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The Determinants of Capital Structure: An Empirical Study of New Zealand-Listed Firms

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Abstract

This paper investigates capital structure determinants of New Zealand-listed firms. This study is an extension from previous studies conducted by Boyle and Eckhold (1997) and, Wellalage & Locke (2012). Boyle and Eckhold and, Wellalage and Locke examine capital structure choices in New Zealand, especially the debt choices of NZ's corporate firms. Using a balanced-panel of 79 New Zealand-listed firms, this study employs a balanced panel method, using dynamic-panel Instrumental Variable-Generalised Methods of Moments (IV-GMM) as it corrects heteroskedasticity and endogeneity problem which might result in an unbiased and inconsistent estimation. All variables, apart from non-debt tax shields and profitability exhibit a significant impact on total debt. Overall, these variables confirm the trade-off theory,

even though the coefficient for non-debt tax shield confirms the pecking-order theory. The empirical evidence is less conclusive than that of previous studies in other countries, particularly Australia where capital structure confirms the pecking-order theory. Overall, the trade-off theory is more appropriate in explaining New Zealand listed firms' capital structure. In addition, it appears that the capital structure theories applied to each study are contradictory, even though the result is in line with Boyle and Eckhold and, Wellalage and Locke which find that those firms' specific characteristics play a significant role in determining the firm's debt level. However, the contradictory results may be due to the different methods, time frames and scope of the samples used.

Keywords: Capital structure, dynamic-panel IV-GMM, New Zealand-listed firms

JEL Classification: G32

1. Introduction

After the seminal work of Modigliani and Miller (1963), numerous studies have been done to explore to what extent the capital structure theory can be applied to different circumstances. Those studies were conducted under different assumptions which fit in to the particular situation. Trade-off theory, pecking-order theory, agency-theory and some other theories are empirical evidences that challenge Modigliani and Miller' capital structure studies (M &M). Further, the empirical relevance of the trade-off theory,pecking-order theory, agency-theory and some other theories has often been questioned. Some research has been conducted to investigate this theory,but the results from various contexts are mixed and inconclusive. The different results may be caused by different firm size, the maturity of the respective capital market, and the country being used as a sample.

The impact of firm characteristics on a firm's financing choices has been extensively studied across firms and countries; for example, Rajan and Zingales (1995), Arvin and Francis (1999), Goyal and Frank (2003) studied US firms, while Deesomsak, Paudyal and Pescetto (2004), and Kabir and Jong (2008) studied Asia Pacific firms, and some from other developed and developing countries. At an aggregate level, firm leverage is similar across the developed countries, and any differences that exist are not easily explained by institutional differences (Rajan & Zingales, 1995). Most firms had a convergence in their capital structure toward industry average (Arvin & Francis, 1999), thus the factors identified by previous cross sectional studies in the United States to be related to leverage seem similarly related in other countries as well. However, the findings of those studies seem to be obsolete, as now some studies find that the capital structure decision of firms is influenced by the environment in which they operate.As well as firm specific factors identified in the extant literature, the capital structure decisions are not only the product of a firm's own characteristics, but also the result of the corporate governance, legal framework and institutional environment of the countries in which the firm operates (Deesomsak, Paudyal & Pescetto, 2004). Firm specific determinants of leverage differ across countries and there is an indirect impact, because country specific factors also influence the roles of firm specific determinants of leverage (Kabir & Jong, 2008).

The evidence indicates that different theories apply for different circumstances and periods, therefore an investigation of capital structure choices and its determinant continues to be an important subject. Apparently, few studies have been conducted to investigate the capital structure choices in New Zealand firms, and therefore it is necessary to conduct ongoing investigation in the pattern of capital structures.

At present there are two common types of financing that can be utilised by New Zealand firms; first, equity financing; and second, debt financing. These two financing methods have their own advantages compared to one another. Firms may raise equity and debt financing through capital markets (the New Zealand stock exchange), which was established in 2002. The New Zealand stock exchange (NZX) opens more opportunities for New Zealand firms to access funding sources. The main financial markets in New Zealand relate to debt

instruments, equities, and managed funds. Debt security markets operate at both wholesale and retail levels, which vary by type of instrument, issuer, buyer, maturity and level of risk.

According to Statistics New Zealand (2004), the majority of New Zealand firms' financing was raised from debt financing, particularly short-term financing. The reasons why short-term financing was preferred over long-term debt financing are; first, New Zealand firms were dominated by small and medium enterprises, and second, the majority of New Zealand firms were in the primary sector, thus giving a different characteristic in contributing to their economic growth.Though New Zealand is considered a developed market, NZ's businesscharacteristics differ from those developed countries, and thus may result in the different financing choices. Vos and Nyamori (1997) conducted a survey research of New Zealand firms' capital structure, and they found that there were several reasons why firms choose debt as source of financing; a debt carries lower cost; it is more convenient and flexible to deal with; the debt requirement fits with their circumstances; it is a corporate policy to adjust their capital structure, and it is available all the time. Further, a recent study by Artemesia and McCulloch (2007) concluded that the cost structure and the net interest margins of New Zealand banks are low, therefore enterprises prefer short-term financing. Moreover, minimising the cost of borrowing is consistent with the pecking-order theory, as confirmed by Boyle and Eckhold (1997) and, Wellalage and Locke (2012).

