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The zero-leverage puzzle: Evidence from Portuguese Firms

Maria Candeias Portugal

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Professor Diana Bonfim

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Abstract

The main objective of this paper is to identify the characteristics of Portuguese firms that have no debt in their capital structure and to understand what are the motivations behind such choices. After that, it aims at understanding if zero-leverage policies predict differences in performance during crisis periods. Using a rich source of high-quality balance sheet data for non-listed and listed Portuguese firms for the period 2006–2018, this study focuses on zero-leverage policies through an empirical analysis of 1,174,151 firm-year observations. We first present evidence that zero-leverage firms are commonly small and young and show lower levels of profitability and tangibility, when compared to their levered counterparts. Moreover, firms with no debt hoard large cash reserves and are found to have higher liquidity ratios than those of levered firms. Furthermore, we confirm that there are different motives for firms to eschew debt financing. On the one hand, findings suggest that micro firms and SMEs are financially constrained, having difficulties in accessing debt markets. On the other hand, larger firms seek for financial flexibility, in order to avoid debt overhang and preserve leverage capacity, when opting for zero-leverage policies. Additionally, we study performance levels of companies that adopt zero-leverage policies to assess if such behaviours help improving the overall firms' functioning after crisis periods. We acknowledge moderate support for our main premise that zero-leverage firms overperform their levered counterparts, during and after crisis periods.

Keywords: zero-leverage, financial constraints, financial flexibility, global financial crisis, European sovereign debt crisis

JEL Classification: G32

O enigma das *zero-leverage*: Evidência de Empresas Portuguesas

Maria Candeias Portugal

Resumo

O principal objetivo desta tese é identificar as características das empresas portuguesas que não têm dívida na sua estrutura de capital e compreender quais são as motivações por detrás de tais escolhas. Posteriormente, pretende-se compreender se as políticas *zero-leverage* preveem diferenças no desempenho durante períodos de crise. Utilizando dados de balanço de empresas portuguesas cotadas e não cotadas para o período 2006-2018, este estudo centra-se em políticas *zero-leverage* através de uma análise empírica de 1,174,151 observações. Apresentamos primeiro provas de que as empresas *zero-levered* são geralmente pequenas e jovens e apresentam níveis mais baixos de rentabilidade e tangibilidade, quando comparadas com as suas congéneres alavancadas. Além disso, as empresas sem dívida acumulam grandes reservas de tesouraria e apresentam rácios de liquidez mais elevados do que os das empresas alavancadas. Além disso, confirmamos que existem diferentes motivos para as empresas se eximirem ao financiamento por endividamento. Por um lado, os resultados sugerem que as microempresas e as PMEs são financeiramente limitadas, tendo dificuldades no acesso aos mercados de dívida. Por outro lado, as empresas maiores procuram flexibilidade financeira, a fim de evitar o excesso de endividamento e preservar capacidade de alavancagem, quando optam por políticas *zero-leverage*. Adicionalmente, estudamos os níveis de desempenho das empresas que adotam políticas *zero-leverage* para avaliar se tais comportamentos ajudam a melhorar o funcionamento global das empresas após períodos de crise. Reconhecemos uma corroboração moderada da nossa principal premissa de que as empresas *zero-levered* superam o desempenho das suas congéneres alavancadas, durante e após períodos de crise.

Palavras-chave: *zero-leverage*, restrições financeiras, flexibilidade financeira, crise financeira global, crise da dívida soberana europeia

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List of Abbreviations

CEO – Chief Executive Officer

EBITDA – Earnings before Interest, Taxes, Depreciation and Amortisation

EBIT – Earnings before Interest and Taxes

EBT – Earnings before Taxes

FE – Fixed Effects

GDP – Gross Domestic Product

MM – Modigliani-Miller

NPV – Net Present Value

ZL – Zero-Leverage

1. Introduction

The theory of capital structure is a matter deeply studied in corporate finance. However, despite of all the efforts put into explaining what exactly determines the financing decisions of firms, studies around this topic remain heterogenous and existing literature only partially explains capital structure behaviours (Graham and Leary, 2011). The zero-leverage phenomenon is an evidence of that. None of the traditional theories manage to explain why so many firms across countries are unlevered (Bessler, Drobetz, Haller and Meier, 2013). For that reason, in recent years, this puzzling behaviour has been raising a lot of interest all over the world. A handful of studies exist assessing this matter. Existing literature focuses on characterizing zero-leverage firms and understanding what could be the motives that drive them towards zero leverage choices (Devos, Dhillon, Jagannathan and Krishnamurthy, 2012; Bessler et al., 2013; Dang, 2013; Strebulaev and Yang, 2013). This study aims to enrich the already existent literature regarding zero-leverage firms through an empirical analysis of Portuguese firms.

A growing body of literature on debt conservatism introduced important insights that help understanding what characterizes these firms and what drives them to follow zero-debt policies, despite the potential advantages arising from the usage of debt. The prevalence of zero-leverage firms is an international growing trend (Bessler et al., 2013) conditioned by firm, industry and country-specific characteristics and market-wide forces (Devos et al., 2012; Bessler et al., 2013; Dang, 2013; Strebulaev and Yang; 2013). Scholars have found that zero-leverage firms are commonly small, young, highly profitable and maintain increasing levels of cash. They are often divided into two main groups, according to their motivations to eschew debt: financially constrained firms and firms seeking financial flexibility (Bessler et al., 2013; Strebulaev and Yang, 2013).

Moreover, macroeconomic conditions also play an important role in explaining debt conservatism and firms' financing decisions (Dang, 2013). Macro-level shocks impact both credit demand and supply and help us clarify why firms are increasingly moving towards zero-leverage policies. Accordingly, an important step for our analysis is taking a closer look into the Portuguese economy over the past few years, enabling us to understand if adverse macroeconomic conditions actually influence the propensity of firms to be zero-levered, and

even more, assess the difference in performance between zero-leverage firms and their levered counterparts after the Portuguese recession.

All in all, it is worth mentioning that, firstly, this paper intends to characterize Portuguese firms that have no debt in their capital structure, and to comprehend the motivations behind such choices. Additionally, we want to understand if zero-leverage behaviours predict differences in performance after crisis periods. Overall, the ultimate objective of the present paper is to focus on zero-leverage policies through a detailed analysis of non-listed and listed Portuguese firms, over the period 2006-2018.

Firstly, our results propose that zero-leverage firms are commonly small and young, in line with the already existing literature (Devos et al., 2012; Bessler et al., 2013; Dang, 2013; Strebulaev and Yang; 2013). Portuguese firms from our sample show, on average, lower levels of profitability and tangibility, when compared to their levered counterparts. Moreover, firms with no debt hoard large cash reserves and are found to have higher liquidity ratios than those of levered firms. Additionally, we increased the scope of our analysis by dividing firms according to their dimension and checking for differences in motivations for zero-leverage choices. We confirm that there are indeed different motives for firms to eschew debt financing. On the one hand, results suggest that micro firms and SMEs are financially constrained, having increasing difficulties in accessing debt markets. On the other hand, larger firms are seeking for financial flexibility, when opting for zero-leverage policies. Finally, we could not find significant evidence to support other traditional theories, such as the tradeoff and the pecking order theories of capital structure.

Furthermore, in order to assess if zero-leverage policies help improving the overall firms' functioning for crisis periods, a difference-in-differences analysis is estimated. To do so, we use three different performance measures: asset growth, investment and profitability growth. We divide our work into three main junctures. We start by directing our focus into the global financial crisis and the European sovereign debt crisis. After that, we encompass a perusal of the recovery years that followed Troika's retreat, in 2014. Lastly, a dynamic difference-in-differences analysis for the three years pre- and post-2011 was also conveyed. Both during and after the crises, zero-leverage firms show stronger growth than levered firms. They also invest more during the euro area sovereign debt crisis, when credit supply was severely constrained, but that increase is reversed in the recovery period. On profitability, the differences across the

two groups are not so marked. In the end, we acknowledge moderate support for our main premise that zero-leverage firms overperform their levered counterparts, during and after crisis periods.

The remainder of this paper will be organized as follows. Section 2 provides an outline of the most relevant capital structures theories along with more recent studies on debt conservatism and zero-debt policies. Section 3 touches upon the methodology followed, variables' creation and models' construction. Section 4 provides further insights on our sample data as well as descriptive statistics and preliminary results. Section 5 focuses on the hypothesis previously defined and refers to our empirical results. Finally, Section 6 concludes and embodies a discussion of the overall results, limitations and future research recommendations.

2. Literature Review

Traditional theories unraveled the determinants of optimal capital structures. However, there are still issues that warrant more research attention (Graham and Leary, 2011). That is the case of zero-leverage policies. Few studies exist focusing on the characteristics of zero-leverage firms and on understanding the motives that drive them towards zero leverage choices (Devos et al., 2012; Bessler et al., 2013; Dang, 2013; Strebulaev and Yang, 2013). In this chapter, the main focus will be on revising the existent literature and, as a result, its value towards this study's purpose will be clarified.

2.1. The Tradeoff and Pecking Order Theories of Capital Structure

The basis for modern thinking on capital structure was shaped by Modigliani and Miller (1958). The authors argue that in a perfect capital markets setting[1], the total value of a firm does not depend on how it is financed, whether it is through equity or debt. Therefore, it is independent of its capital structure – Capital Structure Irrelevance Principle. However, their conclusions hold only when a strict set of assumptions is assumed. These assumptions are rarely verified in the real world.

However, if we move to a setting where there are taxes, the capital structure irrelevance principle does not hold anymore (Modigliani and Miller, 1963). There are indeed advantages for firms to be levered. Firms can deduct interest payments and benefit from a tax shield that lowers the cost of debt capital. Therefore, firm value increases with debt financing. This tax advantage of debt predicts that the optimal capital structure for any firm would be composed only by debt[2], since it does not take in consideration the disadvantages that arise from the usage of leverage. Nonetheless, when financing with debt, firms should also account for risks of financial distress and bankruptcy.

