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# **The Determinants of Zero Leverage: Evidence from Multinational Firms**

Eleni Chatzivgeri<sup>\*</sup>, Panagiotis Dontis-Charitos, Sheeja Sivaprasad

*Westminster Business School, University of Westminster, 35 Marylebone Road, London, NW1 5LS, UK*

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## **ABSTRACT**

There is an ongoing debate in the capital structure literature as to the direction of the effects of internationalisation on firm debt. Despite the increasing attention on the role of internationalization in firms' capital structure decisions, and the increasing adoption of zero leverage policies by multinationals, no study attempts to explain the effect of multinationality on the zero leverage decision. This study explores the relationship between the level of internationalization and zero leverage using a large panel of UK companies, while controlling for various company-related factors. We find strong evidence that multinationality affects the propensity of firms to have zero leverage and that this decision is affected by industry specificities.

**JEL classification:** G32

**Keywords:** Leverage; Zero leverage; Capital structure; Multinational firms; Industry effects; Financial constraints;

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<sup>\*</sup> Corresponding author. Tel.: +44 (0) 20 3506 6527; fax: +44 (0) 20 7911 5839.

E-mail addresses: [e.chatzivgeri@westminster.ac.uk](mailto:e.chatzivgeri@westminster.ac.uk) (E. Chatzivgeri), [p.dontis-charitos@westminster.ac.uk](mailto:p.dontis-charitos@westminster.ac.uk) (P. Dontis-Charitos), [s.sivaprasad@westminster.ac.uk](mailto:s.sivaprasad@westminster.ac.uk) (S. Sivaprasad).

## **1. Introduction**

The irrelevance theorem of Modigliani and Miller (1958) posits that capital structure decisions are irrelevant in firm value maximization. Albeit, in the real world, financing decisions play a paramount role in the financial health of a firm and, thus, have an impact on firm value. Theoretical work on capital structure attempts to gauge firm optimal leverage and explain firms' financing choices considering the numerous benefits of debt financing (Kraus and Litzenberger, 1973; Jensen, 1986; Myers, 1977; Warner, 1977).

Several studies examine the determinants of capital structure (Myers, 1977; Titman and Wessels, 1988; Rajan and Zingales, 1995), financing choices of firms (Hovakimian, et al., 2004; Frank and Goyal, 2009, Frank and Goyal, 2003; Shyam-Sundars and Myers, 1999), and the interaction between capital structure and returns (Muradoglu and Sivaprasad, 2012a,b; George and Hwang, 2010; Gomes and Schmid, 2010; Penman, et al., 2007; Dimitrov and Jain, 2008; Hamada, 1972). Previous studies also examine the low-leverage phenomenon (Gomes and Schmid, 2010; Korteweg, 2010; Marchica and Mura, 2010; Goldstein et al., 2001).

The capital structure of multinational firms (MNCs) has been examined in many international studies (Hughes et al., 1975; Shapiro 1978; Michel and Shaked 1986; Fatemi 1988; Lee and Kwok 1988; Park et al., 2013). The accessibility to international capital markets and their ability to get around capital imperfections has been cited as one of the key successes of MNCs (Park et al., 2013). MNCs are exposed to additional economic forces, and have more opportunities, that are less relevant for domestic firms (Burgman, 1996). The ability of MNCs to arbitrage segmented capital markets helps to reduce risk due to having cash flows in imperfectly correlated markets (Errunza and Senbet, 1981). Through geographic diversification, firms can bring new foreign operations within the boundaries of a firm and exploit tangible and intangible synergies (Kim and Mathur, 2008). Increased

operational flexibility by global diversification reduces the risks across the markets. Geographic diversification creates value through economies of scale and scope.

Previous studies show that MNCs tend to carry less debt in their capital structure relative to domestic firms (Burgman, 1996; Chen, Cheng, He and Kim, 1997). However, evidence by Mansi and Reeb (2002) suggests that not only MNCs carry more debt than domestic firms, but their cost of debt financing is also lower than that of domestic firms (Reeb et al., 2001). Singh and Nejadmalayeri (2004) show that multi-nationality influences firms to have more debt in their capital structure.

However, despite the benefits of debt, a persistent and puzzling empirical regularity is the fact that many firms adopt zero leverage policies. Recent studies analyse zero leverage firms by examining firm level fundamentals (Devos et al., 2012), macro-economic fundamentals (Dang, 2013), the quality of firm level corporate governance mechanisms and managerial entrenchment (Strebulaev and Yang, 2013; Byoun and Xu, 2013), the intensity of human capital in industries (Lambrecht and Pawlina, 2013), and, finally, the long-run performance of zero leverage firms (Lee and Moon 2011). Devos et al. (2012) find that firms prefer conservative financial policies and this is not due to internal or external governance mechanisms. Dang (2013) finds that due to financial constraints and macro-economic conditions, UK firms tend to have zero leverage in their capital structure. Bessler et al. (2013) in an international study of zero leverage firms find that IPO waves, industry effects, financial constraints and risk are important determinants of zero leverage. While examining the benefits of debt, Korteweg (2010) documents that the market expects the zero levered firms to lever-up in the future to capture the benefits of debt financing.

Despite the increasing attention on the role of internationalization in firms' capital structure decisions, and the increasing adoption of zero leverage policies by MNCs, no study attempts to explain the effect of multi-nationality on the zero leverage phenomenon.

We argue that extending the analysis to examine the zero leverage phenomenon in multinational firms is important to promote a better understanding of capital structure decisions. This study contributes to the literature by addressing two previously unexplored questions. First, does multi-nationality affect firms' zero leverage decisions? Second, do industry specificities exert an effect on the determinants of zero leverage?

Our univariate results show that firm characteristics vary with industry type. Our multivariate results provide strong evidence that the propensity of a firm to have zero leverage is influenced by multi-nationality, while the coefficients on the variables used to control for contributing factors – commonly identified in the capital structure literature – are largely in line with prior research. More specifically, size, non-debt tax-shields, growth, cash equivalents and industry concentration reduce the propensity to have zero leverage, while tangibility, profitability and lower risk of bankruptcy increase it. The relationship between zero leverage and multi-nationality is positive and statistically significant for companies belonging to the oil and gas and telecommunications industries, irrespectively of how MNCs are defined. When using the highest threshold for defining MNCs, the results are positive and statistically significant for companies belonging to the health care and consumer services industries.

The remainder of this article is organised as follows. Section two describes the methodology and data employed in this study, Section three presents our findings, while Section four concludes.