2. Literature Review

The trade-off theory is derived from the models based on taxes and agency costs. Modigliani and Miller (1963), DeAngelo and Masulis(1980) and Jensen and Meckling (1976) suggest the firm has an optimal capital structure by offsetting the advantages of debt and the cost of debt. Therefore, trade off theory refers to the idea that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits. It states that there is an advantage to financing with debt; the tax benefits of debt, and tax benefits to be had; but there is also a cost to financing with debt; the costs of financial distress including bankruptcy costs, and agency costs. This theory suggests that there is a positive relationship between debt level and firm performance. Moreover, the implication of this trade off theory is that firms have target leverage and they adjust their leverage toward the target over time.

The trade-off theory has been tested by researchers in developed markets, most focusing on how the determinant factors affect capital structure choice. Graham and Harvey (2001) surveyed 392 chief financial officers (CFOs) about the cost of capital, capital budgeting, and capital structure. They found moderate support that firms follow the trade-off theory and pecking order theory; but mixed or little evidence that signalling, transaction costs, underinvestment costs, asset substitution, bargaining with employees, free cash flow considerations and product market concerns affect capital structure choice. In addition, Brounen, De Jong, and Koedijk (2006) also surveyed 313 CFOs on capital structure, focusing onthe UK, the Netherlands, Germany and France. They also found that the trade-off theory is confirmed by the importance of target debt ratio in general in these four countries but also specifically by tax effects and bankruptcy costs; and they concluded strong similarities in the

capital structure among the four European countries, and also with the US when comparing capital structure policies.

The pecking-order theory was developed by Myers and Majluf (1984). Myers and Majluf (1984) considered that firms must issue common stock to raise cash to undertake a valuable investment opportunity. Management is assumed to know more about the firm's value than potential investors, and investors sometimes interpret the firm's actions irrationally. An equilibrium model of issue-investment decision has been developed under these assumptions. The model shows that firms may refuse to issue stock, and therefore may pass up valuable investment opportunities. The model suggests explanations for several aspects of corporate financing behaviour, including the tendency to rely on internal sources of funds, and to prefer debt to equity if external financing is required. Titman and Wessels (1988) tested various models which explain capital structure choices, by including all hypotheses jointly in the empirical tests; and their results suggest greater confidence in the pecking order than in the target adjustment model. Likewise, Sunder and Myers (1994) re-examined some aspects of the empirical literature on capital structure and found a similar result.

Boyle and Eckhold (1997) examined capital structure choice and financial market liberalisation in New Zealand, especially the debt choices of NZ's corporate firms, but found that most existing theories were of little value in explaining the debt choices of NZ corporate firms. Most of the explained variation in long term debt choices can be attributed to differences in firms' earning power. For short term debt, the data indicated that dividend policy and ability to utilise tax shields were statistically significant, but these variables explain little of the observed variation in debt ratios. This finding is consistent with evidence from other countries across pre- and post-reform periods. Overall, the results are remarkably similar to those of Titman and Wessels (1988) and Bennett and Donnelly (1993) for US and UK data, respectively.

Wellalage and Locke (2012) investigated the capital structure of New Zealand's large listed companies for the period 2003 to 2010 using quantile regressions. They included corporate governance variables (e.g., foreign share ownership, managerial ownership and non-executive directors on the board) in determining capital structure. Wellalage and Locke found that firm-specific characteristics play a significant role in determining a firm's leverage levels rather than corporate governance variables. In addition, they found that New Zealand firms fit into the pecking-order theory. Nevertheless, this study sheds some light on New Zealand's capital structure choices and is necessary for the regulators in stimulating the enterprises to be more active in the debt market activities.

Though theoretical and empirical studies have shown that profitability, tangibility, firm size, non-debt tax shields, growth, managerial ownership, and some others factors impact on capital structure (Titman & Wessels, 1988; Harris & Raviv, 1992; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999; Kabir & Jong, 2008; Wellalage & Locke, 2011), this empirical evidence of firms' specific factors are inconclusive, as different countries show a differentresult. In addition, Deesomsak, Paudyal and Pescetto (2004) suggest that capital structure decisions are not only the product of a firm's own characteristics, but also the result

of the corporate governance, legal framework and institutional environment of the countries in which the firm operates.

Profitability plays a significant role in determining how much debt is utilised by firms. According to the trade-off theory, profitable firms tend to utilise more debt compared to unprofitable ones, to avoid higher tax payment, but firms also have to offset the benefit of and the risk of utilising debt. In contrast, the pecking-order theory suggests that profitable firms tend to utilise less debt compared to unprofitable ones, because profitable firms have more earnings and they prefer to utilise internal financing rather than external financing. The study of Rajan and Zingales (1995) found that profitability is negatively correlated with leverage. Further, the negative influence of profitability on leverage should become stronger as firm size increases. Similarly, Deesomsak, Paudyal and Pescetto (2004) found a negative relationship between profitability and leverage; but this finding is statistically insignificant for all countries. The negative relationship is consistent with the predictions of the pecking order theory, indicating that firms prefer to use internal sources of funding when profits are high; but this has not been proved because the results are statistically insignificant. In addition, Kabir and Jong (2008) also found a negative relationship between profitability and leverage in 25 countries, of which more than half are developed markets.