[1] In a perfect capital markets setting, investors and firms can trade the same set of securities at competitive market prices equal to the present value of their future cash flows. There are no taxes, no transaction costs and no issuance costs associated with security trading. Firms' financing decisions do not change the cash flows generated by its investments, nor do they reveal new information about them (Modigliani and Miller, 1958).

[2] However, Brennan and Schwartz's (1978) and Leland (1994) confirmed that even when there are no costs of bankruptcy, i.e., bankruptcy costs are zero, the optimal level of leverage is always less than 100%.

When deciding for the optimal capital structure, firms should weight both the advantages and the disadvantages of debt financing. This concept of trading-off tax rebates and costs of leverage was primarily noted by Robichek and Myers in 1966. Following the same rationale, Hirshleifer (1966) suggested that, in a perfect capital markets setting, considering taxes and bankruptcy penalties would allow firms to determine their optimal capital structure. Later, Kraus and Litzenberger (1973) posited that "the market value of a levered firm is shown to equal the unlevered market value, plus the corporate tax rate times the market value of the firm's debt, less the complement of the corporate tax rate times the present value of bankruptcy costs" (Kraus and Litzenberger, 1973, p. 918). Overall, the aforementioned literature summarizes the static trade-off theory of capital structure. Adding to this, Myers (1984) proposed that firms attempt to follow a target debt-equity ratio, letting it vary within an optimal range. Firms may indeed diverge from their target capital structure, but they will exhibit an adjustment behavior towards it, suggesting more of a dynamic feature than that of the original trade-off theory.

Moreover, aiming to defy the trade-off theory of capital structure, Myers and Majluf (1984) brought forward the pecking order theory. They postulate that the costs of different financing methods increase with asymmetric information. Managers should not only consider the costs and benefits of taxes, but also agency costs that arise from adverse selection[3] problems. Investors who do not know about the true condition of the firm and its future growth prospects will place a lower value on new security issues. Consequently, managers will base the choice of financing investments in an order of preference. According to the authors, firms primarily favor retained earnings (internal equity). When that is depleted, firms consider external financing: preferably debt and, as a last resort, external equity. On top of that, when opting for external funds, managers should consider the signaling effect consequent to those. The issuance of debt has a positive signaling effect. It drives investors to think that the management of the company is optimistic regarding its future and that the current stock price is undervalued. On the other hand, issuing external equity signals the opposite. It will lead investors to think that the company is overvalued, resulting in a decrease in the company's stock price. Overall, the

[3] Adverse selection problems arise when there are information asymmetries. It generally refers to a situation where one party (usually the seller) has better knowledge about the quality of the product than the other party (the buyer). For more on adverse selection see Akerlof (1979).

pecking order theory of capital structure advocates that firms will not issue debt if internal equity is sufficient to meet financing requirements of new investment opportunities.

2.2. Potential Explanations for Zero-leverage Policies

The zero-leverage phenomenon is not entirely consistent with the traditional theories of capital structure. On the one hand, the static trade-off theory is unable to explain zero-leverage behavior as tax benefits (in most of the cases) exceed the costs of bankruptcy (Korteweg, 2010). Moreover, forecasts on static trade-off models suggest an optimal debt-to-capital ratio of approximately 60 percent (Leland, 1994). On top of that, recent simulation studies based on a more realistic dynamic trade-off theory postulate minimum leverage ratios as low as 12 percent (Ju, Parrino, Poteshman and Weisbach, 2005). On the other hand, the pecking order theory would be valuable at explaining why some firms opt for zero leverage in their capital structure and subsequently use retained earnings to fund investment opportunities. If internal equity can fully meet the financing requirements of external investments, firms have no need for external financing, and hence are expected to be zero-levered. Conversely, the pecking order theory fails to acknowledge why zero-leverage firms issue new external equity when in need of financing.

Thus, studies on this subject have embraced alternative approaches to explain this phenomenon. A growing body of literature has been focusing on enlightening debt conservatism and zero-leverage policies.

2.2.1. Financial Constraints – Supply Side

In an imperfect capital markets setting, when determining what is behind the capital structure's choice of firms, one has to consider not only a firm's demand for capital, but also its ability to raise funds externally (i.e., the supply side). As widely suggested by past literature, financial constraints are certainly one of the motives behind zero-leverage choices (Devos et al., 2012; Bessler et al., 2013; Dang, 2013). Firms may find it beneficial to include debt in their capital structure but imperfections in capital markets prevent them to do so. More specifically, information asymmetries between creditors and managers hinder the ability of firms to access debt markets which consequently results in credit rationing. Since lenders find it difficult to identify "good borrowers" i.e., assess the quality of the firm and the quality of its investments, firms with positive NPV projects may not have access to proper external financing tools

(Stiglitz and Weiss, 1981). Accordingly, Diamond, in 1991, suggested that, in the presence of moral hazard, it is difficult for new borrowers to have access to external debt, since their reputation in debt markets is not sufficiently strong yet. Consequently, new borrowers will begin to build their reputation by relying on bank financing and being subject to monitoring, and later moving to direct borrowing through the issuance of publicly traded bonds (Diamond, 1991).

Furthermore, it is important to point out the importance of debt ratings in predicting the so-called "good borrowers". In line with that, it would be reasonable to assume that firms with no/low credit ratings would find it more difficult to tap debt markets. Faulkender and Petersen in 2006 have shown that the access to public bond markets (measured by the firm having a debt rating) is a good predictor of differences on the level of debt firms have. Actually, the authors found that firms with debt ratings i.e., firms that are able to raise debt from public markets, have 40 percent more debt than firms without.

Besides credit ratings, there are other indicators that influence the ease of firms to access debt markets. For instance, asset tangibility (collateral) positively influences the level of debt firms have. On top of that, Benmelech and Bergman (2009, p. 358) agreed that "collateral which is more redeployable, eases financial frictions, lowers the cost of external financing, and increases debt capacity". Moreover, a firm's dividend policy has positive signaling effects which lower information asymmetries and improve a firm's access to debt markets (Fazzari, Hubbard and Petersen, 1988). Finally, firm size and age are also widely used when predicting financial constraints and are found to be positively correlated to creditor's decisions to grant debt to firms.

Overall, it is reasonable to assume that a zero-leverage policy may not be a voluntary choice. The above discussion suggests that it could be a consequence of constrained firms being restricted by their lenders. As such, firms lacking ability to access external sources of financing would be under levered when compared to their unconstrained counterparts. More recent studies on zero-leverage firms confirm that there is a higher probability for financially constrained firms to have no debt (Devos et al., 2012; Bessler et al., 2013; Dang, 2013). However, it is worth mentioning that not all zero-leverage firms are constrained in their debt. Therefore, zero-leverage firms may be classified as either financially constrained or unconstrained, as suggested by Bessler et al. (2013).

2.2.2. Financial Flexibility – Demand Side

Financial flexibility plays an important role in decisions regarding the capital structure of firms (Graham and Harvey, 2001) and is still a "missing link" in existing theories (Marchica and Mura, 2010, p. 1362). The underlying intuition behind this argument relies on companies being aware that decisions regarding financing methods chosen today may impact a firm's performance tomorrow. Accordingly, financial flexibility can be regarded as crucial in mitigating underinvestment problems[4] as well as avoiding costs related with financial distress (Rapp, Schmid and Urban, 2014). Therefore, capital structure choices can represent strategic efforts firms make in order to avoid debt overhang and preserve leverage capacity (DeAngelo and DeAngelo, 2007).

In their theory, DeAngelo and DeAngelo (2007) claimed that borrowing costs would include the opportunity costs of an inability to borrow in the future. Therefore, in imperfect capital markets, firms would optimally preserve financial flexibility by eschewing debt and issuing equity instead, in order to avoid selling lower priced shares in the future. Hence, profitable firms would maintain very low levels of debt and large cash holdings, aiming at preserving borrowing power and alleviating investment distortions (DeAngelo and DeAngelo, 2007).

Consistent with previous literature, Marchica and Mura (2010) reported that, through conservative levels of debt, firms preserve financial flexibility to a degree which "allows them to have better access to the external market when faced with positive shocks to their investment opportunity set" (Marchica and Mura, 2010, p. 1361). Furthermore, the authors found strong evidence regarding financing and investment decisions. After a period of debt conservatism, firms increase capital expenditures underpinning new investments financed through debt issuances. More recently, De Jong, Verbeek and Verwijmeren (2012) conceptualized that firms showing higher levels of financial flexibility (which they measure using a firm's unused debt capacity) make larger investments in the future than those of comparable firms. The authors also study the relationship between debt issuances and un/constrained periods. They found out

[4] Underinvestment problems are agency problems which arise when firms with valuable investment opportunities forego positive NPV projects. This happens because debtholders would be the first ones to capture (partially or totally) the payoffs from new investments, leaving insufficient returns to equity holders (Myers, 1977).

that firms which maintain conservative levels of debt during unconstrained periods are expected to issue debt in periods characterized by market constraints.

After all, it would be reasonable to assume that financial flexibility can drive firms towards zero debt decisions. Contrasting with the previous financial constraints' argument, financial flexibility represents a voluntary move firms strategically follow. As enlightened recently by Dang (2013), Bessler et al. (2013) and Strebulaev and Yang (2013), financial flexibility plays an important role in zero-leverage choices of capital structure.

Consistently with these findings, Kisser (2013) theorized the importance of holding cash to finance future expansion investments in debt-free firms. Moreover, Strebulaev and Yang (2013) highlighted that one-third of debt-free firms pay out part of their cash both in form of share repurchases or dividends, indicating firms are not in need of external financing. In accordance with the previous discussion, existing literature on the zero-leverage puzzle found a group of firms that deliberately eschew debt and characterized them as being highly profitable (Dang, 2013), holding large cash reserves (Rapp et al., 2014) and high levels of growth opportunities and paying higher dividends (Bessler et al., 2013; Strebulaev and Yang, 2013). More recently, Lotfaliei (2018) postulated that zero-leverage firms do not "leave money on the table" by not considering leverage in their capital structure. In fact, firms possess a real option on waiting to issue debt when good investment opportunities arise.