## **2. Methodology and data**

### *2.1. Model Specification*

The empirical investigation of capital structure has been achieved mostly through the use of fixed and random effect techniques, using linear models. These models explore the

amount of debt raised by companies (Bevan and Danbolt, 2004; Booth et al., 2001; Chen, 2004; Flannery and Rangan, 2006; Frank and Goyal, 2009) but do not take into consideration the zero-leverage phenomenon.

Our chosen sample includes both levered and zero-leverage companies. This means that the dependent variable takes non-negative values, while a substantial number of observations equals zero. Therefore, the present study uses the Logit model (Stock and Watson, 2007) as follows:

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

where,  $\mathbf{Y}$  is the binary dependent variable (leverage) which takes the value 1 for firm-year observations with zero leverage and 0 otherwise,  $\alpha$  is the constant,  $\beta$  is a vector of coefficients to be estimated, and  $\mathbf{X}$  is a vector of the firm specific and other explanatory variables affecting the zero leverage decision; the company degree of multi-nationality (foreign sales-to-total sales), size (log of total assets), asset structure (fixed assets-to-total assets), growth opportunities (market-to-book value), profitability (operating income plus depreciation-to-total assets), non-debt tax shields (depreciation-to-total assets), financial constraints (cash and cash equivalents-to-total assets), and industry concentration (HH index).<sup>2</sup>

## 2.2. *Sample*

We consider a large panel of UK firms from 1990 to 2014. We screen our sample of companies from Bloomberg using the following criteria. First, the company must be traded on the London Stock Exchange. Second, following previous capital structure research, we exclude utility and financial firms with Industry Classification Benchmark (ICB) codes 7000

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<sup>2</sup> Details regarding the construction of our variables, motivation for their inclusion as well as hypotheses are offered in Sections 2.3. and 2.4.

and 8000, respectively. These firms are subject to different regulations and have materially different capital structures (Dang, 2013). We also source company specific data from Bloomberg and apply the following standard data restrictions. First, we exclude firm-year observations for which the leverage and the foreign sales-to-total sales ratios are greater than one. Second, we winsorize all variables (except leverage) at the 1<sup>st</sup> and 99<sup>th</sup> percentile to alleviate any distorting effects of extreme values. The final sample with available observations for leverage and the foreign sales ratio, is an unbalanced panel comprising 2,527 firms and 19,953 firm-year observations. Table 1 presents the distribution of our sample by industry, multinational status<sup>3</sup> and zero leverage status.

**[TABLE 1]**

When all firms are considered, 12.85% of the firm-year observations have zero leverage. We further segregate the sample into domestic and multinational firms. The statistics reveal that 15.79% of firm-year observations for domestic firms have zero leverage, while the percentage of zero leverage firm-year observations for multinational firms stands at 11.65%. The presence of a non-negligible percentage of multinationals with zero debt policies is not consistent with the literature supporting that multinationals carry more debt (Mansi and Reeb, 2002; Singh and Nejadmalayeri, 2004), and have a lower cost of debt financing (Reeb, Mansi and Allee, 2001) than domestic firms, but is somewhat consistent with the literature supporting that multinationals carry less debt in their capital structure (Burgman, 1996; Chen et al., 1997), relative to domestic firms. It is also inconsistent with recent evidence, showing that zero leverage policies are the result of financial constraints (Devos et al., 2012), if we adopt the wider view that multinationals are better positioned than domestic firms along many dimensions.

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<sup>3</sup> We define multinational firms as those with firm-year observations where the ratio of foreign sales-to-total sales is greater than zero.

The statistics also reveal some degree of heterogeneity in the zero leverage policies of multinational firms across different industries. Specifically, the technology industry leads in terms of the percentage of zero leverage firm-year observations (25.18%), followed by oil and gas (19.69%) and health care (15.36%). Similar variations can be observed for domestic firms. The above observations are consistent with the view that extreme debt conservatism is industry-specific (Dang, 2013).

**[FIGURE 1]**

Figure 1 highlights the evolution of leverage and foreign sales of our sample of firms across time. Overall, there is evidence that the zero leverage phenomenon in multinationals is not negligible and requires further scrutiny.

*2.3. Dependent and test variables*

Following previous research (Fama and French, 2002; Flannery and Rangan, 2006) the study uses market leverage to represent the leverage of companies in the sample, as the significance of book ratios tends to be downplayed in the finance theory. This definition represents the total debt to total financing of the firm and is defined as:

$$L_{i,t} = \frac{D_{i,t}}{D_{i,t} + MC_{i,t}}, \tag{2}$$

where,  $L_{i,t}$  is the market leverage,  $D_{i,t}$  is the sum of short-term and long-term debt, and  $MC_{i,t}$  is the market capitalization of company  $i$  at fiscal year  $t$ . Zero leverage firms are defined as those with firm-year observations where  $L_{i,t} = 0$  (Bessler et al., 2013).

Prior research has shown that the level of leverage differs between domestic and multinational firms. Therefore, the present study argues that multi-nationality as a factor can influence firms to have zero leverage in their capital structure. The degree of multi-nationality is measured as follows:



$$M_{i,t} = \frac{FS_{i,t}}{TS_{i,t}}, \quad (3)$$

where,  $M_{i,t}$  is the percentage of foreign sales to total sales,  $FS_{i,t}$  is the figure of foreign sales and  $TS_{i,t}$  is the figure of total sales of company  $i$  at fiscal year  $t$ .<sup>4</sup> MNCs are defined as those with firm-year observations where  $M_{i,t} > 0$ .<sup>5</sup> Prior research (Burgman, 1996; Doukas and Pantzalis, 2003; Lee and Kwok, 1988) argues that MNCs have lower level of leverage compared to domestic firms due to agency costs. Additionally, MNCs should avoid raising debt financing due to the increased probability of financial distress that might be attributed to changes in exchange rate (Burgman, 1996). Therefore, we hypothesize that multi-nationality increases the propensity to have zero leverage.

#### 2.4. Control variables

A combination of theory and empirical evidence motivates our selection of control variables. Size can be considered as a proxy for the information asymmetry within a company. The information provided to the managers and the outside investors of a company differs. According to Kadapakkam et al. (1998), investors are more interested in large companies and, thus, more willing to provide information to large companies than small companies. In other words, ‘informational asymmetries between insiders in a firm and the capital markets are lower for large firms. So, large firms should be more capable of issuing informationally sensitive securities like equity, and should have lower debt’ (Rajan and Zingales, 1995, p. 1457).

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<sup>4</sup> We obtain these figures from the Worldscope database.

