# An Analysis of the Capital Structure Determinants and Financing Behaviour of New Zealand Firms

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**David John Smith**

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# Abstract

This thesis investigates the determinants of the capital structure of New Zealand firms and the financing behavior of these firms. The first essay in the thesis examines the relationship between the capital structure of firms and their product markets. Results suggest that New Zealand firms use debt to compete more aggressively in their product markets, even though this strategy comes at a cost of lower relative-to-industry profitability. A possible explanation for this behaviour is the more competitive trading environment that, due to market deregulation, has developed in New Zealand over the last 25 years. The second essay in the thesis looks at the capital structure choices made by New Zealand firms, why these firms choose particular capital structures and how their structures change over time. It presents evidence of consistent trends in the financing policies of firms, and in the factors that influence those policies. The final essay in the thesis examines factors that determine how quickly New Zealand firms adjust toward target capital structures. The main findings are that speeds of adjustment vary across New Zealand industries, New Zealand firms adjust towards a target debt ratio more quickly when the firms are experiencing a financial deficit, and firms' financing policies influence adjustment speed.

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**Note**

The first essay in the thesis has been accepted for publication and is reproduced in its accepted form in Chapter 2.

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# Chapter One

# Introduction

This chapter provides an overview of the three essays contained in the thesis. In particular it outlines the reasons for studying the determinants of the capital structure of New Zealand firms and the financing behaviour of these firms. The chapter concludes by outlining the journal publications resulting from this thesis and provides a framework for the remainder of the thesis.

## 1.0 Introduction

The general topic of the research is the determinants of the capital structure of New Zealand firms and the financing behaviour of these firms. Because of its size and nature, the New Zealand market is an interesting one to use for studies that focus on this area of research. For example, New Zealand has experienced significant economic reforms in the last quarter of a century which have resulted in industry deregulation and greater market competition. There is also evidence that many of New Zealand's industries are more concentrated than those of other countries (Ratnayake 1999). Factors such as these may have an influence on the capital structure and financing behaviour of New Zealand firms.

Moreover there is only a very small body of published literature on New Zealand firms' capital structure and financing behavior and consequently a great deal of scope for further research on this subject. Papers that have investigated aspects of the topic include Boyle and Eckhold (1997)

who examine listed New Zealand firms' use of short- and long-term debt, in the periods before and after the liberalization of New Zealand financial markets in the mid-1980s. They conclude that existing theory cannot adequately account for the choice of capital structure by New Zealand firms in either period. Morrison Paul, Johnston and Frengley (2000) examine how the economic reforms of the 1980s affected the efficiency of New Zealand sheep and beef farms. They find that farms with lower levels of debt were in a better position to make appropriate adjustments to their investment and production strategies in the new regulatory environment. Margaritis and Psillaki (2007) use data on New Zealand firms from a single year to investigate whether leverage is related to firm performance. They find that higher leverage improves the efficiency of firms and, looking at the relationship in the other direction, that efficiency has a positive impact on leverage at low to medium levels of debt but a negative impact at higher levels.

To provide focus for the general topic, the essays in the thesis concentrate on three areas that are relatively unexplored. The first area is the relationship between capital structure and product markets. Campello (2003; 2006) observes that there has been comparatively little empirical work on this relationship. The second essay of the dissertation examines the capital structure choices made by New Zealand firms, why these firms choose particular capital structures and how their structures change over time, using a combination of tabular statistical analysis and probit analysis. Fama and French (1999; 2005) have noted the particular value of using average characteristics of firms to analyse their capital structures, as an alternative or supplement to cross-section regressions. The final issue examined is the speed with which New Zealand firms adjust towards target capital structures. Flannery and Rangan (2006) note that few researchers allow for the possibility of incomplete adjustment towards leverage targets by firms.

The next three sections of this chapter present an overview of each of the three essays in the thesis and in particular highlight how each essay contributes to the existing body of knowledge. Section 5.0 describes the publication output of the essays contained in the thesis and Section 6.0 outlines the structure of the remainder of the thesis.

## 2.0 Essay One

The first essay in the thesis examines the relationship between the capital structure of New Zealand firms and their product markets. The literature in this area investigates whether a firm's leverage has an impact on or is influenced by factors such as the firms' pricing and production strategies, their decisions on entering and exiting markets, and their interactions with competitors, customers, suppliers and employees. The essay focuses on the relationship between capital structure and product-market performance and competition. Previous literature has provided varying results on this relationship. Some theoretical papers predict that firms should use debt to compete more aggressively. In contrast a number of key empirical papers find that firms with more debt are disadvantaged with respect to less indebted rivals competing in the same markets. Moreover some methodological problems have been highlighted by researchers. In particular product-market and leverage variables may be endogenous with the result that it is difficult to determine whether leverage influences product-market performance or vice-versa.

An examination of the relationship between New Zealand firms' capital structures and their product markets contributes to the existing body of knowledge in a number of ways. First, New Zealand is an interesting case study on this relationship because of the very significant economic reforms introduced by successive governments in the 1980s and 1990s. As a result of these

reforms, the business environment has become more competitive in New Zealand over the last twenty five years. It is suggested that firms may be employing capital structures which help them to survive and prosper in the more competitive product markets that now exist. Second, the research estimates a firm's performance relative to the performance of its competitors in the same industry, by using relative-to-industry performance variables. This is the first time such an approach has been employed using data from a small, open economy.

**3.0 Essay Two**

The second essay in the thesis examines the capital structure choices made by New Zealand firms, why these firms choose particular capital structures and how their structures change over time. Previous literature has proposed a number of theories to explain the capital structure choices of firms, the best known being the trade-off theory and the pecking order theory. Most of the studies on the debt-equity choice are framed in terms of supporting or rejecting one or more of these theories. However there is no conclusive evidence that a single theory can fully account for the financing behavior of firms. Some scholars suggest that both theories may provide useful insights on firms' financing choices. Moreover, most previous literature has relied almost exclusively on regression analyses to identify key factors that appear to influence firms' decisions to issue debt or equity. Very few papers have exploited the potential of other techniques, such as descriptive statistics and tabular analysis as proposed and considered by Fama and French (1999; 2005), to yield information on why firms choose particular capital structures.

The analysis of the financing choices of New Zealand firms adds to the existing literature in a number of ways. First, the New Zealand market provides an interesting case study on the financing policies of companies. The more competitive environment in which New Zealand firms have traded over the last quarter of a century, together with recent financial crises, may be reflected in the capital structure decisions of these firms. Second a variety of approaches are used in order to provide a picture of New Zealand firms' financing policies. The essay investigates the capital structure decisions of firms with respect to debt issues and equity issues, rather than concentrating on one type of financing. As well as analyzing financing decisions at particular points in time, an attempt is made to examine how firms' decisions change from year to year. Finally, both descriptive statistics and regression analyses are used to provide insights on why New Zealand firms choose particular capital structures.

**4.0 Essay Three**

The third essay in the thesis examines factors that determine how quickly New Zealand firms adjust toward target capital structures. Consistent with the trade-off theory of capital structure, previous literature has found evidence that firms adjust toward target debt ratios. However the adjustment speeds reported vary widely from paper to paper. Moreover a number of studies find that specific factors, such as macroeconomic variables and the presence of financial deficits, influence the speed of adjustment. Some methodological issues with respect to this area of research have also arisen. In particular a number of studies challenge the assumption that firms have target debt ratios and suggest that apparent evidence of firms adjusting toward targets can be attributed to mechanical mean reversion rather than a deliberate policy on the part of firms.

The present study of partial adjustment toward target debt ratios extends the literature in this area of research by investigating whether adjustment speeds in the New Zealand market vary from industry to industry and by suggesting possible explanations for these variations. Previous literature controls for industry effects on adjustment speed, but does not explicitly investigate these effects. There are two reasons why New Zealand industries in particular may be more likely to display evidence of differing adjustment speeds. First, one of the principal consequences of reforms in the New Zealand economy over the last 25 years has been the deregulation of New Zealand industries. Deregulation may give firms within industries greater flexibility to select an optimal level of debt and, when they move away from this optimal level, to adjust back to it as they deem appropriate. Second, because of the relatively small size of New Zealand industries, greater differences in competition within those industries are more likely to be seen. Differences in competitiveness may in turn influence the speed of adjustment towards target debt ratios.

The essay then explores the influence of financial deficits on the speed of capital structure adjustment. Previous research finds that funding imbalances in the form of financial deficits and surpluses are likely to influence adjustment speed. Finally, we examine the influence of firms' financing policies on the speed of adjustment. Previous literature has not examined the extent to which a firm's use of debt or equity to finance its activities influences how quickly the firm reverts to a target capital structure.

## 5.0 Publications Arising From The Thesis

Two of the essays contained in this thesis have been submitted to internationally recognized journals for publication. The first essay has been accepted for publication and is reproduced in its accepted form in Chapter 2.

Smith, D.J., Chen, J. and Anderson, H.D., (2010). The relationship between capital structure and product markets: Evidence from New Zealand. Forthcoming in *Review of Quantitative Finance and Accounting*. DOI: 10.1007/s11156-010-0216-x

The final publication is available at www.springerlink.com .

## 6.0 Structure Of The Thesis

The remainder of the thesis is structured as follows. The first essay that examines the relationship between the capital structure of New Zealand firms and their product markets is contained in Chapter 2. Chapter 3 presents the second essay on why New Zealand firms choose particular capital structures. The third essay that examines partial adjustment by New Zealand firms toward target capital structures is contained in Chapter 4. Chapter 5 summarises the key findings and implications of the three essays and also suggests possible areas for future research. A brief appendix to the thesis describes and justifies an amendment made to one of the research variables which was subsequently incorporated into the second and third essays only. The final section of the thesis presents all the references for each chapter in the thesis.

# Chapter Two

## Essay One

The first essay on the relationship between capital structure and product markets is presented in Chapter Two. A brief overview of the literature on the relationship is presented. Hypotheses and variables used in the analysis are then discussed. A methodology section outlines in detail the techniques employed to deal with the issue of endogeneity. Regression analysis is used to explore the relationship between the capital structure of New Zealand firms and their product-market performance. The essay is reproduced in the form in which it is to be published in the *Review of Quantitative Finance and Accounting* as outlined in Section 5.0 of Chapter One. The reference list for the essay is reproduced in the final section of this thesis.

# The relationship between capital structure and product markets: Evidence from New Zealand

**Abstract**

The main purpose of this paper is to investigate whether the capital structure of New Zealand firms influences their product-market performance in the period from 1984 to 2008. Our main findings are that the use of leverage by publicly listed New Zealand companies leads to an increase in relative-to-industry sales growth, but a decrease in relative-to-industry return on assets (ROA). We also conduct a reverse causality test by examining whether sales growth and ROA influence leverage. We find no evidence that sales growth has an impact on the use of debt, but significant evidence that ROA is negatively correlated with its use. Our results suggest that New Zealand firms use debt to compete more aggressively in their product markets, even though this strategy comes at a cost of lower relative-to-industry profitability. A possible explanation for this behaviour is the more competitive trading environment that has developed in New Zealand over the last 25 years.

*Key words:* Capital structure; product markets; imperfect markets

*JEL classification:* G31; G32; L11; L13

## 1.0 Introduction

We investigate whether the capital structure of New Zealand firms influences their product-market performance in the period from 1984 to 2008. New Zealand provides an interesting case study on this relationship because of the dramatic reforms in the New Zealand economy that have occurred since the mid 1980s. The main consequences of these reforms were the deregulation of New Zealand industries, the promotion of competition in New Zealand markets and the liberalisation of trade (Ratnayake (1999)). Scollay and St John (2000) note that by 2000 New Zealand had become one of the least protected trading nations in the Asia-Pacific region. In the more competitive environment which has been operating over the last quarter of a century in New Zealand, it is possible that firms have been using financial structures which help them to maintain or strengthen their position in their markets.

Our main findings are that the use of leverage by publicly listed New Zealand companies leads to an increase in relative-to-industry sales growth, but a decrease in relative-to-industry return on assets (ROA). We interpret increases in relative-to-industry sales growth and declines in relative-to-industry ROA as a reflection of more product-market aggression by firms, and therefore our results indicate that New Zealand firms use debt to compete more aggressively. A further implication of our findings is that firms which are growing faster than their rivals must also be increasing their overall share of the market.

The use of relative-to-industry performance variables enables us to measure a firm's performance relative to the performance of its competitors in the same industry. This method is consistent with

a small number of studies investigating the relationship between product market performance and capital structure (Opler and Titman (1994) and Campello (2003; 2006; 2007)). However we believe our paper is the first to employ this method using data from a small, open economy.

The measures of product-market performance and leverage that we use in our analysis may be endogenous so that leverage is determined by performance rather than the other way around. We control for this issue by employing an instrumental variable approach. Following Campello (2006), we use asset tangibility as our instrumental variable. This proxy estimates the resale value of a firm's assets in liquidation. It is correlated with the firm's use of leverage, but only influences product market performance through its relationship with the financing variable.

We further control for endogeneity by using the book value of leverage rather than the market value and by lagging the independent leverage and performance variables. We then conduct a reverse causality test by making performance our independent variable and leverage our dependent variable.

We find no evidence that performance, as measured by relative-to-industry sales growth, has an impact on leverage. This suggests that firms wish to maintain their levels of debt, rather than reduce them, possibly in order to ensure their sales growth continues in the future. However there is significant evidence that performance, as measured by relative-to-industry ROA, is negatively correlated with the amount of debt used by firms. An explanation of this result is that strongly performing firms tend to have more retained earnings and therefore don't need to use as much

leverage to finance their activities. On the other hand, lower profitability may place pressure on firms to use more debt in future periods.

To test the robustness of our results, we divide our sample into four sectors, primary, energy, goods and services, and repeat the original analysis for each sector. The evidence from these tests tends to confirm the results for the sample as a whole. We also examine whether our results are more pronounced among more competitive industries. We find some evidence to suggest that more competitive industries may indeed be using debt more aggressively. Finally, we examine whether the relationship between leverage and product-market performance in the period up to 1999, when economic reforms were being implemented, differs from the relationship in subsequent years. We find no evidence of significant differences.

The remainder of the paper is structured as follows. Section 2 reviews relevant literature. Sections 3 and 4 describe the variables used in the analysis, our hypotheses, and the methodology used. Section 5 outlines how the data was collected for the study. Section 6 presents the results from the analysis of the data. Section 7 summarizes our findings.

## 2.0 Literature

The theory we are most closely testing is based around Brander and Lewis (1986), the seminal paper on the relationship between financial decisions and product-market decisions. Previous literature had analysed these decisions separately. Assuming an oligopolistic market, Brander and Lewis show that a limited liability firm that uses debt may choose to trade more aggressively by

increasing its output. Such a strategy increases returns for shareholders when the firm is doing well. When the firm is doing poorly, shareholders are indifferent because debt holders have the prior claim on the firm's assets in the event that the firm becomes bankrupt.

Subsequent theory extends and in some cases contradicts the findings of Brander and Lewis. For example, Bolton and Scharfstein (1990) argue that a firm that relies too much on external financing will be more vulnerable to predation in its product markets. The firm may therefore choose to employ internal sources of financing. Chen et al. (2007) argue that firms which delay the introduction of products, and are more indebted than industry rivals, are placed at a competitive disadvantage.

Key empirical papers by Chevalier (1995a; 1995b), Phillips (1995), and Kovenock and Phillips (1995; 1997) tend to contradict Brander and Lewis. Chevalier (1995a; 1995b) examines evidence from the American supermarket industry in the 1980s. The author finds that announcements of leveraged buyouts (LBOs) by supermarkets increase the expected returns of rival firms in the same locality and encourage entry and expansion by rivals. There is also a higher probability that a firm will exit its local market following its LBO if prices fall. Phillips (1995) examines four United States industries and finds in three of them that higher leverage encourages firms to undertake fewer investment opportunities and to behave less aggressively. Kovenock and Phillips (1995; 1997) demonstrate that firms in highly concentrated industries that increase their debt are more likely to close down plants and reduce plant investment. If the market share of these leveraged firms is high, rival firms are less likely to close plants. When firms are highly leveraged, rival firms are also more likely to increase their investment.

Other aspects of product markets may be related to leverage. For example, Low and Chen (2004) find that product diversification allows firms to use more leverage, because it lowers their exposure to risk. Characteristics of debt may also be related to product market behaviour. For example, Glazer (1994) argues that the way firms compete in product markets depends on whether they are using long-term debt, short-term debt, or no debt. The author shows that if firms are competing on the basis of output, the use of long-term debt will tend to encourage collusion between the firms.

