Debt, or not debt, that is the question: A Shakespearean question to a corporate decision

Paolo Saona[a], Eleuterio Vallelado[b], Pablo San Martín[c]

[a] Correspondig author. Richard A. Chaifetz School of Business, Saint Louis University, Av. Del Valle 34, 28003 Madrid, Spain. E-mail: paolo.saona@slu.edu, phone +34 915545858 (ext. 251)

[b] Financial Economics and Accounting Department, Universidad de Valladolid, Avda. Valle de Esgueva, 6, 47011 Valladolid, Spain. E-mail: teyo@eco.uva.es

[c] Facultad de Ciencias Económicas y Administrativas, Universidad Católica de la Santísima Concepción, Av. Alonso de Ribera 2850, 4070129 Concepción, Chile. E-mail: psanmartin@ucsc.cl

Abstract: Capital structure theories are unable to properly explain the zero-debt puzzle, frequently observed in firms around the world. Our paper's contribution is to identify the variables that measure either firm's characteristics or environmental effects, in order to explain why firms have and eventually keep a debt-free policy. Our study includes a comprehensive sample of firms from 47 countries in the period 1996-2014. Our results indicate that all equity companies are small with no growth opportunities, with a low level of tangible assets, high proportion of liquid assets, profitable, and with diluted insider ownership. Furthermore, it is more probable to find low levels of debt in countries with good governance indicators or when the economy is not growing.

Keyword: Zero-debt, Capital Structure, Panel data, Credit rationing, Agency conflicts.

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1. Introduction

From the original and groundbreaking proposal of Modigliani and Miller (1958) on the irrelevance of the capital structure decisions and their subsequent correction after the adjustment by corporate taxes, demonstrating that the firm value increases with debt in the presence of taxes (Modigliani and Miller, 1963), there have been six decades of studies analyzing corporate capital structure decisions. Most of these studies have dealt with issues such as optimal levels of debt financing inspired in the intertwining effect between the tax benefits of debt and the bankruptcy risk caused by corporate borrowing (Fama and French, 2002). Other studies have been focused on the presence of moral hazard and adverse selection problems, as well as the degree of asymmetries of information that cause corporate borrowing decisions to follow a hierarchical order in the use of external financing (Frank and Goyal, 2003; Shyam-Sunder and Myers, 1999). In the same line, the market timing approach has suggested that companies finance their investment opportunities based on debt (or capital) market conditions by taking advantage of the over or under valuation of the firms' equity capital. In this case, firms are more likely to issue equity–and therefore use less debt–when their market values are high, relative to book and past market values, and to repurchase equity–or use more debt–when their market values are low (Baker and Wurgler, 2002; Hovakimian, 2005). Another strand of literature has been centered on the analysis of agency problems in different corporate magnitudes and how these problems impact company's leverage. Others have focused on the use of debt financing as a signaling tool in the presence of market imperfections and asymmetries of information (Saona and Vallelado, 2012). Also, there are empirical analyses that study institutional differences such as regulatory environments or legal and political features to explain how firms make their decisions regarding the debt-equity relationship (López and Rodríguez, 2008; Öztekin and Flannery, 2012).

As observed, all the approaches on the analysis of capital structure decisions are focused on the existence of debt and its various determinants at corporate and institutional levels. However, a non-negligible proportion of companies decide to remain unleveraged, disclosing debt-free financial statements. And what might be even more surprising is that this proportion of unlevered firms has increased in recent years (D'Mello and Gruskin, 2014).

DeAngelo and Roll (2015) emphasize that capital structures are not persistent over time, but that the most stable are those with low leverage ratios. Additionally, Deb and Banerjee (2015) state that about 20% of US firms are debt-free; whilst Byoun and Xu (2013) suggest that debt-free firms are not uncommon in most industries. A similar opinion is shared by Strebulaev and Yang (2013), who determined that a significant fraction of firms keep zero-debt level behavior or extremely low level of debt in their capital structures. Khoo and Durand (2017) find that "nearly-all-equity" firms increased between 1990 (7.5%) to 2014 (28.3%) in Japan. In the international multi-country arena, Bessler *et al.* (2013) document that the extreme debt conservatism is a fact in a sample of firms from twenty developed countries. Moreover, our own findings reveal that about 18% of the companies included in our sample report debt-free financial statements. Hence, in words of El Ghoul *et al.* (2018, p. 46),*"the prevalence of unlevered firms is truly a global phenomenon"*.

Consequently, this work takes a different path of analysis. This research is focused on the other side of the coin, corresponding to the unexplored facet of capital structure decisions represented by debt-free financial statements, or in other words, the zero-leverage behavior. Therefore, this paper contributes to the literature in several ways. First, this study sheds light to the identifications of variables, that measure either firm's characteristics or environmental effects, that explain why firms have and eventually keep a debt-free policy. Second, this study uses an enhanced econometric technique to deal with the unobservable, time invariant effect. Specifically, we followed a Tobit semiparametric estimator for fixed-effect developed by Honoré (1992) that has not been applied before in similar studies. Third, most of the scarce literature uses samples of stand-alone countries in their analyses (Bigelli *et al.*, 2014; Dang, 2013; Ghose and Kabra, 2016; Huang *et al.*, 2017; Ramalho *et al.*, 2018; Takami, 2016; Yasmin and Rashid, 2019). Our study, however, is much more comprehensive by using a

large multi-country sample of companies and by examining the relationship between the use of zero-debt policies and firm level features and environmental characteristics. Fourth, this study awakens the interest of researchers and theorists by challenging them to go further into the development of a unified, all-embracing theory of capital structure that incorporates the unlevered companies in their proposals. As discussed below in the theoretical framework section, there is a clear lack of a sound theoretical body capable to explain why companies decide to have a zero-leverage policy, and furthermore, remain for long periods unlevered.

Briefly, at firm-level determinants, our results confirm that firms that are smaller, with a low level of tangible assets as well as depreciation, and with a low proportion of growth opportunities as well as insider ownership, strong liquidity position, and profitability, are more likely to have zero debt in their capital structure puzzle. At country-level factors, the results show that when governance indicators improve, firms are also more likely to not have debt in their capital structure. It is less probable that companies have no debt when the economy is in an expansion period.

The paper continues in the second section with the literature review and the development of the research question. The third section describes the data set, variables, and the methodology used in the empirical analysis. Section 4 summarizes the main results and Section 5 presents the conclusions.

2. Theoretical Framework

Despite the tax-shield benefits of debt and/or the existence of growth opportunities that will be lost if they cannot be funded with equity capital, firms with zero level of debt are a reality that has persisted for some time (D'Mello and Gruskin, 2014; El Ghoul *et al.*, 2018; Lemmon *et al.*, 2008). It appears that existing capital structure theories are unable to properly explain this zero-debt puzzle (Strebulaev and Yang, 2013). Which variables compel firms to have and eventually keep zero-leverage policies? This is the research question we intend to address in this paper.

In this respect, it seems to be that there are different factors that influence the zero- or extremely low-leverage decision. From our point of view, all these factors might be classified either as demand side factors or supply side factors.

2.1. Demand side of the corporate borrowing

There are several arguments to explain a below optimal demand for debt. First, financial flexibility has been regularly considered by CEOs as the most important factor when determining the company debt level (Bancel and Mittoo, 2004; de Andrés, 2018; Graham and Harvey, 2001). It could be that firms prefer to underinvest to conserve their financial flexibility and avoid undesired supervision (Morgado and Pindado, 2003; Pindado and De La Torre, 2009). In this respect, firms with valuable or high growth opportunities (positive future prospects) using the underinvestment hypothesis should avoid debt financing to alleviate the conflicts of interests between firm' creditors and shareholders (Mayer, 1997). Similarly, the financial flexibility hypothesis aims in the same direction as the underinvestment hypothesis (Marchica and Mura, 2010). Thus, this second argument on the future investment opportunities suggests that firms will save borrowing capacity and avoid debt overhang, which might deteriorate the strategic value of such investments (Denis and McKeon, 2012). Lotfaliei (2018) emphasizes that companies prefer to save debt capacity and eventually use it when is strictly necessary. In this respect, De Jong *et al.* (2012) correlate conservative debt levels in US firms with growth opportunities in similar ways as Ferrando *et al.* (2017) suggest that financial flexibility increases the firm's investment.

In the same way, a third argument related to the future growth opportunities is that companies might adopt the policy of under optimal debt to pursue superior performance based on lower requirements of transparency and a lesser risk of loss of control. The rule of thumb in this case is to keep the firm private to hold a higher trajectory of growth (Goyal *et al.*, 2002). This argument is similar to the hypothesis that entrenched managers attempt to avoid the disciplinary pressures of debt by abstaining from debt financing (Devos *et al.*, 2012). The pecking order hypothesis recognizes the use of debt as the non-preferred option by managers to finance their growth opportunities. Then, in case the company can generate enough internal funds, managers will avoid external financing with its underlying supervisory characteristic.

However, the extreme situation for a company that is sensitive to all the reasons mentioned for being under-levered, is that the firm has no debt at all or zero leverage.

Briefly, according to the financial flexibility hypothesis, it is suggested that firms use zero or extremely low leverage when the underinvestment risk is high, when the firm wants to avoid the debt overhang, when the company wants to keep opaque the financial reporting policies, and when entrenched managers want to avoid the supervisory role of debt.

According to Strebulaev and Yang (2013), one plausible explanation for debt-free level or extremely low leverage is when the firm accounts with outstanding managers whose preferences are to grow with virtually no (or relatively low) debt. Consequently, the managerial risk aversion as well as its capacity to manage the firm efficiently without depending on debt determine the capital structure adopted by the company. An additional argument for no-debt is that the company faces financial constraints to external borrowing. The company has zero debt not by choice but by restriction. This takes place when the firm faces tight financial constraints because of the firm's poor credit quality and the low profitability of its portfolio of investments (Takami, 2016). When firms are too risky to be able to obtain funds from private creditors or issue debt thorough corporate bonds, they must turn to equity capital financing with its subsequent high informational dilution costs (Denis and Mihov, 2003).