<sup>5</sup> The literature offers a wide range of definitions for MNCs, with a detailed summary of the various approaches offered in Aggarwal et al. (2011). It is not the purpose of this study to find the best method to define an MNC and, thus, elect to follow the leverage literature and use the ratio of foreign sales-to-total sales (see, Chen et al., 1997; Park et al., 2013) to obtain comparable results. The percentage threshold defining a MNC varies in these studies from  $0 < M_{i,t} \leq 1$ , with results being largely consistent across definitions. We vary this threshold from  $0 < M_{i,t} \leq 1$  and present results in Section 3.2.

On the other hand, the size of the company is associated with its potential bankruptcy costs, as larger companies have a lower probability of bankruptcy (Titman and Wessels, 1988). Because the probability of bankruptcy is lower for larger companies, they are more able to access debt financing by borrowing at lower interest rates. Therefore, according to the trade-off theory, the size of a company is positively associated with leverage. In the present article, the proxy used for the measurement of size is the logarithm of total assets (Titman and Wessels, 1988; Akhtar and Oliver, 2009).

Finally, the financial constraints hypothesis posits that financial constraints prevent firms from access to capital. In an imperfect market, where there are financial constraints, firms might not be able to undertake positive NPV projects, and due to their riskiness, they have to turn to equity financing (Stiglitz and Weiss, 1981). This implies that firms that are financially constrained will have lower level of leverage as part of their capital structure compared to companies that are not financially constraint (Dang, 2013). Previous research (Hadlock and Pierce, 2010; Dang, 2013) has found that size can be used as a proxy for the measurement of financial constraints. As a result, small, financially constrained companies will be more likely to hold zero debt (Dang, 2013). The previous literature (Bessler et al., 2013; Dang, 2013) predicts that size decreases the propensity of a firm to have zero-leverage.

Rajan and Zingales (1995) argue that tangible assets have a higher liquidation value, which means that they can be used as a guarantee for debt in case of bankruptcy. Companies with higher level of tangible assets face lower risk of bankruptcy, so they are able to borrow at lower risk premiums. According to Jensen and Meckling (1976), the shareholders of a highly leveraged company may attempt to “seize” capital from the bondholders of the company, which will increase the conflict between them. If the debt is secured, then the borrower is not able to use the funds for any reason other than a specified project, which will reduce the conflict between shareholders and bondholders (agency costs) and consequently

the cost of debt. Therefore, according to the trade-off theory, it is expected that asset structure and leverage will be positively related.

According to the pecking order theory, gearing and asset structure are also positively related. This proposition is based on the argument that companies with more tangible assets are more able to raise debt financing at a more attractive rate (Myers and Majluf, 1984). In the present chapter the fixed tangible assets to total assets ratio is used as a measurement of asset structure (Sogorb-Mira, 2005; Bauer, 2004; Bevan and Danbolt, 2004; Akhtar and Oliver, 2009; Teker *et al.*, 2009). The previous literature (Bessler *et al.*, 2013; Dang, 2013, Devos *et al.*, 2012) predicts that asset structure decreases the propensity to have zero-leverage.

We use the market-to-book value ratio (market capitalization divided by the total book value) as a proxy for growth opportunities and to test the validity of the financial flexibility hypothesis (Dang, 2013). According to Myers (1984) and Myers and Majluf (1984), when companies turn to external financing, they prefer debt to equity; low-growth companies do not have sufficient internal funds, and thus they turn to external financing. The previous literature (Bessler *et al.*, 2013; Dang, 2013) finds mixed results on the relationship between growth and the propensity of a firm to have zero-leverage.

According to the pecking order theory, there is a negative association between profitability and gearing, because companies with high profitability are able to raise capital through retained earnings, which in turn results in lower gearing (Myers and Majluf, 1984). On the other hand, according to Modigliani and Miller (1963), companies prefer debt to equity financing, for tax considerations. Companies with high profitability are more inclined to use debt financing because of agency and bankruptcy costs: the probability of being subject to bankruptcy is lower for companies with high profitability, because they can more easily pay back their debt obligations. For this reason, and with regard to their need to

maximize the tax shield, companies with high profitability will turn to more debt financing. The variable used in the present study for the measurement of profitability is the return on assets ratio defined as operating income plus depreciation-to-total assets (Erel et al., 2015). According to Bessler et al. (2013) profitability increases the propensity to have zero-leverage.

Debt and equity are treated differently: *'since interest payments are tax deductible and dividends are not, the fiscal regime is generally considered to favour debt'*, and therefore there may be a *'positive tax incentive for corporate debt financing'* (Van der Wijst, 1990, p. 56). The absence of costs that may balance this tax incentive for corporate debt financing may lead to its maximal use. According to Robichek and Myers (1965) and Baxter (1967), bankruptcy and reorganization are two costs that may balance the tax incentive for corporate financing. The higher the debt level, the higher the costs, which in turn increase the probability of bankruptcy. A high probability of bankruptcy turns a company away from more debt financing, a process that eventually will balance the tax advantage. Non-debt tax shields are expected to be negatively related to leverage, because they can reduce the tax benefits from interest payments. Following Titman and Wessels (1988) and Ozkan (2001), the ratio of depreciation-to-total assets is used as a proxy for the measurement of non-debt tax shields. The results on the relationship between non-debt tax-shields and the propensity to have zero leverage are mixed.

The company's decision to maintain zero leverage is determined, and affected, by its desire to maintain financial flexibility (Dang, 2013). We use cash holdings defined as the ratio of cash and cash equivalents-to-total assets<sup>6</sup>, which also tests the financial flexibility hypothesis. According to the financial flexibility hypothesis, firms tend to hold large cash reserves with a view to alleviate investment distortions in the future and to maintain their

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<sup>6</sup> The previous literature uses cash holdings as a proxy for the measurement of future financial constraints (Erel et al., 2015). The difference between the financial constraints and the financial flexibility hypotheses is that, based on the financial constraint hypothesis, firms do not raise debt due to a lack of external financing, while under the financial flexibility hypothesis, firms do not raise debt due to strategic reasons (Dang, 2013).

borrowing power (Dang, 2013; DeAngelo and DeAngelo, 2007; Modigliani and Miller, 1963). The level of cash holdings increases the propensity of a company to have zero-leverage (Bessler et al., 2013; Dang, 2013).

This study takes into account industry concentration as explanatory variable that might have an effect on the zero-leverage firms. We use end of year balance sheet figures to construct the index. We measure industry concentration using the Herfindahl-Hirschman index, which is defined as:

$$HH = \sum_{i=1}^I s_{ijt}^2 \quad (4)$$

Where  $s_{i,t}$  is the market share of firm  $i$  in industry  $j$  and year  $t$ . The index is calculated for each industry and year and assigned to our firm-year observations. Small values of the Herfindahl-Hirschman index imply that many competing firms operate in the industry, while large values indicate that market share is concentrated in the hands of a few large firms. We anticipate that higher levels of concentration will raise the propensity of firms to choose zero leverage. In markets controlled by a few large corporations, their smaller peers will be facing more financial constraints, and hence will be more likely to be unable to issue debt.