Apart from the different results on the predicted relation between leverage and product-market competition and performance, important methodological issues have arisen in the literature. Zingales (1998) finds that more efficient trucking firms are more likely to survive deregulation of their industry. Firms that under-invest because of higher leverage are less likely to survive. As in previous studies, Zingales employs regression analyses to test the relationship between debt and product-market competition. However he claims that his results are more robust than those in Chevalier (1995a; 1995b), Phillips (1995), and Kovenock and Phillips (1997). In these studies it is possible that a firm's financing choices are made in anticipation of their effect on its competitive position. Therefore it is difficult to determine whether financing choices influence a firm's competitive position or vice versa. The causal relationship is clearer in Zingales, because deregulation was an external event that unexpectedly affected competition and capital structure choices in the trucking industry.

Istaitieh and Rodriguez (2002; 2003) use a simultaneous regression equations model to deal with the issue of cause and effect. In one equation debt is the dependent variable, while product

market factors are included as independent variables. In the other equation a key product market factor is specified as the dependant variable and debt is included as one of the independent variables. Using data from Spanish manufacturing companies, the authors find that industry concentration and product market competition both influence and are influenced by leverage.

Grullon, Kanatas, and Kumar (2002) use advertising expenditure as a proxy for non-price competition, and find that firms that use less debt compete more aggressively. They also test the relationship in the opposite direction but find that significant increases in advertising expenditure do not lead to changes in the amount of leverage used.

Our paper's empirical model is most similar to that of Opler and Titman (1994) and Campello (2003; 2006; 2007), in that it examines the relationship between a firm's capital structure and its performance, relative to the performance of its competitors in the same industry. Opler and Titman (1994) look at the relationship between financial distress and corporate performance. They find that during recessions, highly indebted firms lose business to their less indebted rivals. Highly leveraged firms that spend significant amounts of money on research and development are more liable to lose market share during difficult economic periods. This is because such firms are producing specialised products, and this makes them particularly susceptible to financial distress.

Campello (2003) finds that during economic downturns, highly indebted firms experience a significant decline in their sales growth in industries in which their competitors are less indebted. This outcome is not observed if all firms in an industry are highly leveraged. Campello believes his study is the first to find evidence of a relationship between capital structure, product markets

and business cycles, and that the evidence indicates that capital structure *systematically* affects firms' performance in the marketplace. Campello (2006) finds that firms with significantly higher long-term debt than the industry average may experience sales growth as they take on debt at the margin. However firms with very high levels of debt in comparison to the industry standard may experience no gains in market share, or even losses. The study also finds that market leader firms in concentrated industries do not do as well as their competitors when their debt levels exceed the industry average. In the same industries less indebted leader firms increase their market share as they take on more debt. Campello (2007) finds that when a firm's investments are funded with debt and the firm's assets are observed to be more tangible after the debt has been raised, the firm's product-market performance is better than that of its rivals.

## 3.0 Variables and hypotheses

### 3.1 Determinants of product-market performance

The main aim of our paper is to investigate whether the capital structure of New Zealand firms influences their product-market performance. Therefore we begin by examining product-market performance determinants. The principal independent variable of interest is debt. Control variables are capital expenditure, size and industry dummy variables. In addition the regression of the first performance measure, sales growth, on leverage includes profitability as a control, and the regression of the second performance measure, ROA, on leverage includes sales growth as a control. Following Campello (2003; 2006; 2007), all variables are industry-adjusted.

*Debt*

Our proxy for leverage is long-term debt. Long-term debt is represented as the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Book value of assets is represented as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity.

We use two proxies for product-market performance: sales growth, represented as the change in firm sales, where sales are sales divided by the book value of assets; and return on assets (ROA), represented as earnings before interest and tax (EBIT) divided by the book value of assets. These proxies are similar to those used by Campello (2007). Campello argues that the sales growth proxy is a measure of the total impact of pricing and other product-market strategies. ROA is a standard accounting measure of performance.

If firms compete more aggressively than their industry rivals, they are more likely to experience an increase in relative-to-industry sales growth. Brander and Lewis (1986) argue that the use of more leverage tends to make firms compete more aggressively. We therefore propose the following hypothesis:

> Hypothesis 1: Firms that use long-term debt to compete more aggressively in their product markets experience an increase in relative-to-industry sales growth. Therefore we expect the proxy for long-term debt to have a positive sign.

However, more aggressive competition with rival firms is also likely to be associated with lower profit margins. Our second hypothesis is therefore as follows:

> Hypothesis 2: Firms that use long-term debt to compete more aggressively in their product markets experience a decline in relative-to-industry ROA. Therefore we expect the proxy for long-term debt to have a negative sign.

If the observed relationships are opposite to those proposed in our hypotheses, the results are more consistent with the theory in papers such as Glazer (1994), which suggest that greater use of debt is likely to be associated with less product market aggression.

*Sales growth, profitability, capital expenditure, and size controls*

Campello (2006) examines the impact of long-term debt on competitive performance and includes capital expenditure and size as control variables in his regression analysis. Larger firms that make greater investments in fixed assets might be expected to perform better than rival firms. Our proxy for capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Our proxy for firm size is the natural log of the book value of the firm's assets. Following Campello (2006), we also include profitability as a control variable in the regression of sales growth on leverage, since sales growth may be associated with profitability, and leverage and profitability may also be related. Our proxy for profitability is return on assets (ROA). For similar reasons we include sales growth as a control in the regression of ROA on leverage.

*Industry classification*

It is possible that unobservable characteristics specific to a particular industry may also influence a firm's performance. We therefore include dummy variables for each of the industries in our sample.

## 3.2 Determinants of debt

Our main concern is whether the use of leverage influences product-market performance. However, as part of our effort to deal with the possible presence of endogeneity, we also look at the relationship in the other direction. We therefore examine the determinants of debt. Here the principal independent variable of interest is firm performance. Control variables are capital expenditure, size, volatility and industry dummy variables. All variables are again industry-adjusted.

*Product-market performance*

Titman and Wessels (1988) and Boyle and Eckhold (1997) note that firms may invest in unnecessarily risky projects in order to reduce the returns to the firm's creditors. This strategy may be particularly costly for firms in growth industries that have a wider range of future investments to choose from and therefore growth firms may use less long-term debt. Myers (1984) argues that managers tend to prefer internal to external sources of finance. This implies that increased profitability, which tends to result in more internally-generated funds, also leads to a decline in the use of debt. In summary, firms that are experiencing higher sales growth and

increases in the profitability ratio ROA, may use less long-term leverage. We therefore propose the following hypothesis:

> Hypothesis 3: An increase in either relative-to-industry sales growth or relative-to-industry ROA, leads to a decrease in the amount of long-term debt used by firms. Therefore we expect the proxies for both relative-to-industry sales growth and relative-to-industry ROA to have negative signs.

*Capital expenditure*

Work by Jensen and Meckling (1976) and Myers (1977) suggests that as firms use more fixed assets, the cost of financing with debt declines and firms therefore use more leverage. Stohs and Mauer (1996) note the widely held belief that the maturity of a firm's debt should be matched to the maturity of its assets. This implies that as firms invest more in capital they will tend to use more long-term debt. Our proxy for capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets.

*Size*

Warner (1977) and Ang, Chua, and McConnell (1982) argue that the bankruptcy costs associated with carrying debt tend to decline as firms become larger, and therefore large firms will carry more debt. Our proxy for firm size is the natural log of the book value of the firm's assets.

*Volatility*

Showalter (1999) notes that as earnings become more volatile, the possibility of financial distress increases. Consequently debt becomes more expensive and is less likely to be used. Following a similar measure in Boyle and Eckhold (1997), our proxy for risk is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed.

*Industry classification*

Showalter (1999) notes that unobservable characteristics specific to a particular industry may influence the levels of debt within that industry. We therefore include dummy variables for each of the industries in our sample.

Table 1 summarises the predicted coefficient signs for the determinants of product-market performance and debt (excluding industry dummies).

**(Insert Table 1 about here)**

## 4.0 Model specification

The regression equations we test are as follows:

$$Sales\ Growth_t = \alpha_0 + \alpha_1 Long\text{ - }Term\ Debt_{t-1} + \alpha_2 ROA_{t-1} + \alpha_3 CapitalExpenditure_{t-1} + \alpha_4 Size_t + u_1 \quad (1)$$

$$ROA_t = \beta_0 + \beta_1 Long\ Term\text{ - }Debt_{t-1} + \beta_2 SalesGrowth_{t-1} + \beta_3 CapitalExpenditure_{t-1} + \beta_4 Size_t + u_2 \quad (2)$$

$$Long\text{ - }Term\ Debt_t = \gamma_0 + \gamma_1 Sales\ Growth_{t-1} + \gamma_2 ROA_{t-1} + \gamma_3 CapitalExpenditure_{t-1} + \gamma_4 Size_t + \gamma_5 Volatility_{t-1} + u_3 \quad (3)$$

Following Campello (2003; 2006; 2007), all variables in the model are industry-adjusted by subtracting the industry-specific mean from each firm-year value. The industry means are calculated from the sample data. By estimating relative-to-industry sales growth and relative-to-industry ROA, we are able to measure a firm's performance relative to the performance of its competitors in the same industry.

It is possible that the measures of performance and leverage in equations (1) and (2) are endogenous variables and that leverage is determined by performance rather than the other way around. To deal with this issue we employ an instrumental variable approach, which is used in a number of studies (Kovenock and Phillips (1997) and Campello (2003; 2006; 2007)). The rationale behind this approach is to find a variable that is outside the control of the firm and those providing finance to the firm, but that can be employed to demonstrate a causal relationship between capital structure and product market performance. The variable may be correlated with

the firm's use of leverage, but must only influence product market performance through its relationship with the financing variable.

Following Campello (2006), we use asset tangibility as our instrumental variable. Campello borrows his proxy for asset tangibility from Berger, Ofek and Swary (1996). The proxy estimates the resale value of a firm's assets in liquidation. Resale value is not controllable by the firm and is therefore suitable as an instrumental variable. For a sample of discontinued operations, Berger, Ofek and Swary (1996) find that receivables are sold for \$0.72 in the dollar, inventory for \$0.55, and fixed assets for \$0.54. The specific equation is as follows:

$$\textit{Tangibility} = 0.715 \text{ x } \textit{Receivables} + 0.547 \text{ x } \textit{Inventory} + 0.535 \text{ x } \textit{Fixed Assets} \qquad (4)$$

The coefficients in the tangibility equation are calculated using United States data. The New Zealand equivalents of the coefficient estimates are not readily available, but we believe it is reasonable to assume that liquidation values in New Zealand are similar. Following Campello (2006), we also add a firm's cash deposits to the calculation of tangibility and divide the total by the book value of assets.

To implement the instrumental variable approach, we first regress long-term debt on tangibility. This regression yields a slope coefficient of -0.046 and a t-value of -4.84. We then use the predicted values from this regression as our estimates of long-term debt in equations (1) and (2).

We also employ some other techniques to deal with the endogeneity issue. First, in addition to testing equations (1) and (2) in which performance is the dependent variable, we also test

equation (3) in which leverage is the dependent variable. In other words, as in Istaitieh and Rodriguez (2002; 2003) and Grullon, Kanatas, and Kumar (2002), we examine the relationship of interest in both directions.

Second, our analysis employs the book value of long-term leverage rather than the market value. Campello (2006) notes that the use of long-term book leverage helps to lessen the possibility of reverse causality between firm performance and capital structure. Long-term book values, as opposed to market values of debt, are less likely to be affected by market judgments about future firm performance. Also, leverage levels, as opposed to leverage changes, do not tend to reflect changes in expectations about subsequent product market events.

Third, all independent variables in our equations, with the exception of size, are lagged by one year. We assume that the economic impacts of the independent variables in the equations, apart from size, take some time to be reflected in the dependent variable. But in addition, by lagging the key leverage and performance variables, it is easier to determine whether capital structure influences or is influenced by performance, than it would be if the dependent and independent variables were contemporaneous.

Our analysis employs ordinary least squares regressions. However Petersen (2009) notes that corporate finance data often has a significant firm effect. We therefore calculate White standard errors that are robust to correlation within firm clusters. We also include industry dummy variables in each equation to control for unobservable characteristics specific to particular industries, and dummy variables for each year to control for any variation within periods.

## 5.0 Data

We collected accounting data for New Zealand companies from the New Zealand stock exchange's (NZX) Deep Archive and from historical Datex files. We endeavoured to collect data for all firms for which full and consistent financial summaries were provided. Our original data set contains 178 New Zealand companies, including both listed and delisted firms. It has 2,169 company-years of data for the years from 1984 to 2008. From this data set we exclude property, finance and investment firms on the grounds that their decisions with respect to capital structure may reflect special considerations. For example, Fama and French (1992) note that high leverage usually indicates distress in nonfinancial firms, but not necessarily in financial firms. We also exclude company years for which the book value of assets and the book value of equity are calculated as less than or equal to zero. Most variables in our model are expressed as ratios, with book value of assets as the denominator. However this is not the case for the size and volatility variables, and we therefore inflation-deflate these variables using the Consumer Price Index obtained from the Global Financial Database. The industry-adjusted sales growth and volatility variables display evidence of extreme positive and negative values. We winsorise these two industry-adjusted variables at the $1^{st}$ and $99^{th}$ percentiles to reduce the impact of the extreme observations. The final sample has 127 companies and 1,563 company-years of data. However a considerable number of missing values arise as a result of calculating a number of variables, including the sales growth and volatility variables, and therefore a minimum of 100 companies and 960 company-years of data are used in the regression equations.

Table 2 summarises the final sample of firms broken down by industry and the number of company years of data available for each industry. We use the NZX's industry classification. Analysis of the data was performed using SAS.

**(Insert Table 2 about here)**

## 6.0 Results

### 6.1 Summary statistics

Table 3 presents summary statistics for each variable used in the analysis. In Panel A, the statistics are calculated for the variables before industry-adjustment and winsorisation. Long-term debt comprises on average 22 percent of book assets. The average sales growth is 34 percent and ROA is eight percent. Capital expenditure comprises on average seven percent of book assets, and the tangibility proxy indicates that the resale value of assets in liquidation is on average 53 percent of book assets. In Panel B, the statistics are calculated for the variables after industry-adjustment and winsorisation, and these are the variables which are subsequently used in the regression analysis. Because of industry-adjustment, the mean for each variable tends toward zero.

**(Insert Table 3 about here)**

### 6.2 Correlations between variables

Table 4 presents correlation coefficients for the independent variables used in the regression equations. None of the correlation coefficients has an absolute value greater than 0.3. Variance

inflation factors were calculated for all independent variables, and the relatively low values of the factors (not reported but available from the authors on request) suggest that multicollinearity is not a serious issue.

**(Insert Table 4 about here)**

6.3 Regression results with performance as the dependent variable

For the purposes of our study, the key independent variables are long-term debt in equations (1) and (2), where sales growth and ROA are the dependent variables; and sales growth and ROA in equation (3) where long-term debt is the dependent variable. First, we discuss the situation in which sales growth and ROA are the dependent variables. The results are reported in the first two columns of Table 5.

**(Insert Table 5 about here)**

The ordinary least squares (OLS) regression results show that when sales growth is the dependent variable, the long-term debt variable is significant at the one percent level and has a positive sign. Consistent with our first hypothesis, this outcome indicates that as New Zealand firms use more long-term debt, their sales growth increases relative to the sales growth of firms in the same industry. If we interpret relative-to-industry sales growth as a reflection of more aggressive product-pricing behaviour by firms, then the result indicates that New Zealand firms use debt to compete more aggressively, which is consistent with the arguments of Brander and Lewis (1986) and with the finding in Campello (2006) that debt-taking is initially associated with sales gains at

the expense of rivals. Moreover if firms are growing faster than their rivals, it must also follow that they are growing their overall share of their industry market.

The OLS regression results show that when ROA is the dependent variable, the long-term debt variable is significant at the one percent level and has a negative sign. This outcome is consistent with our second hypothesis that an increase in the amount of long-term debt used by firms leads to a decline in relative-to-industry ROA. If a decline in relative-to-industry ROAs reflects more aggressive product-pricing behaviour by firms, then the result indicates that New Zealand firms use debt to compete more aggressively. This result is consistent with our finding that higher leverage results in greater relative-to-industry sales growth. It is also consistent with Brander and Lewis's theory, and with some of the empirical tests in Campello (2007) which show a negative relationship between leverage and ROA.

To confirm whether firms do indeed use debt to compete more aggressively, we rank firms each year into terciles based on the firms' change in long-term debt from year t-1 to year t. The first tercile contains firms with the lowest leverage growth in a particular year, the second tercile contains firms with average growth, and the third tercile contains firms with the highest growth. For each tercile in each year we then examine the corresponding change in firms' sales from year t-1 to year t and from year t to year t+1. We wish to determine whether any trends detected across terciles are consistent with the relationship between leverage and sales growth revealed in our previous analysis.