Most secured-debt requires collateral, as it guarantees the bondholders, and tangible assets are likely to have an impact on the borrowing decisions because they are less subject to informational asymmetries, and have a greater value than intangible assets, as in the case of bankruptcy (Gaud, Jan, Hoesli & Bender, 2005). Thus, the higher the tangible assets proportion, the greater the chance of obtaining debt financing (Titman & Wessels, 1988; Harris & Raviv, 1992; Rajan & Zingales, 1995; Gaud et al., 2005). According to the trade-off theory, larger firms with higher assets tangibility tend to have more leverage and pay higher dividends. A dividend payment is one form of tacit information that managers convey to the market, thus indicating that firms have higher growth prospects, and referred to as a signalling; and it is assumed that signalling has a positive relationship with leverage. Further, some empirical studies suggest that the performance of each firm may differ according to their size, because larger firms have greater economies of scale in the transaction costs associated with long term debt, which may influence the results and inferences (Ramaswamy, 2001; Goyal & Frank, 2003; Coleman, 2007; Jermias, 2008; Ebaid, 2009). In addition, larger firms have less potential for bankruptcy costs; therefore, firm size should be positively related to borrowing capacity (Rajan & Zingales, 1995; Krishnan & Moyer, 1997; Padron et al., 2005).In addition, Harris & Raviv (1992) and Booth et al. (2001) imply that higher leverage can be expected to be associated with larger firm value; higher debt level relative to expected income; and lower probability of reorganization following default. However, Titman & Wessels (1988) and Wald (1999) assert that larger firms with less asymmetric information prefer to use less debt, suggesting a negative relationship between firm size and leverage. Because of asymmetric information, smaller firms are likely to bear higher costs in debt financing (Graham, 2000; Padron et al, 2005).

The tax deduction for depreciation and investment tax credits is called non-debt tax shields (NDTS). DeAngelo and Masulis (1980) argue that non-debt tax shields are substitutes for the

tax benefi of debt financing; and firms with larger non-debt tax shields have low debt. However, many studies argue that larger firms tend to be more diversified and hence are less likely to go bankrupt; so they tend to utilise debt to have the benefit of tax-shields. Debt usage will reduce the taxable income, and thus firms fav r having more debt, as this increase the amount of cash obtained (Bradley et al., 1984). On the other han the presence of non-debt tax shields reduces the optimal advantage of debt, because a higher level of non-debt tax shields results in less reliance on the tax-deductible aspect of debt which leads to a negative lationship with debt. Wiwattanakantang (1999) and, De Miguel and Pindado (2001) found an inverse relationship between non-debt tax shield and debt.

Empirical studies find that firms with higher growth tend to have more debt as they expect to expand their business scale; and debt financing is considered as a preferable option as it carries lower cost; however, high-growth firms having an outstanding debt with higher opportunities on profitable investments will forgo these investments as it only affects debt holders rather than shareholders; th fore, growth is expected to have negative relationships with debt (Myers, 1977). Further, Titman and W sels (1988), Rajan and Zingales (1995), Harris d Raviv (1992), Ghosh and Cai (2000), Booth et al (2001) and Padron et al. (2005) found that firms with higher growth should utilise equity financing resulting in a negative relationship with leverage.

Jensen and Meckling (1976 and 1986) suggest that leverage minimises the total agency costs resulting from the conflicts of interest between shareholders and managers, and conflicts between shareholders and debt holders, therefore it i xpected that leverage has a correlation with ownership (including managerial ownership). Leland and Pyle (1977) and Berger et al (1997) found that leverage is positively correlated with the extent of managerial shareholdings. On the other hand, it is assumed that higher inside ownership tends to have less debt, because they prefer to use internal financing to avoid the agency problem with debt holders; therefore negative relationships between leverage and mana rial ownership are expected. Friend and Hasbrouck (1988) tested director's shareholdings as a determinant of a firm's capital structure, and they found significant negative relationship between ownership and debt. Likewise, Wiwattanakantang (1999) found that ownership structure affects financial structure. Further, Seifert and Gonenc (2008) explain that in the US and the UK, ownership is dispersed, and managers and insiders have superior information compared to outside shareholders. In Japan and Germany, the asymmetric information issues are caused more due to the quality of information provided to investors and the legal rights afforded to these outside investors. However, empirical studies provide mixed results on how ownership structure impacts on capital structure.

A series of specific hypothesis in determining the capital structure choice is provided as follows:

H_1 : *Tangibility is positively associated with leverage*

H_2 : *Non-debt tax shields are negatively associated with leverage*

H_3 : *Profitability is negatively associated with leverage*

H_4 : *Growth is negatively associated with leverage*

H_5 : *Signalling is positively associated with leverage*

H_6 : *Firm size is positively associated with leverage*

H_7 : *Managerial ownership is negatively associated with leverage*

The empirical relevance of the capital structure theory has often been questioned. Some research has been conducted to investigate this theory and the results from various contexts are mixed and inconclusive. The evidence does indicate there are likely to be differences attributable to firm size, country and the maturity of the respective capital market.

3. Research Methodology

3.1 Sample set

This study uses data from the annual report of New Zealand-listed firms for the period of 2007-2011 collected from NZX deep archive. Those firms with any missing observations for any variable in the model during the research period are dropped, and thus a balanced panel data of 79 New Zealand-listed firms were observed from 147. Though only 79 firms were included, the sample may do well in capturing aggregate leverage in the country because the listed firms can represent the whole industry in New Zealand.