### 3. Empirical findings

#### 3.1. Univariate analysis

This section compares characteristics of zero leverage firms with those of levered firms across both the domestic and multinational dimension. Table 2 presents the mean values for our variables of interest and the t-statistics for differences in means among different samples.

#### [TABLE 2]

The first column presents the variables. Columns 2 and 3 present the mean values for levered domestic and multinational firms, while columns 4 and 5 contain the mean values for domestic and multinational zero leverage firms. Finally, columns 6 to 9 present the t-statistics

for the differences in means across different groups of firms. The results provide some interesting insights as well as provide some support for our main hypothesis that multi-nationality affects the zero leverage decision. First, consistent with Dang (2013), we find that zero leverage firms are significantly smaller than levered firms. Moreover, zero leverage multinational firms are significantly smaller than their zero leverage domestic counterparts. Second, the results reveal statistically significant differences in the cash holdings of levered and zero leverage firms, with the latter holding more cash. Interestingly, when we compare the zero leverage domestic with zero leverage multinationals, we find that the latter hold significantly less cash, are less liquid, and operate in more concentrated markets. These observations support the notion that multinationals that choose to hold no debt might be doing so as a result of greater financial constraints. Third, the zero leverage firms have significantly lower non-debt tax shields than levered firms. This is in contrast with the broader trade-off framework (De Angelo and Masulis, 1980), but in line with Dang (2013). Nevertheless, zero leverage multinationals exhibit significantly lower non-debt tax shields than domestic zero leverage companies. Consistent with the literature, zero leverage firms have higher z-scores and higher growth opportunities than levered firms, indicating a lower probability of bankruptcy. Finally, the results do not reveal any significant difference in the mean z-score and growth opportunities of domestic and multinational zero leverage firms.

### 3.2. *Multivariate analysis*

This section examines the results from the logistic regression analysis of a firms' decision to have zero leverage. We examine whether multi-nationality influences the propensity of a firm to have zero leverage, while controlling for a number of factors commonly applied in the capital structure literature. Table 3 presents our findings for the full sample. Models 1 to 5 present alternative definitions of multi-nationality, based on different thresholds of its proxy variable.

### [TABLE 3]

Model 1 presents the coefficient estimates when our proxy for multi-nationality (foreign sales-to-total sales) is greater than 0. Although we fail to uncover any significant relationship between multi-nationality and zero leverage status, other definitions of multi-nationality (see models 3 to 6), yield significant coefficients. Specifically, we find a positive relationship between multi-nationality and zero leverage status, which increases in magnitude and significance with increases in our chosen threshold. This implies that multinational firms are more likely to adopt zero leverage policies. This result is consistent with our primary hypothesis that multi-nationality increases the propensity to have zero leverage due to agency costs and the increased probability of financial distress due to foreign exchange fluctuations.

Moreover, the coefficients on the remaining variables are consistent across models and also largely in line with prior work on zero leverage (Bessler et al., 2013; Dang, 2013; Devos et al., 2012). Starting with size, its coefficient is negative and significant. This is consistent with the financial constraint hypothesis, which predicts that smaller firms are likely to be more financially constrained and, thus, less able to raise debt. The coefficient on the cash ratio is positive and significant, indicating that firms with larger cash reserves are more likely to adopt zero leverage policies. This finding is in line with the financial flexibility hypothesis that firms tend to hold large cash reserves with a view to alleviate investment distortions in the future and to maintain their borrowing power (DeAngelo and DeAngelo, 2007; Modigliani and Miller, 1963). Growth opportunities enter our model with a negative coefficient, suggesting that high-growth firms have a lower propensity to have zero leverage. This result corroborates the findings in Bessler et al. (2013), but contradicts Dang (2013). We also find that tangibility (asset structure), increases the propensity of firms to have zero leverage. To the extent that this is a suitable proxy for tangibility, our results are not in line with either the trade-off, or pecking order theory. The coefficient on profitability is positive

and significant and indicates that more profitable firms are more likely to hold zero debt. This is consistent with the results of Bessler et al. (2013) and in line with the pecking order, according to which, more profitable firms are more likely to rely on internal funds and, therefore, less likely to issue debt. Finally, consistent with Dang (2013), we find that companies with lower probabilities of bankruptcy are less likely to issue debt. We also report a negative relationship between the level of industry concentration and the propensity to have zero leverage. This finding suggests that firms operating in more competitive industries are more likely to have debt in their capital structure.

We also perform additional tests in order to shed more light into our univariate finding that the characteristics of firms vary across industries. Prior studies employ intercept dummies to control for the overall effect of industry on zero leverage decisions, albeit without examining the potential effect on its determinants. Table 4 presents industry specific results on the marginal effects from logistic regressions of firms' zero leverage decisions. Specifically, Panel A presents the results for the oil and gas, basic materials and industrials industries, Panel B presents the results for the consumer goods, healthcare and consumer services industries, while Panel C presents the results for the telecommunications and technology industries.

#### **[TABLE 4]**

Overall, the results are supportive of our univariate findings and point to the fact that industry specificities exert an effect on the determinants of zero leverage. A closer examination of our test variable reveals some interesting variations across industries. Our full sample results on the positive and significant relationship between multi-nationality and the propensity of firms to have zero leverage persist for the oil and gas, telecommunications, health care, and technology firms. Nevertheless, the latter two industries realise such coefficient only when the highest threshold for defining a multi-national firm ( $M_{i,t} > 0.8$ ) is



considered. Nevertheless, we do not find a significant relationship between any proxy for multi-nationality and zero leverage decisions for the basic materials, consumer goods and consumer services industries.