We also examine the corresponding change in firms' ROA from year t-1 to year t and from year t to year t+1 to ascertain whether any trends are consistent with the relationship found between leverage and ROA. Finally we test whether decreases in ROA are the result of firms aggressively increasing sales, by ranking firms into terciles based on the firms' change in sales from year t-1 to year t and then examining the corresponding change in firms' ROA from year t-1 to year t and from year t to year t+1.

The results of the tests are reported in Table 6. We present average results for the whole sample period, and omit results for individual years (these are available from the authors on request). Panel A contains the results for the relationships between change in long-term debt and changes in sales and ROA. As firms' leverage increases over the three terciles, sales from year t-1 to year t and from year t to year t+1 follow a U-shaped curve, that is they decline and then increase. Sales increase overall from the first to third terciles, consistent with our previous findings on the relationship between leverage and sales growth.

As firms' leverage increases over the three terciles, ROA from year t-1 to year t also follows a U-shaped curve. ROA decreases overall from the first to third terciles, which is again consistent with our previous findings on the relationship between leverage and ROA. ROA from year t to year t+1 increases slightly from the first to third terciles, which is not consistent with our previous analysis.

Panel B contains the results for the relationships between change in sales and change in ROA. As firms' sales increase over the three terciles, ROA from year t-1 to year t again follows a U-shaped

curve. ROA decreases overall from the first to third terciles, consistent with our previous findings on the relationship between sales and ROA.

Overall, the results in Panels A and B provide some evidence to confirm the direction of the relationships revealed in our original analysis. However further tests are required to explain the U-shaped curves for the sales and ROA variables.

**(Insert Table 6 about here)**

6.4 Regression results with leverage as the dependent variable

As discussed in previous sections of the paper, it is possible that the measures of performance and leverage in our model are endogenous variables and that leverage is determined by performance rather than the other way around. We now discuss the situation in which leverage is the dependent variable, and sales growth and ROA are the key independent variables. The results are reported in the third column of Table 5.

The OLS regression results indicate that when leverage is the dependent variable, the sales growth variable is not significant, though it does have the expected negative sign. This suggests that when sales growth has been achieved, New Zealand firms tend to maintain their levels of long-term debt, rather than reduce them, possibly in order to ensure their sales growth continues in the future. However the ROA variable is significant at the one percent level and has a negative sign. We therefore have evidence to support our third hypothesis, to the extent that an improvement in relative-to-industry ROA leads to a decrease in the amount of long-term debt

used by firms. Better performing firms have more retained earnings and therefore don't need to use as much leverage to finance their activities, which is consistent with studies on the determinants of capital structure such as Myers (1984). On the other hand, our results in section 6.3 show that as a result of taking on more long-term debt, New Zealand firms increase their sales at the expense of rival firms but experience a decline in relative-to-industry profitability. Lower profitability may in turn place pressure on firms to use more debt in subsequent years.

Overall, our results suggest that New Zealand firms may be using more long-term debt to compete more intensively in their product markets. This strategy gives firms the opportunity to increase their sales relative to rival firms, and to increase their overall share of their market. However such a strategy comes at a cost of lower relative-to-industry profitability. Moreover the strategy does not necessarily give firms an advantage in subsequent years. Our results show that increased sales growth does not release the pressure on firms to use debt, while lower profitability increases the requirement for more leverage.

A question that naturally arises is why New Zealand firms are using debt to compete aggressively, particularly given the costs in terms of reduced profit margins. A possible explanation is the economic reforms introduced in the 1980s and 1990s. The more competitive trading environment that has developed over the last quarter century may have encouraged firms to adopt aggressive but risky strategies.

## 6.5 Sector results

Previous literature has investigated the relationship between capital structure and product markets by examining particular industries (see, for example, Chevalier (1995a; 1995b), Phillips (1995), and Kovenock and Phillips (1995; 1997)). These papers can be viewed as industry case studies on possible linkages between capital structure and product markets. In some cases they also point to differences that exist among industries.

Ideally we would like to explore the nature of the relationship between capital structure and product markets in different industries in the wider New Zealand market and whether that relationship varies between industries. However many of the industries listed in Table 2 contain relatively few firms, and analysis of these industries may not produce robust statistical results. Therefore we aggregate all industries in Table 2 into four larger sectors for analysis purposes: primary, energy, goods, and services. Table 7 summarises the sample of firms broken down by sector and the number of company years of data available for each sector. We use the NZX's sector classification.

**(Insert Table 7 about here)**

### *6.5.1 Regression results with sales growth as the dependent variable*

First, we discuss the situation in which sales growth is the dependent variable. The results are reported in Table 8.

**(Insert Table 8 about here)**

The strongest results are obtained for the services sector. For this sector, the long-term debt variable is significant at the one percent level and has the expected positive sign. Thus, consistent with our original hypothesis and with the sample results as a whole, there is evidence to suggest that as firms in industries within the New Zealand services sector use more long-term debt, their sales growth increases relative to the sales growth of firms in the same industries.

Although the primary and goods sectors do not show evidence of a significant relationship between long-term debt and sales growth, the positive signs on the long-term debt coefficients are consistent with the results for the services sector and for the sample as a whole. However the energy sector does not have the expected positive sign. Overall, the aggresive use of long-term debt to increase relative-to-industry sales growth tends to be supported at the sector level, but the hypothesis should be tested further with a different model or more comprehensive data.

### *6.5.2 Regression results with ROA as the dependent variable*

Next, we discuss the situation in which ROA is the dependent variable. The results are reported in Table 9.

**(Insert Table 9 about here)**

The strongest results are obtained for the energy and services sectors. For both these sectors, the long-term debt variable is significant at the one percent level and has the expected negative sign. Thus, consistent with our original hypothesis and with the sample results as a whole, there is evidence to suggest that as firms in industries within the New Zealand energy and services

sectors use more long-term debt, their ROA decreases relative to the ROA of firms in the same industries.

The primary and goods sectors do not show evidence of a significant relationship between long-term debt and ROA. However the negative signs on the long-term debt coefficients for both sectors are consistent with the results for the energy and services sectors and for the sample as a whole. Thus, the association of long-term debt with a decline in relative-to-industry ROA is supported at the sector level, but further tests are again recommended.

### *6.5.3 Regression results with leverage as the dependent variable and sales growth and ROA as the independent variables*

The third relationship we discuss is between leverage as the dependent variable and sales growth and ROA as the independent variables. The results are reported in Table 10.

**(Insert Table 10 about here)**

Only the goods sector shows evidence of a significant relationship between sales growth as the independent variable and leverage as the dependent variable. For this sector, the sales growth variable is significant at the five percent level and has a negative sign. This result is consistent with our original hypothesis, but not with the sample results as a whole, and suggests that goods sector firms that experience increasing growth in sales, may use less long-term leverage.

For the primary and goods sectors, the ROA variable is significant at the ten percent and one percent levels respectively and has the expected negative sign. The energy and services sectors do

not show evidence of a significant relationship between ROA and long-term debt. However the negative signs on the long-term debt coefficients for both these sectors are consistent with the results for the primary and goods sectors and for the sample as a whole. Thus, there is evidence to suggest that when firms in industries within these sectors experience an increase in relative-to-industry ROA, they subsequently use less long-term debt.

In summary, there is evidence in New Zealand market sectors of significant relationships between capital structure and product-market performance and, with one or two exceptions, the evidence tends to confirm the results for the sample as a whole. The strongest results with respect to the performance and leverage variables are for the energy, goods and services sectors, and these sector variables are as significant as the corresponding variables for the whole sample.

## 6.6 Industry competitiveness

Our main finding is that firms use debt to compete more aggressively in their product markets. Consequently we might expect our results to be more pronounced among more competitive industries and less pronounced in less competitive industries. Some evidence of such a relationship is provided by Kovenock and Phillips (1995; 1997), who show that in more concentrated industries engaged in manufacturing activities, greater use of debt leads to less competitive behaviour. On the other hand, it is possible that less competitive industries may use more debt precisely in order to increase their competitiveness. Moreover less competitive industries are generally associated with less business risk and so will have lower financial distress

costs when using more leverage. To test these hypotheses, we rank industries based on their competitiveness.

The measure of competitiveness we use is the Herfindahl index. The Herfindahl index measures the market share of firms within an industry. Larger index values indicate that a relatively small number of firms tend to dominate an industry and therefore that competition is less intense. The index is calculated as follows:

$$Herfindahl_j = \sum_{i=1}^{I} s_{ij}^2, \qquad (5)$$

where $s_{ij}$ is the market share of firm *i* in industry *j*. The market share of each firm is based on sales data extracted from our firm database. Following Hou and Robinson (2006), we calculate the index for each industry in each year, and then average the values for the previous three years. Average values are used to reduce the impact on the index of potential errors in the data. A summary of industry competitiveness rankings based on calculations of the Herfindahl index is reported in Table 11.

**(Insert Table 11 about here)**

The Herfindahl index is a somewhat noisy measure because of limitations in our data set. A number of important firms in particular industries are not listed on the New Zealand stock exchange, and information on these firms is not readily available from other data sources. This problem is more severe in the earlier years of our sample period. Consequently Herfindahl index

values may decrease over the sample period simply because the number of firms in our data set increases, rather than because industry competition increases. We therefore use dummies for groups of competitive and non-competitive industries in the pooled data regressions, rather than individual Herfindahl index values.

To test whether our results are more pronounced among more competitive industries, we add a competitive industry dummy to the regression equations, which takes the value 1 when an industry is ranked in the upper 50 percent of industries in a particular year with respect to competitiveness, based on the three-year average values of the Herfindahl index, and the value 0 otherwise. We also test the interactions between the competitive industry dummy and the leverage and performance variables. We then repeat the analysis carried out in Sections 6.3 and 6.4. The results are reported in Table 12.

**(Insert Table 12 about here)**

When sales growth is the dependent variable (equation 1), the long-term debt variable has the expected positive sign but is no longer significant. The competitive industry dummy and interaction variable are also not significant. When long-term debt is the dependent variable (equation 3), the sales growth and ROA variables are not significant, and the competitive industry dummy and interaction variable are also not significant.

When ROA is the dependent variable (equation 2), the long-term debt variable has the expected negative sign and is significant at the ten percent level. The competitive industry dummy is not

significant but the interaction variable is significant at the five percent level and also has a negative sign. Thus there is some evidence to suggest that, in more competitive industries in particular, an increase in the amount of long-term debt used by firms leads to a decline in relative-to-industry ROA. If a decline in relative-to-industry ROAs reflects more aggressive product-pricing behaviour by firms, then the result indicates that New Zealand firms in more competitive industries use debt to compete more aggressively in their product markets.

Thus, consistent with the findings in Kovenock and Phillips (1995; 1997), there is some evidence that the use of debt to compete aggressively in the New Zealand market is more pronounced among more competitive industries and less pronounced in less competitive industries. However because of the limitations in our data set noted above, our findings on industry competitiveness need to be tested further using a more comprehensive data set.

### 6.7 Do differences occur over time?

As noted in the introduction, extensive reform of the New Zealand economy occurred from the mid 1980s onward. The Labour government elected in 1984 introduced measures which dismantled the extensive system of economic regulations and controls established since the 1930s. This process of reform continued throughout the six years that Labour was in office, and under the National governments of the 1990s. The process of reform was largely completed by 2000.

We might expect the relationship between leverage and product-market performance in the period up to 1999, when reforms were still being implemented, to differ somewhat from the relationship in subsequent years, after the reforms had been completed. Alternatively, it is also possible that the reform process may have affected the relationship in a consistent manner throughout the entire 25 years we are examining.

To test for possible differences, we add a period dummy to the regression equations, which takes the value 0 for the years from 1984 to 1999 and the value 1 for the years from 2000 to 2008. We also test the interactions between the period dummy and the leverage and performance variables. The original year dummies are excluded. We then repeat the analysis carried out in Sections 6.3 and 6.4. The results are reported in Table 13.

**(Insert Table 13 about here)**

The results for all variables are generally consistent with those reported in Table 5, although in some cases the variable coefficients are no longer significant.
In all three regression equations the period dummy and interaction variables are not significant. Thus there is no evidence to suggest that the relationship between capital structure and product-market performance in the period of reform differs significantly from the relationship in the period subsequent to reform.

## 7.0 Conclusion

We find that when publicly listed New Zealand companies use leverage, there is an increase in relative-to-industry sales growth, but a decrease in relative-to-industry return on assets (ROA). We interpret these findings as evidence that New Zealand firms use more long-term debt to compete aggressively against their rivals and to increase their market share. They do this by lowering product prices, which results in higher sales growth but lower ROAs relative to those of competing firms.

Looking at the relationship in the other direction, we find no evidence that relative-to-industry sales growth has an impact on leverage. Thus when sales growth has been achieved, New Zealand firms appear to maintain their levels of long-term debt, rather than reduce them. The reason for this may be to ensure their sales growth continues in the future. However there is significant evidence that increases in relative-to-industry ROA result in a decline in the amount of debt used by firms. An explanation of this result is that firms with greater profitability have more retained earnings and therefore don't need to use as much leverage to finance their activities. On the other hand, lower profitability may increase the pressure on firms to use more debt in subsequent years.

We speculate that the changing economic environment in New Zealand may help to explain why New Zealand firms are using debt to compete aggressively. A potentially interesting area for future research is to identify with more certainty the reasons for New Zealand firms' product-market strategies, using different models and more comprehensive data.

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**Table 1.** Predicted signs for the determinants of product market performance and long-term debt

| *Models* | *Sales Growth* | *ROA* | *Long-Term Debt* |
|---|---|---|---|
| Long-Term Debt | + | - | |
| Sales Growth | | | - |
| ROA | | | - |
| Capital Expenditure | + | + | + |
| Size | + | + | + |
| Volatility | | | - |

**Table 2.** Number of firms and company years by industry

| | *Firms* | *Years* |
|---|---|---|
| *Primary* | | |
| Agriculture and Fish | 15 | 165 |
| Mining | 7 | 95 |
| Forestry | 6 | 86 |
| Building | 4 | 60 |
| *Energy* | 14 | 152 |
| *Goods* | | |
| Food | 6 | 71 |
| Textiles and Apparel | 4 | 66 |
| Intermediate | 20 | 245 |
| *Services* | | |
| Transport | 5 | 72 |
| Ports | 6 | 97 |
| Leisure and Tourism | 9 | 116 |
| Consumer | 19 | 226 |
| Media and Communications | 12 | 112 |
| *Total* | **127** | **1,563** |

**Table 3.** Summary statistics

| Variable | N | Mean | Median | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|---|
| *Panel A Statistics before industry-adjustment and winsorisation* | | | | | | |
| Debt | 1,563 | 0.221493 | 0.191521 | 0.219491 | 0 | 0.981026 |
| Sales Growth | 1,332 | 0.340971 | -0.00089 | 4.795092 | -1 | 159.773 |
| ROA | 1,563 | 0.079303 | 0.122142 | 0.476624 | -8.23175 | 1.448729 |
| Capital Expenditure | 1,436 | 0.069805 | 0.044125 | 0.172332 | -2.38907 | 1.814318 |
| Size | 1,563 | 8.982099 | 8.898693 | 1.875449 | 3.633341 | 13.75919 |
| Volatility | 1,086 | 2.229412 | 0.418257 | 13.16925 | 0.023991 | 272.3807 |
| Tangibility | 1,563 | 0.531369 | 0.486639 | 0.532355 | 0 | 7.675334 |
| *Panel B Statistics after industry-adjustment and winsorisation* | | | | | | |
| Debt | 1,519 | -0.00058 | -0.02077 | 0.207483 | -1.37901 | 1.3072 |
| Sales Growth | 1,289 | -0.07405 | -0.02978 | 0.852892 | -3.55331 | 4.010813 |
| ROA | 1,519 | -0.01778 | 0.000878 | 0.463166 | -7.56229 | 1.554469 |
| Capital Expenditure | 1,380 | -0.00144 | -0.00693 | 0.225316 | -3.71217 | 2.526958 |
| Size | 1,563 | 0.007735 | 0.029546 | 1.60415 | -4.97654 | 4.718207 |
| Volatility | 1,086 | -0.24095 | -0.17046 | 4.054121 | -15.3923 | 24.9245 |
| Tangibility | 1,519 | 0.020324 | -0.0329 | 0.555246 | -3.74574 | 6.826886 |

*Notes:* The table displays descriptive statistics of variables used in the analysis. In Panel A, the statistics are calculated before industry-adjustment and winsorisation of variables. In Panel B, the statistics are calculated after industry-adjustment and winsorisation. Long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Sales growth is defined as the change in firm sales, given by $(Sales_t - Sales_{t-1})/ Sales_{t-1}$, where sales are sales divided by the book value of assets. ROA is earnings before interest and tax (EBIT) divided by the book value of assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. Volatility is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed. Tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits.