2.2.3. Macroeconomic Conditions

When studying the incentives behind zero-leverage choices one has to consider both demand and supply-side motivations to acknowledge why firms make such decisions. Notwithstanding, unfavorable macroeconomic conditions can also play an important role in explaining firms' financing decisions (Dang, 2013).

Traditional theories on capital structures foretell what could be consequences of adverse macro-level environments on financing decisions. When markets are characterized by high uncertainty and risk, costs of financial distress and information asymmetries are expected to increase, leading to a decrease in debt demand. Besides, consumers' confidence usually drops, resulting in a decline in firm's investments, which ultimately lowers firms' financing needs. However, as suggested by Korajczyk and Levy (2003), it is essential to distinguish between

financially constrained and unconstrained firms to better understand how such events impact firms' capital structures. The authors claimed that, on the one hand, financially unconstrained firm's leverage varies counter-cyclically with macro-economic conditions, meaning that those firms decrease debt financing when faced with an improvement of macro-level settings. On the other hand, constrained firms' leverage changes pro-cyclically – debt issuances decrease as unfavorable market conditions arise (Korajczyk and Levy, 2003). Moreover, they showed empirically that macroeconomic conditions are found to significantly influence issue choices for unconstrained firms. Indeed, under favorable macroeconomic conditions, adverse selection costs and information asymmetries are minimized, creating an advantageous environment for unconstrained firms to place their issues.

Cook and Tang (2010) studied the relationship between macroeconomic conditions and capital structure adjustment speed. The authors determined that firms show a faster speed of adjustment towards target leverage ratios in periods characterized by good macroeconomic conditions, regardless of being financially constrained or unconstrained. They concluded that "movement toward target leverage ratios is impeded by poor economic conditions" (Cook and Tang, 2010, p. 86). Studies relating the recent financial crisis with the accessibility of capital showed that credit supply shocks affect financial and investment policies of firms (Kahle and Stulz, 2013). In fact, it was found that net issuances of debt increased during the first year of the crisis but fell sharply after that. Contrastingly, cash holdings of firms increased during the whole crisis period (Kahle and Stulz, 2013). Generally, theories on macro-level conditions suggest that adverse market settings could positively influence the propensity for firms to be zero-levered.

Focusing on country-level macro characteristics which can affect leverage choices of firms, recent worldwide studies advocated that countries with common law systems, high creditor protection and a dividend imputation or dividend relief tax system are found to have the highest percentage of debt-free firms (Bessler et al., 2013). Dang (2013) showed that the GDP growth rate positively (and significantly) affects zero-leverage policies, while the term structure of interest rates is not significant in explaining such capital structure choices.

2.2.4. Other Possible Explanations

Besides all the arguments mentioned before, scholars have been focusing on other possible factors that could be affecting zero-leverage choices of firms. Recent literature on management entrenchment and ownership structure brought conflicting arguments on how firm-specific features could be influencing firms to adopt more conservative financing policies. Devos et al. (2012) ascertained that zero-leverage policies are not motivated by managers facing weak monitoring. In contrast, Strebulaev and Yang (2013) suggested that the CEO and governance characteristics are indeed important determinants behind zero-levered capital structures. The authors advocated that firms with larger CEO (stock) ownership and more CEO-friendly boards (where it is easier for managers to make choices based on their own personal preferences) are expected to be debt-free. Moreover, the authors found a positive and significant relationship between family-owned firms and the likelihood of being zero-levered.

3. Methodology

Following the previous analysis of existing literature, the research methodology used in this paper will be described in detail throughout this Section. In order to assess the research questions underpinning this empirical study, critical variables were identified, and several models were constructed.

3.1. Zero-Leverage Decisions

It is primarily important to revisit past academic studies on the zero-leverage phenomenon to better understand how we should define the dependent variable to be tested. On the one hand, Bessler et al. (2013), Dang (2013) and Strebulaev and Yang (2013) defined zero-leverage firms as firms that have zero book debt in a given year, i.e., the total of short-term and long-term debt sums up to zero in a given year. On the other hand, Devos et al. (2012) suggested that firms which appear to have zero debt for only one year are firms with no debt, and not actually zero-leverage firms. The authors argue that firms are only zero-levered if they have no debt in their capital structure for at least three consecutive years (i.e., the short-term and long-term debt have to be equal to zero for a minimum of three years).

The dependent variable of our empirical model was constructed following the approach suggested by Bessler et al. (2013), Dang (2013) and Strebulaev and Yang (2013). It is a binary variable *(zl)* taking the value 1 if the firm has indeed zero book debt in a given year, and 0 otherwise. A firm i is classified as having zero debt in year t if in that year the sum of its short-term and long-term debt amounts to zero. Notwithstanding, the approach followed by Devos et al. (2012) was considered as robustness and results were generally consistent with our findings (refer to Appendices 4 and 5).

Additionally, in order to understand what could be driving firms towards zero-leverage decisions, it is of first order to clearly define variables that could predict such behaviour. For that reason, we will further explore the firm-level variables to be included in the models (see Appendix 1, referring to the definition of each variable used).

Age and Size: A firm's age and size (natural logarithm of Total Assets) are good predictors of financial constraints and, consequently, directly influence the ability of firms to access debt markets. An increase in age and size usually has a positive impact on the creditor's decisions

to grant loans to firms, leading to an increase in the usage of debt (Hadlock and Pierce, 2010). Also, past literature shows that constrained firms are commonly small and young (Hadlock and Pierce, 2010), suggesting exactly that there is a negative relationship between these variables and zero-leverage choices. In line with that, we expect these variables to be negatively correlated with the propensity of firms to be zero-levered.

Profitability: Profitability was measured as EBITDA scaled by Total Assets. According to the pecking order theory of capital structure, as long as internal equity is sufficient to meet financing requirements of new investment opportunities, firms will not issue debt and thus tend to be zero-levered (Myers and Majluf, 1984). Therefore, high levels of profitability increase the amount of internally generated funds and, consequently, decrease a firm's demand for debt. In line with that, Fama and French (2002) suggested that more profitable firms are more likely to be less levered. Hence, we expect profitability to be positively correlated with the propensity of firms to be zero-levered.

Tangibility: Asset tangibility (collateral), determined by the ratio of Fixed Tangible Assets to Total Assets, positively influences the ease of firms in accessing debt markets as it is a good predictor of financial constraints. Accordingly, as suggested by Benmelech and Bergman (2009), it is positively correlated with the amount of debt firms have, as increasing levels of tangible assets decrease information asymmetries between managers and creditors. Contrastingly, firms showing lower levels of loan collateral are more constrained in their debt, as they face higher levels of information asymmetries (Devos et al., 2012; Bessler et al., 2013; Dang, 2013). Therefore, we expected asset tangibility to be negatively correlated with the propensity of firms to be zero-levered.

Cash Holdings: Cash holdings are commonly used as a proxy for firms' financial flexibility demand (Byoun, S., 2011), scaling Cash and Bank Deposits by Total Assets. In order to avoid expensive debt financing and aiming at retaining future leverage capacity, firms hoard large cash reserves so as to preserve financial flexibility (DeAngelo and DeAngelo, 2007). Besides, firms will prefer using cash holdings to finance new investments opportunities rather than external sources of financing, as predicted by the pecking order theory (Myers and Majluf, 1984). Thus, we expect that cash holdings positively influence the propensity of firms to be zero-levered.

Non-Debt Tax Shields: Non-debt tax shields work as substitutes for the tax benefits arising from the usage of debt and are expressed as the ratio of Depreciation and Amortisation to Total Assets. Consequently, increasing levels of non-debt tax shields trade-off the advantages of firms in resorting to external financing (DeAngelo and Masulis, 1980). The presence of tax shields substitutes for debt may constitute an incentive for firms to eschew debt. As such, we expect non-debt tax shields to be positively correlated with the propensity of firms to be zero-levered.

Liquidity: Liquidity, considered as the current ratio (dividing Total Current Assets by Total Current Liabilities), is also a commonly used predictor of financial constraints. Lower levels of liquidity indicate an increasing propensity of firms to be in financial distress. We, therefore, expect liquidity to be positively correlated with the propensity of firms to be zero-levered.

Debt Tax Shields: Debt tax shields, commonly defined as Interest Expenses scaled by Total Assets, are one of the main advantages arising from the usage of debt. Firms deduct interest payments and benefit from this tax shield, which lowers the cost of debt capital (Modigliani and Miller, 1963). Therefore, if a company has increasing benefits from the usage of debt, they have less incentives to be zero-levered. Debt tax shields will exhibit the opposite effect in zero-leverage decisions, when compared with non-debt tax shields. Hence, debt tax shields are expected to be negatively correlated with the propensity of firms to be zero-levered.

Tax Ratio: Tax ratio is measured as the proportion of Income Taxes to Total Assets. Firms facing lower corporate taxes will exhibit less incentives in exploiting the tax advantage of debt. Therefore, we expect tax ratio to be negatively correlated with the propensity of firms to be zero-levered.

Retained Earnings: Retained earnings, similarly to cash holdings, usually perform as a proxy for financial flexibility. In the present study, this variable is estimated by the ratio of Retained Earnings to Total Assets and it is expected to be positively correlated with the propensity of firms to be zero-levered.

In addition, aiming at solving unobserved heterogeneity problems, controlling for industry and time-specific effects is crucial. Therefore, industry and time dummies are included in the models. Despite the importance of also including firm-specific effects in our estimations, they

would capture part of the effects that we aim to observe for this set of explanatory variables. Ultimately, this would lead to biases in the results and increase the variance of our models. For these reasons, they were not included in our analysis.

Finally, after clearly defining all the essential variables, it is important to understand which statistical model would be best to address the research questions. Since the dependent variable under analysis can only assume one out of two possible values (i.e., it is a dummy variable), a logistic regression model would be ideal[5] (Devos et al., 2012; Bessler et al., 2013; Dang, 2013; Strebulaev and Yang, 2013). However, due to computational limitations arising from a large dataset, it was not possible to follow such method. Instead, a linear probability model was the most adequate statistical approach to conduct the present analysis.