Table 3.1 presents descriptive statistics for the sample data. The mean value of leverage/total debt (TD) is 0.45, with a range of 0 to 0.99, suggesting that all firms have leverage close to the average leverage of industry. Further, the mean value for total long-term debt (TLTD) is lower than that for total short-term debt (TSTD); indicating firms have more short-term debt. Two considerable reasons for utilising more short-term debt are the majority of small & medium enterprises for New Zealand's business, and the majority of agriculture industry's domination. According to Statistics New Zealand (2004), New Zealand's firms utilised debt rather than equity financing which account for 72% total debt compared to Australian firms which utilised only 25% of debt financing in 2003 (Welch, 2003). In addition, the reason that short-term debt financing seems to dominate the capital structure in New Zealand may be due to either the bank interest rate in New Zealand is quite low compared with other financing choices or the firm specific characteristics of each firm in determining their capital structure.

Further, the average total debt utilised by New Zealand firms accounts for 45% which is close to the range of the average total debt for most developed countries in the 1990s; 50 to 60% (Rajan & Zingales, 1995). Comparing two different periods might be absurd; therefore, based on recent studies by Bessler, Drobetz and Gruninger (2011), the average total debt for all firms over the world is 25%; for non-US firms it is 26%; for US firms it is 23%; for common law countries it is 25%; and for civil law countries it is 27%. It seems now that New Zealand's firms utilised debt financing above the average. Further, the mean value for tangibility is 0.44, suggesting that the majority of firms have moderate fixed assets, hence they are useful for raising debt financing by using them as collateral.

Table 3.2 presents correlation matrix for all variables in the model. The highest correlation is between non-debt tax shields and profitability at 0.79. This suggests that firms with higher level of debt tend to maximise non-debt tax shields resulted in higher profitability tend to maximise. None of the correlations among explanatory variables are above 0.79, indicating a low likelihood of multicollinearity issues arising in the OLS regressions.

Table 1. Descriptive Statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*
Leverage/Total debt (TD)	395	0.4537	0.2642
Total long-term debt (TLTD)	395	0.1986	0.1862
Total short-term debt (TSTD)	395	0.8014	0.1862
Tangibility (Tang)	395	0.4397	0.3259
NDTS	395	4.6304	22.5214
Profitability	395	5.1427	60.5113
Growth	395	1.1198	1.3446
Signalling	395	1.0028	20.2749
Ownership (IOWNP)	395	0.1537	0.2455
Firm size	395	5.3363	1.1819
Industry_Primary	395	0.1519	0.3594
Industry_Energy	395	0.0759	0.2653
Industry_Goods	395	0.1772	0.3823
Industry_Property	395	0.0633	0.2438
Industry_Service	395	0.4177	0.4938
Industry_Investment	395	0.1013	0.3021

Table 2. Correlation Matrix

	TD	TLTD	TSTD	Tangibility	NDTS	Profitability	Growth	Signalling	IOWNP	Firm size
TD	1.0000									
TLTD	0.4134	1.0000								
TSTD	-0.4134	-1.0000	1.0000							
Tangibility	-0.1619	0.1469	-0.1469	1.0000						
NDTS	-0.1808	-0.1983	0.1983	-0.0077	1.0000					
Profitability	-0.1298	-0.0530	0.0530	-0.0684	0.7904	1.0000				
Growth	-0.0513	-0.0108	0.0108	0.1139	-0.0227	-0.0106	1.0000			
Signalling	0.0880	0.1184	-0.1184	-0.0564	-0.0096	-0.0017	0.0196	1.0000		
IOWNP	-0.0282	-0.1350	0.1350	-0.1340	-0.0583	-0.0531	0.1701	0.0191	1.0000	
Firm size	-0.0850	0.1825	-0.1825	0.2974	0.1739	0.1139	0.0139	-0.0258	-0.1637	1.0000

3.2 Variables

Variables are largely adopted from previous study, thus this study uses three leverage proxies as the dependent variableswhich are total debt, long-term debt and short term debt. The explanatory variables include tangibility, non-debt tax shields (NDTS), profitability, growth, signalling, managerial ownership and firm size, while industry dummy serves as a control variable Variables (Titman & Wessels, 1988; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999).

Variables are defined as follow: leverage is measured as ratio of total debt over total assets; tangibility is measured as ratio of total fixed assets over total assets; non-debt tax shield is measured as ratio of total depreciation over total assets; profitability is measured as ratio of earnings before interest, tax and depreciation over total assets; growth is measured as book to market ratio; signalling is measured as ratio of dividend payment over total assets; managerial ownership is measured as percentage of the inside ownership's equity; firm size is measured as the log of total assets (Titman & Wessels, 1988; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999; Gaud et al., 2005; Padron et al., 2005).

3.3 Method

This study uses panel data which allows the unobservable heterogeneity for each observation in the sample to be eliminated and multicollinearity among variables to be alleviated. Maddala and Lahiri (2009) specify problems that might be present in the regression model, such as heteroskedasticity, multicollinearity and endogeneity problems. Those problems cause inconsistency of the OLS estimates.

Dang (2005) examined the performance of two influential but contradicting theories of capital structure, known as the trade off and pecking order theories, using a partial adjustment model, and an error correction model as a generalised specification of the partial adjustment process. This framework allowed him to nest the cash flow deficit variable necessary to examine the pecking order theory. The empirical models are estimated by the Anderson and Hsiao IV and the Arellano and Bond GMM methods, which are argued to yield consistent estimates for dynamic panel data.