**Table 4.** Correlation matrix

| | Lag debt | Lag sales growth | Lag ROA | Lag capital expenditure | Size |
|---|---|---|---|---|---|
| Lag sales growth | -0.141<br><.0001 | | | | |
| Lag ROA | 0.264<br><.0001 | -0.291<br><.0001 | | | |
| Lag capital expenditure | -0.282<br><.0001 | 0.013<br>0.651 | -0.038<br>0.179 | | |
| Size | 0.059<br>0.027 | -0.095<br>0.001 | 0.129<br><.0001 | -0.028<br>0.314 | |
| Lag volatility | -0.052<br>0.093 | 0.066<br>0.038 | -0.063<br>0.039 | -0.018<br>0.565 | -0.141<br><.0001 |

*Notes:* The table displays correlation coefficients for the independent variables used in the regression equations. For each correlation between different variables, the first line gives the coefficient, and the second line gives the p-value for testing whether the absolute value of the coefficient is greater than zero.

**Table 5.** Ordinary least squares regressions for determinants of firm performance and leverage

| | Equation 1 | Equation 2 | Equation 3 |
|---|---|---|---|
| | Performance Variable: Sales Growth | Performance Variable: ROA | Long-Term Debt |
| Intercept | 0.098<br>(0.77) | -0.122<br>(-1.51) | -0.233***<br>(-3.25) |
| Long-Term Debt$_{t-1}$ | 3.118***<br>(3.58) | -1.671***<br>(-4.24) | |
| Sales Growth$_{t-1}$ | | -0.019<br>(-1.59) | -0.003<br>(-0.39) |
| ROA$_{t-1}$ | -0.049<br>(-0.88) | | -0.044***<br>(-2.52) |
| Capital Expenditure$_{t-1}$ | 0.221**<br>(2.04) | -0.005<br>(-0.15) | 0.097***<br>(4.66) |
| Size$_t$ | -0.056***<br>(-2.60) | 0.043***<br>(2.68) | 0.051***<br>(7.80) |
| Volatility $_{t-1}$ | | | 0.000<br>(0.11) |
| $R^2$ | 0.075 | 0.057 | 0.180 |
| Adjusted $R^2$ | 0.044 | 0.024 | 0.147 |
| F statistic | 2.86*** | 2.42*** | 20.60*** |
| Number of observations | 1,153 | 1,141 | 960 |
| Number of firm clusters | 113 | 112 | 100 |

*Notes:* The first two columns of the table report the results from ordinary least squares regressions of sales growth and ROA performance proxies on long term debt and other determinants of firm performance. The third column of the table reports the results from ordinary least squares regressions of long term debt on sales growth and ROA performance proxies and other determinants of leverage. Sales growth is defined as the change in firm sales, given by ($Sales_t$ – $Sales_{t-1}$)/ $Sales_{t-1}$, where sales are sales divided by the book value of assets. ROA is earnings before interest and tax (EBIT) divided by the book value of assets. In equations (1) and (2), the long-term debt variable is the predicted values from a regression of long-term debt on asset tangibility, where long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets, and asset tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits. In equation (3), the long-term debt variable is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. Volatility is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed. All variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for

industry and time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

**Table 6.** Comparison of changes in long-term debt with changes in sales and ROA; and changes in sales with changes in ROA

***Panel A***

| First tercile | Second tercile | Third tercile |
|---|---|---|
| **Long-term debt t-1 to t** | | |
| -1.641 | -0.079 | 1.551 |
| **Sales t-1 to t** | | |
| -0.185 | -0.313 | 0.018 |
| **Sales t to t+1** | | |
| -0.267 | -0.304 | -0.083 |
| **ROA t-1 to t** | | |
| 1.004 | 0.053 | 0.749 |
| **ROA t to t+1** | | |
| 0.570 | 0.051 | 0.609 |

***Panel B***

| First tercile | Second tercile | Third tercile |
|---|---|---|
| **Sales t-1 to t** | | |
| -0.971 | -0.038 | 0.455 |
| **ROA t-1 to t** | | |
| 1.427 | 0.030 | 0.398 |
| **ROA t to t+1** | | |
| 0.769 | -0.061 | 0.583 |

*Notes:* Panel A reports terciles based on firms' changes in long-term debt from year t-1 to year t, matched with changes in firms' sales from year t-1 to year t and from year t to year t+1, and changes in firms' ROA from year t-1 to year t and from year t to year t+1. Panel B reports terciles based on firms' changes in sales from year t-1 to year t, matched with changes in firms' ROA from year t-1 to year t and from year t to year t+1. Long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Sales is sales divided by the book value of assets. ROA is earnings before interest and tax (EBIT) divided by the book value of assets.

**Table 7.** Number of Firms and Company Years by Sector

| *Sector* | *Firms* | *Years* |
|---|---|---|
| Primary | 32 | 406 |
| Energy | 14 | 152 |
| Goods | 30 | 382 |
| Services | 51 | 623 |
| *Total* | **127** | **1,563** |

*Note:* The primary sector includes firms from the agriculture and fisheries, mining, forestry, and building industries; the energy sector includes firms from the energy industry; the goods sector includes firms from the food, textiles and apparel, and intermediate industries; and the services sector includes firms from the transport, ports, leisure and tourism, consumer, and media and communications industries.

**Table 8.** Sector regression results: dependent variable sales growth; independent variable leverage

| | Sector: Primary | Sector: Energy | Sector: Goods | Sector: Services |
|---|---|---|---|---|
| Intercept | -0.004<br>(-0.06) | 0.000<br>(0.00) | -0.005<br>(-0.18) | 0.093***<br>(2.68) |
| Long-Term $Debt_{t-1}$ | 7.164<br>(1.02) | -0.396<br>(0.19) | 1.039<br>(0.84) | 5.121***<br>(3.59) |
| $ROA_{t-1}$ | -1.006***<br>(-2.52) | -1.521*<br>(-2.10) | 0.018<br>(0.29) | -0.056<br>(-1.09) |
| Capital $Expenditure_{t-1}$ | 0.408<br>(0.36) | 0.717*<br>(1.79) | 0.135<br>(1.35) | 0.225<br>(1.01) |
| $Size_t$ | -0.112<br>(-1.47) | -0.087*<br>(-1.77) | -0.035*<br>(-1.92) | -0.041*<br>(-1.83) |
| $R^2$ | 0.072 | 0.191 | 0.029 | 0.193 |
| Adjusted $R^2$ | -0.015 | -0.034 | -0.075 | 0.150 |
| F statistic | 8.79*** | 3.71*** | 273,721*** | 26.00*** |
| Number of observations | 283 | 93 | 270 | 507 |
| Number of firm clusters | 26 | 13 | 26 | 48 |

*Notes:* The table reports the results from ordinary least squares regressions of sales growth on long term debt and other determinants of firm performance, for the primary, energy, goods, and services sectors. Sales growth is defined as the change in firm sales, given by $(Sales_t - Sales_{t-1})/ Sales_{t-1}$, where sales are sales divided by the book value of assets. The long-term debt variable is the predicted values from a regression of long-term debt on asset tangibility, where long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets, and asset tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits. ROA is earnings before interest and tax (EBIT) divided by the book value of assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. All variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

**Table 9.** Sector regression results: dependent variable ROA; independent variable leverage

| | Sector: Primary | Sector: Energy | Sector: Goods | Sector: Services |
|---|---|---|---|---|
| Intercept | -0.017<br>(-0.96) | 0.001<br>(0.02) | -0.108<br>(-1.45) | -0.051***<br>(-3.11) |
| Long-Term Debt$_{t-1}$ | -0.055<br>(-0.04) | -1.636***<br>(-6.51) | -1.867<br>(-1.43) | -1.802***<br>(-3.01) |
| Sales Growth$_{t-1}$ | -0.014<br>(-0.91) | -0.062***<br>(-4.52) | -0.095<br>(-1.17) | -0.009<br>(-0.49) |
| Capital Expenditure$_{t-1}$ | -0.070<br>(-0.30) | -0.093<br>(-1.20) | -0.003<br>(-0.06) | 0.246*<br>(1.90) |
| Size$_t$ | 0.039<br>(1.47) | 0.014<br>(0.72) | 0.086**<br>(2.18) | 0.020*<br>(0.96) |
| $R^2$ | 0.083 | 0.452 | 0.106 | 0.131 |
| Adjusted $R^2$ | -0.003 | 0.298 | 0.010 | 0.084 |
| F statistic | 11.24*** | 125.12*** | 15,821*** | 1,465*** |
| Number of observations | 281 | 92 | 268 | 500 |
| Number of firm clusters | 26 | 13 | 25 | 48 |

*Notes:* The table reports the results from ordinary least squares regressions of ROA on long term debt and other determinants of firm performance, for the primary, energy, goods, and services sectors. ROA is earnings before interest and tax (EBIT) divided by the book value of assets. The long-term debt variable is the predicted values from a regression of long-term debt on asset tangibility, where long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets, and asset tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits. Sales growth is defined as the change in firm sales, given by ($Sales_t$ – $Sales_{t-1}$)/ $Sales_{t-1}$, where sales are sales divided by the book value of assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. All variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

**Table 10.** Sector regression results: dependent variable leverage; independent variables sales growth and ROA

| | Sector: Primary | Sector: Energy | Sector: Goods | Sector: Services |
|---|---|---|---|---|
| Intercept | 0.006<br>(0.09) | -0.040<br>(-0.55) | -0.204*<br>(-1.97) | -0.228***<br>(-34.51) |
| Sales Growth$_{t-1}$ | -0.001<br>(-0.13) | 0.015<br>(0.26) | -0.078**<br>(-2.39) | 0.002<br>(0.08) |
| ROA$_{t-1}$ | -0.094*<br>(-1.80) | -0.013<br>(-0.03) | -0.070***<br>(-2.98) | -0.047<br>(-1.42) |
| Capital Expenditure$_{t-1}$ | -0.014<br>(-0.11) | -0.136<br>(-1.41) | 0.113***<br>(6.57) | 0.172<br>(1.54) |
| Size$_t$ | 0.055***<br>(4.36) | 0.047<br>(0.78) | 0.059***<br>(4.54) | 0.048***<br>(4.91) |
| Volatility $_{t-1}$ | 0.000<br>(0.14) | -0.006<br>(-0.60) | 0.012***<br>(3.62) | -0.000<br>(-0.08) |
| $R^2$ | 0.247 | 0.171 | 0.312 | 0.169 |
| Adjusted $R^2$ | 0.167 | -0.138 | 0.233 | 0.115 |
| F statistic | 2,835*** | 2.42* | 2,065*** | 56.53*** |
| Number of observations | 239 | 71 | 233 | 417 |
| Number of firm clusters | 24 | 10 | 22 | 44 |

*Notes:* The table reports the results from ordinary least squares regressions of long term debt on sales growth, ROA and other determinants of firm performance, for the primary, energy, goods, and services sectors. Long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Sales growth is defined as the change in firm sales, given by ($Sales_t$ – $Sales_{t-1}$)/ $Sales_{t-1}$, where sales are sales divided by the book value of assets. ROA is earnings before interest and tax (EBIT) divided by the book value of assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. Volatility is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed. All variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

**Table 11.** Industry rankings based on competitiveness

| Industry | Average Herfindahl index | Number of years ranked as competitive |
|---|---|---|
| Agriculture & Fish | 0.320 | 23 |
| Intermediate | 0.323 | 23 |
| Consumer | 0.335 | 23 |
| Ports | 0.339 | 16 |
| Energy | 0.389 | 19 |
| Leisure & Tourism | 0.478 | 15 |
| Textiles & Apparel | 0.497 | 16 |
| Mining | 0.622 | 7 |
| Media & Communications | 0.647 | 2 |
| Transport | 0.673 | 0 |
| Food | 0.686 | 5 |
| Building | 0.695 | 2 |
| Forestry | 0.862 | 0 |

*Notes:* The table summarises industry rankings based on competitiveness. The measure of competitiveness employed is the Herfindahl index. The index is calculated as $Herfindahl_j = \sum_{i=1}^{I} s_{ij}^2$, where $s_{ij}$ is the market share of firm $i$ in industry $j$. The market share of each firm is based on sales data extracted from our firm database. We calculate the index for each industry in each year, and then average the values for the previous three years. The average index values for each industry over the complete sample period (1984-2008), from smallest value (most competitive) to largest value (least competitive), are reported in the second column. The number of years an industry is ranked in the upper 50 percent of industries with respect to competitiveness, based on the three-year average values of the index, is reported in the third column.

**Table 12.** Ordinary least squares regressions on determinants of firm performance and leverage, controlling for industry competitiveness

| | Equation 1 | Equation 2 | Equation 3 |
|---|---|---|---|
| | Performance Variable: Sales Growth | Performance Variable: ROA | Long-Term Debt |
| Intercept | 0.029<br>(0.30) | -0.091<br>(-1.17) | -0.025<br>(-0.43) |
| Long-Term $Debt_{t-1}$ | 2.183<br>(1.60) | -0.757*<br>(-1.68) | |
| Sales $Growth_{t-1}$ | | -0.019<br>(-1.56) | 0.004<br>(0.52) |
| $ROA_{t-1}$ | -0.049<br>(-0.88) | | -0.015<br>(-0.53) |
| Capital $Expenditure_{t-1}$ | 0.200*<br>(1.80) | 0.017<br>(0.58) | 0.094***<br>(4.64) |
| $Size_t$ | -0.058***<br>(-2.65) | 0.045***<br>(2.71) | 0.051***<br>(7.81) |
| Volatility $_{t-1}$ | | | -0.000<br>(-0.02) |
| CompetitiveIndustry Dummy | -0.035<br>(-0.39) | 0.010<br>(0.24) | 0.093<br>(1.49) |
| CompetitiveIndustry Dummy x Long Term $Debt_{t-1}$ | 1.790<br>(1.38) | -1.556**<br>(-2.23) | |
| CompetitiveIndustry Dummy x Sales $Growth_{t-1}$ | | | -0.016<br>(-1.06) |
| CompetitiveIndustry Dummy x $ROA_{t-1}$ | | | -0.048<br>(-1.29) |
| $R^2$ | 0.070 | 0.059 | 0.190 |
| Adjusted $R^2$ | 0.038 | 0.026 | 0.154 |
| F statistic | 3.03*** | 2.71*** | 7.21*** |
| Number of observations | 1,153 | 1,141 | 960 |
| Number of firm clusters | 113 | 112 | 100 |

*Notes:* The table reports the results from ordinary least squares regressions on determinants of firm performance and leverage, controlling for industry competitiveness. The first two columns of the table report the results from ordinary least squares regressions of sales growth and ROA performance proxies on long term debt and other determinants of firm performance. The third column of the table reports the results from ordinary least squares regressions of long term debt on sales growth and ROA performance proxies and other determinants of leverage. Sales growth is defined as the change in firm sales, given by ($Sales_t$ – $Sales_{t-1}$)/ $Sales_{t-1}$, where sales are sales divided by the book value of assets. ROA is earnings before interest and tax (EBIT) divided

by the book value of assets. In equations (1) and (2), the long-term debt variable is the residuals from a regression of long-term debt on asset tangibility, where long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets, and asset tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits. In equation (3), the long-term debt variable is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. Volatility is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed. The competitive industry dummy takes the value 1 when an industry is ranked in the upper 50 percent of industries in a particular year with respect to competitiveness, based on the three-year average values of the Herfindahl index, and the value 0 otherwise. Apart from the dummy variable, all variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for industry and time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