3.2. Differences in Performance

Macroeconomic conditions play a major role in explaining debt conservatism and firms' financing decisions, as previously seen in Section 2. Studies have been focusing on country macro-level characteristics that impact capital structure choices of firms and drive zero-leverage decisions (Bessler et al., 2013; Dang, 2013). Instead, we believe it is valuable to take a closer look into what has been happening to the Portuguese economy over the past years and explore a unique large-scale crisis.

Portugal was profoundly affected by the global financial crisis and the following European sovereign debt crisis. Particularly, the banking sector, which has critical linkages to the economy as an intermediator of the majority of capital flows, was relentlessly impacted by the crisis (Bonfim, Farinha, and Félix, 2019). Banks lost access to international debt markets which led to a contraction in Portuguese credit supply (Farinha, Spaliara, and Tsoukas, 2019). Thus, the country was forced to request financial assistance in 2011: an emergency bailout package from the European Central Bank, the European Commission and the International Monetary Fund (Troika). Following such events, banks were forced to comply with new capital requirements. Because of that, debt supply was immensely constrained: banks cut back on lending and reallocated credit to firms in financial distress. All in all, literature on this topic

[5] In an unreported analysis, logistic regressions were estimated, and results were found to be robust and consistent with the analysis presented in this paper.

suggests that the global financial crisis and, essentially, the European sovereign debt crisis led to a worsening of credit access and credit conditions (Bonfim, Farinha, and Félix, 2019).

Hence, it is reasonable to hypothesise that firms which were highly dependent on bank debt prior to 2011 would be very much affected by this economic shock. Levered firms highly dependent on debt to finance operations are assumed to be worse off after all this. Therefore, we predict that these firms would ultimately report falling performance levels. On the other hand, firms with no debt were not directly affected by such contraction in credit supply and would, therefore, outperform after the crisis period. This is the driving motivation underpinning our analysis: checking if zero-leverage firms explain differences in performance after the crisis period.

To address this, we study the interaction between zero-leverage firms and the years of the global financial crisis (2008-2010), the European sovereign debt crisis (2011-2013) and the recovery period (2014-2017), to check for differences in overall firm performance. After that, we present a dynamic analysis considering the three years pre- and post-2011, characterized as the first year of Portuguese austerity. We present a difference-in-differences regression analysis, using three different performance measures to check the validity of our predictions: asset growth, investment (capex) and profitability growth (see Appendix 1, referring to the definition of each variable used).

4. Data and Summary Statistics

In order to conduct our study, we started by collecting balance sheet data for non-listed and listed Portuguese firms from Banco de Portugal Microdata Research Laboratory (BPLIM, 2020). We extracted data from the Central Balance Sheet database for the period 2006-2018. This timeframe comprises the years of the global financial crisis (2007-2009) and of the sovereign debt crisis in Europe (2010-2012). All variables are denominated in euros. To better perform our study, standard restrictions were imposed in order to clean the data. We started by removing financial and utility firms from the sample, given that they are subject to particular regulatory and accounting requirements (Fama and French, 2002; Frank and Goyal, 2003; Flannery and Rangan, 2006). Next, we excluded observations of firms classified as in the end of business, dissolved or liquidated, keeping only observations of firms still in business. Moreover, observations of firms with zero total assets, zero sales, less than 2 employees and reporting for the first time were removed from the sample. Also, firm-year observations that have missing relevant data for the variables under analysis were omitted. Finally, aiming at mitigating the effects of potential sample outliers, we winsorized all the variables at the 1st and 99th percentiles. In the end, the sample considered for data analysis comprised 1,174,151 firm-year observations.

Table 1: Zero-leverage firms by years

Table 1 refers to the distribution of zero-leverage firms by years. Table 1 summarizes the absolute and relative number of zero-leverage firms by years. The relative number of zero-leverage firms is computed by dividing the absolute value of zero-leverage firms by the total number of firms in the whole sample in a given year. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year.

Year	Total	Zero-Leverage Firms	Zero-Leverage Firms (%)
2006	105,355	18,095	17.18
2007	97,734	15,492	15.85
2008	96,842	14,787	15.27
2009	93,432	13,803	14.77
2010	92,854	16,574	17.85
2011	90,252	15,947	17.67
2012	84,899	16,220	19.11
2013	82,038	16,629	20.27
2014	82,895	17,638	21.28
2015	84,816	18,443	21.74
2016	86,281	18,940	21.95
2017	87,664	19,327	22.05
2018	89,089	19,484	21.87
Number of Observations	1,174,151	221,379	18.85

Table 1 above, referring to the distribution of zero-leverage firms on a yearly basis, enables us to have a yearly representation of the data and further acknowledges some preliminary conclusions. To begin with, from 2006 until 2018, 18.85% of 1,174,151 firm-year observations have zero book debt, meaning that the total of their short-term and long-term debt amounts to zero. Over the whole sample period, zero-leverage firms range between a minimum of 14.77% in 2009 and a maximum of 22.05% in 2017. Moreover, during the years of financial crisis, between 2008 and 2009, there was a trending decrease in zero-leverage firms, reaching its lowest level in the latter year. A similar behaviour is again observed in 2011, during the sovereign debt crisis in Europe. Notwithstanding, after this year, the percentage of zero-leverage firms in Portugal follows an increasing trend. This could be regarded as a result of the credit crunch that followed Troika's intervention in the Portuguese economy, reducing drastically debt supply. This ultimately stemmed an overall increase of zero-leverage firms.

Table 2: Zero-leverage firms by industry

Table 2 refers to the distribution of zero-leverage firms by industry following *Classificação Portuguesa das Atividades Económicas Rev. 3* (INE, 2007). The first column refers to the section's codes for each industry, represented in the second column. The third column summarizes the absolute number of *zl* firms in each industry and, finally, the last column refers to the relative number of *zl* firms in each industry. The relative number of zero-leverage firms in each industry is computed by dividing the absolute value of *zl* firms in each industry by the total number of *zl* firms in the whole sample. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. Financial and utility firms were excluded from the sample. Therefore, sections D, E, K, O, T and U have zero observations and were omitted from this table.

Section	Industry	Zero-Leverage Firms	Zero-Leverage Firms (%)
A	Agriculture, Farming, Hunting and Forestry	9,139	4.13
B	Mining and Quarrying	1,050	0.47
C	Manufacturing	42,927	19.39
F	Construction	16,759	7.57
G	Wholesale and Retail Trade	96,782	43.72
H	Transportation and Storage	1,909	0.86
I	Accommodation and Food Service Activities	28,706	12.97
J	Information and Communication Activities	3,484	1.57
L	Real Estate Activities	1,799	0.81
M	Consultancy, Scientific and Technical Activities	6,413	2.90
N	Administrative and Support Service Activities	3,102	1.40
P	Education	1,273	0.58
Q	Human Health and Social Work Activities	1,212	0.55
R	Arts, Entertainment, Sports and Recreation Activities	1,206	0.54
S	Other Service Activities	5,618	2.54

Table 2 allows us to have a visual representation of zero-leverage firms by industries. A notorious variation of zero-leverage firms across all sections is detected. Table 2 acknowledges that zero-leverage firms are concentrated in the Wholesale and Retail Trade industries (43.72%), followed by Manufacturing businesses (19.39%) and Accommodation and Food Service activities (12.97%). Actually, and maybe puzzling, the highest proportion of Portuguese zero-leverage firms is found to be in capital-intensive sectors, contrasting with previous findings of related literature (Bessler et al., 2013; Dang, 2013; Strebulaev and Yang, 2013). A possible explanation for such phenomenon could be that these companies have high levels of tangible assets – which they can liquidate when in need of financing – and also, large cash holdings – in order to preserve financial flexibility. All in all, results from this table lead us to the conclusion that zero-leverage policies are largely dependent on industry-specific factors, contrarily to what Strebulaev and Yang (2013) suggested.

Table 3: Descriptive statistics

Table 3 refers to the descriptive statistics of the variables considered in this study. The variables mentioned in the first column are described through number of observations (Obs.), mean, median, standard deviation (Std. Dev), minimum (Min) and maximum (Max). See appendix 1 for the definition of the variables.

	Obs.	Mean	Median	Std. Dev	Min	Max
zl	1,174,151	0.189	0	0.391	0	1
Age	1,174,151	22.532	19	13.642	3	74
Size	1,174,151	12.906	12.794	1.542	9.494	17.236
Profitability	1,174,151	0.033	0.061	0.238	-1.375	0.508
Tangibility	1,174,151	0.248	0.174	0.236	0	0.911
Cash Holdings	1,174,151	0.139	0.066	0.176	0	0.810
Non-Debt Tax Shields	1,174,151	0.042	0.028	0.046	0	0.237
Liquidity	1,174,151	2.492	1.393	3.728	0.081	26.756
Debt Tax Shields	1,174,151	0.011	0.005	0.015	0	0.077
Tax Ratio	1,174,151	0.179	0.166	0.242	-0.438	1.276
Retained Earnings	1,174,151	-0.148	0	0.744	-4.984	0.727
Asset Growth	922,425	0.057	0.012	0.290	-0.577	1.461
Investment	899,827	0.179	-0.063	1.307	-1	9.760
Profitability Growth	922,424	-0.332	-0.146	3.156	-18.267	13.375

Aiming at characterizing all variables considered in this study, Table 3 refers to the descriptive statistics of our data sample. The variables were winsorized at the 1st and the 99th percentiles (excepting *zl*), in order to mitigate the effects of possible sample outliers. Zero-leverage firms are, on average, 18.9% of the total sample, as seen previously in Table 1.