2.2. Supply side of corporate borrowing

From the supply side, we might also identify several relationships which impact the availability of credit that eventually impact the level of debt the company has. One exogenous factor which determines the supply of funds is the quality of the legal and regulatory environment. When the rights of the lenders are poorly regulated and protected, the volume of debt offered to corporations will shrink, meaning that stronger property rights protection leads to lenders more willing to monitor firms, resulting in increased lending that discourages zero-leverage policies (Bae and Goyal, 2009). Berger and Udell (2006) identify a causal chain between countries' government policies, structure of their financial institutions, and

their lending infrastructure which subsequently influences the availability of credit in the economy. A positive relationship between creditor protection and credit access has been recently found by Moro *et al.* (2018) and Haselmann *et al.* (2010).

Another variable that moderates the supply of funds and that might trigger debt-free capital structure decisions is the industry in which the firm operates (Miao, 2005). In this case, it might be expected that firms in technological, high risk industrial sectors would be more inclined to low or even zero-debt capital structures because of the high spreads in the cost of debt that penalize their borrowing capacity, which reduces the number of investment projects with positive net present value. This is not surprising given the uncertainty of the prospects of a particular technology or an innovation in addition to the usually low amount of fixed assets these firms should offer as collateral. Therefore, young firms, with no significant credit reputation and operating in innovative, risky industries will have a higher propensity to zero or extremely low debt level (Beck and Levine, 2002).

Similarly, Dang (2013) points out that in imperfect capital markets, the firm's capital structure is determined by its capacity to raise funds externally. Specifically speaking, under significant asymmetries of information, a firm might face credit rationing because lenders cannot easily assess the firm's creditworthiness (Saona and Vallelado, 2012). Under these circumstances, firms might not be able to obtain private or public debt in good conditions and therefore turn to equity rather than debt with higher informational costs (Frank and Goyal, 2003). For instance, Ramalho *et al.* (2018) suggest that better soft information on firms would be important in reducing financing gaps in family-owned firms in Portugal. When the financial system promotes credit data exchange, a more robust and due diligent process carried out by lenders is expected, which thwarts the existence of asymmetries of information (Kallberg and Udell, 2003). Therefore, the likelihood of credit rationing is greater in the face of large gaps of information between borrowers and lenders, leading to low or near to zero debt level in the capital structure. In the same vein as the previous arguments, a conceivable explanation for low or debt-free position might come from the current macroeconomic conditions. Under financial crises and weak economic performance, the credit rationing increases and therefore those firms not financially strong enough might

see themselves excluded from the debt market (Korajczyk and Levy, 2003). These kinds of firms tend to lose market share in economic downturns, which is consistent with the financial constraints' hypothesis. Therefore, one might expect that the debt level be pro-cyclical as conditioned by the availability of funds and the cost of debt.

The previous argument is also related to the market timing hypothesis (Baker and Wurgler, 2002). This approach suggests that the capital structure decisions are contingent on the capital market conditions. Consequently, the issuance of new common stocks should take place when the company's stock price is overvalued and the share repurchase is exercised when the stocks are undervalued (Hovakimian, 2005). Similarly, the level of debt might also be conditioned by the market situation (Haddad and Lotfaliei, 2019). When the prevailing interest rates are extremely low and the cost to get external funds is consequently relatively cheap, the leverage increases. Conversely, when the real interest rates increase (because of high net interest margins marked by private creditors like banks) the external funds become relatively more expensive in comparison to common equity, and therefore the leverage is reduced. Zero-debt and or very low leverage should be observed in economies with extremely high market interest rates. In this line, Ferrando *et al.* (2017) emphasize that financial flexibility is more valuable in countries with weaker legal protection and less developed capital markets.

Agency theory also provides a useful argument to justify a zero-leverage policy from the supply side. Ownership structure plays a crucial role as a corporate governance mechanism (Yafeh and Yosha, 2003). Thus, the higher the number of shares in the hands of the same shareholder, the higher will be his or her incentives to control managers. This eventually reduces agency problems by aligning the interests of managers and internal shareholders (Jensen and Meckling, 1976). Thus, the role of ownership structure as a governance device might be beneficial for creditors, if majority shareholders efficiently reduce the principal-agent problem, supporting a positive relationship between debt and corporate ownership concentration. In this case, the alignment of interests' hypothesis would support other than a zero-leverage policy. Notwithstanding, the monitoring role of majority shareholders might also be harmful for creditors if controlling shareholders push managers toward asset

substitution problems by undertaking riskier projects. In this scenario, because of the limited liability of shareholders, the wealth of creditors is expropriated if those riskier projects fail. This interaction might explain a zero-leverage policy because of the creditors' expropriation hypothesis (also known as the asset substitution hypothesis). Thus, the debt-free balance sheet policy is supported by the dynamics between the alignment of interests or the asset substitution hypotheses.

3. Methodology and data

The multivariate analysis is based on a few alternative models. The first one is performed with a multivariate panel logistic fixed-effect regression analysis to examine both firm-level and country-level determinants of the un-leverage process (Parsons and Titman, 2008). Following to Dang (2013), the main model takes the form:

$$Pr(ZL = 1|X) = \frac{1}{1+e^{-(\alpha+X\beta)}} \quad (1)$$

Where ZL is the binary variable which takes the value 1 if the firm has zero leverage in a given year and 0 otherwise, X is a vector compounded by firm- and country-level covariates that determine a zero-leverage decision, β is the vector of coefficients, and α is the constant term. X includes the following firm-level variables: firm size as our proxy for measuring financial capacity, liquidity to measure financial flexibility and managers' risk aversion, tangibility of assets is our proxy for asymmetries of information, profitability is our measure of pecking order theory, non-debt tax shield allows us to measure if the company has incentives for leverage, growth opportunities is used to measure underinvestment, closely held shares is our measure of agency problems between the owners and the rest of stakeholders, the firm's life cycle is used as a proxy of the financial restrictions that the firm may face, and finally, the growth rate of the stock price to measure the impact of the market timing on the firm's capital structure. X vector also includes the country-level covariates to measure the quality of the legal and regulatory environment, the term structure of interest

rates is used to measure the country's debt market situation, and the growth rate of the GDP to assess the impact of economic shocks such as recessions in the expected credit rationing.

The firm's size ($Size$) is computed as the logarithm of the firm's total assets (Frank and Goyal, 2009). The firm's liquidity position ($CashTA$) is computed as the cash and cash equivalent as a share of total assets, and for tangibility ($Tang$) we use a measure which corresponds to the net property, plan, and equipment over total assets (Almeida and Campello, 2007). Profitability was measured as the return on assets calculated as the net income over total assets ($Prof$) according to Öztekin (2015), whilst for the non-debt tax shield ($NDTS$) we used the annual depreciation charge over total assets (Vallelado and Saona, 2011). Growth opportunities (GO) are measured as the logarithm of the proxy variable market capitalization and total debt and divided by the total assets (Adam and Goyal, 2008), which corresponds to the market to book value of total assets.[1] At firm-level, we also used the insider ownership ($CloHSh$) as a proxy for internal corporate governance mechanisms according to Saona *et al.* (2018). This variable is defined by Thomson ONE Banker as the ownership that is closely held and represents the fraction of outstanding shares held by holding companies, employees, and insiders (e.g. managers, officers, and directors). Companies that are closely held tend to be resistant to hostile takeovers, since most shares are held within a relatively small, interested group of shareholders, and consequently the use of the closely held variable assumes a convergence of interest between all the closely held participants. The purpose of this variable is to measure the proportion of shares held by shareholders, who are directly related with the company or perform management or supervisory roles. These stocks are assumed not to be publicly traded in the same manner as common shares. Thus, closely held shares involve shareholders that do not necessarily have executive (e.g. managers) or monitoring (e.g. member of the board of directors) duties inside the firm but have a certain level of direct or indirect decision-making power, such as the case of holding companies. Since this variable exhibits a high skewness, we also computed the percentage of shares closely held ($CloHSh$) in its logarithmic transformation ($LogCloHSh$)

[1]According to Parsons and Titman (2008), the market to book value of common equity is one of the strongest and most reliable predictors of leverage, regardless of whether book or market leverage is used as the dependent variable.

to reduce such skewness that might potentially bias the results (Demsetz and Villalonga, 2001). The firm's life cycle ($LifeCycle$) was used as a measure of the firm's borrowing restrictions. We followed Anthony and Ramesh (1992) to compute the $LifeCycle$ variable that represents a composite index which includes the dividend ratio (Div), calculated as the annual dividend payment as a share of the earnings before extraordinary items, annual sales growth ($SalesGrowth$), and the capital expenditure ($CapEx$), calculated as the annual capital expenditure over the sum of the market capitalization and the long-term debt. Thus, $LifeCycle = (1 + Div)(1 + SalesGrowth)(1 + CapEx) - 1$ which represents a continuous variable with lower values for mature and stagnant companies that consequently have less borrowing restrictions and greater values associated to growing and start-up companies with significant restrictions to credit. Consequently, growing companies are more likely to be credit rationed. The market timing arguments ($MktTiming$) enter the models with the growth rate of the firm's year-end stock price. The market timing theory suggests that companies are more likely to issue debt when their market values are low, relative to book and past market values, and to repay or reduce the debt when their market values are high (Baker and Wurgler, 2002; Becker *et al.*, 1999; Hovakimian, 2005; Vallelado and Saona, 2011).