**Table 13.** Ordinary least squares regressions on determinants of firm performance and leverage, controlling for differences between the sub-periods 1984-1999 and 2000-2008

| | Equation 1 | Equation 2 | Equation 3 |
|---|---|---|---|
| | Performance Variable: Sales Growth | Performance Variable: ROA | Long-Term Debt |
| Intercept | 0.022<br>(0.24) | -0.085<br>(-1.16) | -0.023<br>(-0.47) |
| Long-Term Debt$_{t-1}$ | 2.776$^{***}$<br>(2.73) | -1.843$^{***}$<br>(-3.94) | |
| Sales Growth$_{t-1}$ | | -0.018<br>(-1.47) | -0.006<br>(-0.53) |
| ROA$_{t-1}$ | -0.053<br>(-0.98) | | -0.057<br>(-1.46) |
| Capital Expenditure$_{t-1}$ | 0.216$^{**}$<br>(1.94) | 0.003<br>(0.09) | 0.099$^{***}$<br>(5.14) |
| Size$_t$ | -0.057$^{***}$<br>(-2.64) | 0.044$^{***}$<br>(2.79) | 0.051$^{***}$<br>(7.79) |
| Volatility $_{t-1}$ | | | 0.000<br>(0.04) |
| Period Dummy | -0.049<br>(-0.92) | -0.027<br>(-0.75) | 0.005<br>(0.26) |
| Period Dummy x Long Term Debt$_{t-1}$ | 0.379<br>(0.28) | 0.399<br>(0.43) | |
| Period Dummy x Sales Growth$_{t-1}$ | | | 0.005<br>(0.38) |
| Period Dummy x ROA$_{t-1}$ | | | 0.019<br>(0.49) |
| $R^2$ | 0.047 | 0.035 | 0.168 |
| Adjusted $R^2$ | 0.032 | 0.019 | 0.151 |
| F statistic | 5.02$^{***}$ | 2.09$^{***}$ | 7.10$^{***}$ |
| Number of observations | 1,153 | 1,141 | 960 |
| Number of firm clusters | 113 | 112 | 100 |

*Notes:* The table reports the results from ordinary least squares regressions on determinants of firm performance and leverage, controlling for differences between the sub-periods 1984-1999 and 2000-2008. The first two columns of the table report the results from ordinary least squares regressions of sales growth and ROA performance proxies on long term debt and other determinants of firm performance. The third column of the table reports the results from ordinary least squares regressions of long term debt on sales growth and ROA performance proxies and other determinants of leverage. Sales growth is defined as the change in firm sales, given by (Sales$_t$ – Sales$_{t-1}$)/ Sales$_{t-1}$, where sales are sales divided by the book value of assets. ROA is earnings before interest and

tax (EBIT) divided by the book value of assets. In equations (1) and (2), the long-term debt variable is the residuals from a regression of long-term debt on asset tangibility, where long-term debt is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets, and asset tangibility is a weighted sum of receivables, inventories, fixed assets and cash deposits. In equation (3), the long-term debt variable is the book value of the firm's capital notes, mortgages and debentures divided by the book value of the firm's assets. Capital expenditure is the annual difference in fixed assets, adjusted for depreciation, divided by the book value of the firm's assets. Size is the natural log of the book value of the firm's assets. Volatility is the standard deviation of the firm's EBIT divided by the absolute value of average EBIT, calculated over a five-year period centred around the year when the risk is observed. The period dummy takes the value 0 for the years from 1984 to 1999 and the value 1 for the years from 2000 to 2008. Apart from the dummy variable, all variables are industry-adjusted by subtracting the industry-specific mean from each firm-year value. Results for industry dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. The *t*-values in brackets are for White standard errors which are robust to within cluster correlation.

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## STATEMENT OF CONTRIBUTION TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

**Name of Candidate:** David John Smith

**Name/Title of Principal Supervisor:** Dr. Jianguo Chen

**Name of Published Paper:** The relationship between capital structure and product markets: Evidence from New Zealand

**In which Chapter is the Published Work:** Chapter Two

**What percentage of the Published Work was contributed by the candidate:** 90%

David J. Smith
Candidate's Signature

26/7/2011
Date

Principal Supervisor's signature

28/07/2011
Date

# Chapter Three

## Essay Two

The second essay on why firms make particular financing choices is presented in Chapter Three. There is a brief review of the literature that examines the debt-equity choice and of the small number of papers that have made extensive use of descriptive statistics and tabular analysis in preference to regression analysis. A methodology section outlines the variables used in the paper and the techniques employed to examine New Zealand firms' capital structure decisions. The essay uses a combination of summary statistics and probit analysis, and examines firms' decisions both cross-sectionally and over time. The reference list for the essay is reproduced in the final section of this thesis.

# An analysis of New Zealand firms' financing choices and the factors that influence their choices

**Abstract**

We examine the financing choices made by New Zealand firms and the factors that influence those choices over the period from 1984 to 2009. Our aim is to provide a picture of the capital structure decisions of New Zealand companies. We examine both debt and equity decisions, how capital structure decisions vary over time as well as cross-sectionally, and employ a combination of summary statistics and probit analysis. Our main finding is that there are consistent trends in the financing policies of New Zealand firms, and in the factors that influence those policies, over the period examined. New Zealand firms issue significantly more debt than equity. Key factors determining firms' financing policies are profitability, growth, levels of indebtedness and firm size. A significant proportion of firms maintain a consistent policy over time of not issuing debt, while many firms consistently issue and repay debt but do not engage in equity financing. There is some evidence of differences in financing policies after 2000, possibly as a result of the recent financial crises.

*Key words:* Capital structure; corporate investment; cash; financing constraints; crisis

*JEL classification:* G01, G31, G32

## 1.0 Introduction

We examine the financing choices made by New Zealand firms and the factors that influence those choices over the period from 1984 to 2009. Our main purpose is to provide a picture of the capital structure decisions of New Zealand companies. New Zealand provides an interesting case study with respect to corporate financing policies. From the mid-1980s until the end of the 1990s New Zealand went through a period of extensive economic reform. Consequences of these reforms included the deregulation of New Zealand industries, the promotion of competition in New Zealand markets and the liberalisation of trade (Ratnayake (1999)). Moreover, after the year 2000 New Zealand firms experienced the impact of significant financial crises, most notably the recent global financial crisis. The capital structure policies of New Zealand firms are likely to reflect both the impact of these crises and the more competitive environment in which they have traded over the last 25 years.

A small number of studies examine the characteristics of firms' capital structures in detail over an extended period of time. Thus, Fama and French (1999) present historical information on the corporate cash flows, financing decisions and investment decisions of United States firms in the years from 1951 to 1996. Fama and French (2005) investigate why United States firms issue stock, by examining the average characteristics of firms over the years from 1973 to 2002. They find that firms frequently choose to issue equity, even when circumstances do not require them to do so. The authors use summary statistics to conduct their investigation rather than the regression analysis used almost exclusively in capital structure studies. They note that regressions of

financing and capital structure variables on key determinants, such as profitability, may not reveal significant differences in the way individual firms are financed.

Our paper is consistent with the work of Fama and French (1999, 2005) in that it examines the characteristics of firms' capital structures in detail over an extended period of time. However we believe our paper is the first to undertake such an investigation using data from a small, open economy.

Moreover we extend the literature by combining three approaches to our analysis. First, we examine capital structure changes from the perspective of issues of debt and issues of equity, rather than focusing on one type of financing. In the case of debt, the key changes we investigate are new issues of debt and the repayment of principal. In the case of equity, the key changes are new issues of equity and the retirement of equity through mechanisms such as share repurchases.

Second, in addition to performing cross-sectional analysis of capital structure decisions, we examine how these decisions change over time. In particular we examine all possible debt-equity decisions preceding and following each possible debt-equity choice, to identify patterns in the way firms' decisions change from one period to the next. We believe our paper is the first to use this approach to the analysis of firms' capital structure choices.

Finally, we conduct our analysis using a combination of summary statistics and probit analysis. We present summary statistics of New Zealand companies' key capital structure changes and possible determinants of those changes. We also model the financing decisions of firms using a

probit model. As noted above, Fama and French (1999, 2005) employ summary statistics in their papers. A number of studies employ logit or probit models to investigate the debt-equity choice (see, for example, Marsh (1982), Bayless and Chaplinsky (1990), Helwege and Liang (1996), Hovakimian, Opler and Titman (2001) and Hovakimian, Hovakimian and Tehranian (2004)). We believe our paper is one of the first to accord equal importance to each type of analysis.

Our main finding is that there are consistent trends in the financing policies of New Zealand firms, and in the factors that influence those policies, over the period examined. First, in contrast to the findings of Fama and French (2005), summary statistics of New Zealand firms' capital structure decisions reveal that only a minority of New Zealand firms issue equity and that a greater proportion of firms issue debt. Very few New Zealand firms retire equity. Around 11 percent of firms issue both debt and equity.

Second, profitability, growth, levels of indebtedness and firm size are key determinants of firms' financing policies. Thus summary statistics show that profitable firms tend to issue debt while firms with poorer earnings tend to issue equity. This result suggests that New Zealand firms are less willing or less able to take on leverage when their earnings are poor and is consistent with findings in Hovakimian, Opler and Titman (2001) and Fama and French (2005). When growth is increasing, firms issue equity or debt or a combination of both. When growth is declining, firms retire equity, repay debt, or do not change their capital structure. These results are consistent with the findings in Fama and French (2005). There is some evidence that already highly indebted firms resort to issues of equity to fund their activities. Larger firms tend to carry more debt, while firms that issue equity tend to be smaller than firms that retire equity. Consistent with our

summary statistics, probit analysis indicates that larger firms with increasing earnings make a decision to increase their leverage, while larger firms with better growth opportunities, choose to issue both debt and equity. Smaller firms with declining profitability and increasing levels of debt are more likely to issue equity. We suggest that our results provide evidence to support aspects of both the pecking order and trade-off theories of capital structure.

Third, analysis of how financing decisions change from year to year reveals that many firms' policies remain unchanged. Thus, summary statistics show that most firms that are non-issuers of debt maintain this policy over time. On the other hand, a significant proportion of firms that issue or repay debt also consistently maintain this policy. We investigate these two results further using probit analysis, and again find that profitability, growth opportunities, levels of indebtedness and firm size are key determinants. Firms that do not use leverage, and therefore rely on equity funding or do not use any external funding at all, tend to be smaller businesses with lower levels of debt. Firms that issue and repay debt but do not use equity funding tend to be larger more leveraged businesses with stronger earnings and declining growth opportunities.

Our results provide evidence of some differences between capital structure decisions in the years before and after the year 2000. Thus, summary statistics show that in the years after 2000, firms tend to have poorer earnings performance, higher average growth, increased leverage, and declining working capital. Probit analysis indicates that in this later period larger firms tend to issue securities, while firms with higher levels of debt tend not to undertake changes in their capital structures. These results may reflect the negative impact of the financial crises on firms during these years.

The remainder of the paper is structured as follows. Section 2 reviews relevant literature. Section 3 describes the methodology used. Section 4 outlines how the data was collected for the study. Section 5 presents the results from the analysis of the data. Section 6 summarises our findings.

## 2.0 Literature

Modern capital structure theory begins with Modigliani and Miller (1958) who show that in perfect markets, capital structure should have no influence on the value of a firm. Subsequently three principal models have been developed to explain capital structure choice. Capital market imperfections, such as taxes and bankruptcy costs, imply that the choice of capital structure does have an impact on value, and that firms will trade off the costs and benefits of debt (see, for example, Kraus and Litzenberger (1973)). The best known alternative to the trade-off model of capital structure is the pecking order theory. Myers (1984) and Myers and Majluf (1984) argue that asymmetric information makes managers reluctant to issue equity. Firms prefer to use retained earnings first to fund investments, followed by debt if retained earnings are not sufficient, and externally raised equity last of all. Most recently Baker and Wurgler (2002) have proposed a market timing theory to explain capital structure choices. They present evidence that changes in the market-to-book ratio have a large and persistent impact on leverage. Firms with low levels of debt have tended to issue equity when their market values are high, while firms with higher levels of debt have raised funds when their market values are low.

A number of papers use logit or probit regressions to examine the ability of the main capital structure theories to explain firms' capital structure choices. Thus Marsh (1982) uses a logit

model and a sample of United Kingdom companies to investigate the debt-equity choice. His results appear to support aspects of both the trade-off and market timing theories. In particular, evidence is presented that firms' choice between debt and equity is influenced by target debt ratios. On the other hand, market conditions and historical security prices also appear to be significant factors in the choices firms make.

Bayless and Chaplinsky (1990) examine investors' expectations about the type of security to be issued by a firm. The pecking order model implies that when investors expect firms to issue debt, but in fact equity is issued, the market reaction is likely to be negative. On the other hand, if the expectation is for an equity issue, but in fact debt is issued, the market reaction is likely to be positive. The results of logit regressions support these predictions and therefore lend support to the pecking order model.

In contrast, most of the results in Helwege and Liang (1996) tend to contradict the pecking order theory. Using logit regressions, the authors examine the financing choices made by young firms after they went public in 1983. They find that when firms have insufficient internal funds to finance their activities, they do not necessarily issue debt or equity. Moreover, the probability of issuing equity is no higher for riskier firms that might find it difficult to issue debt, while less risky firms choose equity even though they have ready access to debt funding. On the other hand, firms with surplus funds tend not to issue debt and equity, which is consistent with the pecking order model.

Hovakimian, Opler and Titman (2001) employ logit regressions to investigate how firms choose between debt and equity financing. As well as examining the decision to issue securities, they consider why firms retire debt and repurchase equity. Their results indicate that, consistent with the tradeoff model of capital structure choice, firms adjust toward an optimal debt ratio. Firms with higher profits tend to have lower debt ratios, to issue debt in preference to equity, and to repurchase equity rather than repay debt. In contrast, firms with higher current stock prices tend to issue equity in preference to debt and to retire debt rather than repurchase equity.

In contrast to previous studies, Hovakimian, Hovakimian and Tehranian (2004) examine the debt-equity choice by focusing on firms that issue both debt and equity. Their research indicates that the frequency of dual issues is quite high and that the amount of capital raised by such issues is on average very large in relation to the issuer's size. Consistent with the trade-off theory of capital structure, the authors find that firms with positive growth, as measured by market-to-book ratio, have low target-debt ratios. Such firms are more likely to issue equity but less likely to issue debt. Firms with high stock returns are also more likely to issue equity, but no relationship is found between stock returns and the likelihood of issuing debt. The positive relationship between returns and equity issues is more consistent with the market timing theory of capital structure. Finally, the authors find that firms with higher profitability are less likely to issue equity, but find no evidence of a relationship between profitability and debt issues. They note that their profitability results are not fully consistent with either the trade-off or pecking order theories.

Papers by Fama and French (1999, 2005) employ summary statistics to derive information about firms' capital structure choices, as an alternative to regression analyses. The main purpose of Fama and French (1999) is to estimate the cost of capital and the return on cost for the United States corporate sector. However the authors believe that the most interesting outcome of their study is the historical information they present on corporate cash flows, financing decisions and investment decisions. The authors find that, from 1951 to 1996, firms' internally generated funds in the form of cash earnings exceed their expenditure on investments, firms make substantial dividend and interest payments to equity and debt holders, and firms issue substantial amounts of new equity and debt securities. Their results also suggest that new issues of equity are not closely correlated with changes in investment and that firms issue debt to fund shortfalls in investment funding needs. Fama and French do not indicate how this historical information might be used in future research.

Fama and French (2005) confirm their earlier finding that firms issue substantial amounts of equity. Contrary to the expectations of the pecking order theory, which holds that firms issue equity as a last resort, the authors find that most United States firms issue or repurchase stock in the years from 1973 to 2002. Firms frequently choose to issue equity, even when not compelled to do so by circumstances such as financial deficits, and in most years net stock issues comprise significant proportions of firms' assets. Firms that issue stock tend to be less profitable and faster growing than firms that repurchase stock. In contrast to previous work on the pecking order model, Fama and French draw their conclusions from an analysis of the average characteristics of firms over the sample period, rather than from cross-section regressions. They note that

regressions of financing and capital structure variables on key determinants, such as profitability, may not reveal significant differences in the way individual firms are financed.

In summary, there is no conclusive evidence that a particular capital structure theory can fully explain firms' capital structure choices. Fama and French (2005) suggest it may be a fruitless task trying to prove that the trade-off model is superior to the pecking order model or vice versa, and note that aspects of both may help to explain firms' financing decisions. Moreover, work by Fama and French (1999, 2005) indicates that a variety of techniques, including summary statistics and regression analyses, may yield useful insights on the financing choices that firms make.

## 3.0 Methodology

### 3.1 Statistical analysis of capital structure decisions

#### *3.1.1 Summary of business status variables*

Our initial objective is to obtain a complete picture of the capital structure decisions New Zealand firms make, and the business status variables that may influence those decisions. First, we examine the statistical characteristics of six business status variables that firms may take into account when deciding whether to issue or repay debt and issue or retire equity. These variables are the firm's profitability, growth, level of debt, working capital, financing deficit or surplus, and size.

*Profitability*

Fama and French (2005) note that profitability is critical for evaluating the financing decisions of firms because it is a main contributing factor to firms' financing deficits or surpluses. For example, Myers (1984) argues that as firms' profits increase, there are more retained earnings available to finance investments. Consequently firms do not have the need to employ as much leverage. Our proxy for profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. Following Fama and French (2005), we divide firms into three profitability groups: firms with negative earnings, low profitability firms and high profitability firms. The cut-off point between low and high profitability firms in a particular year is defined as the average median value for all firms in our sample that have positive earnings in that year.