As can be seen in the Table 3.2 most cross-correlation for the independent variables are fairly small, thus, giving less cause for concern about the multicollinearity problem. Further, the Arellano-Bond test for zero autocorrelation in first difference errors results -14.5681 (*p-value 0.1169*) confirms no serial correlation in the original error as desired. The Breusch-Pagan test for heteroskedasticity results 7.43 (*p-value 0.006*) indicates that variances among the explanatory variables are not constant.

To estimate the leverage, this equation is the first point to begin, the model is as follows:

$$y_{it} = \alpha + x_{it}^{'}\beta + \cdots + x_{in}^{'}\beta_n + u_{it} \quad (1)$$

$$u_{it} = \mu_i + \lambda_t + v_{it} \quad (2)$$

$$i = 1, \dots, N; t = 1, \dots, T$$

Where μ_i denotes the unobservable individual effect, λ_t denotes the unobservable time effect, and v_{it} is the remainder stochastic disturbance term.

When using the Ordinary Least Squares (OLS) to estimate β, one assumes that $x_{it}^{'}$ is orthogonal with u_{it} of equation (1), but this may not be true, and thus the estimated β may be biased with endogeneity. Therefore, the instrumental variable (IV), denoted as z, approach may be used to solve the endogeneity; while the changes in the new IV are associated with changes in x but do not lead to changes in y (except indirectly via x). Therefore, the equation which includes endogeneity is specified as follows (Cameron & Trivedi, 2010);

$$y_{1i} = y_{2i}^{'}\beta_1 + x_{1i}^{'}\beta_2 + \cdots + x_{ni}^{'}\beta_n + u_i\,, \qquad i = 1, \dots, N \tag{3}$$

The regression errors u_i are assumed to be uncorrelated with $x_{1i}^{'}$ and $x_{ni}^{'}$ but correlated with $y_{2i}^{'}$, and this correlation leads to an inconsistent estimation. To obtain a consistent estimation, a reduced-form model is appropriate;

$$y_i = x_{1i}^{'}\beta_1 + \cdots + x_{ni}^{'}\beta_n + u_i \tag{4}$$

$$e = (u_i|z_i) = 0 \tag{5}$$

Most previous studies on the capital structure determinants treat tangibility, non-debt tax shields, growth and managerial ownership as endogenous variable determinants (Agrawal and Knoeber, 1996; Dessi& Robertson, 2003; Maghyereh, 2005; Coricelli, Driffield, Pal & Roland, 2011), thus the Durbin-Wu-Hausman test for endogeneity is necessary, and the result confirms that tangibility, non-debt tax shields, growth and managerial ownership are indeed endogenous. Therefore, this study employs dynamic-panel IV-GMM (Instrumental Variable-Generalised Methods of Moments) which provides consistent estimates by utilising instruments that have been obtained from the orthogonality condition between the regressors and the error terms. The analysis includes the Sargan test for over-identification restrictions to test the validity of instruments used in the model, which will confirm that the parameters of the model are estimated using optimal GMM.

It is worth mentioning the possibility that some of the regressors may be correlated with the past and current values of the idiosyncratic component of disturbances. The model for dynamic-panel GMM is (Cameron & Trivedi, 2010);

$$y_{it} = \alpha_i + \gamma_1 y_{i,t-1} + \cdots + \gamma_p y_{i,t-p} + x_{it}^{'}\beta + \varepsilon_{it}\,, \qquad t = p+1, \dots\dots, T \tag{6}$$

The assumption is that ε_{it} are serially uncorrelated. An important aspect of the dynamic panel estimator is its using the firm's history as instruments for explanatory variables.

The regression model is specified as follows (Titman & Wessels, 1988; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999):

$$Lev_{it} = \beta_0 + Tang_{it} + NDTS_{it} + Profitability_{it} + Growth_{it} + Signalling_{it} + Ownership_{it} + Firm\ Size_{it} + \varepsilon_{it} \quad (7)$$

4. Findings

Table 4.1, Table 4.2 and Table 4.3 present the regression results for total debt, long-term debt and short-term debt, respectively. Each table provides four different methods, which are OLS Robust, 2SLS, GMM and dynamic-GMM. In addition, instrument in the Dynamic-IV GMM is significant in the level of two-lagged for total debt and long-term debt, while for short-term debt the lagged instrument is significant in one-lagged. More specifically, the Wald (joint) test provides evidence that supports the joint significance of all the regressors in the model. Furthermore, the Sargan test confirms the validity of the instruments used. As mentioned in the method section, this study uses dynamic-GMM, but there is no harm if we compare the regression results that confirmed efficient and unbiased estimators.

The coefficients of tangibility, growth, signalling, managerial ownership and firm size are significant for the total debt equation (Table 4.1; Dynamic-IV GMM, REG.2). It can be concluded that firms' specific factors play a significant impact in explaining New Zealand listed-firms' capital structure. The different results were obtained for long-term debt and short-term debt. For long-term debt, only growth coefficient is significant (Table 4.2; Dynamic-IV GMM, REG.2), while for short-term debt, only coefficients for tangibility, profitability, managerial ownership and firm size are significant (Table 4.3; Dynamic-IV GMM, REG.1).

The tangibility coefficients for total debt and short-term debt are positive and significant, which confirm that higher assets' tangibility is associated with higher leverage. This result is supported also by the survey of Statistics New Zealand (2004), that more than 70% of New Zealand firms utilise debt financing, particularly short-term debt, in which the majority source of the short-term debt financing is banks. The significant result for tangibility in explaining short-term debt confirms that collateral is of importance for banks to secure the debt.