In addition to the firm-level variables, we also used country-level variables which proxy for the legal and regulatory systems in which firms operate. Using the data provided in Kaufmann *et al.* (2011),[2] for the legal and regulatory system we computed $GovSys$ variable as the average of a total of six dimensions of governance including (i) Voice and Accountability which is the process by which governments are selected, monitored, and replaced; (ii) Political Stability and Absence of Violence/Terrorism which measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism; (iii) Government Effectiveness which corresponds to the quality of public and civil services, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies;

[2] The latest update took place in September 2015. Information can be download from www.govindicators.org

(iv) Regulatory Quality, which measures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; (v) Rule of Law which reflects the confidence that the agents will abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence; and finally (vi) the Control of Corruption which measures the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests. These six individual indicators range between -2.5 and 2.5 with increasing values as the governance indicator improves. The $GovSys$ variable changes by country and by year.

Additionally, we used Regulatory Quality (RQ) and Rule of Law (RL) variables as described above. These two variables, as specific measures of governance effectiveness, exercise a deeper impact on capital structure decisions due their direct relation to the different legislative and regulatory issues that might impact the potential risks managers are willing to take and in the how they make their capital structure decisions. The term structure of interest rates variable ($TermInt$) was estimated as long-term interest rates minus short-term interest rates and everything divided by long-term interest rates (Vallelado and Saona, 2011). This variable is used to measure the country's debt market situation. Finally, the GDP growth rate ($GrowthRGDP$) was included as right-hand side variable to measure if the economy is growing or in recession.

Furthermore, we also used industry dummy variables to control for the possibility that the debt-free policy is determined by industry financing characteristics. Country and year dummy variables were also used in the estimates to control for the country and the temporal effects.

Given that the residuals may be correlated across firms or across time in the estimations with OLS, the standard errors can be biased. Consequently, as suggested by Petersen (2009), we use the logistic estimation with robust standard errors that are adjusted for heteroskedasticity and clustered by firm. The results report the average marginal effects which correspond to the partial derivatives $\partial Pr(ZL_{it} = 1)/\partial X$. According to Bartus (2005), this marginal effect

measures the marginal change in the predicted probability of a firm having a zero leverage policy resulting from a marginal change in a continuous independent variable or from a switch of a dummy variable from zero to one, ceteris paribus.

In a second stage, we use the dependent variable censored between 0 and 1. In this case, the variable corresponds to $PYZL$ which measures the proportion of years a company held zero leverage policy during the period of study. Consequently, we follow a suitable econometric approach to deal with the censored nature of this dependent variable. Thus, in this second stage we used a panel data Tobit regression model with fixed effects with standard errors clustered by country, industry and year level which is specified as:

$$PYZL_{ict} = \alpha + \beta_1 X_{ict} + \varepsilon_{ict} \quad (2)$$

Where the vector X_{ict} includes the set of independent variables previously defined for the firm i, country c, and period t, and ε_{ict} is the error term. Panel data Tobit model requires normal distribution and homoskedasticity (Cotei and Farhat, 2010; Lin and Schmidt, 1984). Since pooled Tobit models fit random-effects only, and since there is no available strategy for a parametric conditional fixed-effects model, we followed Honoré (1992) who developed a semiparametric estimator for fixed-effect Tobit models.

We obtained information on the financial reports of companies from Thomson ONE Banker to conduct our empirical analysis. This source of information basically includes the audited financial statements of public companies from 47 countries (Anguilla, Argentina, Australia, Austria, Bahamas, Belgium, Bermuda, Brazil, Canada, Cayman Islands, Chile, China, Cyprus, Denmark, Falkland Islands, Faroe Islands, Finland, France, Gabon, Germany, Gibraltar, Guernsey, Hong Kong, Hungary, India, Ireland, Isle of Man, Israel, Italy, Ivory Coast, Jersey, Liberia, Luxembourg, Malta, Marshall Islands, Mexico, Monaco, Netherlands, New Zealand, Panama, Papua New Guinea, Poland, Spain, Switzerland, United Kingdom, United States of America, and Virgin Islands) during the period 1996 to 2014. This yields 194,341 firm-year observations with 14,950 unique firms, which corresponds to an average of 13 consecutive observations per company (see Table 1 for the distribution of observations by country and time).

The dependent variable in the logistic model, as mentioned above, is ZL which takes the value 1 if the firm has zero leverage in a given year and 0 otherwise. The dependent variable $PYZL$ in the Tobit model corresponds to the proportion of years a company followed a zero-leverage policy in the period of analysis. Alternatively, we also use $PY5L$, which similarly measures the proportion of years in which a firm kept a leverage ratio lower than 5%.

Since we are interested in measuring actual capital structure choices made by firms, total liabilities are not included in the estimation of our dependent variables but short- and long-term debt only. Recall that total liabilities include nontrivial portions of nondebt liabilities such as accounts payable and accruals which reflect the day-by-day business arrangements instead of financing considerations. Hence, these components are not part of our estimated leverage ratios.

4. Results

4.1. Univariate analysis

About 18% of the firm year observations have zero debt, whilst one third of them have less than 5% of total debt in their capital structure. The firms in our sample have on average around 20% of debt in the capital structure (Table 2).

Figure 1 portrays the evolution along time for the proportion of companies that hold zero-leverage policy. As observed, the average amount of companies with no debt was slightly higher than 10% in 1996 and achieved a peak above 20% in the aftermath of the global financial recession of 2007-08. However, we observe a clear decline in the proportion of companies with a zero-leverage policy in the last two years of our period of analysis (2013 and 2014). The most remarkable observation of this figure is the consistently higher proportion of companies with no debt in those countries with relatively better corporate governance systems than in those countries with relatively weak governance. In this case, we considered countries with good governance systems as those with $GovSys$ variable above

the mean and countries with poor governance as those with $GovSys$ variable below its mean value.

4.2. Multivariate analysis

4.2.1. Drivers of likelihood of zero leverage

In Table 3 we observe that larger firms ($Size$) are less likely to have zero debt level than their counterpart smaller firms. A similar situation occurs with the tangibility of assets ($Tang$). Those companies with a greater proportion of tangible assets such as property, plant, land, and equipment in their asset structure are less likely to have no debt in their capital structure than firms with less tangible assets. Firms with a larger proportion of depreciation expense over total assets ($NDTS$) are also less likely to have zero debt level than firms with relatively low depreciation expenses. Additionally, firms with a high level of growth opportunities (GO) are less likely to have zero debt in their capital structure in comparison with firms with low levels of growth opportunities. When considering the proxy for insider ownership ($CloHSh$), we observe that at higher levels of insiders' concentration, firms are less likely to have no debt than at low levels of insider ownership concentration (e.g. see models 4 through 6, Table 3). The results show that at high levels of cash and equivalent ($CashTA$) and profitability ($Prof$), firms are more likely to have a zero level of debt than at low levels of cash and profitability. These results are consistent with the idea that companies prefer financial flexibility and carry out actions with the aim of creating it. Thus, higher levels of cash and profitability favour this goal (Marchica and Mura, 2010). We used $LifeCycle$ covariate to measure the exposure of the company to borrowing restrictions. We observe that the $LifeCycle$ variable is positive along all the six models in Table 3, meaning that as the company has higher financial constraints to borrowing, it is more likely that its capital structure will exhibit a zero leverage policy. Finally, we analyse how market timing ($MktTiming$) explains the no-debt policy. As tabulated, companies with growing stock prices are more likely to have no debt in their liabilities than companies whose stock price is dropping over time. This finding is consistent with the argument that as the company's stock

price increases, it will substitute the use of debt in favour of overvalued equity (Frank and Goyal, 2003; Hovakimian, 2005).

Furthermore, we observe that when governance indicators improve ($GovSys$), measured as outlined in Kaufmann *et al.* (2011), firms are also more likely to have no debt in their capital structure puzzle than when there is poor governance. In addition to that, we wanted to focus the analysis on two of these indicators: regulatory quality (RQ) and rule of law (RL). They are the two most influential indicators in the capital structure decisions, because they measure the direct impact of changes in the legal environment at which companies must adapt by changing their financial decisions. In fact, as shown in Table 3, the two variables indicate that as the legal environment improves across countries, the likelihood of holding a debt-free position increases. This finding is in line with that observed above concerning the $GovSys$ variable. Additionally, as the difference between the long- and short-term interest rates increases, the likelihood to have no debt also increases. Finally, we observe that it is less probable that companies have no debt in their capital structure when the economy is in an expansion period. Conversely, during an economic recession the likelihood to have no debt in companies' financial reports increases as a consequence of the typical credit rationing in this economic scenario.

According to model (1) in Table 4, as firm dimension ($Size$) increases in one unit, it is 3.44% less likely that the firm will have a zero-debt ratio. A similar situation is observed with the assets' tangibility ($Tang$). When tangibility increases in one unit, it is about 5.02% less probable that the firm will have no debt. The most sensitive variable considered in the analysis, however, is the non-debt tax shield, which shows that the probability of having no debt decreases by almost 57% when the $NDTS$ measure increases in one unit. Therefore, our results show that firms decide to have debt in their capital structure to take advantage of non-debt tax shields such as the depreciation expense. This finding is also supported by the advantages provided by the collateral capacity generated by tangible assets ($Tang$) as well as by the reputation that firm dimension ($Size$) implies. Growth opportunities are shown to also have a negative impact on the probability of having zero debt. In this case, when the variable GO increases in one unit, the probability for a firm to have no debt in its capital

structure drops 0.31% only as shown in the first model. Concerning the company's life cycle as a proxy of credit restrictions, we observe that as the $LifeCycle$ variable increases in one unit, the probability to have an all-equity capital structure increases by 4.79%. A similar situation is recorded with the $MktTiming$ variable that shows that as it increases in one unit, the probability of having no debt in the company increases by almost 29%. All these findings remain the same across the six models displayed in Table 4. In the same vein, when $CashTA$ variable increases by 1 percentage point, the probability to have only equity in the capital structure increases by 25.47%, ceteris paribus. Consequently, the likelihood of having no debt is very sensitive to the firm's liquidity position. If profitability increases by 1 percentage point, according to the first model in Table 4, the probability of having zero debt level increases by about 4.84%. All these findings are comparable if we look at the models displayed in Table 4.