We also examine whether the relationship between our control variables varies with the type of industry. First, the results for the oil and gas, industrials and technology industries remain consistent for all control variables except asset structure and profitability. It seems that tangibility and profitability are not associated with a higher or lower propensity of those firms to have zero leverage. Second, the results for the basic materials show that profitability, non-debt tax shields and growth do not affect the propensity to have zero leverage, while the results for the remaining control variables are in line with the results of our full sample. Third, industry concentration is the only control variable that does not relate with the propensity to have zero leverage in the consumer goods industry. Fourth, the results on the health care industry reveal some interesting variations from our overall findings. The results remain consistent only for the coefficients on size, cash ratio, non-debt tax shields and growth. Tangibility and profitability assume negative signs and, thus, found to significantly decrease the propensity to have zero leverage. While this is not in line with our overall sample results, it is consistent with Dang (2013). In addition, z-score and industry concentration do not have an impact on the decision to have zero leverage. Fifth, the results on the consumer services industry are consistent only for the coefficients on size, cash ratio, growth and z-score. Sixth, size, profitability and z-score remain consistent as important determinants of the zero leverage decision of the telecommunications industry. While tangibility is also significant, there is a change in its sign, which turns negative. Finally, the results on the industry concentration remain consistent only for the technology sector. Industry concentration is found to be positively related to the propensity to have zero leverage for the oil and gas, basic materials, industrials, consumer services and

telecommunications industries, while it is insignificant for consumer goods and health care industries.

#### **4. Concluding remarks**

Despite the benefits of debt, a persistent and puzzling empirical regularity is the fact that many firms adopt zero leverage policies. At the same time, companies are increasing their international presence at a torrid pace, while a non-negligible number of them are adopting zero leverage policies. Despite the increasing attention on the role of internationalization in firms' capital structure decisions, and the increasing adoption of zero leverage policies by MNCs, no study attempts to explain the effect of multi-nationality on the zero leverage phenomenon.

Our study contributes to this front by examining whether multi-nationality plays an important role in the zero leverage decision. We find that multi-nationality increases the propensity of firms to adopt zero leverage policies. More specifically, our results indicate that there is a positive relationship between zero leverage and multi-nationality, which increases in magnitude and significance with increases in the chosen threshold used for the classification of multi-nationality. Moreover, consistent with existing studies, the results indicate that firms' decision to remain debt-free can be explained through the presence of financial constraints and by their desire to maintain financial flexibility. Further tests reveal that industry specificities exert an effect on the determinants of zero leverage. Further research is deemed necessary so as to shed more light into the underlying industry dynamics affecting the zero leverage decision and its drivers for both multinational and domestic firms.

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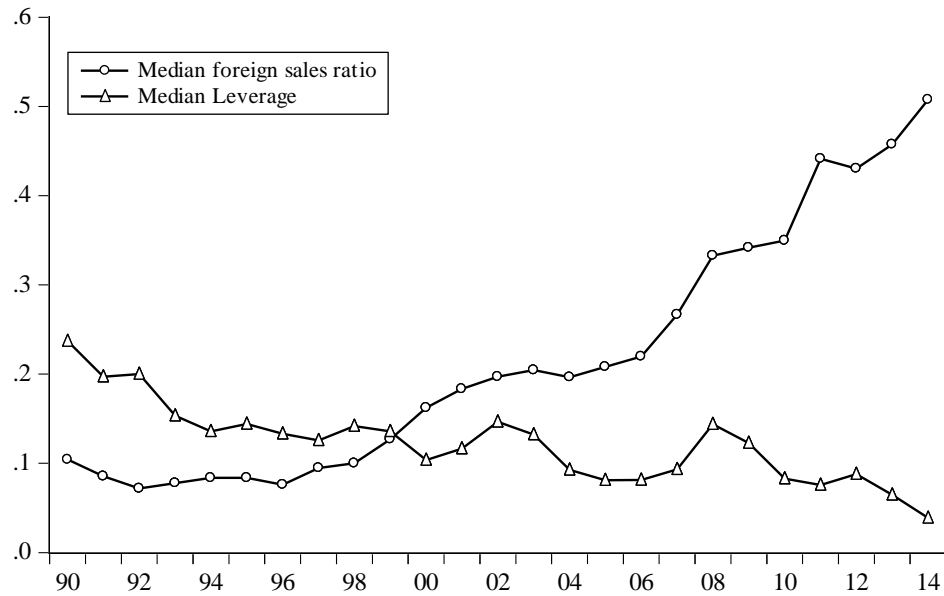
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**Table 1.**  
Number of firm-year observations for domestic and MNC firms by leverage status.

ICB Code	Industry Name	Domestic Firms					MNCs				
		All	Levered	%	Zero Leverage	%	All	Levered	%	Zero Leverage	%
-	All	5,775	4,863	84.21%	912	15.79%	14,178	12,526	88.35%	1,652	11.65%
0001	Oil and Gas	148	97	65.54%	51	34.46%	762	612	80.31%	150	19.69%
1000	Basic Materials	143	107	74.83%	36	25.17%	1,072	957	89.27%	115	10.73%
2000	Industrials	1,716	1,512	88.11%	204	11.89%	5,063	4,750	93.82%	313	6.18%
3000	Consumer Goods	972	848	87.24%	124	12.76%	1,720	1,560	90.70%	160	9.30%
4000	Health Care	394	287	72.84%	107	27.16%	918	777	84.64%	141	15.36%
5000	Consumer Services	1,785	1,572	88.07%	213	11.93%	2,492	2,234	89.65%	258	10.35%
6000	Telecommunications	66	56	84.85%	10	15.15%	201	177	88.06%	24	11.94%
9000	Technology	551	384	69.69%	167	30.31%	1,950	1,459	74.82%	491	25.18%

**Figure 1.** The evolution of foreign sales and leverage.



**Table 2.**

Characteristics of levered and zero leverage firms by MNC status.

	Levered		Zero Leverage		$\Delta$ Mean ( <i>t-stat</i> )			
	1. Domestic	2. MNCs	3. Domestic	4. MNCs	1-2	1-3	2-4	3-4
Cash ratio	0.093	0.108	0.314	0.276	-(6.98) <sup>a</sup>	-(35.26) <sup>a</sup>	-(47.60) <sup>a</sup>	(3.91) <sup>a</sup>
Altman z-Score	3.376	3.214	9.951	8.776	(1.66) <sup>c</sup>	-(19.41) <sup>a</sup>	-(29.20) <sup>a</sup>	(1.75) <sup>c</sup>
Asset Structure	0.504	0.499	0.351	0.407	(1.19)	(15.42) <sup>a</sup>	(15.76) <sup>a</sup>	-(5.36) <sup>a</sup>
Foreign sales ratio	0.000	0.453	0.000	0.556	-	-	-(12.41) <sup>a</sup>	-
Size	3.722	4.889	2.691	3.147	-(34.78) <sup>a</sup>	(17.01) <sup>a</sup>	(32.77) <sup>a</sup>	-(7.11) <sup>a</sup>
Growth opportunities	2.552	2.963	3.493	3.550	-(3.79) <sup>a</sup>	-(3.97) <sup>a</sup>	-(3.45) <sup>a</sup>	-(0.22)
Non-debt tax shields	0.037	0.037	0.030	0.024	-(0.06)	(5.94) <sup>a</sup>	(16.27) <sup>a</sup>	(5.01) <sup>a</sup>
Profitability (ROA)	-0.018	-0.003	-0.074	-0.069	-(3.78) <sup>a</sup>	(5.96) <sup>a</sup>	(10.87) <sup>a</sup>	- (0.33)
Industry Concentration (HH)	0.081	0.097	0.118	0.130	-(8.52) <sup>a</sup>	-(9.66) <sup>a</sup>	-(10.91) <sup>a</sup>	-(2.30) <sup>b</sup>

**Table 3**

Logistic regressions of firms' zero leverage decision.