Table 4: Characteristics of zero-leverage firms vs. levered firms

Table 4 refers to the characteristics of zero-leverage and levered firms. Table 4 compares the means of firm-level variables considered in this study for zero-leverage and levered firms. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. See appendix 1 for the definition of the variables. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	Zero-Leverage Firms	Levered Firms	Diff. in means: t-stats
Age	21.880	22.683	23.237***
Size	12.153	13.081	266.075***
Profitability	0.021	0.036	21.493***
Tangibility	0.184	0.263	152.579***
Cash Holdings	0.238	0.116	-240.000***
Non-Debt Tax Shields	0.039	0.043	32.479***
Liquidity	3.709	2.209	-130.000***
Debt Tax Shields	0.002	0.013	435.735***
Tax Ratio	0.157	0.184	52.593***
Retained Earnings	-0.183	-0.140	20.107***
Asset Growth	0.053	0.058	6.451***
Investment	0.130	0.190	15.775***
Profitability Growth	-0.332	-0.332	-0.076
Number of Observations	221,379	952,772	

Table 4 explores a comparison of mean characteristics of zero-leverage firms with those of levered firms. Firstly, taking a closer look at age and size, we can conclude that zero-leverage firms from our sample are significantly younger and smaller than levered firms. Accordingly, these findings suggest that zero-leverage firms from our sample may most likely be debt constrained, going in line with the theory developed by Hadlock and Pierce (2010). Secondly, one can note that zero-leverage firms present lower levels of profitability and tangibility, when compared to their levered counterparts. While the former was not expected, the latter goes in line with recent studies on zero-leverage policies (Devos et al., 2012; Bessler et al., 2013; Dang, 2013) and suggests that Portuguese zero-leverage firms are more financially constrained. Regarding cash holdings, in accordance with the financial flexibility hypothesis (DeAngelo and DeAngelo, 2007), zero-leverage firms hoard, on average, larger levels of cash than levered firms. Moreover, zero-leverage firms are found to have higher liquidity ratios and lower debt tax shields and tax rates, as expected. Surprisingly, zero-leverage firms have lower non-debt tax shields and lower retained earnings than those of levered firms, contradicting previous research (DeAngelo and Masulis, 1980; Myers and Majluf, 1984). Finally, levered firms show

increasing levels of asset growth and investment whereas profitability growth levels are not found to be significantly different from those of zero-leverage firms.

Table 5: Characteristics of micro, SMEs and large zero-leverage firms

Table 5 refers to the characteristics of micro, SMEs and large zero-leverage firms. Table 5 compares the means and medians of firm-level variables considered in this study for micro, SMEs, and large zero-leverage firms. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. This dimension categorisation was prepared according to the number of employees and total turnover/assets of each firm (BPLIM, 2020). See appendix 1 for the definition of the variables.

	Micro		**SMEs**		**Large**	
	Mean	Median	Mean	Median	Mean	Median
Age	20.815	17	29.038	27	35.053	29
Size	11.786	11.767	14.755	14.997	16.864	17.236
Profitability	0.007	0.059	0.077	0.079	0.131	0.114
Tangibility	0.179	0.092	0.258	0.203	0.201	0.138
Cash Holdings	0.240	0.159	0.146	0.067	0.136	0.068
Non-Debt Tax Shields	0.039	0.021	0.042	0.031	0.038	0.026
Liquidity	3.836	1.704	2.361	1.460	2.280	1.530
Debt Tax Shields	0.002	0	0.009	0.003	0.002	0
Tax Ratio	0.147	0.138	0.210	0.220	0.227	0.252
Retained Earnings	-0.216	0	-0.044	0	0.049	0.015
Asset Growth	0.049	0.013	0.067	0.026	0.067	0.029
Investment	0.127	-0.127	0.139	-0.038	0.080	-0.036
Profitability Growth	-0.378	-0.188	-0.176	-0.080	-0.094	-0.037
Number of Observations	178,301	178,301	91,000	91,000	982	982

Finally, Table 5 enables us to relate the mean and median characteristics of micro firms, small and medium enterprises, and large companies that are zero levered. Notably, the great majority of zero-leverage firms are young and small and are encountered in the lower firm dimension categories (micro firms and SMEs). This suggests that zero-leverage firms from our sample are more likely to be financially constrained (Hadlock and Pierce, 2010). Taking a closer look into micro zero-leverage firms, first, it is important to point out that they are characterized as slightly profitable and generating, on average, negative retained earnings. Nevertheless, they exhibit the highest levels of cash holdings and the highest liquidity ratios. Regarding zero-leverage SMEs, it is worth noting that they show the highest levels of fixed tangible assets and have increasing levels of profitability, cash holdings and liquidity. Finally, larger zero-leverage firms are regarded as the most profitable ones, benefiting from higher tax rates and increasing levels of retained earnings.

5. Empirical Analysis and Results

5.1. Zero-Leverage Decisions

To begin with, we analyse the motives behind zero-leverage choices. Table 6 refers to the results of the linear regressions estimated in order to assess what drives firms to pursue zero-leverage policies, for the whole sample. Column (1) presents regression results when including all firm-level variables that would possibly explain zero-leverage decisions. In order to solve potential multicollinearity problems, other alternative regressions are also reported (see Appendix 2, referring to the correlation between the variables under analysis). Explicitly, in column (2) we exclude non-debt tax shields due to its high correlation with tangibility. In column (3) retained earnings are omitted because of its high correlation with size and profitability. Finally, in column (4) size is eliminated since it is highly correlated with age, profitability and cash-holdings.

Table 6: Firms' zero-leverage decisions for the whole sample

Table 6 refers to regressions results regarding firms' zero-leverage decisions for the whole sample. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	(1)	**(2)**	**(3)**	**(4)**
Intercept	1.173***	1.131***	1.104***	0.273***
	(0.008)	(0.008)	(0.008)	(0.004)
Age	0.001***	0.001***	0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.074***	-0.071***	-0.069***	-
	(0.001)	(0.001)	(0.001)	-
Profitability	0.037***	0.033***	0.037***	-0.019***
	(0.002)	(0.002)	(0.002)	(0.002)
Tangibility	-0.094***	-0.116***	-0.115***	-0.130***
	(0.003)	(0.003)	(0.003)	(0.003)
Cash Holdings	0.231***	0.230***	0.233***	0.278***
	(0.004)	(0.004)	(0.004)	(0.004)
Non-Debt Tax Shields	-0.267***	-	-	-
	(0.013)	-	-	-
Liquidity	0.005***	0.005***	0.005***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
Debt Tax Shields	-3.006***	-3.048***	-3.092***	-3.217***
	(0.029)	(0.029)	(0.029)	(0.030)
Tax Ratio	-0.007***	-0.008***	-0.007***	-0.021***
	(0.001)	(0.001)	(0.001)	(0.001)
Retained Earnings	0.009***	0.010***	-	-
	(0.001)	(0.001)	-	-
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Overall *R*-Squared	0.143	0.143	0.144	0.133
Number of Observations	1,174,146	1,174,146	1,174,146	1,174,146

Overall, results are generally consistent with the preliminary analysis presented in Section 4. Taking a closer look at firm age, one can note its coefficients being significantly positive in models (1) – (3). These findings seem inconsistent with our predictions but may be justified by the high correlation between age and size. Accordingly, when we exclude size, in model (4), the coefficient for firm age becomes significantly negative. Then, the coefficient on firms' size is negatively significant for all three models in which it is included. Generally, these findings suggest that the propensity of firms to be zero levered decreases for older and larger companies, meaning that young and small firms are more likely to be zero-levered, enforcing the financial constraints' hypothesis.

Regarding profitability, results are mixed. For the models (1) – (3), its coefficients are positively significant, suggesting that more profitable firms are more likely to be zero levered. On the other hand, in model (4), the coefficient flips sign after removing size from the model. Next, tangibility is found to negatively and significantly influence the propensity of firms to be zero levered, in line with our predictions. Firms with lower levels of tangible assets face higher information asymmetries resulting in difficulties in accessing debt markets. Hence, these findings are consistent with the financial constraints view. Moreover, cash holdings as well as retained earnings are found to have a positive and significant influence on a firm's propensity to be zero levered. These results taken together suggest that firms look for financial flexibility when following zero-leverage policies, to preserve leverage capacity for future investments. Furthermore, liquidity is found to be positively and significantly influencing zero-leverage decisions, suggesting that financial distress does not appear to be an important factor for such decisions.

Finally, exploring tax-related variables, it is worth noting that the negative coefficient for non-debt tax shields offers no support to what was primarily predicted. This finding could be explained by lower levels of tangible assets zero-leverage firms possess, resulting in lower levels of tax shields coming from depreciation and amortisation (Dang, 2013). Lastly, regarding debt tax shields and tax ratio, our findings indicate that increasing benefits from debt usage negatively and significantly influence zero-leverage decisions.

Table 7: Firms' zero-leverage decisions for micro, SMEs and large firms

Table 7 refers to regressions results regarding firms' zero-leverage decisions for micro, SMEs and large firms. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	Micro				**SMEs**				**Large**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Intercept	1.449***	1.378***	1.320***	0.268***	0.764***	0.740***	0.750***	0.202***	1.214***	1.224***	1.237***	0.166**
	(0.011)	(0.010)	(0.010)	(0.005)	(0.014)	(0.014)	(0.014)	(0.006)	(0.249)	(0.248)	(0.247)	(0.075)
Age	0.001***	0.001***	0.001***	-0.001***	0.000***	0.000***	0.000***	-0.001***	-0.000	-0.000	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.096***	-0.092***	-0.087***	-	-0.043***	-0.041***	-0.042***	-	-0.063***	-0.064***	-0.065***	-
	(0.001)	(0.001)	(0.001)	-	(0.001)	(0.001)	(0.001)	-	(0.015)	(0.015)	(0.015)	-
Profitability	0.043***	0.037***	0.044***	-0.020***	0.035***	0.031***	0.029***	0.001	0.101**	0.103**	0.102**	0.085*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)	(0.005)	(0.048)	(0.048)	(0.048)	(0.048)
Tangibility	-0.096***	-0.127***	-0.125***	-0.139***	-0.076***	-0.085***	-0.085***	-0.088***	-0.104***	-0.098***	-0.097***	-0.099***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.031)	(0.033)	(0.033)	(0.033)
Cash Holdings	0.232***	0.231***	0.236***	0.288***	0.242***	0.242***	0.241***	0.274***	0.114*	0.114*	0.114*	0.133**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.008)	(0.008)	(0.062)	(0.062)	(0.062)	(0.062)
Non-Debt Tax Shields	-0.359***	-	-	-	-0.137***	-	-	-	0.074	-	-	-
	(0.015)	-	-	-	(0.025)	-	-	-	(0.203)	-	-	-
Liquidity	0.004***	0.004***	0.005***	0.004***	0.008***	0.008***	0.007***	0.007***	0.017***	0.016***	0.016***	0.016***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.006)	(0.006)	(0.006)
Debt Tax Shields	-3.476***	-3.540***	-3.618***	-3.712***	-2.410***	-2.422***	-2.401***	-2.447***	-2.653***	-2.648***	-2.623***	-2.598***
	(0.036)	(0.036)	(0.035)	(0.036)	(0.047)	(0.047)	(0.047)	(0.047)	(0.356)	(0.357)	(0.361)	(0.368)
Tax Ratio	-0.006***	-0.007***	-0.007***	-0.021***	-0.013***	-0.013***	-0.014***	-0.016***	-0.008	-0.008	-0.008	-0.007
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.011)	(0.011)	(0.011)	(0.011)
Retained Earnings	0.016***	0.016***	-	-	-0.006***	-0.005**	-	-	-0.003	-0.004	-	-
	(0.001)	(0.001)	-	-	(0.002)	(0.002)	-	-	(0.014)	(0.014)	-	-
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overall *R*-Squared	0.152	0.151	0.151	0.129	0.121	0.121	0.120	0.125	0.110	0.109	0.109	0.103
Number of Observations	797,512	797,512	797,512	797,512	367,702	367,702	367,702	367,702	8,932	8,932	8,932	8,932