In the last three models shown in Table 4, we observe that the likelihood of holding a zero debt level decreases by an average of 4.51% before a 1 percentage increase in $CloHSh$ variable. Therefore, as the percentage of shares held by managers, directors, and controlling shareholders increases, firms are more prone to have debt in their capital structures. This conduct can be understood as a way for insiders to leverage their potential yields through debt if projects are profitable. An alternative rationale for this relationship is the notion that shareholders enhance governance mechanisms through external debt, in that way constraining the potential managerial misbehaviour.

Finally, Table 4 also reports the impact of the world governance index variable ($GovSys$), the regulatory quality variable (RQ) and the rule of law (RL). For instance, as $GovSys$ variable increases in a single unit, the probability of having zero debt level increases between 4.20% and 6.00% as observed in models (1) and (4), respectively. Comparable behaviour is reported by RQ and RL variables. Concerning the term structure of the interest rates ($TermInt$) and the growth rate pace of the economy ($GrowthRGDP$), we observe that as the difference between long- and short-term rates increases by 1%, the probability of having no debt increases by 1.26%, but this probability decreases by about 5.38% if the growth rate of the economy increases by 1%, as observed in model (1). Hence, we cannot dissociate the

analysis of the de-leverage process of listed companies from the governance and country-level variables.

The findings in the first model in Table 5 show that there is an odd of 0.66 times that larger firms will have zero debt compared with the odds of smaller firms ($Size$). However, the odds of having no debt when there is a large proportion of cash ($CashTA$) is 48.76 times bigger than when there is a low cash position. Another odds ratio that is worth considering is the one observed in the profitability variable ($Prof$). In this case, the odds of having no debt are 3.17 times the odds of having debt when the firm's profitability increases. The opposite situation is observed for the non-debt tax shield ($NDTS$). Our results show that the odds of having a zero-debt level are negligible in comparison with the odds of having debt when the proportion of depreciation expense increases relative to the firm's total assets. Finally, the odds of financing the investment portfolio entirely with equity ($MktTiming$) are almost 18 times greater in firms with increasing stock prices than in companies with decreasing stock prices.

Country-level governance variables show in all the cases odds ratios greater than the unit. This means, for instance, that the probability of having zero debt level are 1.57 times greater that the probability of having debt in the capital structure when the $GovSys$ variable changes from its lower value to its higher value (e.g. see model (1) in Table 5). The regulatory quality (RQ) as well as the rule of law (RL) dimensions have similar odds ratios of around 1.65, meaning that the probability of having no debt is 1.65 times the probability of having debt when the regulatory system improves. Regarding the term structure of domestic interest rates ($TermInt$), the probability of having no debt is about 1.81 times greater than the probability of having debt when this indicator moves from its lower values to its higher values. The growth rate of the GDP, however, exhibits that the odds ratio of having an all-equity capital structure is 3.8 times greater than having debt in the financing structure when the GDP grows from its lower levels to its higher levels.

Table 6 shows that correctly classified predictions are systematically above 86% across all the models. The predicted probabilities according to the six fixed-effect Logit models shown

so far can be easily compared with the actual values of the ZL variable that is a dummy variable that takes value 1 for zero leverage and 0 if the company has debt in its capital structure. For this, we summarize the descriptive statistics of these variables in Table 7 and graphically represent them in the outputs shown in Figure 1. For model 1, the mean value of predicted probability is the same as the actual mean value of ZL variable. For the other six models, which included a substantially lower number of observations caused by the constraints imposed by the insider ownership variable, which is not available in many firms, the mean value of the predicted probabilities is, nevertheless, virtually the same as the actual mean value of ZL variable. Thus, our models perform well in predicting firms with and without debt in their capital structure.

4.2.2. Continuity in zero leverage

We used fixed-effect Tobit models to take advantage of the informative content of the zero leverage by studying the proportion of years in the study period that a firm has no debt. Since there are not available econometric tools to run Tobit models with invariant, individual effects, we followed the Honoré (1992) development[3] to estimate the Tobit models with fixed effects. This technique states that there is no estimator consistent due to the fact that the cross-section dimension increases with the time dimension fixed. Although, Tobit models are usually estimated by maximizing a likelihood function over all the parameters, including the fixed-effects, these estimators will not have the desired asymptotic properties in most of the cases.

Hence, the dependent variable used is $PYZL$ which is censored between 0 and 1 and defined as the proportion of years that a firm maintained a zero-leverage policy during the period of analysis in this study. Additionally, to study also those firms with relatively low leverage

[3]Honoré (1992) proposes a model that is consistent and asymptotically normal as the number of individuals approaches infinity with the number of observations per individual fixed, hence it is suitable for the purposes followed in this research.

ratios, we computed the variable $PY5L$, which corresponds to the proportion of years a firm in the study maintained a leverage policy lower than 5% of total assets.

The major advantage of a Tobit model is that it allows, on the one hand, the Probit specification to investigate why some firms maintain a zero-leverage policy in their capital structures and why some other firms do not; and on the other hand, the fixed-effect Tobit model allows us to quantify such relationships. In this case, the estimated coefficients of Tobit models are the marginal effects of the right-hand side variables over the dependent variable.

As observed in Table 8, model 1, the signs of all the estimated coefficients are consistent with our previous findings except for the $GovSys$ variable that has a change in sign from positive in the Logit model (e.g. see Tables 1, 2, and 3) to negative in Tobit model. Nevertheless, in this case it is important to recall that we are analysing the time dimension of the firm's zero-leverage policy and not just the point in time of zero leverage. Hence, as we can observe in the outputs tabulated in Table 8, the increase in company size ($Size$) is associated with a reduction of the number of years a company keeps zero-leverage policy ($PYZL$). Therefore, should a certain company have no debt, it is less likely that it will continue with such zero-leverage policy as the firm size grows over time, and consequently will use debt eventually. The parameter of the $Size$ variable is statistically significant across all the first six models estimated in Table 8. This finding is like the one observed in those firms with relatively low leverage, for example less than 5% of assets ($PY5L$) (see models 7 through 12 in Table 8). In this case, the proportion of years with a relatively low leverage ratio is also reduced when company size increases. As observed in these findings, companies change their un-leverage policy by borrowing larger amounts of external sources of funds as firm dimension gets bigger. A plausible explanation of this finding may be associated with the usage of reputation as a valuable asset, which allows companies to issue debt in more favourable conditions. Additionally, as the overall portfolio of investments grows (e.g. total assets), the findings seem to point out that such growth is financed with debt (Gonzalez and Gonzalez, 2012). Other arguments provide the evidence that the relevance of direct bankruptcy costs decreases as firm value increases, suggesting that the impact of these costs

on the borrowing decisions of large firms might be negligible (Ang *et al.*, 1982). An appealing explanation for our observed relationship between the proportion of time a company remains with no debt over time–or a systematically low proportion of debt–and the firm size is explained by the cost of capital. According to Hann *et al.* (2013), the coinsurance among a firm's business units can reduce systematic risk through the avoidance of countercyclical deadweight costs. Such coinsurance is generated through business diversification which implies a lower cost of capital than comparable portfolios of stand-alone firms. Consequently, larger firms have more chances to have more diversified business portfolios than smaller firms, which results in relatively lower cost of capital for larger firms than for smaller firms. Consequently, as the company size increases, the implied cost of capital decreases and therefore is it less likely that the company will remain unleveraged ($PYZL$ and $PY5L$) for longer periods of time.

Similar findings are observed when the collateral capacity of the firm improves, which is when the tangibility of assets ($TANG$) increases. The results show that when more tangible assets are available, the proportion of years that a company holds zero debt in its capital structure decreases. Consequently, firms change their policy from no debt to debt when firms account with more insurable assets (Almeida and Campello, 2007). The reduction in the proportion of years a firm keeps a low debt of less than 5% of total assets ($PY5L$) is even more sensitive before increases in tangible assets (see models 7 to 12 in Table 8). When the dependent variable is ($PYZL$), the proportion of years with no leverage declines between 8.83% and 9.54% as the $Tang$ variable increases by a unit. However, when the dependent variable is ($PY5L$), it drops between 10.09% to 14.68% when the tangibility measure increases by one unit. Therefore, we observe a clear link between the firm's capacity to offer tangible assets as collateral and changes in the capital structure of zero leverage companies. The low (and even zero) debt policy is modified when tangible assets increase. Our result is in agreement with the Rampini and Viswanathan (2013) argument that collateral determines the capital structure. This approach involves a relationship between an optimal financing structure and the risk management collateralization of debt with tangible assets. Hence, our findings support that the existence of collateral assets allows companies to remain for less time with no or low leverage. This finding indicates also that companies eventually adjust to

a certain target debt level. In fact, Matemilola and Ahmad (2015) empirically show that fixed assets required as collateral for African companies help them to adjust to long-run optimal debt level.

Another statistically significant variable and with a negative relationship with the proportion of years with low (even zero) debt is the non-debt tax shields ($NDTS$). Hence, as non-debt tax shield increases, the proportion of years a company maintains a zero-debt policy decreases. Our results hold for companies with low proportions of debt ($PY5L$), as the non-debt tax shield increases, they also remain less time with this low leverage policy, eventually changing it towards more debt in their capital structures (models 7 to 12 in Table 8). We observe a similar pattern when firms account for future growth opportunities (GO). In this case, the no-debt policy seems to be an inefficient capital structure decision when growth opportunities increase. Consequently, the proportion of years a firm remains unlevered decreases as new growth opportunities appear; or in other words, firms are compelled to use debt for financing their future investments. According to Serrasqueiro and Nunes (2010), debt is a way to discipline managers' actions when growth opportunities encourage opportunistic behaviour. Likewise, according to the pecking order approach (Myers, 1984; Myers and Majluf, 1984), when retained earnings are exhausted, there is a preference for debt rather than for equity in those companies with high growth opportunities.