*Growth opportunities*

Fama and French (2005) note that growth is also critical for evaluating firms' financing decisions because it is a contributing factor to firms' financing deficits or surpluses. For example, Jensen and Meckling (1976) and Myers (1977) argue that firms may invest in unnecessarily risky projects in order to reduce the returns to the firm's creditors. This strategy may be particularly costly for firms with growth opportunities that have a wider range of future investments to choose from and therefore firms with growth opportunities may use less debt. Our proxy for growth opportunities is the ratio of the market value of equity to the book value of equity. We divide

firms into two growth groups: low growth firms and high growth firms. The cut-off point between low and high growth firms in a particular year is defined as the average median value for all firms in our sample in that year.

*Debt levels*

Firms' existing debt levels are likely to influence their decisions about whether to issue additional debt or repay existing debt. Moreover, Fama and French (2005) note that, in line with the predictions of the pecking order model developed by Myers (1984) and Myers and Majluf (1984), we might expect already highly indebted firms to issue equity. Our proxy for level of debt is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. We divide firms into two groups based on their debt ratios: firms with low levels of debt and firms with high levels of debt. The cut-off point between low and high debt firms in a particular year is defined as the average median value for all firms in our sample that have positive levels of debt in that year.

*Working capital*

We argue that, all else being equal, if a firm has a significant shortage of working capital it is more likely to consider issuing debt or equity, while having surplus working capital may encourage firms to repay debt or retire equity. Thus, Shyam-Sunder and Myers (1999) note that working capital is a component of financing deficits. A shortage of working capital is likely to

reduce the firm's internal cash flows, increase the deficit and make it more likely that the firm will need to issue debt or equity. Our proxy for working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. We divide firms into two groups, those with negative working capital and those with positive working capital.

*Financing deficits and surpluses*

The pecking order model of Myers (1984) and Myers and Majluf (1984) implies that financing deficits are the critical factor driving firms' decisions on whether to issue debt and equity. Our proxy for a financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the following identity:

$$Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t} \quad (1)$$

where $Div_{i,t}$ are the dividend payments of firm *i* at time *t*, $I_{i,t}$ is the net investment of firm *i* at time *t*, and $OCF_{i,t}$ are operating cash flows after interest and taxes for firm *i* at time *t*. A financial deficit must be covered by either debt or equity. We divide firms into two groups, those with a financial deficit and those with a financial surplus.

*Size*

Warner (1977) and Ang, Chua, and McConnell (1982) argue that the bankruptcy costs associated with carrying debt tend to decline as firms become larger, and therefore large firms will carry more debt. On the other hand, we might expect smaller firms to resort to equity issues when short of funds. Our proxy for firm size is the natural log of the book value of the firm's assets. We divide our sample into two groups of small and large firms. The cut-off point between small and large firms in a particular year is defined as the average median value of size for all firms in our sample in that year.

*3.1.2 Summary of capital structure decisions*

Second, we summarise the frequency of the capital structure decisions New Zealand firms make at a particular point in time. Capital structure decisions comprise decisions with respect to the issue of debt and the issue of equity.

*Debt issues*

Our proxy for annual debt issues is the change in the book value of the firm's long-term debt from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. We divide firms into three debt issue groups: firms which issue debt during the year, firms whose debt does not change, and firms which repay debt.

*Equity issues*

Our proxy for annual equity issues is the change in the firm's share capital from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. We divide firms into three equity issue groups: firms which issue equity during the year, firms whose equity does not change, and firms which reduce their share capital (for example, by means of share repurchases)[1].

*3.1.3 Relating business status variables to capital structure decisions*

The final step in our statistical analysis is to examine the relationships between business status variables and capital structure decisions. In particular we wish to determine the way in which fundamental characteristics of a firm, such as the magnitude of its earnings and how rapidly it is growing, are related to whether the firm issues or repays debt and issues or reduces equity.

**3.2 Using probit and logit models**

Our paper focuses on a firm's choice between using debt or equity. The particular decisions relating to this choice can be determined to have just two outcomes. For example, a firm may either issue debt or not issue debt, and issue equity or not issue equity. Consequently it is appropriate to use a probit or logit regression model to explore the debt versus equity choice, since these models are designed to investigate the relationship between a binary variable which can take on only two values, and possible determinants of the variable.

[1] Share repurchases have only been legally permitted in New Zealand since July 1994 (Koerniadi, Liu and Tourani-Rad ((2007)).

In practice, probit and logit models often produce similar outcomes and the choice between one or the other is not critical. We therefore implement a probit model of the following form:

$$\Pr\left[Y = \frac{1}{X}\right] = \emptyset(\beta X')$$

$$Y^* = X'\beta + \epsilon$$

$$Y = \begin{cases} 1, & if\ Y^* > 0 \\ 0, & otherwise \end{cases}$$

where Pr denotes probability, Y is the binary variable being investigated, X is a vector of possible determinants of Y, and $\emptyset$ is the cumulative standard normal distribution function.

As discussed in our literature review, a number of papers use probit or logit models to examine the debt-equity choice. Zhu (2010) notes that using these models to investigate the choice between debt and equity has a number of advantages. In particular, there is no assumption that debt is simply a substitute for equity, and no assumption that firms have a target debt ratio.

We use the probit model to investigate seven decisions or groups of decisions by firms with respect to debt and equity financing:

1. a net increase in debt (an increase in debt with a reduction in equity, an increase in debt with no change in equity, or no change in debt with a reduction in equity);
2. a net increase in equity (an increase in equity with a reduction in debt, an increase in equity with no change in debt, or no change in equity with a reduction in debt);

3. no change in either debt or equity.
4. an increase in both debt and equity;
5. an increase in equity with a reduction in debt;
6. an increase in debt with a reduction in equity;
7. a decrease in both debt and equity.

Possible determinants of these decisions are profitability, growth, debt levels, working capital, financing deficits and surpluses, and size. By conducting a probit analysis we hope to confirm the relationships revealed by the preliminary statistical analysis and gain additional insights on the debt-equity choice.

### 3.3 Do capital structure choices change over time?

Our initial tests of New Zealand capital structure decisions are at a particular point in time. To extend our analysis, we examine whether the capital structure choices that New Zealand firms make change over time. First, we summarise the frequency of all possible debt-equity decisions at time t, following each possible debt-equity decision at time t-1; and the frequency of all possible debt-equity decisions at time t-1, preceding each possible debt-equity decision at time t. We attempt to identify patterns in the way firms' decisions change from one period to the next. In particular, we examine whether a significant number of firms prefer to remain with either debt or equity as the primary source of financing, preceding or following particular capital choice decisions; or whether a significant number switch from debt financing to equity financing or vice versa. We then investigate the reasons why firms remain with a particular financing source or

why they switch from one source to another. As we are dealing with choices that have a limited number of outcomes it is again appropriate to use probit analysis. Consistent with our initial analysis, the possible determinants of changes in financing decisions that we examine are profitability, growth, debt levels, working capital, financing deficits and surpluses, and size.

**4.0 Data**

Data for New Zealand companies was supplied to us by the New Zealand stock exchange (NZX). The original data set contains 390 New Zealand companies, including both listed and delisted firms. It has 3,564 company-years of data for the years from 1984 to 2009. From this data set we excluded firms for which market prices and full accounting data could not be provided. We also excluded overseas issuers. This left a data set of 227 companies and 2,482 company-years of data.

We exclude finance firms on the grounds that their decisions with respect to capital structure may reflect special considerations. For example, Fama and French (1992) note that high leverage usually indicates distress in nonfinancial firms, but not necessarily in financial firms. We exclude company years for which the book value of assets and the book value of equity are calculated as less than or equal to zero. Byoun (2008) note that when these variables are used to deflate other variables, as they are in our paper, results obtained using negative values may be difficult to interpret. We also treat relatively small changes in equity (greater than -5% and less than 5% of book assets) as representing no change, as they are likely to represent events such as asset

revaluations which have been booked to the equity side of the balance sheet, rather than issues or retirements of equity.

Most variables in our model are expressed as ratios. However this is not the case for the size variable; we therefore inflation-deflate book value of assets using the Consumer Price Index obtained from the Global Financial Database, before determining the natural log of book value of assets. The profitability variable displays evidence of extreme negative values and the growth variable displays evidence of extreme positive values. We winsorise these two variables at the 1$^{st}$ and 99$^{th}$ percentiles respectively, in order to reduce the impact of the extreme observations. The final sample has 205 companies and 2,224 company-years of data. However a number of missing values arise as a result of calculating a number of variables, including the growth variable, and therefore a minimum of 199 companies and 2,007 company-years of data are used in the analysis.

## 5.0 Results

In the following sections, we present our results both for the whole sample period and for the two sub-periods from 1984 to 1999 and from 2000 to 2009. The sub-periods are selected for two reasons. First, from the mid-1980s until the end of the 1990s New Zealand went through a period of extensive economic reform. Consequences of these reforms included the deregulation of New Zealand industries, the promotion of competition in New Zealand markets and the liberalisation of trade (Ratnayake (1999)). Second, there were significant financial crises in the years from 2000 onwards, most notably the recent global financial crisis. We might therefore expect to see somewhat different developments in firms' capital structures in the periods before and after 2000.

## 5.1 Statistical analysis

### *5.1.1 Summary of business status variables*

Table 1 summarises average characteristics of New Zealand firms' key business status variables. The average profitability of New Zealand firms for the whole period is 2.93 percent of book capital. For the period from 1984 to 1999 the mean value is 8.08 percent and for the period from 2000 to 2009 the mean value is -1.03 percent. The poor earnings performance of firms in the latter period may be the consequence of the financial crises that occurred during the decade.

**(Insert Table 1 about here)**

The proxy for growth opportunities (the ratio of the market value of equity to the book value of equity) indicates that for the whole period market equity is on average 2.10 times the size of book equity. For the period from 1984 to 1999 the mean value of the ratio is 1.67 and for the period from 2000 to 2009 the mean value is 2.43. The somewhat higher average growth figure for the recent decade may be evidence of some firms engaging in high growth strategies prior to the global crash.

New Zealand firms' average debt ratios for the whole sample are consistent across the two sub-periods. The average ratio for high debt firms is a little higher over 2000 to 2009 (40.80 percent of book capital) than over 1984 to 1999 (38.98 percent). These results suggest that in the last decade already highly indebted firms increased their risk by taking on more leverage.

The average value of *negative* working capital is significantly lower in the decade from 2000 to 2009 (-31.43 percent) than in the years from 1984 to 1999 (-21.85 percent). Consequently the average overall value of working capital, while remaining positive, declines from 18.13 percent in the earlier period to 15.32 percent in the later period. These results may indicate that firms experienced cash flow difficulties as a result of the recent financial crisis.

For New Zealand firms with a financing surplus, the average value of the surplus in the decade from 2000 to 2009 (36.39 percent of book capital) is significantly higher than in the years from 1984 to 1999 (19.78 percent). Similarly, for firms with a financing deficit the average value of the deficit for 2000 to 2009 (31.73 percent) is significantly higher than for 1984 to 1999 (14.60 percent). Overall, firms have a small average financing deficit of 1.41 percent over the years from 1984 to 1999, but this deficit increases significantly to 6.72 percent in the decade from 2000 to 2009.

*5.1.2 Summary of capital structure decisions*

Table 2 reports the frequency of New Zealand firms' capital structure decisions, for the whole sample period and for the two sub-periods from 1984 to 1999 and from 2000 to 2009. The table reports both the absolute frequency of particular capital structure decisions and the frequency as a percentage of the total number of firms.

**(Insert Table 2 about here)**

The frequency of individual capital structure decisions, as a percentage of total firms, is generally consistent across both sub-periods and for the period as a whole. On average, 23 percent of New Zealand firms issue equity each year in the period from 1984 to 1999, and 25 percent of firms from 2000 to 2009. In contrast, Fama and French (2005) report averages for United States firms ranging from 54 to 72 percent for the years from 1973 to 2002. Our results indicate that only a minority of New Zealand firms issue equity. These findings tend to support the pecking order theory which holds that firms only issue equity as a last resort. The number of New Zealand firms retiring equity each year is not significant, averaging just 4 percent for 1984 to 1999 and 5 percent for 2000 to 2009. These averages are considerably lower than the results of 20 to 21 percent reported for United States firms by Fama and French. These results again tend to support the predictions of the pecking order model of capital structure. On average 73 percent of New Zealand firms neither issue nor retire equity in the years from 1984 to 1999, and 70 percent from 2000 to 2009.

Turning to debt, we find that on average 40 percent of New Zealand firms issue debt each year for the period from 1984 to 1999, and 41 percent of firms from 2000 to 2009. Thus, the proportion of firms issuing debt is significant, and is substantially higher than the proportion of firms that issue equity. This again tends to support the pecking order theory which holds that firms issue debt in preference to equity. The number of New Zealand firms repaying debt each year is also significant, averaging 38 percent for 1984 to 1999 and 35 percent for 2000 to 2009. However a large proportion of New Zealand firms neither issue nor repay debt each year, the averages being 22 percent for 1984 to 1999 and 24 percent for 2000 to 2009.

Looking at combinations of debt and equity decisions, we see that the issue and repayment of debt, combined with no change in equity, comprise the highest proportion of possible decisions. Thus for 1984 to 1999 and for 2000 to 2009, an average of 28 percent of firms issue debt only. For 1984 to 1999 an average of 30 percent of firms repays debt only, while for 2000 to 2009 the average is 26 percent. No change in either debt or equity is also a significant outcome, comprising 15 percent of decisions over 1984 to 1999 and 16 percent of decisions over 2000 to 2009. Issues of both debt and equity comprise 11 percent of decisions in 1984 to 2009 and in 2000 to 2009.

*5.1.3 Relating business status variables to capital structure decisions*

Table 3 reports the frequency of firms' capital structure decisions matched with average characteristics of firms' key business status variables, for the whole sample period and for the two sub-periods from 1984 to 1999 and from 2000 to 2009. Observations for all business status variables other than size are lagged one year in order to observe more clearly the impact of the variables on subsequent capital structure decisions.

**(Insert Table 3 about here)**

In both sub-periods, the profitability of New Zealand firms is positive when firms issue only debt, and negative when firms issue only equity. Thus when firms issue only debt, profitability is 11.25 percent of book capital in the period from 1984 to 1999 and 10.81 percent in the period from 2000 to 2009. When firms issue only equity, profitability is -17.27 percent of book capital in the

period from 1984 to 1999 and -41.36 percent in the period from 2000 to 2009. These results suggest that firms are less willing or less able to take on leverage when their earnings are poor and are consistent with the findings in Hovakimian, Opler and Titman (2001) and Fama and French (2005).

Our results provide evidence of a relationship between growth and the capital structure decisions of New Zealand firms. When growth is relatively high New Zealand firms tend to issue equity or debt or a combination of both. When growth is relatively low firms tend to retire equity, repay debt or undertake no change in capital structure. For example, average growth rates of 2.01 for 1984 to 1999 and 3.46 percent for 2000 to 2009 are associated with the simultaneous issue of both equity and debt, while average growth rates of 1.92 percent for 1984 to 1999 and 1.78 percent for 2000 to 2009 are associated with the simultaneous retirement of equity and repayment of debt. These results indicate that New Zealand firms experiencing rapid growth tend to issue debt and equity to fund that growth, while firms experiencing a significant decline in assets tend to retire equity and repay debt. The results are consistent with the findings in Fama and French (2005).

On average, in the two sub-periods from 1984 to 1999 and from 2000 to 2009, firms that do not issue (or repay) debt have very low debt ratios. These ratios range from 0.48 percent to 0.93 percent of book capital in the earlier period and from 0.00 percent to 3.75 percent in the later period. For firms that issue debt, the ratios range from 20.96 to 24.57 percent in the earlier period and from 14.75 to 27.26 percent in the later period; for firms that repay debt, the ratios range from 16.83 to 29.71 percent and from 20.47 to 29.92 percent respectively. However two of

the largest debt ratios for 1984 to 1999 (27.73 percent) and for 2000 to 2009 (29.92 percent) are for firms that issue equity and repay debt. These results suggest that firms that are already highly indebted may resort to issues of equity to fund their activities.

In both sub-periods, firms that retire equity, repay debt or undertake no change in capital structure tend to have higher average levels of working capital. For example, the highest average level of working capital for 1984 to 1999 (29.76 percent of book capital) and for 2000 to 2009 (38.57 percent) is associated with firms retiring equity and not issuing debt. The second highest level for 1984 to 1999 (29.23 percent) and for 2000 to 2009 (36.91 percent) is associated with firms undertaking no change in capital structure. On the other hand, firms that issue equity or debt tend to have lower average levels of working capital. For example, the lowest average level of working capital for 1984 to 1999 (3.07 percent of book capital) is associated with firms that retire equity and issue debt and the lowest for 2000 to 2009 (5.55 percent) is associated with firms that issue debt while undertaking no change in equity. These results suggest that New Zealand firms with healthy cash flows tend not to feel the need to raise additional funds by means of security issues.