For further analysis, we increased the scope of our previous model to check for differences in motivations for zero-leverage choices, conditioned on firms' dimension. This analysis is motivated by the heterogenous results found in Section 4 (Table 5), that lead us to believe that firms have different incentives for following zero leverage policies, depending on their dimension, and, therefore, on the level of constraints they face. Hence, in order to assess this matter, Table 7 refers to the main findings regarding firms' zero-leverage decisions for micro, SMEs and large firms. It is worth mentioning that results are largely consistent with the main outcomes of Table 6, but some variations were found in the effects of some variables for different types of firms.

Firstly, firm size's coefficient is significantly negative for all firms, supporting the financial constraints hypothesis. In particular, for micro firms these effects are stronger, suggesting exactly that firms in this group may have increasing difficulties in accessing debt markets. Regarding profitability, results confirm that higher levels of this variable increase the propensity of firms to eschew debt. However, mixed evidence is found in what regards micro firms. On the one hand, for models (1)-(3), the coefficient is positive and significant, confirming what was predicted. But, for model (4) the coefficient flips sign. Regarding large firms, one can note that profitability effects are the greatest in magnitude but minor in significance.

Next, levels of tangibility are regarded as negative and significant, independently of firm dimension. Its effects are greater for micro firms, in line with the financial constraints' hypothesis. SMEs have the highest levels of tangible assets (please refer to Table 5) and document the lesser effects of tangibility, suggesting that they face fewer information asymmetries and have an increasing ability of accessing debt markets. In addition, cash holdings are positive and significant for all dimension categories suggesting that firms are seeking financial flexibility (DeAngelo and DeAngelo, 2007). Their coefficients are greatly significant for micro firms and SMEs but lose statistical power for large firms. These findings could be explained by the increasing necessity of sources of finance other than debt for smaller firms, as larger firms can more easily access debt markets when in need.

Moreover, mixed evidence is found regarding retained earnings. For micro firms, its coefficients are positive and significant, in line with the financial flexibility hypothesis. Whereas for SMEs and large firms, coefficients flip sign and lose statistical significance for

the latter group, providing little support for the pecking order theory of capital structure. Then, liquidity is found to be positive and significant for all dimension categories, in accordance with findings in Table 6, as well as non-debt tax shields, which are significant with an unexpected negative sign for micro firms and SMEs, and not significant for large firms. Finally, taking a closer look into debt tax shields and tax ratio it is worth mentioning that findings confirm high negative and significant effects of both. The former being very high in magnitude for all types of firms (specially for small firms) supporting the trade-off theory of capital structure, while the latter losing statistical significance for large firms.

All in all, strong evidence is found in favour of the financial constraints' hypothesis, especially for micro firms and SMEs, and moderate evidence to support the financial flexibility hypothesis. Lastly, weak evidence is found regarding the traditional theories of capital structure, as the trade-off and the pecking order theories.

5.2. Differences in Performance

Next, we study performance levels of companies that adopt zero-leverage policies to assess if such behaviours help improving the overall firms' functioning after crisis periods. This research was motivated by the enlarged importance of the macroeconomic context in explaining capital structure choices, and particularly, debt supply and demand. Our analysis is divided into three main stages aiming at assessing differences in performance. The first and second ones focusing on the global financial crisis and the European sovereign debt crisis, respectively. The third stage encompasses a perusal of the recovery years that followed Troika's retreat, in 2014. In the end, a dynamic difference-in-differences analysis for the three years pre- and post-2011 was also reported.

Table 8: Difference-in-differences – Global Financial Crisis

Table 8 refers to the regression results assessing differences in performance levels during the global financial crisis. The estimation period considered is 2006-2010. The variable *post* is binary, taking the value 1 if data corresponds to the years 2008, 2009 or 2010, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.270***	-0.134***	-1.602***
	(0.008)	(0.028)	(0.072)
zl	-0.030***	-0.048***	0.112***
	(0.003)	(0.013)	(0.029)
Post	-0.047***	-0.076***	-0.158***
	(0.001)	(0.006)	(0.013)
Post x zl	0.017***	0.010	0.032
	(0.003)	(0.015)	(0.033)
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.055	0.004	0.003
Number of Observations	328,505	324,763	328,505

First, we begin our analysis by acknowledging differences in performance of firms during the years of the global financial crisis. Table 8 refers to the interaction terms' coefficients of our difference-in-differences regressions for the years of the global financial crisis (2008, 2009 and 2010). Overall, we find weak evidence regarding our main premise that zero-leverage firms outperform when faced with adverse macroeconomic settings. To begin with, regarding asset

growth, results suggest that firms following zero-leverage policies outperform when compared to their levered counterparts, as the coefficient for the interaction term is positive and significant at a 1% significance level. Nevertheless, for both investment and profitability growth, no substantial findings were encountered. Interaction coefficients are found to be statistically insignificant, proposing that differences in capital expenditures and profitability cannot be explained by zero-leverage status of firms, for the years of the global financial crisis. The coefficients for control variables are referred in Appendix 6.

Table 9: Difference-in-differences – European Sovereign Debt Crisis

Table 9 refers to the regression results assessing differences in performance levels during the European sovereign debt crisis. The estimation period considered is 2006-2013. The variable *post* is binary, taking the value 1 if data corresponds to the years 2011, 2012 or 2013, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.293***	-0.156***	-1.717***
	(0.006)	(0.023)	(0.064)
zl	-0.022***	-0.053***	0.136***
	(0.002)	(0.007)	(0.017)
Post	-0.057***	-0.133***	-0.130***
	(0.001)	(0.004)	(0.009)
Post x zl	0.058***	0.069***	-0.089***
	(0.002)	(0.009)	(0.024)
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.062	0.005	0.003
Number of Observations	553,227	544,600	553,226

Next, we analyse differences in performance for the period of the European sovereign debt crisis (2011, 2012 and 2013). Regression results for the interactions between the years under analysis and zero-leverage status are reported in Table 9, while the coefficients for control variables are referred in Appendix 7. We find strong evidence that zero-leverage firms overperform when compared to levered firms, during the European sovereign debt crisis. Both asset growth and investment are positively and significantly (at a 1% significance level) influenced by zero-leverage choices. However, when taking a closer look into profitability growth, zero-leverage policies are found to negatively and significantly impact firms'

performance. This finding advocates that firms following zero-leverage policies have decreasing levels of profitability growth, underperforming when compared to their levered counterparts in both periods under analysis.

Table 10: Difference-in-differences – Recovery Period

Table 10 refers to the regression results assessing differences in performance levels for the recovery period following Troika's retreat (in 2014). The estimation period considered is 2006-2017. The variable *post* is binary, taking the value 1 if data corresponds to the years 2014, 2015, 2016 or 2017, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.346***	-0.183***	-1.713***
	(0.006)	(0.021)	(0.054)
zl	-0.006***	-0.051***	0.079***
	(0.001)	(0.005)	(0.013)
Post	-0.003***	0.070***	0.108***
	(0.001)	(0.003)	(0.008)
Post x zl	0.022***	-0.034***	0.019
	(0.002)	(0.008)	(0.019)
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.054	0.004	0.003
Number of Observations	845,923	826,690	845,922

Finally, we assess differences in performance for the recovery period that proceeded the Portuguese austerity (2014, 2015, 2016 and 2017). Table 10 denotes the difference-in-differences regressions results for the period under analysis. The coefficients for control variables are referred in Appendix 8. By analysing the present results, one can note that zero-leverage policies are found to positively and significantly influence asset growth for the recovery period. Conversely, investment growth is being negatively impacted by such choices, for the same period. Lastly, taking a closer look into profitability growth, coefficients are found to be statistically insignificant, proposing that this performance measure cannot be explained by zero-leverage status of firms.