Our findings also support the rationale that the permanence in zero-leverage policy increases as the firm's liquidity position improves. As seen in all the models displayed in Table 8, $CashTA$ variable is always positive and statistically significant. Higher coefficients are reported when dependent variable is $PY5L$ than when it is $PYZL$, meaning that the temporal permanence in zero level of debt increases by 2.72%[4] when cash and equivalent over total assets ratio increases by 10 basis points. This responsiveness is even greater when the dependent variable is $PY5L$, which means that when the leverage is not greater than 5% of total assets, firms stay even longer periods with a low leverage policy when cash position improves (as cash ratio increases by 10 basis points, the average firm stays about 3.33% more

[4] Computed as the 10% of the average among the coefficients of $CashTA$ variable in the three first models of Table 8.

time with low leverage ratios). These results suggest that liquidity substitutes for external borrowing.

Findings concerning firm's performance ($Prof$) are also according to the theoretical predictions. For instance, in Table 8 all the models exhibit a direct relationship between firm's profitability and the proportion of years the firm stays with zero (PZL) or low debt ($PY5L$) level. In other words, the higher the profitability, the longer the period a firm with zero or low debt will remain in that status. Previous literature has recognized the relevance of profitability as a driver of a firm's capital structure policy (Pandey, 2004). The results confirms the asymmetric information hypothesis of Myers (1977) of a negative relationship between borrowing external funds and profitability, tested in several empirical studies (Rajan and Zingales, 1995; Saona and Vallelado, 2012; Titman and Wessels, 1988; Vallelado and Saona, 2011).

Results on the closely held shares ($CloHSh$) are significant only in one out of three regressions that explain the long-run, zero-leverage policy (PZL) as shown in model 5, Table 8. This finding is statistically significant at the 10% level, showing that the closely held ownership exhibits a negative relationship with the proportion of years a company holds a zero-debt level in its capital structure. This finding suggests that the potential entrenchment risk by managers is constrained by the implied monitoring effect of the external creditors. The findings are more robust when we analyze the low-leverage decision over time ($PY5L$). In this case, the results are statistically significant in the last three estimations of Table 8 for $CloHSh$ variable. We can assert that the proportion of shares held by insiders negatively influences the proportion of years companies remain with a relatively low debt ratio. Hence, the findings seem to support a complementary monitoring effect of debt on the potential discretionary power of insiders.

The firm-level features that determine the restrictions to external borrowing such as the life cycle of the company ($LifeCycle$), influence the long-run permanence at zero or low leverage. As observed in Table 8, as the intrinsic restrictions to borrowing increase, the permanence at zero or low level of debt also increases. Hence, consolidated companies in

their respective industries tend to stay for shorter periods of time unlevered. Conversely, growing companies and start-ups that are just beginning their operations have fewer chances to become indebted and, consequently, they remain longer periods at zero or low leverage.

The last firm-level variable analyzed at this point is the market timing condition ($MktTiming$). According to this variable, when the firm's stock price grows, the company has more incentives to remain unlevered or an extremely low leverage, because of a substitution of debt for equity.

Additionally, at the country-level, the governance indicators show dissimilar behaviour. For instance, the worldwide governance indicator ($GovSys$) of Kaufmann *et al.* (2011) is positive and statistically significant only in models 1 and 7; whilst the regulatory quality (RQ) and the rule of law (RL) indexes show positive and statistically significant parameters (e.g. see models 3, 5, and 11 in Table 8). This finding indicates that as the governance indicator at the national level improves, the number of years a company remains with zero (PZL) or low ($PY5L$) leverage declines. These findings demonstrate that the capital structure dynamics change with respect to better governance systems. Then, companies operating in good governance environments are more willing to hold debt. However, regarding the specific indicators of the proper functioning of the legal and regulatory systems, the results show that as the regulatory quality and the rule of law improve at the national level, companies remain longer periods with low or zero level of debt. It seems to be a substitution effect in the specific case when the legislation that protects the interests of shareholders is enhanced, because in that case companies will favour greater levels of equity capital. When investor rights are better protected, firms are more prone to use debt rather than using just equity capital.

The term structure of the interest rates ($TermInt$) is only significant in the last three regressions in Table 8. There, we observe that when the relative difference between long-and short-term interest rates increases, the companies in the sample decided to remain longer periods with zero (PZL) or low leverage ratios ($PZL5$). In the same vein, when the cost of borrowing increases, companies remain unleveraged to avoid these financing costs.

The growth rate of the GDP ($GrowthRGDP$) is highly significant in explaining the long-term dynamics of the zero-leverage policy. As observed in Table 8, in periods of economic growth companies tend to remain for shorter periods financed entirely with equity. If we compare the two financial decisions–zero leverage and low leverage–the results demonstrate that the low leverage decision (lower than 5% of total assets) is much more sensitive to changes in the country's economic conditions than the zero-debt decision.

Finally, to improve the robustness of our results, we test the interaction between the ownership concentration and the zero-leverage policy. Table 9 shows similar estimations as those observed in the previous tables, but this time we changed the closely held shares ($CloHSh$) for the voting rights of the majority shareholder (Own). Table 9 is subdivided in two parts, the marginal effects (first three models) and their corresponding odds ratio (last three models). There, we observe that the voting rights of the controlling shareholder do not explain the zero-leverage policy since Own variable is not statistically significant.

However, when we look at the country-level governance variables ($GovSys$, RQ, RL, $TermInt$, and $GrowthRGDP$), in all the cases they still positively impact the probability of having no debt in the capital structure. Moreover, the odds ratio of having no debt are about 1.8 times greater than the probability of having debt financing in the capital structure when these governance indicators increase. Lastly, like that shown in our findings above, the models shown in Table 9 correctly classify 86.00% of predicted estimations as exhibited at the bottom of the table.

5. Conclusions

Which variables compel firms to have and eventually keep zero-leverage policies? This was the research question that we addressed for a set of companies from developed, developing, and underdeveloped economies for the period 1996 – 2014.

Low leverage is a more common outcome than expected in the financial literature (Byoun and Xu, 2013). Furthermore, DeAngelo and Roll (2015) find that low leverage companies

are persistent over time. Thus, small companies with cash and cash equivalent assets, low growth opportunities and low need of tangible assets for their business are the ones with the highest probability of having an all-equity capital structure. This situation is not exceptional of a particular year but rather a permanent fact that lasts for several years. External factors contribute in the consolidation of low levels of leverage in a company, such as an effective regulation of governance and an economic period of low economic growth or recession. Furthermore, those companies with a continuous overvaluation of their equity are good candidates to maintain a low leveraged capital structure.

As a summary of the results, we can say that with regard to the firm-level determinants, our results confirm that smaller companies with a low level of tangible assets and low level of depreciation, with a low proportion of growth opportunities as well as diluted insider ownership, and strong liquidity position and profitability, are more likely to have zero debt in their capital structure puzzles. Additionally, regarding the country-level factors, the results show that when governance indicators improve, firms are also more likely to have no debt in their capital structure. Similarly, when the economy is in an expansion period, it is less probable that companies would have no debt in their capital structures.

This study contributes to understand why some companies recurrently tend to keep a zero-debt capital structure. Our most important findings indicate that certain factors at the firm level as well as some other contextual variables influence this type of non-debt behaviour in the corporate sector.

We still know little about why companies use a certain level of debt. We still do not have a single way to answer this question, but many different views on how companies claim to use debt financing; and even more, we do not have a unified theoretical framework of capital structure that incorporates the not negligible group of zero-debt firms. Our study demonstrates that there is a considerable number of companies that have chosen to be free of debt. Hence, we believe that there is a lack of a unified, all-embracing theory of capital structure that incorporates the un-levered companies in their proposals. This is left for future research.

We do recognize limitations in this study that open the door for further studies. First, as observed in the major findings, governance systems are key factors in explaining the zero-

leverage decision. In this study we do not consider specific governance tools such as the nature of the family firm, which is associated with particular governance characteristics. Hence, a future line of research might be advocated to the specific analysis of the zero-leverage decision in family owned firms. Second, given the wide scope of analysis of this study that considered so many countries, we were not able to collect specific information on the board characteristics that ultimately shape capital structure decisions. Hence, we acknowledge this limitation in our empirical analysis and left it pending for a future study.

Figure 1: Distribution of Zero-Leverage Firms over Years.