On average, in the two sub-periods from 1984 to 1999 and from 2000 to 2009, firms that have surpluses retire equity. These surpluses range from 4.27 percent to 19.84 percent of book assets in the earlier period and from 3.93 percent to 15.22 percent of book assets in the later period. On the other hand, in both sub-periods the highest deficits are associated with equity issues. Thus in the years from 1984 to 1999 firms that issue equity with no change in debt have average deficits of 20.76 percent and firms that issue both equity and debt have deficits of 3.65 percent. In the

years from 2000 to 2009 firms that issue equity with no change in debt have average deficits of 55.26 percent and firms that issue equity and repay debt have deficits of 40.83 percent. These results tend to support the pecking order theory of capital structure.

On average, over the whole sample period and the two sub-periods from 1984 to 1999 and from 2000 to 2009, larger New Zealand firms tend to issue (and repay) debt, while firms that are smaller tend not to issue debt. These results are consistent with, for example, Warner (1977) and Ang, Chua, and McConnell (1982) who argue that the bankruptcy costs associated with carrying debt tend to decline as firms become larger, and therefore that large firms will carry more debt. However the results also indicate that firms that issue equity tend to be smaller than firms that retire equity.

**5.2 Probit analysis**

Table 4 reports the results of performing a probit analysis on the seven decisions and groups of decisions described in Section 3.2: a net increase in debt, a net increase in equity, no change in either debt or equity, an increase in both debt and equity, an increase in equity with a reduction in debt, an increase in debt with a reduction in equity, and a decrease in both debt and equity. Possible determinants of these decisions are profitability, growth, debt levels, working capital, financing deficits and surpluses, and size. Observations for all determinants other than size are lagged one year.

**(Insert Table 4 about here)**

Looking first at the results for a net increase in debt, we find that the profitability and size variables are significant at the one percent level and have positive signs, while the working capital variable is significant at the one percent level and has a negative sign. Thus there is evidence that larger firms, whose earnings are increasing, and which have declining levels of working capital, make capital structure decisions which result in a net increase in debt. These results are consistent with our previous statistical analysis which indicated that larger, profitable firms tend to issue debt.

Turning to the results for a net increase in equity, we find that the profitability and size variables are significant at the one percent level and have negative signs, while the debt ratio variable is significant at the one percent level and has a positive sign. Thus smaller firms which experience a decrease in earnings and have increasing levels of debt make capital structure decisions which result in a net increase in equity. Again, these findings support the results of our statistical analysis. In particular, firms with poor earnings and high levels of debt may have lower retained earnings, find it harder to access debt markets and therefore have to resort to issuing equity as a way of financing their activities. The growth variable is significant at the ten percent level and has a negative sign. Thus there is weaker evidence suggesting that firms with poorer growth opportunities issue equity.

When there is no change in either debt or equity, we see that the profitability variable is significant at the one percent level and has a positive sign, while the growth, debt ratio and size variables are significant at the one percent level and have negative signs. Again, these findings are consistent with our statistical results and suggest that smaller firms, whose earnings are

increasing but which have declining growth and declining levels of debt, are more likely to be at a point in their life cycle where they do not need or do not choose to raise funds from external sources. The working capital variable is significant at the ten percent level and has a positive sign. Thus there is weaker evidence which indicates that firms with higher levels of working capital do not issue new securities.

When firms increase both their debt and their equity, both the growth and size variables are significant at the one percent level and have positive signs. Thus there is evidence that larger firms whose growth is increasing, choose to issue both debt and equity. As might be expected, these results contrast with those for firms that issue neither debt nor equity, and suggest that larger, growing firms must go to external capital markets to fund their growth.

When firms issue more equity but repay debt, the debt ratio variable is significant at the one percent level and has a positive sign. The profitability and size variables are significant at the ten percent level only and have negative signs. Thus consistent with our results for a net increase in equity, firms with increasing debt in particular, but also smaller less profitable firms, are more likely to issue equity and reduce their leverage.

Results for the two remaining decisions that we consider (an increase in debt with a reduction in equity and a decrease in both debt and equity) are not as strong. This may be due to the smaller number of observations for these decisions (30 and 26 respectively). When firms issue more debt but retire equity, the debt ratio is significant at the ten percent level and has a negative sign and the size variable is significant at the ten percent level and has a positive sign. Larger less indebted

firms can afford to issue more debt. When firms repay debt and retire equity, the working capital variable is significant at the five percent level and has a positive sign. Firms with stronger cash flows may take advantage of this position to repay debt and return cash to shareholders.

To test for possible differences between the two sub-periods from 1984 to 1999 and from 2000 to 2009, we add a period dummy to the probit regressions, which takes the value 0 for the years from 1984 to 1999 and the value 1 for the years from 2000 to 2009. We also test the interactions between the period dummy and the six potential determinants of the debt-equity choice. The results are reported in Table 5. To simplify the presentation, only the period dummy and interaction results are reported.

**(Insert Table 5 about here)**

The most significant results are obtained for a net increase in equity, no change in capital structure, and an increase in both debt and equity. When firms have a net increase in equity, the interaction between the period dummy and the debt ratio variable is significant at the five percent level and has a negative sign, while the interaction between the period dummy and the size variable is significant at the five percent level and has a positive sign. When firms undertake no change in debt or equity, the debt ratio variable is significant at the one percent level and has a positive sign. When firms increase both debt and equity, the size variable is significant at the one percent level and has a positive sign. These results indicate that in the years from 2000 to 2009, larger firms tend to issue debt and equity, and are more likely to issue equity when their levels of debt are declining; firms with increasing levels of debt are more likely to undertake no change in

debt or equity financing. During the financial crises of these years larger firms may have been better positioned to issue securities, and the crises may also have discouraged already indebted firms from undertaking further securities issues.

In summary, our results provide some support for the pecking order theory of capital structure. For example, we find that New Zealand firms with poorer earnings and higher levels of debt make capital structure decisions which result in a net increase in equity. These findings suggest that such firms may find it more difficult to access debt markets and therefore have to resort to issuing equity as a way of financing their activities. On the other hand, there is also some evidence to support the trade-off theory. For example, larger New Zealand firms, which are less vulnerable to the costs of bankruptcy, tend to employ more leverage than smaller firms.

**5.3 Do capital structure choices change over time?**

Table 6 reports changes in the frequency of New Zealand firms' capital structure decisions over time. Panel A reports the frequency of firms' capital structure decisions at time *t-1*, preceding each of the possible debt-equity decisions at time *t.* Panel B reports the frequency of firms' capital structure decisions at time *t*, following each of the possible debt-equity decisions at time *t-1*.

**(Insert Table 6 about here)**

Clear trends that emerge from the data are that a significant number of firms consistently refrain from using debt over time, while a significant number consistently either issue or repay debt or do both. First, firms that neither issue nor repay debt tend not to have issued or repaid debt in the previous year and tend not to issue or repay debt in the following year. Thus, looking at the centre row of Panel A, we see that of firms that retire equity and do not issue or repay debt, issue and repay neither debt nor equity, and issue equity but do not issue or repay debt, 79 percent, 81 percent and 83 percent respectively did not issue or repay debt in the preceding year. Similarly, looking at the centre row of Panel B, we see that of firms that retired equity and did not issue or repay debt, issued and repaid neither debt nor equity, and issued equity and did not issue or repay debt, 83 percent, 80 percent and 76 percent respectively do not issue or repay debt in the following year. In summary, these results indicate that most firms that are non-issuers of debt have not issued debt in the previous year or maintain a policy of not issuing debt in the following year.

Second, significant proportions of firms that issue or repay debt have done so in the previous year or continue to do so in the following year. For example, the second column of Panel A shows that, of firms that repay (issue) debt and retire equity, 60 (58) percent issued or repaid only debt in the previous year. The second column of Panel B shows that of firms that repaid (issued) debt and retired equity, 55 (82) percent issue or repay only debt in the following year. The centre column of Panel A shows that of firms that repay (issue) only debt, 75 (70) percent issued or repaid only debt in the previous year. The centre column of Panel B shows that of firms that repaid (issued) only debt, 69 (82) percent issue or repay only debt in the following year. The eighth column of Panel A shows that of firms that repay (issue) debt and issue equity, 61 (47)

percent issued or repaid only debt in the previous year. The eighth column of Panel B shows that of firms that repaid (issued) debt and issued equity, 61 (60) percent issue or repay only debt in the following year. In summary, these results indicate that in most cases at least 50 percent of firms that use debt financing, with or without equity financing, have only issued or repaid debt in the preceding year, or only issue or repay debt in the following year.

To investigate further why some firms are consistent non-issuers of debt over time while others consistently prefer to use debt financing, we again employ probit analysis. In particular we investigate the following decisions:

1. no change in debt;
2. either an increase or a reduction in debt, with no change in equity.

Consistent with the probit analysis reported in the previous section of the paper, we specify possible determinants of these decisions to be profitability, growth, debt levels, working capital, financing deficits and surpluses, and size. Observations for all determinants other than size are lagged one year. The results are reported in Table 7.

**(Insert Table 7 about here)**

Looking first at the results for no change in debt, we see that both the debt ratio and size variables are significant at the one percent level and have negative signs. Thus there is evidence that smaller firms, with lower levels of debt, tend not to issue or repay debt. On the other hand, when

firms increase or reduce the amount of leverage they use, but do not employ equity funding, we see that the profitability, debt ratio and size variables are significant at the one percent level and have positive signs, while the growth variable is significant at the one percent level and has a negative sign. Thus larger, more profitable firms with higher levels of debt, but reduced growth opportunities, are more likely to continue relying on leverage rather than resort to equity to finance their activities.

To test for possible differences between the two sub-periods from 1984 to 1999 and from 2000 to 2009, we add a period dummy to the probit regressions, which takes the value 0 for the years from 1984 to 1999 and the value 1 for the years from 2000 to 2009. We also test the interactions between the period dummy and the six potential determinants of the debt-equity choice. The results are reported in Table 8. To simplify the presentation, only the period dummy and interaction results are reported.

**(Insert Table 8 about here)**

Significant results are only obtained for firms that neither issue nor repay debt. In particular, when firms undertake no change in debt the interaction between the period dummy and the growth variable is significant at the five percent level and has a positive sign, while the interaction between the period dummy and the debt ratio variable is significant at the one percent level and also has a positive sign. These results indicate that in the years from 2000 to 2009, firms with better growth opportunities but higher levels of debt tend not to issue or repay debt.

The financial crises during these years may have discouraged already indebted firms from becoming more leveraged.

Finally, as might be expected we are able to identify particular companies in our dataset that have consistently followed a policy of not issuing (or repaying) debt; or of issuing and repaying debt while undertaking no change in equity. For example, two relatively new companies, Blis Technologies Ltd and Botry-Zen Ltd, neither issued nor repaid debt throughout the years from 2003 to 2009 and 2003 to 2008 respectively. Consistent with our probit regression results, these firms are relatively small in comparison to other companies in our sample and carried lower levels of debt during these years. On the other hand, two established firms, Broadway Industries Ltd and Horizon Electricity Distribution Ltd, consistently issued and repaid debt but undertook no change in equity from 2002 to 2008 and 2001 to 2009 respectively. The characteristics of these two companies are not all consistent with our probit regression results, but in line with those results the former company had relatively lower growth opportunities than other firms and the latter company was relatively more profitable and indebted.

Overall, our results provide strong evidence for the characteristics of two groups of New Zealand firms, those that are consistent non-issuers of debt and those that consistently use debt in preference to equity financing. In particular, those firms that do not issue or repay debt, and therefore rely on equity funding or do not use any external funding at all, tend to be smaller businesses with already declining levels of debt. On the other hand, firms that issue and repay debt but do not use equity tend to be larger more indebted businesses with stronger earnings and declining growth opportunities.

## 6.0 Conclusion

We present evidence of consistent trends in the financing policies of New Zealand firms, and in the factors that influence those policies, in the years from 1984 to 2009. Only a minority of New Zealand firms issue equity, while a greater proportion of firms issue debt. Very few New Zealand firms retire equity. Profitability, growth, levels of indebtedness and firm size are key determinants of firms' financing policies. Thus, profitable firms tend to issue debt while firms with poorer earnings tend to issue equity. When growth is increasing, firms issue equity or debt or a combination of both. When growth is declining, firms retire equity, repay debt, or do not change their capital structure. Firms that are already highly indebted resort to issues of equity to fund their activities. Larger firms tend to carry more debt, and firms that issue equity tend to be smaller than firms that retire equity.

Most firms that are non-issuers of debt maintain this policy over time. On the other hand, a significant proportion of firms that issue or repay debt also consistently maintain this policy. Profitability, growth opportunities, levels of indebtedness and firm size are again key determinants of these choices. Firms that do not issue or repay debt, and therefore rely on equity funding or do not use any external funding at all, tend to be smaller businesses with already declining debt levels. Firms that issue and repay debt but do not use equity funding tend to be larger more leveraged businesses with stronger earnings and declining growth opportunities.

There is some evidence of differences between capital structure decisions in the years before and after the year 2000. Thus, in the years after 2000, firms tend to have poorer earnings

performance, higher average growth, increased leverage, and declining working capital. Larger firms tend to issue securities, while firms with higher levels of debt tend not to undertake changes in their capital structures. These results may reflect the negative impact on firms of the recent global financial crisis in particular during these years.

**Table 1.** Average characteristics of firms' key business status variables

| | | Profitability | | | | Growth | | | Debt Ratio | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Negative | Low | High | All | Low | High | All | Low | High | All |
| | N | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean |
| 1984-1999 | 889 | -29.79 | 7.83 | 25.59 | 8.08 | 0.79 | 2.50 | 1.67 | 4.39 | 38.98 | 20.73 |
| 2000-2009 | 1155 | -53.04 | 7.66 | 26.15 | -1.03 | 0.91 | 3.79 | 2.43 | 4.07 | 40.80 | 21.49 |
| All years | 2044 | -44.69 | 7.74 | 25.89 | 2.93 | 0.85 | 3.24 | 2.10 | 4.21 | 40.01 | 21.16 |

| | | Working Capital | | | Financing Deficit/Surplus | | | Size | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Negative | Positive | All | Surplus | Deficit | All | Small | Big | All |
| | N | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean |
| 1984-1999 | 889 | -21.85 | 31.67 | 18.13 | -19.78 | 14.60 | 1.41 | 7.40 | 10.13 | 8.84 |
| 2000-2009 | 1155 | -31.43 | 32.02 | 15.32 | -36.39 | 31.73 | 6.72 | 7.00 | 10.48 | 8.73 |
| All years | 2044 | -27.36 | 31.87 | 16.54 | -28.99 | 24.39 | 4.41 | 7.17 | 10.32 | 8.78 |

*Notes:* The table reports average characteristics of key business status variables that are likely to influence capital structure decisions. Profitability is defined as earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the ratio of the market value of equity to the book value of equity. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $\boldsymbol{Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}}$, where $\boldsymbol{Div_{i,t}}$ are the dividend payments of firm *i* at time *t*, $\boldsymbol{I_{i,t}}$ is the net investment of firm *i* at time *t*, and $\boldsymbol{OCF_{i,t}}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value of the firm's assets.

**Table 2.** Frequency of firms' capital structure decisions

| | | Equity | | |
|---|---|---|---|---|
| | **Retirement** | **No Change** | **Issues** | **All** |
| **Debt** | **N (%)** | **N (%)** | **N (%)** | **N (%)** |
| ***Period 1984-1999*** | | | | |
| **Repayments** | 8 (1) | 301 (30) | 71 (7) | 380 (38) |
| **No Change** | 17 (2) | 145 (15) | 53 (5) | 215 (22) |
| **Issues** | 9 (1) | 283 (28) | 111 (11) | 403 (40) |
| **All** | 34 (4) | 729 (73) | 235 (23) | 998 (100) |
| ***Period 2000-2009*** | | | | |
| **Repayments** | 19 (2) | 289 (26) | 82 (7) | 390 (35) |
| **No Change** | 15 (1) | 172 (16) | 74 (7) | 261 (24) |
| **Issues** | 22 (2) | 305 (28) | 127 (11) | 454 (41) |
| **All** | 56 (5) | 766 (70) | 283 (25) | 1105 (100) |
| ***Whole Period*** | | | | |
| **Repayments** | 27 (1) | 590 (28) | 153 (7) | 770 (36) |
| **No Change** | 32 (2) | 317 (15) | 127 (6) | 476 (23) |
| **Issues** | 31 (1) | 588 (28) | 238 (11) | 857 (40) |
| **All** | 90 (5) | 1495 (71) | 518 (24) | 2103 (100) |

*Notes:* The table reports the frequency of firms' capital structure decisions. Debt issues are defined as the change in the book value of the firm's long-term debt from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Equity issues are defined as the change in the firm's share capital from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. The first number is the frequency of a particular capital structure decision and the number in brackets is the frequency as a percentage of the total number of firms.