The growth coefficients for total debt, long-term debt and short-term debt are positive and significant which contradict the notion of negative association between growth and leverage. This result indicates that higher growth-firms tend to have more debt, as they expect to expand their business scale and a debt financing is preferable as it carries lower cost. The result is contradictory to Titman and Wessels (1988), Rajan and Zingales (1995), Harris and Raviv (1992), Ghosh and Cai (2000) and Booth et al (2001) with a negative relationship between growth and leverage.

The signalling coefficient is positive and significant for total debt which confirms that larger firms paying higher dividends tend to have more debt, as they want to convey the information to investor about the future prospects of the firm.

The managerial ownership coefficients are positive and significant for total debt and short-term debt, which confirms that leverage minimises the total agency costs resulting from the conflicts of interest between shareholders and managers; and conflicts between

shareholders and debt holders (Jensen & Meckling, 1976 & 1986). Further, this result supports the finding of Leland and Pyle (1977) and Berger et al (1997) studies which found that leverage is positively correlated with the extent of managerial shareholdings.

The firm size coefficient for total debt is negative and significant while positive and significant for short-term debt. For total debt, the result is in line with Harris and Raviv (1992) and Rajan and Zingales (1995). While, the positive coefficient for short-term debt suggests that larger firms with higher assets' tangibility utilise more leverage (short-term debt) to gain the tax benefits of debt, as larger firms have less risk of bankruptcy.

Finally, only short-term debt yields negative and significant coefficient for profitability confirming the pecking-order theory. However, this study is unable to generate that the pecking-order theory fits to New Zealand listed-firms, as the majority of the firms' specific factors support the trade-off theory. In addition, the bank interest rate in New Zealand is quite low compared with other financing choices and this may explain why short-term financing is preferred. Hence, not only firms' specific factors are of importance but also the business environment characteristic in New Zealand are of substantialin explaining New Zealand listed-firms' capital structure. Further research is necessary as the firms' behaviour changes over time, using wider scope of sample and periods.

The estimated coefficients for those four models (OLS Robust, 2SLS, IV-GMM and Dynamic-IV GMM) are considerably different. The different results are affected by the differencing used for IV, in which simple dynamic panel models suffer from a weak instrument problem when the dynamic panel autoregressive coefficient approaches unity, as the estimator depends on time span. If the time span is small; the estimators are asymptotically random, and if time span is large; the un-weighted GMM estimator may be inconsistent and the efficient two step estimator may be biased. Because of the small time span for this study, the estimated coefficients for Dynamic-IV GMM yielded higher estimated coefficients and higher standard errors compared to the rest of the model. The consistent estimators yielded by dynamic GMM were because the GMM procedure can use moment conditions based on the level equations together with the usual Arellano and Bond type orthogonality conditions (Blundell & Bond, 1998), and direct maximum likelihood estimation based on the differenced data under assumed normality for the idiosyncratic errors (Hsiao et al., 2002).

Table 3. Summary of four different estimators of total debt equation

Variables	*OLS Robust*		*2SLS*		*IV-GMM*		*Dynamic-IV GMM*	
	REG. 1	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*
L1.							0.0912	0.1065
							(0.1300)	(0.1243)
L2.								-0.7153***
								(0.2346)
Constant	0.07463***	0.7398***	0.6877***	0.6450**	0.5684***	0.4396***	0.3762	1.4958***
	(-0.1385)	(0.2117)	(0.1097)	(0.2822)	(0.1024)	(0.1360)	(0.4800)	(0.3761)
Tangiblity	-0.0764	-0.1000	-0.2108**	-2740***	-0.1590	-0.2249*	-0.6580***	0.3989**
	(0.0699)	(0.0750)	(0.1001)	(0.1149)	(0.1018)	(0.1183)	(0.2580)	(0.1910)
NDTS	-0.0011	-0.0011	-0.0016	-0.0017	-0.0030	-0.0030	-0.0020	-0.0003
	(0.0010)	(0.0010)	(0.0016)	(0.0016)	(0.0020)	(0.0020)	(0.0032)	(0.0026)
Profitability	-0.0001	-0.0002	-0.0001	-0.0001	0.0002	0.0003	-0.0001	0.0001
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0010)	-0.0007
Growth	0.0020	-0.0018	0.0379	0.0312	-0.2182	0.0215	-0.0837	-0.0386*
	(0.0200)	(0.0205)	(0.0245)	(0.0265)	(0.0269)	(0.0284)	(0.0344)	(0.0416)
Signalling	0.0000	0.0001***	-0.0005	-0.0005	-0.0011*	-0.0012**	-0.0001	0.0057***
	(0.000)	(0.0000)	(0.0012)	(0.0012)	(0.0006)	(0.0006)	(0.0003)	(0.0019)
IOWNP	-0.0806	-0.0769	-0.0999	-0.0976	-0.0999	-0.1050	0.1382	-0.9356***
	(0.0939)	(0.0942)	(0.1107)	(0.1119)	(0.0900)	(0.0901)	(0.1487)	(0.3198)
Firm Size	-0.0442*	-0.0463	-0.0207	-0.0175	-0.0019	0.0027	0.0636	-0.1543**
	(0.0264)	(0.0297)	(0.0215)	(0.0232)	(0.0203)	(0.0222)	(0.0950)	(0.0685)
Industry_Primary		0.0436		0.0620		0.1409		
		(0.1040)		(0.2478)		(0.0980)		
Industry_Energy		0.1265		0.1171		(0.1604)*		
		(0.0835)		(0.2547)		(0.0891)		
Industry_Goods		0.0562		0.0826		0.1740**		
		(0.0924)		(0.2483)		(0.0788)		
Industry_Property		-0.0666		-0.0832		(omitted)		
		(0.1009)		(0.2616)				
Industry_Service		0.0324		0.0800		0.1577*		
		(0.0842)		(0.2418)		(0.0926)		
Industry_Investment		-0.0762		-0.0589		0.0328		
		(0.1426)		(0.2587)		(0.1256)		
Groups	79	79	78	78	78	78	78	75
R-squared	0.0402	0.0662	0.0741	0.1069	0.0766	0.1096		
Wald-Chi2	41.54	239.50	18.33	21.09	65.74	88.79	26.57	70.82
Prob.Chi2	0.0000	0.000	0.0000	0.0712	0.0000	0.0000	0.0008	0.0000
Arellano Bond test							-1.5094	-1.5681
Prob.Chi2							0.1312	0.1169
Sargan test							15.3490	13.9363
Prob.Chi2							0.2861	0.3048