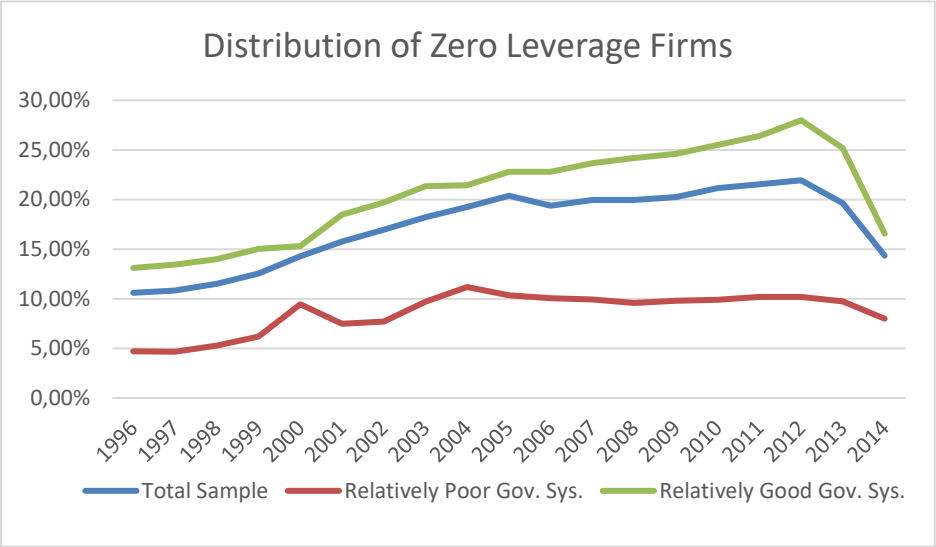

Table 1: Observations Total Sample by Country & Year

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Anguilla	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0	12
Argentina	33	35	53	72	78	77	76	73	70	64	64	64	63	59	58	55	53	45	42	1134
Australia	148	174	220	334	564	929	963	531	587	691	1,467	1,676	1,719	1,646	1,682	1,625	1,534	1,190	198	17878
Austria	83	90	96	99	100	95	89	86	85	83	82	81	82	76	67	68	67	63	49	1541
Bahamas	1	1	1	1	2	2	3	4	4	4	4	4	4	4	4	4	4	3	1	55
Belgium	114	128	137	142	136	128	126	130	128	127	125	119	118	116	108	100	79	85	78	2224
Bermuda	188	212	214	221	342	447	456	469	476	470	462	465	460	459	458	459	459	427	200	7344
Brazil	113	120	141	308	313	286	268	283	311	296	290	280	258	255	252	236	212	203	118	4543
Canada	398	422	678	857	956	1,023	1,171	1,250	1,310	1,326	1,273	1,179	1,070	984	928	874	727	687	276	17389
Cayman Islands	30	35	38	48	105	193	258	294	314	310	301	307	305	289	290	287	281	249	38	3972
Chile	78	81	114	171	169	168	190	190	192	196	193	188	183	179	176	163	148	136	106	3021
China	0	0	0	0	2	6	6	10	8	8	8	7	6	7	7	6	6	5	0	92
Cyprus	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	9
Denmark	133	144	152	147	150	141	136	132	126	126	102	119	115	112	105	102	97	89	81	2309
Falkland Islands	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	9
Faroe Islands	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	12
Finland	99	117	132	135	137	134	137	137	134	133	128	127	120	118	116	114	111	103	89	2321
France	645	739	809	833	799	767	751	739	725	723	712	688	667	627	605	563	255	466	356	12469
Gabon	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Germany	583	701	779	779	830	794	764	755	764	796	794	760	721	683	647	608	199	449	334	12740
Gibraltar	0	0	0	0	0	0	3	3	2	2	3	2	2	3	3	3	3	3	0	32
Guernsey	0	1	0	3	8	12	14	14	16	25	28	26	21	21	20	20	19	19	1	268
Hong Kong	145	150	146	154	180	203	205	198	200	197	193	192	192	190	186	191	187	179	129	3417
Hungary	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	7
India	217	232	236	248	369	377	414	502	647	702	793	1,813	1,790	1,755	1,746	1,729	1,658	1,506	226	16960
Ireland; Republic of	62	61	69	70	79	76	73	72	81	86	80	73	66	66	66	60	57	53	36	1286
Isle of Man	1	1	1	1	4	4	5	8	11	18	30	38	35	32	30	28	24	20	0	291
Israel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Italy	93	120	140	164	177	185	204	218	240	254	260	264	263	253	247	225	63	195	109	3674
Ivory Coast	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	17
Jersey	10	13	14	14	18	24	25	27	33	35	40	40	38	37	34	34	30	27	12	505
Liberia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	18
Luxembourg	2	4	4	3	3	3	2	4	5	5	4	6	6	6	6	5	5	4	0	77
Malta	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	2	1	1	0	21
Marshall Islands	0	0	0	0	2	2	2	3	4	7	9	10	10	10	10	10	8	2	0	89
Mexico	70	72	105	117	118	118	115	121	117	111	112	106	103	103	100	97	83	78	72	1918
Monaco	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
Netherlands	187	208	214	211	200	181	179	171	171	162	157	153	139	130	125	116	107	97	86	2994
New Zealand	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	0	14
Panama	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	33
Papua New Guinea	3	4	4	4	5	5	5	5	5	5	5	5	5	5	4	4	4	4	3	84
Poland	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	13

Spain	153	159	153	157	158	160	149	149	149	138	134	125	123	117	111	105	97	90	70	2497
Switzerland	183	205	214	221	255	254	250	245	245	244	236	225	219	206	202	193	184	175	136	4092
United Kingdom	492	533	545	577	519	1,641	1,620	1,583	1,654	1,724	1,723	1,625	1,447	1,323	1,283	1,217	1,127	1,056	456	22145
United States of America	588	1,457	2,030	2,137	2,218	2,263	2,336	2,457	2,571	2,675	2,783	2,846	2,842	2,869	2,973	2,806	2,673	2,168	1,854	44546
Virgin Islands; British	0	0	0	2	4	8	9	12	16	16	16	19	19	20	20	17	16	15	1	210
Total	**4,861**	**6,228**	**7,447**	**8,239**	**9,010**	**10,717**	**11,014**	**10,884**	**11,412**	**11,772**	**12,626**	**13,647**	**13,226**	**12,775**	**12,685**	**12,140**	**10,591**	**9,904**	**5,163**	**194,341**

Table 2: Descriptive Statistics of Variables

Variable	Description	Mean	Std. Dev.	Min	Max
TDTA	Total Debt / Total Assets	0.199	0.193	0.000	0.999
ZL	1 if TDTA=0% and 0 otherwise	0.180	0.384	0.000	1.000
Z5L	1 if TDTA<5% and 0 otherwise	0.327	0.469	0.000	1.000
PYZL	Proportion of years with 0% debt	0.102	0.258	0.000	1.000
PY5L	proportion of years with debt < 5%	0.235	0.371	0.000	1.000
Size	Ln(Total Assets)	5.095	2.407	-1.468	12.562
CashTA	Cash &Cash Equivalent / Total Assets	0.175	0.214	0.000	1.000
Tangible	Net PPE / Total Assets	0.298	0.271	0.000	1.000
Prof	NI / Total Assets	0.016	0.125	-0.500	0.463
NDTS	Depreciation / Total Assets	0.038	0.036	0.000	0.205
GO	Ln(MktCap + Total Debt) / Total Assets)	0.013	0.785	-2.078	2.346
CloHSh	% Closely Held Shares	0.399	0.275	0.000	1.000
LifeCycle	(1 + Div) (1 + Sales Growth) (1 + CAPEX) - 1	0.647	0.195	0.078	0.964
MktTiming	Growth rate of year-end stock price	0.033	0.085	-0.369	0.480

Table 3. Panel data Logit models.

Dependent variable is the ZL dummy variable which takes value 1 for zero leverage and 0 other wise. Standard errors in parenthesis.

	(1)		(2)		(3)		(4)		(5)		(6)	
Size	-0.6250	***	-0.6379	***	-0.6382	***	-0.8619	***	-0.8664	***	-0.8594	***
	(0.0125)		(0.0125)		(0.0126)		(0.0206)		(0.0206)		(0.0206)	
CashTA	4.6230	***	4.5858	***	4.5877	***	5.3399	***	5.3251	***	5.3730	***
	(0.0848)		(0.0847)		(0.0848)		(0.1321)		(0.1320)		(0.1320)	
Tang	-0.9102	***	-0.9087	***	-0.8934	***	-0.4560	***	-0.4102	***	-0.4238	***
	(0.0867)		(0.0866)		(0.0869)		(0.1278)		(0.1276)		(0.1277)	
Prof	0.8789	***	0.9079	***	0.9312	***	1.2720	***	1.2650	***	1.2716	***
	(0.1007)		(0.1006)		(0.1009)		(0.1531)		(0.1528)		(0.1531)	
NDTS	-10.3386	***	-10.2641	***	-10.3829	***	-12.1190	***	-12.0510	***	-12.2964	***
	(0.5234)		(0.5227)		(0.5242)		(0.8366)		(0.8354)		(0.8380)	
GO	-0.0558	***	-0.0601	***	-0.0577	***	-0.0841	***	-0.0860	***	-0.0740	**
	(0.0199)		(0.0199)		(0.0200)		(0.0317)		(0.0317)		(0.0316)	
CloHSh							-0.9183	***	-0.9501		-0.8499	***
							(0.1034)		(0.1032)		(0.1038)	
LifeCycle	1.0982	***	1.0884	***	1.0817	***	1.0963	***	1.0863	***	1.0805	***
	(0.0308)		(0.0304)		(0.0303)		(0.0310)		(0.0306)		(0.0305)	
MktTiming	6.6250	***	6.6179	***	6.6873	***	6.6466	***	6.6399	***	6.7072	***
	(0.1889)		(0.1883)		(0.1882)		(0.1898)		(0.1892)		(0.1892)	
GovSys	0.7627	***					1.2063	***				
	(0.0509)						(0.0704)					
RQ			0.8663	***					1.0686	***		
			(0.0456)						(0.0605)			
RL					1.1087	***					1.2155	***
					(0.0524)						(0.0685)	
TermInt	0.2898	*	0.3357	**	0.3507	**	0.3008	*	0.3469	**	0.3648	**
	(0.1631)		(0.1624)		(0.1621)		(0.1635)		(0.1628)		(0.1625)	
GrowthRGDP	-1.2326	***	-1.2150	***	-1.1679	***	-1.2414	***	-1.2250	***	-1.1777	***
	(0.2027)		(0.2021)		(0.2019)		(0.2038)		(0.2032)		(0.2031)	
Intercept	-1.8713	***	-2.0284	***	-2.4145	***	-1.1966	***	-1.1638	***	-1.4834	***
	(0.0958)		(0.0937)		(0.1024)		(0.1459)		(0.1438)		(0.1531)	
/lnsig2u	2.0850		2.0787		2.0985		2.3374		2.3302		2.3343	
	(0.0265)		(0.0266)		(0.0266)		(0.0331)		(0.0331)		(0.0331)	
sigma_u	2.8363		2.8274		2.8556		3.2178		3.2063		3.2129	
	(0.0376)		(0.0375)		(0.0380)		(0.0532)		(0.0531)		(0.0532)	
rho	0.7097		0.7085		0.7125		0.7589		0.7576		0.7583	
	(0.0055)		(0.0055)		(0.0055)		(0.0061)		(0.0061)		(0.0061)	
Observations	152,288		152,295		152,313		80,625		80,654		80,660	
Groups	14,948		14,949		14,950		12,468		12,468		12,469	

Table 4. Marginal Effects.