This table presents the marginal effects from logistic regressions of firms' zero leverage decisions. Zero leverage firms are defined as those with firm-year observations where market leverage is equal to zero. The first column presents the independent variables, while each of the subsequent columns presents the results for different definitions of multi-nationality. MNC is a dummy variable equal to one when the foreign sales-to-total sales ratio exceeds the predefined threshold and zero otherwise. The thresholds are 0 in Model 1, 0.20 in Model 2, 0.40 in Model 3, 0.60 in Model 4, and 0.80 in Model 5. Size is the logarithm of total assets. Cash ratio is the ratio of cash and cash equivalents-to-total assets. Asset structure is the ratio of fixed assets-to-total assets. Profitability is the ratio of operating income and depreciation-to-total assets. Non-debt tax shields is the ratio of depreciation-to-total assets. Growth is the market-to-book value. Z-score is measured using Altman's specification. HH is a Herfindahl-Hirschman index capturing the level of industry concentration. The industry dummies are set to one for each industry and zero otherwise. Figures in brackets show z-statistics (Huber-White robust standard errors and covariances). a/b/c denote significance at the 0.01/0.05/0.10 levels, respectively.

	Degree of multi-nationality				
	Model 1 MNC 0	Model 2 MNC 20	Model 3 MNC 40	Model 4 MNC 60	Model 5 MNC 80
Constant	0.010 (0.030)	-0.052 (-0.157)	-0.115 (-0.352)	-0.135 (-0.414)	-0.184 (-0.562)
MNC	-0.102 (-1.532)	-0.032 (-0.515)	0.104 (1.660) <sup>c</sup>	0.261 (3.850) <sup>a</sup>	0.547 (6.902) <sup>a</sup>
Size	-0.380 (-22.420) <sup>a</sup>	-0.384 (-22.847) <sup>a</sup>	-0.391 (-23.409) <sup>a</sup>	-0.395 (-23.871) <sup>a</sup>	-0.394 (-24.069) <sup>a</sup>
Cash ratio	4.325 (19.971) <sup>a</sup>	4.324 (19.966) <sup>a</sup>	4.303 (19.925) <sup>a</sup>	4.263 (19.782) <sup>a</sup>	4.207 (19.593) <sup>a</sup>
Asset Structure	0.402 (2.731) <sup>a</sup>	0.408 (2.769) <sup>a</sup>	0.403 (2.732) <sup>a</sup>	0.372 (2.527) <sup>b</sup>	0.296 (2.003) <sup>b</sup>
Profitability	0.367 (2.340) <sup>b</sup>	0.368 (2.354) <sup>b</sup>	0.376 (2.417) <sup>b</sup>	0.393 (2.544) <sup>b</sup>	0.420 (2.728) <sup>a</sup>
Non-debt tax shields	-11.478 (-9.178) <sup>a</sup>	-11.463 (-9.154) <sup>a</sup>	-11.326 (-9.053) <sup>a</sup>	-11.084 (-8.891) <sup>a</sup>	-10.726 (-8.678) <sup>a</sup>
Growth	-0.025 (-4.397) <sup>a</sup>	-0.025 (-4.443) <sup>a</sup>	-0.025 (-4.432) <sup>a</sup>	-0.025 (-4.419) <sup>a</sup>	-0.024 (-4.347) <sup>a</sup>
z-score	0.045 (7.636) <sup>a</sup>	0.046 (7.656) <sup>a</sup>	0.046 (7.665) <sup>a</sup>	0.046 (7.653) <sup>a</sup>	0.045 (7.587) <sup>a</sup>
HH	-1.321 (-1.928) <sup>c</sup>	-1.292 (-1.886) <sup>c</sup>	-1.310 (-1.913) <sup>c</sup>	-1.405 (-2.044) <sup>b</sup>	-1.512 (-2.183) <sup>b</sup>
<i>Industry Dummies</i>					
Basic Materials	-0.839 (-3.408) <sup>a</sup>	-0.829 (-3.376) <sup>a</sup>	-0.832 (-3.396) <sup>a</sup>	-0.842 (-3.439) <sup>a</sup>	-0.844 (-3.467) <sup>a</sup>
Industrials	-1.484 (-5.144) <sup>a</sup>	-1.466 (-5.080) <sup>a</sup>	-1.429 (-4.956) <sup>a</sup>	-1.405 (-4.855) <sup>a</sup>	-1.337 (-4.600) <sup>a</sup>
Consumer Goods	-1.037 (-4.139) <sup>a</sup>	-1.014 (-4.046) <sup>a</sup>	-0.964 (-3.850) <sup>a</sup>	-0.933 (-3.720) <sup>a</sup>	-0.872 (-3.460) <sup>a</sup>
Health Care	-0.919 (-5.491) <sup>a</sup>	-0.907 (-5.425) <sup>a</sup>	-0.875 (-5.235) <sup>a</sup>	-0.836 (-4.997) <sup>a</sup>	-0.755 (-4.491) <sup>a</sup>
Consumer Services	-1.069 (-3.818) <sup>a</sup>	-1.042 (-3.718) <sup>a</sup>	-0.984 (-3.515) <sup>a</sup>	-0.944 (-3.360) <sup>a</sup>	-0.866 (-3.072) <sup>a</sup>
Telecommunications	-0.222 (-0.708)	-0.212 (-0.671)	-0.165 (-0.520)	-0.102 (-0.322)	0.007 (0.021)
Technology	-0.597 (-2.552) <sup>b</sup>	-0.589 (-2.515) <sup>b</sup>	-0.565 (-2.411) <sup>b</sup>	-0.539 (-2.291) <sup>b</sup>	-0.462 (-1.946) <sup>c</sup>
N	16,360	16,360	16,360	16,360	16,360
McFadden R <sup>2</sup>	0.23	0.23	0.23	0.24	0.24

**Table 4**

Logistic regressions of firms' zero leverage decision by industry.