*Standard errors in parentheses are for coefficients. *sig. at 10%level, **sig. at 5% level, and ***sig. at 1% level*

Table 4. Summary of four different estimators of total long-term debt equation

Variables	*OLS Robust*		*2SLS*		*IV-GMM*		*Dynamic-IV GMM*	
	REG. 1	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*
L1.							0.0316	-0.0292
							(0.1048)	(0.1051)
L2.								-0.9093***
								(0.2082)
Constant	0.0767	-0.2233***	0.0825	-0.2112	0.0425	(omitted)	0.1080	0.3829***
	(0.0691)	(0.0860)	(0.0718)	(0.1826)	(0.0701)		(0.4208)	(0.1543)
Tangiblity	0.0479	0.0734*	0.0534	0.1034	0.0751	0.1225**	-0.2113	0.1028
	(0.0413)	(0.0434)	(0.0609)	(0.0685)	(0.0587)	(0.0556)	(0.2837)	(0.1439)
NDTS	-0.0026***	-0.0025***	-0.0031***	-0.0031***	-0.0042***	-0.0041**	0.0014	-0.0004
	(0.0009)	(0.0009)	(0.0010)	(0.0010)	(0.0018)	(0.0020)	(0.0030)	(0.0027)
Profitability	0.0008***	0.0009***	0.0009***	0.0010***	0.0010**	0.0011**	0.0002	0.0002
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0005)	(0.0006)	(0.0009)	(0.0007)
Growth	0.0001	0.0039	-0.0081	-0.0020	-0.0151	-0.0067	-0.0309***	-0.0571***
	(0.0132)	(0.0136)	(0.0165)	(0.0178)	(0.0172)	(0.0185)	(0.0345)	(0.0290)
Signalling	0.0005***	0.0005***	-0.0007	-0.0007	-0.0010***	-0.0010***	-0.0001	0.0017
	(0.0000)	(0.0005)	(0.0010)	(0.0009)	(0.0001)	(0.0001)	(0.0002)	(0.0018)
IOWNP	-0.0806	-0.0822	-0.0790	-0.0746	-0.0658	-0.0646	0.5537***	0.0300
	(0.0504)	(0.0516)	(0.0673)	(0.0670)	(0.0569)	(0.0536)	(0.1530)	(0.2949)
Firm Size	0.0228*	0.0223*	0.0224	0.0185	0.0249**	0.01417	0.0189)	-0.0122
	(0.0138)	(0.0135)	(0.0138)	(0.0147)	(0.01480)	(0.0127)	(0.0893)	(0.0370)
Industry_Primary		0.2981***		0.2822*		0.0874		
		(0.0397)		(0.1591)		(0.0707)		
Industry_Energy		0.2672***		0.2958*		0.1039		
		(0.0547)		(0.1628)		(0.0733)		
Industry_Goods		0.2854***		0.2913*		0.0963		
		(0.0444)		(0.1595)		(0.07156)		
Industry_Property		0.4038***		0.4255***		0.2432***		
		(0.0685)		(0.1675)		(0.0981)		
Industry_Service		0.2820***		0.2746*		0.0802		
		(0.0358)		(0.1555)		(0.0681)		
Industry_Investment		0.3051***		0.3137**		0.1022		
		(0.0830)		(0.1660)		(0.0781)		
Groups	79	79	78	78	78	78	78	75
R-squared	0.1432	0.1893	0.14130	0.19480	0.14590	0.18410		
Wald-Chi2	1945.93	38565.11	17.58	25.76	172	466.44	121.99	488.71
Prob.Chi2	0.0000	0.0000	0.0140	0.0183	0.000	0.0000	0.0000	0.0000
Arellano Bond test							-0.4263	-0.0208
Prob.Chi2							0.6699	0.9835
Sargan test							12.5497	22.5939**
Prob.Chi2							0.4832	0.0319

*Standard errors in parentheses are for coefficients. *sig. at 10%level, **sig. at 5% level, and ***sig. at 1% level*