Table 11: Dynamic difference-in-differences regressions

Table 11 refers to the results of the dynamic difference-in-differences regressions. The regressions use yearly data for the period 2008 to 2014, excluding the year 2011. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.354***	-0.128***	-1.584***
	(0.006)	(0.016)	(0.048)
zl	0.006***	-0.081***	0.091***
	(0.001)	(0.006)	(0.013)
2008 x zl	-0.035***	0.031**	-0.023
	(0.003)	(0.015)	(0.031)
2009 x zl	-0.040***	0.042***	0.112***
	(0.003)	(0.015)	(0.034)
2010 x zl	-0.017***	-0.042***	0.038
	(0.003)	(0.014)	(0.035)
2012 x zl	0.019***	0.108***	-0.090**
	(0.003)	(0.013)	(0.039)
2013 x zl	0.020***	0.039***	-0.070*
	(0.003)	(0.013)	(0.038)
2014 x zl	0.008***	0.011	-0.020
	(0.003)	(0.014)	(0.037)
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.055	0.005	0.003
Number of Observations	922,424	899,826	922,423

Aiming at extending the breadth of our research, we estimated a dynamic difference-in-differences analysis for the period ranging between the start of the global financial crisis (2008) and the year when Portugal left Troika's financial rescue programme (2014). Table 11 provides us with the coefficients for the interactions between the years under enquiry (three years pre- and post-2011) and zero-leverage status. The coefficients for the control variables are presented in Appendix 9. Drawing from the regressions presented in this table, mixed results are encountered. To begin with, one can note that for the years 2008, 2009 and 2010, asset growth has been negatively linked to zero-leverage policies. Whereas for 2012, 2013 and 2014, zero-leverage is found to positively influence asset growth. As for investment, zero-leverage policies are positively affecting firm capital expenditures in both pre- and post-years (excepting 2010). These findings, although not supportive of our main hypothesis, suggest that firms eschewing

debt overinvest when compared to their levered counterparts, confirming theories on financial flexibility. Lastly, taking a closer look into profitability growth, findings for 2012 and 2013 suggest that zero-leverage policies negatively impact firms' performance, for 5 and 10% significance levels. However, the only coefficient that is statistically significant before 2011 is that of 2009, suggesting that zero levered firms benefit from increasing levels of profitability on that year. Overall, evidence is weak regarding zero-leverage influence on profitability growth.

Ultimately, results from Table 11 are robust and consistent with our previous analysis. After all, we find moderate support for our main hypothesis that zero-leverage firms outperform after crisis periods. Overall, it appears reasonable that zero-leverage firms are indeed better off after 2011, when analysing asset growth and investment. For the former, the impact is clear: zero-leverage status increase asset growth after the crisis period. As for the latter, investment has not been significantly affected, since the coefficients are found to be positive in all years under analysis (except in 2010). However, one could conclude that zero-leverage firms have increasing investments when compared to levered firms. As for profitability growth, evidence suggests that, surprisingly, zero-leverage firms underperform when compared their levered counterparts.

6. Conclusions and Future Research

In this study, we assess the puzzling question of why some firms chose to have zero leverage in their capital structures, despite the potential advantages arising from debt usage. Our paper provides new insights to the already existent and limited literature on zero-debt firms through an empirical analysis of Portuguese firms. For a sample of 1,174,151 firm-year observations between 2006 and 2018, we acknowledge the characteristics of zero-leverage firms and the motives behind their choices. Moreover, we comprehend that these policies predict differences in performance during crisis periods.

All in all, restricting our analysis to the Portuguese economy allowed us to work with a rich micro dataset and was crucial to developing the present empirical study. Notwithstanding, the high proportion of non-listed firms in the sample prevented us from including insightful variables in our analysis, such as market values, credit ratings and dividend policies.

Our research robustly found that firms with no debt are commonly small and young and display, on average, lower levels of profitability and tangibility, when compared to their levered counterparts. Adding on to that, zero-leverage firms pile large cash holdings and have higher liquidity ratios than those of levered firms. Moreover, we posit that firms have different motives for eschewing debt, depending on their dimension. By increasing the scope of our methodology, we confirm that firms are either financially constrained or are seeking for financial flexibility. In what regards micro firms and SMEs, our results suggest that they face increasing difficulties in accessing debt markets. On the other hand, evidence regarding large firms acknowledges that these firms strategically follow zero-leverage policies in order to avoid debt overhang and preserve leverage capacity.

It is worth noting that the present research generally concerns firms pertaining to different sectors. One could possibly apply our models assessing firms zero-leverage decisions to particular industries to increase the scope of our studies. Furthermore, a supplementary detailed analysis regarding credit demand and supply could potentially be an avenue for future research to better comprehend zero-debt policies.

Next, our results confirm that adverse macroeconomic conditions influence the propensity of firms to be zero-levered. Moreover, our estimations assess differences in performance between

zero-leverage firms and their levered counterparts during the Portuguese recession. We proxy overall firms' performance using three different measures: asset growth, investment and profitability growth. Our regression estimations sustain our main hypothesis for the years of the Global Financial Crisis, the European sovereign debt crisis and for the recovery period. We find strong evidence that zero-leverage policies are associated with increasing levels of asset growth in these three periods. Furthermore, these firms invested more in the years of the European sovereign debt crisis, perhaps benefitting from the financial flexibility coming from the lack of debt overhang that affected many firms in that period. However, in the recovery period these firms invested less than levered firms. The results on profitability are not in line with our hypothesis, as zero-leverage firms do not differ significantly in these periods (with the exception of the European sovereign debt crisis, during which these firms actually become less profitable).

Generally, our difference-in-differences regression results allow us to have a descriptive analysis of how zero-leverage choices predict dissimilarities in performance in crisis periods. Before these macroeconomic shocks, firms with no debt already behaved differently from their levered counterparts. Therefore, the assumption of parallel trends cannot be entirely satisfied. For that reason, one should note that we cannot establish causality between zero-leverage policies and overall firm performance, after crisis periods. Additionally, the influence of zero-leverage policies on firms' performance under adverse macroeconomic conditions is touched upon is our analysis. Conducive towards the attainment of further insight on debt conservatism, the role of macroeconomic conditions ought to be explored.

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8. Appendices

Appendix 1: Definition of variables

Appendix 1 refers to the definition of the variables considered in this study. The corresponding label/code of each accounting item is expressed in parenthesis. All accounting items are denominated in Euros.

Variable	Definition
Panel A: Firm Characteristics	
Age	The difference between the last year of available data (2018) and the firm's founding year (ancon)
Size	Natural logarithm of total assets (B001)
Profitability	Ratio of earnings before interest, taxes, depreciation and amortisation (EBITDA) (D084) to total assets (B001)
Tangibility	Ratio of fixed tangible assets (B012) to total assets (B001)
Cash Holdings	Ratio of cash and bank deposits (B049) to total assets (B001)
Non-Debt Tax Shields	Ratio of depreciation and amortisation (the difference between EBITDA and EBIT) (D084 – D085) to total assets (B001)
Liquidity	Ratio of total current assets (B029) to total current liabilities (B089)
Debt Tax Shields	Ratio of interest expense on debt (D053) to total assets (B001)
Tax Ratio	Ratio of income taxes (D060) to profit before tax (EBT) (D086)
Retained Earnings	Ratio of retained earnings (BL007) to total assets (B001)
Panel B: Firm Performance	
Asset Growth	Ratio of total assets (B001) in year *t* minus total assets in year *t – 1* divided by total assets in year *t – 1*
Investment	Ratio of fixed tangible assets (B012) in year t minus fixed tangible assets in year *t – 1* divided by fixed tangible assets in year *t – 1*
Profitability Growth	Ratio of profitability (refer to Panel A) in year *t* minus profitability in year *t – 1* divided by profitability in year *t – 1*

Appendix 2: Pearson's correlation matrix

Appendix 2 refers to the Pearson's correlation matrix between the variables considered in this study. See appendix 1 for the definition of the variables.

	zl	Age	Size	Profitability	Tangibility	Cash Holdings	Non-Debt Tax Shields	Liquidity	Debt Tax Shields	Tax Ratio	Retained Earnings	Asset Growth	Investment	Profitability Growth
zl	1.000													
Age	-0.023	1.000												
Size	-0.236	0.261	1.000											
Profitability	-0.025	-0.011	0.237	1.000										
Tangibility	-0.130	-0.028	0.051	0.034	1.000									
Cash Holdings	0.270	-0.023	-0.222	0.123	-0.220	1.000								
Non-Debt Tax Shields	-0.031	-0.140	-0.221	0.077	0.429	0.009	1.000							
Liquidity	0.157	0.088	0.001	0.083	-0.165	0.232	-0.121	1.000						
Debt Tax Shields	-0.269	0.017	0.100	-0.049	0.110	-0.191	0.089	-0.150	1.000					
Tax Ratio	-0.044	0.011	0.163	0.242	-0.054	0.024	-0.019	0.011	-0.008	1.000				
Retained Earnings	-0.023	-0.015	0.306	0.427	-0.036	0.077	-0.124	0.152	-0.102	0.186	1.000			
Asset Growth	-0.007	-0.134	0.073	0.244	-0.033	0.080	-0.088	-0.026	-0.115	0.073	0.108	1.000		
Investment	-0.017	-0.046	0.020	0.053	0.059	-0.003	-0.050	-0.008	-0.033	0.027	0.051	0.309	1.000	
Profitability Growth	0.000	-0.003	0.045	0.130	0.015	0.023	0.028	0.009	-0.012	0.086	0.010	0.036	0.011	1.000

Appendix 3: Univariate analysis – Firms' zero-leverage decisions for the whole sample

Appendix 3 refers to the univariate analysis results regarding firms' zero-leverage decisions for the whole sample. Zero-leverage firms are firms that have zero book debt in a given year, i.e., the total of their short-term and long-term debt sums up to zero in a given year. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Intercept	0.221***	1.136***	0.190***	0.285***	0.145***	0.212***	0.173***	0.237***	0.194***	0.192***
	(0.004)	(0.008)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Age	-0.002***									
	(0.000)									
Size		-0.074***								
		(0.001)								
Profitability			0.018***							
			(0.002)							
Tangibility				-0.225***						
				(0.003)						
Cash Holdings					0.343***					
					(0.004)					
Non-Debt Tax Shields						-0.277***				
						(0.013)				
Liquidity							0.007***			
							(0.000)			
Debt Tax Shields								-3.597***		
								(0.031)		
Tax Ratio									-0.012***	
									(0.001)	
Retained Earnings										-0.005***
										(0.001)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overall *R*-Squared	0.011	0.060	0.013	0.037	0.078	0.015	0.034	0.078	0.014	0.013
Number of Observations	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146	1,174,146

Appendix 4: Firms' zero-leverage decisions for the whole sample following Devos et al. (2012) dependent variable definition