This table presents industry specific results on the marginal effects from logistic regressions of firms' zero leverage decisions. Zero leverage firms are defined as those with firm-year observations where market leverage is equal to zero. The first column presents the independent variables, while each of the subsequent columns presents the results for different definitions of multi-nationality, and industry. Panel A presents the results for the oil and gas, basic materials and industrials industries. Panel B presents the results for the consumer goods, healthcare and consumer services industries, while Panel C presents the results for the telecommunications and technology industries. MNC 40, MNC 60 and MNC 80 are dummy variables equal to one when the foreign sales-to-total sales ratio exceeds 0.40, 0.60 and 0.80, respectively, and zero otherwise. Size is the logarithm of total assets. Cash ratio is the ratio of cash and cash equivalents-to-total assets. Asset structure is the ratio of fixed assets-to-total assets. Profitability is the ratio of operating income and depreciation-to-total assets. Non-debt tax shields is the ratio of depreciation-to-total assets. Growth is the market-to-book value. Z-score is measured using Altman's specification. HH is a Herfindahl-Hirschman index capturing the level of industry concentration. Figures in brackets show z-statistics (Huber-White robust standard errors and covariances). a/b/c denote significance at the 0.01/0.05/0.10 levels, respectively.

Panel A	Oil & Gas			Basic Materials			Industrials		
	1	2	3	4	5	6	7	8	9
Constant	-4.788 -(3.534) <sup>a</sup>	-4.571 -(3.349) <sup>a</sup>	-4.339 -(3.252) <sup>a</sup>	-3.590 -(3.792) <sup>a</sup>	-3.491 -(3.777) <sup>a</sup>	-3.264 -(3.352) <sup>a</sup>	-2.817 -(7.150) <sup>a</sup>	-2.793 -(7.098) <sup>a</sup>	-2.680 -(6.760) <sup>a</sup>
MNC 40	0.512 (1.709) <sup>c</sup>	-	-	0.202 (0.629)	-	-	-0.253 -(1.896) <sup>c</sup>	-	-
MNC 60	-	0.638 (2.340) <sup>b</sup>	-	-	0.242 (0.845)	-	-	-0.143 -(0.914)	-
MNC 80	-	-	0.572 (2.333) <sup>b</sup>	-	-	0.462 (1.395)	-	-	0.307 (1.551)
Size	-0.367 -(5.274) <sup>a</sup>	-0.364 -(5.213) <sup>a</sup>	-0.346 -(4.846) <sup>a</sup>	-0.442 -(5.343) <sup>a</sup>	-0.440 -(5.376) <sup>a</sup>	-0.440 -(5.333) <sup>a</sup>	-0.496 -(13.499) <sup>a</sup>	-0.506 -(13.671) <sup>a</sup>	-0.521 -(14.231) <sup>a</sup>
Cash ratio	3.672 (3.719) <sup>a</sup>	3.520 (3.558) <sup>a</sup>	3.378 (3.377) <sup>a</sup>	3.683 (2.785) <sup>a</sup>	3.540 (2.647) <sup>a</sup>	3.141 (2.250) <sup>b</sup>	4.666 (10.337) <sup>a</sup>	4.655 (10.318) <sup>a</sup>	4.540 (10.160) <sup>a</sup>
Asset Structure	0.716 (1.096)	0.567 (0.866)	0.437 (0.666)	2.409 (3.020) <sup>a</sup>	2.301 (2.858) <sup>a</sup>	2.012 (2.326) <sup>b</sup>	-0.372 -(1.079)	-0.381 -(1.103)	-0.467 -(1.328)
Profitability	-0.552 -(0.930)	-0.526 -(0.884)	-0.561 -(0.957)	-1.196 -(1.507)	-1.190 -(1.517)	-1.134 -(1.466)	-0.269 -(0.564)	-0.248 -(0.521)	-0.182 -(0.386)
Non-debt tax shields	-8.209 -(1.871) <sup>c</sup>	-7.809 -(1.778) <sup>c</sup>	-7.819 -(1.795) <sup>c</sup>	-0.811 -(0.132)	-0.876 -(0.144)	-0.985 -(0.163)	-9.588 -(3.680) <sup>a</sup>	-9.534 -(3.638) <sup>a</sup>	-9.464 -(3.574) <sup>a</sup>
Growth	-0.134 -(2.032) <sup>b</sup>	-0.132 -(1.989) <sup>b</sup>	-0.128 -(1.979) <sup>b</sup>	-0.027 -(0.539)	-0.027 -(0.547)	-0.026 -(0.536)	-0.039 -(2.166) <sup>b</sup>	-0.041 -(2.242) <sup>b</sup>	-0.041 -(2.214) <sup>b</sup>
z-score	0.094 (3.546) <sup>a</sup>	0.094 (3.495) <sup>a</sup>	0.095 (3.545) <sup>a</sup>	0.140 (3.132) <sup>a</sup>	0.140 (3.154) <sup>a</sup>	0.139 (3.192) <sup>a</sup>	0.091 (4.806) <sup>a</sup>	0.090 (4.796) <sup>a</sup>	0.089 (4.700) <sup>a</sup>
HH	8.634 (3.426) <sup>a</sup>	8.215 (3.226) <sup>a</sup>	7.960 (3.143) <sup>a</sup>	4.209 (2.142) <sup>b</sup>	4.086 (2.060) <sup>b</sup>	3.601 (1.688) <sup>c</sup>	80.814 (5.466) <sup>a</sup>	79.361 (5.370) <sup>a</sup>	76.000 (5.116) <sup>a</sup>
N	723	723	723	984	984	984	5,834	5,834	5,834
McFadden R <sup>2</sup>	0.33	0.33	0.33	0.34	0.34	0.34	0.24	0.24	0.24