Table 5. Summary of four different estimators of total short-term debt equation

Variables	*OLS Robust*		*2SLS*		*IV-GMM*		*Dynamic-IV GMM*	
	REG. 1	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*	*REG. 1*	*REG. 2*
L1.							-0.1800	0.2450*
							(0.1173)	(0.1418)
L2.								0.0574
								(0.1287)
Constant	0.9234***	1.2233***	0.9175***	1.2112***	0.9575***	(omitted)	0.7309***	0.3280
	(-0.0691)	(0.0860)	(0.0718)	(0.1826)	(0.0701)		(0.2390)	(0.3045)
Tangiblity	-0.0479	-0.0734*	-0.0534	-0.1034	-0.0751	-0.0933	-0.4393***	-0.2917**
	(0.0413)	(0.0434)	(0.0608)	(0.0685)	(0.0587)	(0.0628)	(0.1852)	(0.1435)
NDTS	0.0026***	0.0025***	0.0031***	0.0031***	0.0042***	0.0041*	0.0060	0.0055**
	(0.0009)	(0.0009)	(0.0010)	(0.0010)	(0.0018)	(0.0022)	(0.0038)	(0.0026)
Profitability	-0.0008***	-0.0009***	-0.0009***	-0.0010***	-0.0010**	-0.0003	-0.0020**	-0.0018***
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0005)	(0.0007)	(0.0010)	(0.0007)
Growth	-0.0066	-0.0039	0.0081	0.0020	0.0151	0.0067	-0.0134	0.0033
	(0.0185)	(0.0135)	(0.0165)	(0.0178)	(0.0172)	(0.0185)	(0.0211)	(0.0246)
Signalling	-0.0005***	-0.0005***	0.0007	0.0007	0.0010***	0.0009***	0.0001	-0.0010
	(0.0000)	(0.0000)	(0.0010)	(0.0010)	(0.0001)	(0.0001)	(0.0001)	(0.0014)
IOWNP	0.0806	0.0822	0.0790	0.0746	0.0658	0.0847	-0.5138***	0.0028
	(0.0504)	(0.0516)	(0.0673)	(0.0670)	(0.0569)	(0.0604)	(0.1452)	(0.2358)
Firm Size	-0.0228*	-0.0223*	-0.0224	-0.0185	-0.0284**	0.0170	0.0891**	0.0663
	(0.0138)	(0.0135)	(0.0138)	(0.0147)	(0.0148)	(0.0325)	(0.0423)	(0.0442)
Industry_Primary		-0.2981***		-0.2822*		0.7320***		
		(0.0396)		(0.1591)		(0.1871)		
Industry_Energy		-0.2672***		-0.2958*		0.6567***		
		(0.0546)		(0.1628)		(0.2196)		
Industry_Goods		-0.2854***		-0.2913*		0.7317***		
		(0.0444)		(0.1595)		(0.1775)		
Industry_Property		-0.4037***		-0.4255***		0.5630***		
		(0.0685)		(0.1675)		(0.2197)		
Industry_Service		-0.2820***		-0.2746*		0.7330***		
		(0.0358)		(0.1555)		(0.1884)		
Industry_Investment		-0.3051***		-0.3137**		0.7555***		
		(0.0830)		(0.1660)		(0.1598)		
Groups	79	79	78	78	78	78	78	75
R-squared	0.1432	0.1893	0.1413	0.1948	0.14590	0.18410		
Wald-Chi2	1945.93	38565.11	17.58	25.76	172	3392.35	208.14	1223.57
Prob.Chi2	0.0000	0.000	0.0140	0.0183	0.0000	0.000	0.0000	0.0000
Arellano Bond test							0.8324	-0.8725
Prob.Chi2							0.4052	0.3829
Sargan test							13.6350	13.2600
Prob.Chi2							0.4000	0.3504

*Standard errors in parentheses are for coefficients. *sig. at 10%level, **sig. at 5% level, and ***sig. at 1% level*

5. Conclusions

In the last five decades, there has been considerable theoretical emphasis on the capital structure determinants as they apply to corporate finance. This paper is an attempt to empirically test for the capital structure determinants in the New Zealand context in which this study examines a recent dataset of New Zealand listed-firms. Using dynamic-panel IV GMM, this study demonstrates that controlling for endogeneity and dynamic nature in the capital structure equation slightly increases the estimated coefficients (Table 4.1, Table 4.2 and Table 4.3). Therefore, OLS estimates are upward-biased, but the bias is not so large as to be concern. Additionally, this study demonstrates that using valid or non-weak instruments (firms' history in lagged-value), leads to precise estimates of the capital structure determinants. Further, the dynamic analysis of this study shows that capital structure is persistent over time.

The dynamic-IV GMM regression reveals that tangibility, growth, signalling, managerial ownership and firm size exhibit a significant impact on total debt. Those variables confirm the trade-off theory but firm size supports the pecking-order theory. In addition, non-debt tax shield and profitability have no significant impact on total debt; though the coefficient for non-debt tax shield confirms the pecking-order theory and the coefficient for profitability confirms the trade-off theory. This evidence is less conclusive than studies in other countries, particularly Australia which confirm the pecking-order theory in their capital structure. Overall, the trade-off theory is more appropriate in explaining New Zealand listed firms' capital structure. In addition, though the result is in line with Boyle and Eckhold and Wellalage and Locke which find that those firms' specific characteristics play a significant role in determining a firm's debt level; but the capital structure theory applied is contradictory, in which the pecking-order style is adopted by New Zealand-listed firms. However, the contradictory results are restricted to different methods, time frame and scope of the sample used.

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