Dependent variable is dummy variable which takes value 1 for zero leverage and 0 other wise.

	(1)		(2)		(3)		(4)		(5)		(6)	
Size	-0.0344	***	-0.0351	***	-0.0470	***	-0.0429	***	-0.0432	***	-0.0428	***
	(0.0007)		(0.0007)		(0.0010)		(0.0009)		(0.0009)		(0.0009)	
CashTA	0.2547	***	0.2522	***	0.2730	***	0.2658	***	0.2653	***	0.2673	***
	(0.0050)		(0.0049)		(0.0082)		(0.0068)		(0.0068)		(0.0067)	
Tang	-0.0502	***	-0.0500	***	0.0065	***	-0.0227	***	-0.0204	***	-0.0211	***
	(0.0047)		(0.0047)		(0.0071)		(0.0063)		(0.0063)		(0.0063)	
Prof	0.0484	***	0.0499	***	0.0618	***	0.0633	***	0.0630	***	0.0633	***
	(0.0056)		(0.0056)		(0.0087)		(0.0077)		(0.0076)		(0.0076)	
NDTS	-0.5697	***	-0.5645	***	-0.6402	***	-0.6032	***	-0.6003	***	-0.6118	***
	(0.0291)		(0.0290)		(0.0501)		(0.0416)		(0.0416)		(0.0417)	
GO	-0.0031	***	-0.0033	***	0.0080	***	-0.0042	***	-0.0043	***	-0.0037	**
	(0.0011)		(0.0011)		(0.0019)		(0.0016)		(0.0016)		(0.0016)	
CloHSh							-0.0457	***	-0.0473	***	-0.0423	***
							(0.0051)		(0.0051)		(0.0052)	
LifeCycle	0.0479	***	0.0477	***	0.0475	***	0.0480	***	0.0478	***	0.0476	***
	(0.0011)		(0.0011)		(0.0011)		(0.0011)		(0.0011)		(0.0011)	
MktTiming	0.2889	***	0.2901	***	0.2939	***	0.2907	***	0.2920	***	0.2956	***
	(0.0083)		(0.0083)		(0.0083)		(0.0084)		(0.0084)		(0.0084)	
GovSys	0.0420	***					0.0600	***				
	(0.0028)						(0.0034)					
RQ			0.0476	***					0.0532	***		
			(0.0025)						(0.0029)			
RL					0.0307	**					0.0605	***
					(0.0052)						(0.0033)	
TermInt	0.0126	*	0.0147	**	0.0154	**	0.0132	*	0.0153	**	0.0161	**
	(0.0071)		(0.0071)		(0.0071)		(0.0072)		(0.0072)		(0.0072)	
GrowthRGDP	-0.0538	***	-0.0533	***	-0.0513	***	-0.0543	***	-0.0539	***	-0.0519	***
	(0.0088)		(0.0089)		(0.0089)		(0.0089)		(0.0089)		(0.0089)	

Table 5. Odds Ratio.

Dependent variable is dummy variable which takes value 1 for zero leverage and 0 other wise.

Variables	(1)		(2)		(3)		(4)		(5)		(6)	
Size	0.6641	***	0.6588	***	0.6644	***	0.6356	***	0.6339	***	0.6372	***
	(0.0032)		(0.0032)		(0.0032)		(0.0043)		(0.0043)		(0.0043)	
CashTA	48.7556	***	46.8306	***	48.7515	***	51.4857	***	50.6612	***	52.3275	***
	(2.0768)		(1.9952)		(2.0768)		(3.0379)		(2.9885)		(3.0860)	
Tang	1.3208	***	1.3373	***	1.3409	***	1.2717	***	1.3186	***	1.2960	***
	(0.0470)		(0.0475)		(0.0476)		(0.0627)		(0.0649)		(0.0638)	
Prof	3.1651	***	3.3375	***	3.2664	***	5.5250	***	5.6318	***	5.5621	***
	(0.1914)		(0.2019)		(0.1979)		(0.4632)		(0.4721)		(0.4667)	
NDTS	<0.0000	***	<0.0000	***	<0.0000	***	0.0002	***	0.0002	***	0.0001	***
	(0.0000)		(0.0000)		(0.0000)		(0.0001)		(0.0001)		(0.0001)	
GO	1.1988	***	1.1966	***	1.1871	***	1.1965	***	1.1958	***	1.1883	***
	(0.0132)		(0.0132)		(0.0131)		(0.0187)		(0.0187)		(0.0186)	
CloHSh							0.5076	***	0.5100	***	0.5471	***
							(0.0235)		(0.0236)		(0.0256)	
LifeCycle	0.6321	***	0.6313	***	0.6342	***	0.6330	***	0.6322	***	0.6348	***
	(0.0049)		(0.0049)		(0.0049)		(0.0049)		(0.0049)		(0.0049)	
MktTiming	17.9884	***	17.3480	***	12.9957	***	17.2563	***	16.6549	***	19.1224	***
	(5.1189)		(5.0682)		(5.2591)		(5.0832)		(5.0350)		(5.2139)	
GovSys	1.5765	***					1.6752	***				
	(0.0261)						(0.0364)					
RQ			1.6493	***					1.6248	***		
			(0.0258)						(0.0317)			
RL					1.6824	***					1.7573	***
					(0.0285)						(0.0386)	
TermInt	1.8121	***	1.8527	***	1.8641	***	1.8142	***	1.8557	***	1.8682	***
	(0.0972)		(0.0992)		(0.0998)		(0.0976)		(0.0997)		(0.1003)	
GrowthRGDP	3.8013	***	3.8783	***	3.7422	***	3.9106	***	3.9898	***	3.8193	***
	(0.3729)		(0.3804)		(0.3670)		(0.3890)		(0.3969)		(0.3799)	
Intercept	0.3734	***	0.3445	***	0.3174	***	0.6137	***	0.5932	***	0.4990	***
	(0.0127)		(0.0118)		(0.0114)		(0.0326)		(0.0317)		(0.0281)	
Correctly Classified	86.72%		86.78%		86.76%		86.38%		86.34%		86.41%	

Table 6. Classification of the Prediction.

Panel A of this table classify the prediction according to the dummy dependent variable ZL as "+" if the classified probability Pr(ZL)≥50%. True classification is defined as dummy variable equal 1. Panel B computes the proportion of positive and negative predictive values.

Panel A			
Classified	Zero Debt	With Debt	Total
+	6,885	4,116	11,001
-	16,109	125,178	141,287
Total	22,994	129,294	152,288
Panel B			
Sensitivity		Pr(+| D)	29.94%
Specificity		Pr(-|~D)	96.82%
Positive predictive value		Pr(D| +)	62.59%
Negative predictive value		Pr(~D| -)	88.60%
Correctly classified			86.72%

Table 7. Predicted Probabilities.

Dependent variable is dummy variable which takes value 1 for zero leverage and 0 other wise.

Variable	Obs	Mean	Std. Dev.	Min	Max
ZL	152,288	0.1510	0.3580	0.0000	1.0000
plogit1	152,303	0.1510	0.1870	0.0011	0.9926
plogit2	152,310	0.1510	0.1877	0.0011	0.9925
plogit3	152,328	0.1510	0.1875	0.0011	0.9925
plogit4	80,661	0.1577	0.1946	0.0013	0.9969
plogit5	80,663	0.1577	0.1949	0.0012	0.9969
plogit6	80,669	0.1577	0.1951	0.0012	0.9968

Figure 1.
Dependent variable is dummy variable which takes value 1 for zero leverage and 0 other wise.

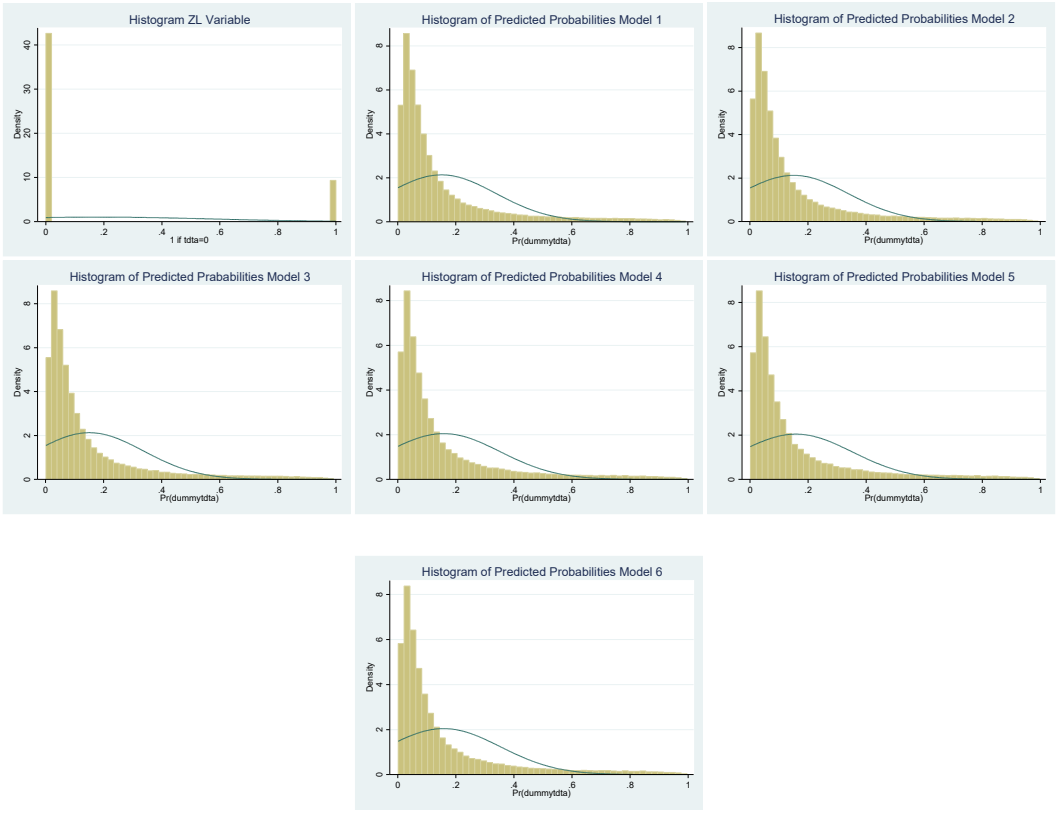

Table 8. Panel data Tobit models

Dependent variable is PYZL or PY5L.