Appendix 4 refers to regressions results regarding firms' zero-leverage decisions for the whole sample following Devos et al. (2012) dependent variable definition. Zero-leverage firms are firms that have zero book debt for three consecutive years, i.e., the total of their short-term and long-term debt sums up to zero for three consecutive years. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	(1)	**(2)**	**(3)**	**(4)**
Intercept	0.247***	0.229***	0.229***	0.015***
	(0.005)	(0.005)	(0.005)	(0.003)
Age	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.019***	-0.018***	-0.018***	-
	(0.000)	(0.000)	(0.000)	-
Profitability	-0.001***	-0.003**	-0.003**	-0.020***
	(0.002)	(0.002)	(0.002)	(0.002)
Tangibility	-0.052***	-0.063***	-0.063***	-0.063***
	(0.002)	(0.002)	(0.002)	(0.002)
Cash Holdings	0.127***	0.127***	0.126***	0.144***
	(0.003)	(0.003)	(0.003)	(0.003)
Non-Debt Tax Shields	-0.126***	-	-	-
	(0.009)	-	-	-
Liquidity	0.004***	0.004***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Debt Tax Shields	-1.134***	-1.154***	-1.152***	-1.218***
	(0.016)	(0.016)	(0.016)	(0.016)
Tax Ratio	-0.005***	-0.005***	-0.005***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
Retained Earnings	-0.001	-0.000	-	-
	(0.001)	(0.001)	-	-
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Overall *R*-Squared	0.093	0.092	0.092	0.085
Number of Observations	1,174,146	1,174,146	1,174,146	1,174,146

Appendix 5: Firms' zero-leverage decisions for micro, SMEs and large firms following Devos et al. (2012) dependent variable definition

Appendix 5 refers to regressions results regarding firms' zero-leverage decisions for micro, SMEs and large firms following Devos et al. (2012) dependent variable definition. Zero-leverage firms are firms that have zero book debt for three consecutive years, i.e., the total of their short-term and long-term debt sums up to zero for three consecutive years. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

	Micro				**SMEs**				**Large**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Intercept	0.289***	0.262***	0.257***	-0.004	0.198***	0.182***	0.183***	0.027***	0.532***	0.532***	0.518***	0.061
	(0.007)	(0.007)	(0.007)	(0.003)	(0.010)	(0.009)	(0.009)	(0.004)	(0.174)	(0.175)	(0.175)	(0.040)
Age	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***	0.000***	0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.024***	-0.022***	-0.022***	-	-0.011***	-0.012***	-0.012***	-	-0.028***	-0.028***	-0.028***	-
	(0.001)	(0.001)	(0.001)	-	(0.001)	(0.001)	(0.001)	-	(0.010)	(0.010)	(0.010)	-
Profitability	0.001	-0.001	-0.000	-0.019***	-0.002	-0.005	-0.005	-0.014***	0.032	0.032	0.034	0.027
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.025)	(0.025)	(0.025)	(0.026)
Tangibility	-0.053***	-0.065***	-0.064***	-0.068***	-0.038***	-0.045***	-0.045***	-0.045***	-0.059***	-0.059***	-0.059***	-0.060***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.018)	(0.018)	(0.018)	(0.018)
Cash Holdings	0.131***	0.131***	0.132***	0.150***	0.139***	0.139***	0.139***	0.151***	0.111**	0.111**	0.110**	0.118**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)	(0.046)	(0.046)	(0.045)	(0.046)
Non-Debt Tax Shields	-0.142***	-	-	-	-0.091***	-	-	-	-0.003	-	-	-
	(0.010)	-	-	-	(0.017)	-	-	-	(0.114)	-	-	-
Liquidity	0.004***	0.004***	0.004***	0.004***	0.005***	0.005***	0.005***	0.005***	0.008**	0.008**	0.008**	0.008**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)	(0.004)	(0.004)
Debt Tax Shields	-1.402***	-1.429***	-1.437***	-1.489***	-0.854***	-0.861***	-0.858***	-0.880***	-0.943***	-0.943***	-0.965***	-0.953***
	(0.020)	(0.019)	(0.019)	(0.019)	(0.028)	(0.028)	(0.027)	(0.027)	(0.239)	(0.239)	(0.232)	(0.234)
Tax Ratio	-0.006***	-0.007***	-0.007***	-0.012***	-0.006***	-0.006***	-0.006***	-0.007***	-0.003	-0.003	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.007)	(0.007)	(0.007)	(0.007)
Retained Earnings	0.001	0.002**	-	-	-0.001	-0.001	-	-	0.005	0.005	-	-
	(0.001)	(0.001)	-	-	(0.002)	(0.002)	-	-	(0.008)	(0.008)	-	-
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overall *R*-Squared	0.096	0.095	0.095	0.087	0.079	0.079	0.079	0.078	0.065	0.065	0.065	0.060
Number of Observations	797,512	797,512	797,512	797,512	367,702	367,702	367,702	367,702	8,932	8,932	8,932	8,932

Appendix 6: Difference-in-differences – Global Financial Crisis

Appendix 6 refers to the regression results assessing differences in performance levels during the global financial crisis. The estimation period considered is 2006-2010. The variable *post* is binary, taking the value 1 if data corresponds to the years 2008, 2009 or 2010, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.270***	-0.134***	-1.602***
	(0.008)	(0.028)	(0.072)
zl	-0.030***	-0.048***	0.112***
	(0.003)	(0.013)	(0.029)
Post	-0.047***	-0.076***	-0.158***
	(0.001)	(0.006)	(0.013)
Post x zl	0.017***	0.010	0.032
	(0.003)	(0.015)	(0.033)
Size	0.027***	0.024**	0.105***
	(0.001)	(0.002)	(0.005)
Profitability	0.329***	0.225***	-
	(0.003)	(0.013)	-
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.055	0.004	0.003
Number of Observations	328,505	324,763	328,505

Appendix 7: Difference-in-differences – European Sovereign Debt Crisis

Appendix 7 refers to the regression results assessing differences in performance levels during the European sovereign debt crisis. The estimation period considered is 2006-2013. The variable *post* is binary, taking the value 1 if data corresponds to the years 2011, 2012 or 2013, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.293***	-0.156***	-1.717***
	(0.006)	(0.023)	(0.064)
zl	-0.022***	-0.053***	0.136***
	(0.002)	(0.007)	(0.017)
Post	-0.057***	-0.133***	-0.130***
	(0.001)	(0.004)	(0.009)
Post x zl	0.058***	0.069***	-0.089***
	(0.002)	(0.009)	(0.024)
Size	0.028***	0.026***	0.111***
	(0.000)	(0.002)	(0.004)
Profitability	0.320***	0.218***	-
	(0.002)	(0.009)	-
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.062	0.005	0.003
Number of Observations	553,227	544,600	553,226

Appendix 8: Difference-in-differences – Recovery Period

Appendix 8 refers to the regression results assessing differences in performance levels for the recovery period following Troika's retreat (in 2014). The estimation period considered is 2006-2017. The variable *post* is binary, taking the value 1 if data corresponds to the years 2014, 2015, 2016 or 2017, and 0 otherwise. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.346***	-0.183***	-1.713***
	(0.006)	(0.021)	(0.054)
zl	-0.006***	-0.051***	0.079***
	(0.001)	(0.005)	(0.013)
Post	-0.003***	0.070***	0.108***
	(0.001)	(0.003)	(0.008)
Post x zl	0.022***	-0.034***	0.019
	(0.002)	(0.008)	(0.019)
Size	0.031***	0.024***	0.105***
	(0.000)	(0.001)	(0.004)
Profitability	0.338***	0.279***	-
	(0.002)	(0.007)	-
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.054	0.004	0.003
Number of Observations	845,923	826,690	845,922

Appendix 9: Dynamic difference-in-differences regressions

Appendix 9 refers to the results of the dynamic difference-in-differences regressions. The regressions use yearly data for the period 2008 to 2014, excluding the year 2011. The variable *zl* is binary taking the value 1 if the firm has zero book debt in a given year, and 0 otherwise. See appendix 1 for the definition of the variables. All standard errors are adjusted for heteroskedasticity and clustered at the firm level. Standard errors of coefficients are reported in parentheses. ***, **, * denote statistical significance at 1%, 5% and 10%, correspondingly.

Dependent Variable:	**Asset Growth**	**Investment**	**Profitability Growth**
Intercept	-0.354***	-0.128***	-1.584***
	(0.006)	(0.016)	(0.048)
2008	0.015***	-0.011*	-0.041***
	(0.001)	(0.005)	(0.012)
2009	-0.001	-0.079***	-0.090***
	(0.001)	(0.005)	(0.013)
2010	0.006***	-0.012**	-0.120***
	(0.001)	(0.006)	(0.013)
2012	-0.045***	-0.176***	-0.263***
	(0.001)	(0.005)	(0.015)
2013	-0.018***	-0.132***	-0.060***
	(0.001)	(0.005)	(0.014)
2014	-0.016***	-0.059***	-0.066***
	(0.001)	(0.006)	(0.015)
zl	0.006***	-0.081***	0.091***
	(0.001)	(0.006)	(0.013)
2008 x zl	-0.035***	0.031**	-0.023
	(0.003)	(0.015)	(0.031)
2009 x zl	-0.040***	0.042***	0.112***
	(0.003)	(0.015)	(0.034)
2010 x zl	-0.017***	-0.042***	0.038
	(0.003)	(0.014)	(0.035)
2012 x zl	0.019***	0.108***	-0.090**
	(0.003)	(0.013)	(0.039)
2013 x zl	0.020***	0.039***	-0.070*
	(0.003)	(0.013)	(0.038)
2014 x zl	0.008***	0.011	-0.020
	(0.003)	(0.014)	(0.037)
Size	0.032***	0.025***	0.103***
	(0.000)	(0.001)	(0.003)
Profitability	0.330***	0.255***	-
	(0.002)	(0.007)	-
Year FE	-	-	-
Industry FE	Yes	Yes	Yes
Overall *R*-Squared	0.055	0.005	0.003
Number of Observations	922,424	899,826	922,423