	Std. Error	T-Sta- tistic	p-value	Coeffi- cient	Std. Error	T-Sta- tistic	p-value	Coeffi- cient	Std. Error	T-Sta- tistic	p-value
Financial Deficit	-0,0007	0,0004	-1,6803	0,0935*	-0,0007	0,0004	-1,6721	0,0951*	-0,0005	0,0004	-1,2433	0,2143
Financial Deficit dummy	-0,0353	0,0099	-3,5585	0,0004***	-0,0354	0,0100	-3,5496	0,0004***	-0,0407	0,0099	-4,1275	0,0000***
Yearly Timing	0,0031	0,0018	1,7077	0,0883*	0,0031	0,0018	1,7020	0,0894*	0,0032	0,0018	1,7838	0,075*
Long-term Timing	0,0011	0,0014	0,7716	0,4407	0,0011	0,0014	0,7708	0,4412	0,0008	0,0014	0,5960	0,5515
Cumulative stock return	-0,1978	0,0139	-14,1848	0,0000***	-0,1975	0,0140	-14,0949	0,0000***	-0,1912	0,0138	-13,8300	0,0000***
Cumulative profit-ability	0,0001	0,0009	0,1642	0,8696	0,0001	0,0009	0,1430	0,8864	0,0001	0,0008	0,0638	0,9492
Leverage Deficit	-0,4868	0,0339	-14,3589	0,0000***	-0,4869	0,0342	-14,2268	0,0000***	-0,4691	0,0338	-13,8739	0,0000***
Δ Target Debt ratio	0,5689	0,0370	15,3918	0,0000***	0,5698	0,0372	15,3112	0,0000***	0,5465	0,0369	14,8180	0,0000***
Dividend increase					0,0021	0,0121	0,1753	0,8609	0,0037	0,0119	0,3109	0,7560
Dividend decrease					0,0029	0,0115	0,2529	0,8004	0,0031	0,0113	0,2749	0,7835
Financial Crises dummy									-0,0400	0,0088	-4,5652	0,0000***
c	0,0162	0,0049	3,3208	0,0000***	0,0141	0,0103	1,3731	0,1703	0,0410	0,0117	3,5160	0,0005***
Adjusted R-Squared	78,6400%				78,5600%				79,3524%			