Panel B	Consumer Goods			Health Care			Consumer Services		
	1	2	3	4	5	6	7	8	9
Constant	-2.156 (-3.054) <sup>a</sup>	-2.159 (-3.061) <sup>a</sup>	-2.141 (-3.033) <sup>a</sup>	1.287 (1.812) <sup>c</sup>	1.280 (1.800) <sup>c</sup>	1.317 (1.838) <sup>c</sup>	-3.905 (-9.385) <sup>a</sup>	-3.912 (-9.423) <sup>a</sup>	-3.898 (-9.469) <sup>a</sup>
MNC 40	0.008 (0.038)	-	-	0.030 (0.146)	-	-	-0.239 (-1.438)	-	-
MNC 60	-	-0.055 (-0.229)	-	-	0.313 (1.485)	-	-	-0.240 (-1.136)	-
MNC 80	-	-	-0.163 (-0.504)	-	-	0.563 (2.544) <sup>b</sup>	-	-	-0.250 (-0.855)
Size	-0.634 (-11.162) <sup>a</sup>	-0.634 (-11.407) <sup>a</sup>	-0.637 (-11.491) <sup>a</sup>	-0.243 (-3.751) <sup>a</sup>	-0.260 (-4.027) <sup>a</sup>	-0.276 (-4.240) <sup>a</sup>	-0.294 (-8.857) <sup>a</sup>	-0.296 (-8.920) <sup>a</sup>	-0.300 (-9.065) <sup>a</sup>
Cash ratio	7.327 (8.691) <sup>a</sup>	7.359 (8.688) <sup>a</sup>	7.392 (8.667) <sup>a</sup>	1.397 (2.791) <sup>a</sup>	1.366 (2.727) <sup>a</sup>	1.389 (2.759) <sup>a</sup>	5.202 (9.507) <sup>a</sup>	5.197 (9.521) <sup>a</sup>	5.211 (9.569) <sup>a</sup>
Asset Structure	1.951 (4.088) <sup>a</sup>	1.983 (4.113) <sup>a</sup>	2.046 (4.128) <sup>a</sup>	-1.466 (-3.205) <sup>a</sup>	-1.465 (-3.161) <sup>a</sup>	-1.424 (-3.055) <sup>a</sup>	-0.617 (-1.792) <sup>c</sup>	-0.594 (-1.727) <sup>c</sup>	-0.570 (-1.667) <sup>c</sup>
Profitability	3.357 (2.839) <sup>a</sup>	3.341 (2.822) <sup>a</sup>	3.336 (2.841) <sup>a</sup>	-1.222 (-3.061) <sup>a</sup>	-1.250 (-3.134) <sup>a</sup>	-1.219 (-3.126) <sup>a</sup>	0.693 (1.245)	0.676 (1.221)	0.682 (1.239)
Non-debt tax shields	-13.408 (-3.152) <sup>a</sup>	-13.479 (-3.154) <sup>a</sup>	-13.966 (-3.190) <sup>a</sup>	-35.949 (-5.199) <sup>a</sup>	-35.925 (-5.205) <sup>a</sup>	-35.625 (-5.156) <sup>a</sup>	1.383 (0.674)	1.534 (0.752)	1.559 (0.770)
Growth	-0.077 (-2.266) <sup>b</sup>	-0.077 (-2.270) <sup>b</sup>	-0.078 (-2.275) <sup>b</sup>	-0.048 (-3.624) <sup>a</sup>	-0.048 (-3.649) <sup>a</sup>	-0.045 (-3.480) <sup>a</sup>	-0.018 (-1.758) <sup>c</sup>	-0.017 (-1.722) <sup>c</sup>	-0.017 (-1.698) <sup>c</sup>
z-score	0.064 (3.616) <sup>a</sup>	0.064 (3.613) <sup>a</sup>	0.064 (3.614) <sup>a</sup>	0.006 (0.936)	0.007 (1.056)	0.006 (1.002)	0.081 (1.958) <sup>c</sup>	0.081 (1.957) <sup>c</sup>	0.081 (1.958) <sup>c</sup>
HH	6.130 (0.940)	6.145 (0.944)	6.031 (0.926)	-2.351 (-1.410)	-2.454 (-1.461)	-2.601 (-1.529)	57.219 (6.979) <sup>a</sup>	56.626 (6.914) <sup>a</sup>	55.792 (6.959) <sup>a</sup>
N	2,377	2,377	2,377	994	994	994	3,450	3,450	3,450
McFadden R <sup>2</sup>	0.28	0.28	0.28	0.24	0.25	0.25	0.27	0.27	0.27

Panel C	Telecommunications			Technology		
	1	2	3	4	5	6
Constant	-4.792 (-1.598)	-5.229 (-1.666) <sup>c</sup>	-1.714 (-0.663)	-0.136 (-0.428)	-0.117 (-0.376)	-0.180 (-0.579)
MNC 40	4.884 (4.601) <sup>a</sup>	-	-	0.121 (0.929)	-	-
MNC 60	-	5.054 (3.918) <sup>a</sup>	-	-	0.153 (1.078)	-
MNC 80	-	-	3.648 (4.453) <sup>a</sup>	-	-	0.437 (2.652) <sup>a</sup>
Size	-0.357 (-3.023) <sup>a</sup>	-0.256 (-2.456) <sup>b</sup>	-0.280 (-1.707) <sup>c</sup>	-0.207 (-5.208) <sup>a</sup>	-0.209 (-5.167) <sup>a</sup>	-0.213 (-5.502) <sup>a</sup>

Cash ratio	3.780	4.661	2.985	2.925	2.920	2.935
	(1.228)	(1.328)	(1.226)	(6.807) <sup>a</sup>	(6.809) <sup>a</sup>	(6.894) <sup>a</sup>
Asset Structure	-7.187	-6.892	-4.513	0.036	0.031	0.061
	-(4.032) <sup>a</sup>	-(3.475) <sup>a</sup>	-(2.292) <sup>b</sup>	(0.101)	(0.088)	(0.172)
Profitability	7.486	5.351	3.649	0.288	0.302	0.342
	(2.587) <sup>a</sup>	(2.608) <sup>a</sup>	(1.869) <sup>c</sup>	(1.161)	(1.214)	(1.390)
Non-debt tax shields	-3.380	-9.702	-7.400	-14.396	-14.260	-13.885
	-(0.234)	-(0.791)	-(0.750)	-(4.408) <sup>a</sup>	-(4.358) <sup>a</sup>	-(4.272) <sup>a</sup>
Growth	-0.020	0.005	-0.024	-0.021	-0.021	-0.021
	-(0.440)	(0.119)	-(0.802)	-(2.087) <sup>b</sup>	-(2.103) <sup>b</sup>	-(2.033) <sup>b</sup>
z-score	0.197	0.183	0.138	0.047	0.047	0.046
	(2.628) <sup>a</sup>	(2.478) <sup>b</sup>	(2.108) <sup>b</sup>	(3.909) <sup>a</sup>	(3.914) <sup>a</sup>	(3.843) <sup>a</sup>
HH	10.169	11.156	4.003	-7.508	-7.526	-7.250
	(1.691) <sup>c</sup>	(1.754) <sup>c</sup>	(0.760)	-(4.962) <sup>a</sup>	-(4.977) <sup>a</sup>	-(4.847) <sup>a</sup>
N	200	200	200	1,798	1,798	1,798
McFadden R <sup>2</sup>	0.50	0.52	0.47	0.17	0.17	0.17