	PYZL						PY5L					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Size	-0.0328***	-0.0275***	-0.0279***	-0.0571***	-0.0575***	-0.0569***	-0.0372***	-0.0348***	-0.0347***	-0.0596***	-0.0597***	-0.0597***
	(-9.2671)	(-7.7894)	(-7.9094)	(-12.3833)	(-12.4541)	(-12.3447)	(-13.9480)	(-13.0654)	(-13.0030)	(-15.4681)	(-15.5076)	(-15.4882)
CashTA	0.2891***	0.2900***	0.2902***	0.2539***	0.2535***	0.2537***	0.3584***	0.3581***	0.3584***	0.3078***	0.3077***	0.3077***
	(17.9040)	(18.0571)	(18.0393)	(13.4763)	(13.5049)	(13.4708)	(29.7497)	(29.6995)	(29.7235)	(19.7794)	(19.8183)	(19.7666)
Tang	-0.0883***	-0.0954***	-0.0948***	-0.0450	-0.0459	-0.0452	-0.1428***	-0.1468***	-0.1464***	-0.1014***	-0.1023***	-0.1009***
	(-4.1188)	(-4.5491)	(-4.5163)	(-1.5643)	(-1.6013)	(-1.5734)	(-7.9888)	(-8.2520)	(-8.2216)	(-4.2787)	(-4.3303)	(-4.2633)
Prof	0.0842***	0.0787***	0.0786***	0.0931***	0.0899***	0.0926***	0.2173***	0.2149***	0.2154***	0.2127***	0.2106***	0.2136***
	(5.3483)	(5.0043)	(4.9983)	(5.3223)	(5.1509)	(5.2941)	(17.8003)	(17.6739)	(17.7094)	(13.0888)	(12.9915)	(13.1461)
NDTS	-0.7620***	-0.8111***	-0.8129***	-0.8509***	-0.8482***	-0.8500***	-0.4891***	-0.5006***	-0.4994***	-0.5074***	-0.5045***	-0.5042***
	(-6.6442)	(-7.0240)	(-7.0249)	(-5.7279)	(-5.7506)	(-5.7445)	(-5.9325)	(-6.0856)	(-6.0682)	(-4.3769)	(-4.3591)	(-4.3537)
GO	-0.0080**	-0.0102***	-0.0100***	-0.0165***	-0.0178***	-0.0169***	-0.0137***	-0.0147***	-0.0148***	-0.0237***	-0.0244***	-0.0237***
	(-2.1822)	(-2.7635)	(-2.7135)	(-3.5687)	(-3.8641)	(-3.6789)	(-5.0612)	(-5.4910)	(-5.5273)	(-6.4043)	(-6.6268)	(-6.4315)
CloHSh				-0.0235	-0.0278*	-0.0238				-0.0260*	-0.0288**	-0.0269**
				(-1.4621)	(-1.7230)	(-1.4818)				(-1.9485)	(-2.1553)	(-2.0154)
LifeCycle	0.0646***	0.0635***	0.0644***	0.0569***	0.0573***	0.0567***	0.0986***	0.0974***	0.0988***	0.0894***	0.0895***	0.0773***
	(13.0391)	(13.0269)	(13.0874)	(12.3661)	(12.4253)	(12.3101)	(14.9370)	(14.8150)	(14.9582)	(15.3934)	(15.4484)	(15.5980)
MktTiming	0.2045***	0.2042***	0.2045***	0.2551***	0.2547***	0.2549***	0.2707***	0.2696***	0.2700***	0.3079***	0.3078***	0.3260***
	(9.5930)	(9.6080)	(9.5898)	(13.5076)	(13.5383)	(13.5019)	(13.3972)	(13.3659)	(13.3436)	(19.6982)	(19.7591)	(19.0311)
GovSys	-0.2706***			-0.0390			-0.1087***			0.0134		
	(-6.4765)			(-0.8019)			(-4.2011)			(0.3255)		
RQ		0.0093			0.0775***			0.0024			0.0586***	
		(0.3700)			(2.7958)			(0.1518)			(2.6999)	
RL			0.0490*			-0.0119			-0.0141			-0.0247
			(1.7630)			(-0.3336)			(-0.7259)			(-0.8805)
TermInt	0.0084	0.0063	0.0074	-0.0450	-0.0459	0.0452	0.0396	0.0405	0.0394	0.1035***	0.1045***	0.1211***
	(0.2666)	(0.2015)	(0.2367)	(-1.5631)	(-1.6029)	(1.5708)	(1.4621)	(1.5030)	(1.4531)	(4.3586)	(4.4112)	(3.9066)
GrowthRGDP	-0.0787***	-0.0757***	-0.0803***	-0.0938***	-0.0905***	-0.0933***	-0.2199***	-0.2185***	-0.2223***	-0.2141***	-0.2119***	-0.2216***
	(-4.4295)	(-4.2799)	(-4.5093)	(-5.3500)	(-5.1812)	(-5.3168)	(-11.5549)	(-11.4810)	(-11.6547)	(-13.1299)	(-13.0362)	(-13.3610)
Observations	152,288	152,295	152,313	80,652	80,654	80,660	152,288	152,295	152,313	80,652	80,654	80,660
Year/Country/Ind FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
No Obs.	152288	152295	152313	80652	80654	80660	152288	152295	152313	80652	80654	80660

Table 9. Marginal Effects and Odds Ratio.

Dependent variable is dummy variable which takes value 1 for zero leverage and 0 other wise.

	Marginal Effects						Odds Ratio					
Variables	(1)		(2)		(3)		(4)		(5)		(6)	
Size	-0.0479	***	-0.0477	***	-0.0475	***	0.6321	***	0.6313	***	0.6342	***
	(0.0011)		(0.0011)		(0.0011)		(0.0049)		(0.0049)		(0.0049)	
CashTA	0.2889	***	0.2901	***	0.2939	***	70.9884	***	70.3480	***	72.9957	***
	(0.0083)		(0.0083)		(0.0083)		(5.1189)		(5.0682)		(5.2591)	
Tang	0.0126	*	0.0147	**	0.0154	**	1.8121	***	1.8527	***	1.8641	***
	(0.0071)		(0.0071)		(0.0071)		(0.0972)		(0.0992)		(0.0998)	
Prof	0.0538	***	0.0533	***	0.0513	***	3.8013	***	3.8783	***	3.7422	***
	(0.0088)		(0.0089)		(0.0089)		(0.3729)		(0.3804)		(0.3670)	
NDTS	-0.6656	***	-0.6638	***	-0.6849	***	0.0000	***	0.0000	***	0.0000	***
	(0.0507)		(0.0508)		(0.0511)		(0.0000)		(0.0000)		(0.0000)	
GO	0.0095	**	0.0102	***	0.0094	***	1.2964	***	1.3022	***	1.2825	***
	(0.0019)		(0.0019)		(0.0019)		(0.0237)		(0.0238)		(0.0235)	
Own	-0.0018		-0.0019		-0.0016		0.9481	**	0.9506	**	0.9621	*
	(0.0022)		(0.0022)		(0.0021)		(0.0227)		(0.0226)		(0.0220)	
LifeCycle	0.0342	***	0.0414	***	0.0470	***	0.6606	***	0.6449	***	0.6323	***
	(0.0006)		(0.0009)		(0.0010)		(0.0032)		(0.0044)		(0.0049)	
MktTiming	0.2403	***	0.2553	***	0.2730	***	3.3999	***	7.3416	***	6.7060	***
	(0.0048)		(0.0067)		(0.0082)		(1.8504)		(2.7918)		(4.3832)	
GovSys	0.0686	***					1.8078	***				
	(0.0035)						(0.0416)					
RQ			0.0593	***					1.7205	***		
			(0.0030)						(0.0352)			
RL					0.0617	***					1.8077	***
					(0.0032)						(0.0405)	
TermInt	0.0536	***	0.0258	***	0.0065		1.2115	***	1.2317	***	1.7028	
	(0.0046)		(0.0063)		(0.0071)		(0.0433)		(0.0608)		(0.0007)	
GrowthRGDP	-0.0579	***	-0.0679	***	-0.0618	***	4.0732	***	5.8773	***	4.5842	***
	(0.0055)		(0.0076)		(0.0087)		(0.2483)		(0.4931)		(0.4519)	
Intercept							0.4778	***	0.4706	***	0.4131	***
							(0.0241)		(0.0238)		(0.0216)	
Correctly Classified							86.27%		86.32%		86.35%	

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