**Table 3.** The frequency of firms' capital structure decisions matched with average characteristics of firms' key business status variables

| Capital Structure Decisions | | | Business Status Variables | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Debt** | **Equity** | | **Profitability** | **Growth** | **Debt Ratio** | **Working Capital** | **Financing Deficit** | **Size** |
| | | **N** | **Mean** | **Mean** | **Mean** | **Mean** | **Mean** | **Mean** |
| ***Period 1984-1999*** | | | | | | | | |
| **Repayments** | **Retirement** | 7 | 9.79 | 1.92 | 16.83 | 28.59 | -6.00 | 8.68 |
| | **No Change** | 294 | 11.77 | 1.43 | 29.71 | 19.44 | -0.19 | 8.94 |
| | **Issues** | 62 | 6.59 | 1.71 | 27.73 | 14.88 | 3.22 | 8.70 |
| **No Change** | **Retirement** | 17 | 1.24 | 1.37 | 0.48 | 29.76 | -19.84 | 7.56 |
| | **No Change** | 139 | 4.41 | 1.49 | 0.70 | 29.23 | -5.82 | 7.49 |
| | **Issues** | 50 | -17.27 | 2.22 | 0.93 | 9.71 | 20.76 | 7.22 |
| **Issues** | **Retirement** | 8 | 14.22 | 2.43 | 24.57 | 3.07 | -4.27 | 10.13 |
| | **No Change** | 271 | 11.25 | 1.64 | 23.85 | 18.48 | 4.97 | 9.36 |
| | **Issues** | 102 | 8.68 | 2.01 | 20.96 | 16.22 | 3.65 | 9.41 |
| ***Period 2000-2009*** | | | | | | | | |
| **Repayments** | **Retirement** | 19 | 11.92 | 1.78 | 20.47 | 35.98 | -5.45 | 9.56 |
| | **No Change** | 280 | 7.66 | 1.68 | 29.38 | 16.79 | 1.20 | 9.29 |
| | **Issues** | 72 | -22.21 | 3.81 | 29.92 | 11.56 | 40.83 | 8.58 |
| **No Change** | **Retirement** | 15 | 1.57 | 1.43 | 0.00 | 38.57 | -15.22 | 6.83 |
| | **No Change** | 168 | 3.61 | 2.14 | 3.75 | 36.91 | -0.40 | 7.66 |
| | **Issues** | 66 | -41.36 | 4.70 | 0.81 | 27.90 | 55.26 | 6.56 |
| **Issues** | **Retirement** | 22 | 10.12 | 1.77 | 14.75 | 15.78 | -3.93 | 9.06 |
| | **No Change** | 299 | 10.81 | 2.21 | 27.26 | 5.55 | 4.04 | 9.69 |
| | **Issues** | 116 | -7.09 | 3.46 | 24.80 | 11.76 | -38.01 | 8.82 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Whole Period*** | | | | | | | | |
| **Repayments** | **Retirement** | 26 | 11.35 | 1.82 | 19.49 | 33.99 | -5.60 | 9.30 |
| | **No Change** | 574 | 9.77 | 1.55 | 29.55 | 18.15 | 0.57 | 9.11 |
| | **Issues** | 134 | -8.88 | 2.84 | 28.91 | 13.10 | 25.23 | 8.64 |
| **No Change** | **Retirement** | 32 | 1.39 | 1.40 | 0.25 | 33.89 | -17.45 | 7.22 |
| | **No Change** | 307 | 3.97 | 1.84 | 2.37 | 33.43 | -2.63 | 7.58 |
| | **Issues** | 116 | -30.97 | 3.63 | 0.86 | 20.06 | 42.24 | 6.84 |
| **Issues** | **Retirement** | 30 | 11.21 | 1.94 | 17.37 | 12.39 | -4.02 | 9.37 |
| | **No Change** | 570 | 11.02 | 1.94 | 25.64 | 11.70 | 4.43 | 9.53 |
| | **Issues** | 218 | 0.29 | 2.78 | 23.00 | 13.85 | -19.58 | 9.10 |

*Notes:* The table reports the frequency of firms' capital structure decisions matched with average characteristics of key business variables. Debt issues are defined as the change in the book value of the firm's long-term debt from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Equity issues are defined as the change in the firm's share capital from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the ratio of the market value of equity to the book value of equity. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $\boldsymbol{Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}}$, where $\boldsymbol{Div_{i,t}}$ are the dividend payments of firm *i* at time *t*, $\boldsymbol{I_{i,t}}$ is the net investment of firm *i* at time *t*, and $\boldsymbol{OCF_{i,t}}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value of the firm's assets. Observations for all business status variables other than size are lagged one year.

**Table 4.** Probit regressions for determinants of the debt-equity choice

| | Net increase in debt | Net increase in equity | No change | Increase in both debt and equity | Increase in equity, reduction in debt | Increase in debt, reduction in equity | Decrease in both debt and equity |
|---|---|---|---|---|---|---|---|
| Intercept | -1.706*** (-9.85) | 0.199 (1.24) | 0.836*** (3.58) | -1.866*** (-8.83) | -1.432*** (-6.06) | -2.743*** (-6.80) | -2.935*** (-6.17) |
| $Profitability_{t-1}$ | 0.003*** (3.04) | -0.002*** (-2.86) | 0.004*** (3.25) | -0.001 (-0.72) | -0.002* (-1.91) | 0.002 (0.64) | 0.001 (0.42) |
| $Growth_{t-1}$ | 0.000 (0.36) | -0.000* (-1.86) | -0.001*** (-2.87) | 0.001*** (3.65) | 0.000 (1.30) | -0.000 (-0.00) | -0.000 (-0.59) |
| Debt $Ratio_{t-1}$ | -0.001 (-0.41) | 0.014*** (8.80) | -0.044*** (-12.45) | 0.001 (0.32) | 0.011*** (4.92) | -0.008* (-1.84) | -0.002 (-0.37) |
| Working $Capital_{t-1}$ | -0.002*** (-2.89) | 0.001 (0.80) | 0.002* (1.87) | -0.000 (-0.49) | -0.000 (-0.14) | -0.001 (-0.69) | 0.007** (2.37) |
| Deficit/ $Surplus_{t-1}$ | -0.000 (-0.39) | 0.001 (1.42) | -0.000 (-0.70) | -0.000 (-0.79) | 0.001 (1.36) | -0.000 (-0.30) | -0.000 (-0.20) |
| $Size_t$ | 0.136*** (6.97) | -0.080*** (-4.39) | -0.154*** (-5.64) | 0.059*** (2.50) | -0.046* (-1.68) | 0.084* (1.86) | 0.072 (1.42) |
| Probability Level | 31.00% | 40.24% | 15.55% | 11.31% | 6.69% | 1.63% | 1.41% |
| Number of observations | 570 | 740 | 286 | 208 | 123 | 30 | 26 |

*Notes:* The table reports the results from probit regressions of seven debt-equity choice variables on possible determinants of each choice. The debt-equity choice variables are: a net increase in debt (an increase in debt with a reduction in equity, an increase in debt with no change in equity, or no change in debt with a reduction in equity); a net increase in equity (an increase in equity with a reduction in debt, an increase in equity with no change in debt, or no change in equity with a reduction in debt); no change in either debt or equity; an increase in both debt and equity; an increase in equity and a reduction in debt; an increase in debt and a reduction in equity; and a decrease in both debt and equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the change in the book value of the firm's assets from year *t-1* to year *t* divided by the

book value of the firm's assets at *t-1*. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $\boldsymbol{Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}}$, where $\boldsymbol{Div_{i,t}}$ are the dividend payments of firm *i* at time *t*, $\boldsymbol{I_{i,t}}$ is the net investment of firm *i* at time *t*, and $\boldsymbol{OCF_{i,t}}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value of the firm's assets. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively.

**Table 5.** Probit regressions for determinants of the debt-equity choice, controlling for differences between the sub-periods 1984-1999 and 2000-2009

| | Net increase in debt | Net increase in equity | No change | Increase in both debt and equity | Increase in equity, reduction in debt | Increase in debt, reduction in equity | Decrease in both debt and equity |
|---|---|---|---|---|---|---|---|
| Period Dummy | 0.498<br>(1.37) | -0.665**<br>(-1.98) | -0.596<br>(-1.16) | 1.018**<br>(2.27) | -0.163<br>(-0.33) | 1.870**<br>(1.96) | -1.317<br>(-1.33) |
| Period Dummy x Profitability$_{t-1}$ | 0.001<br>(0.23) | -0.002<br>(-1.09) | 0.002<br>(0.87) | -0.000<br>(-0.11) | -0.001<br>(-0.32) | 0.001<br>(0.15) | 0.001<br>(0.13) |
| Period Dummy x Growth$_{t-1}$ | -0.007<br>(-0.21) | -0.013<br>(-0.43) | 0.058<br>(1.13) | 0.003<br>(0.10) | 0.014<br>(0.35) | -0.111<br>(-1.41) | -0.089<br>(-0.97) |
| Period Dummy x Debt Ratio$_{t-1}$ | 0.003<br>(0.90) | -0.007**<br>(-2.18) | 0.060***<br>(4.72) | 0.007<br>(1.59) | 0.003<br>(0.64) | -0.006<br>(-0.58) | -0.002<br>(-0.22) |
| Period Dummy x Working Capital$_{t-1}$ | -0.002*<br>(-1.68) | 0.002<br>(1.38) | 0.004*<br>(1.78) | -0.001<br>(-0.57) | 0.000<br>(0.21) | 0.002<br>(0.56) | 0.007<br>(1.30) |
| Period Dummy x Deficit/ Surplus$_{t-1}$ | -0.001<br>(-0.74) | 0.001<br>(0.43) | 0.001<br>(0.87) | -0.001<br>(-0.44) | 0.001<br>(0.59) | 0.001<br>(0.47) | 0.001<br>(0.34) |
| Period Dummy x Size$_t$ | -0.050<br>(-1.23) | 0.083**<br>(2.15) | 0.028<br>(0.46) | 0.137***<br>(2.74) | -0.002<br>(-0.04) | -0.136<br>(-1.30) | 0.176*<br>(1.61) |
| Probability Level | 31.00% | 40.24% | 15.55% | 11.31% | 6.69% | 1.63% | 1.41% |
| Number of observations | 570 | 740 | 286 | 208 | 123 | 30 | 26 |

*Notes:* The table reports the results from probit regressions of seven debt-equity choice variables on possible determinants of each choice, controlling for differences between the sub-periods 1984-1999 and 2000-2009. The debt-equity choice variables are: a net increase in debt (an increase in debt with a reduction in equity, an increase in debt with no change in equity, or no change in debt with a reduction in equity); a net increase in equity (an increase in equity with a reduction in debt, an increase in equity with no change in debt, or no change in equity with a reduction in debt); no change in either debt or equity; an increase in both debt and equity; an increase in equity and a reduction in debt; an increase in debt and a reduction in equity; and a decrease in both debt and equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the change

in the book value of the firm's assets from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $\boldsymbol{Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}}$, where $\boldsymbol{Div_{i,t}}$ are the dividend payments of firm *i* at time *t*, $\boldsymbol{I_{i,t}}$ is the net investment of firm *i* at time *t*, and $\boldsymbol{OCF_{i,t}}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value of the firm's assets. The period dummy takes the value 0 for the years from 1984 to 1999 and the value 1 for the years from 2008 to 2009. Observations for all determinants other than size are lagged one year. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively.

**Table 6.** Changes in the frequency of firms' capital structure decisions over time

**Panel A: Frequency of firms' capital structure decisions at time *t-1*, preceding each of the possible debt-equity decisions at time *t***

| | E(t) | (-) | | | (0) | | | (+) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | E(t-1) | (-) | (0) | (+) | (-) | (0) | (+) | (-) | (0) | (+) |
| D(t) | D(t-1) | | | | | | | | | |
| | (-) | 1 (3) | 15 (41) | 2 (5) | 7 (1) | 203 (36) | 39 (7) | 1 (1) | 37 (31) | 16 (13) |
| (-) | (0) | 1 (3) | 2 (5) | 0 (0) | 0 (0) | 11 (2) | 1 (0) | 0 (0) | 0 (0) | 2 (2) |
| | (+) | 1 (3) | 7 (19) | 8 (22) | 15 (3) | 221 (39) | 64 (11) | 0 (0) | 36 (30) | 28 (23) |
| | (-) | 1 (3) | 3 (10) | 1 (3) | 2 (1) | 35 (12) | 8 (3) | 1 (1) | 12 (12) | 3 (3) |
| (0) | (0) | 5 (17) | 10 (34) | 8 (28) | 11 (4) | 184 (64) | 38 (13) | 8 (8) | 37 (36) | 41 (39) |
| | (+) | 0 (0) | 1 (3) | 0 (0) | 1 (0) | 7 (2) | 0 (0) | 1 (1) | 0 (0) | 1 (1) |
| | (-) | 1 (3) | 12 (41) | 2 (7) | 4 (1) | 154 (29) | 43 (8) | 2 (1) | 51 (26) | 21 (11) |
| (+) | (0) | 0 (0) | 4 (14) | 1 (3) | 3 (1) | 22 (4) | 12 (2) | 1 (1) | 18 (9) | 12 (6) |
| | (+) | 1 (3) | 5 (17) | 3 (10) | 7 (1) | 221 (41) | 71 (13) | 1 (1) | 42 (21) | 50 (25) |

**Panel B: Frequency of firms' capital structure decisions at time *t*, following each of the possible debt-equity decisions at time *t-1***

| | E(t-1) | (-) | | | (0) | | | (+) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | E(t) | (-) | (0) | (+) | (-) | (0) | (+) | (-) | (0) | (+) |
| D(t-1) | D(t) | | | | | | | | | |
| | (-) | 1 (5) | 7 (35) | 1 (5) | 15 (3) | 203 (39) | 37 (7) | 2 (1) | 39 (29) | 16 (12) |
| (-) | (0) | 1 (5) | 2 (10) | 1 (5) | 3 (1) | 35 (7) | 12 (2) | 1 (1) | 8 (6) | 3 (2) |
| | (+) | 1 (5) | 4 (20) | 2 (10) | 12 (2) | 154 (30) | 51 (10) | 2 (1) | 43 (32) | 21 (16) |
| | (-) | 1 (3) | 0 (0) | 0 (0) | 2 (1) | 11 (4) | 0 (0) | 0 (0) | 1 (1) | 2 (2) |
| (0) | (0) | 5 (17) | 11 (38) | 8 (28) | 10 (3) | 184 (64) | 37 (13) | 8 (7) | 38 (33) | 41 (36) |
| | (+) | 0 (0) | 3 (10) | 1 (3) | 4 (1) | 22 (8) | 18 (6) | 1 (1) | 12 (10) | 12 (10) |
| | (-) | 1 (4) | 15 (56) | 0 (0) | 7 (1) | 221 (41) | 36 (7) | 8 (4) | 64 (28) | 28 (12) |
| (+) | (0) | 0 (0) | 1 (4) | 1 (4) | 1 (0) | 7 (1) | 0 (0) | 0 (0) | 0 (0) | 1 (0) |
| | (+) | 1 (4) | 7 (26) | 1 (4) | 5 (1) | 221 (41) | 42 (8) | 3 (1) | 71 (32) | 50 (22) |

*Notes:* The table depicts changes in the frequency of firms' capital structure decisions over time. Panel A reports the frequency of firms' capital structure decisions at time *t-1*, preceding each of the possible debt-equity decisions at time *t*. Panel B reports the frequency of firms' capital structure decisions at time *t*, following each of the possible debt-equity decisions at time *t-1*. Debt issues are defined as the change in the book value of the firm's long-term debt from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Equity issues are defined as the change in the firm's share capital from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. The first number is the frequency of a particular capital structure decision and the number in brackets is the frequency as a percentage of the total number of firms.

**Table 7.** Probit regressions for determinants of two decisions consistently made by firms

| | No change in debt | Increase or reduction in debt, with no change in equity |
|---|---|---|
| Intercept | 1.729*** (7.65) | -0.901*** (-5.38) |
| $Profitability_{t-1}$ | 0.001 (1.04) | 0.004*** (3.52) |
| $Growth_{t-1}$ | -0.024 (-1.57) | -0.061*** (-3.94) |
| $Debt\ Ratio_{t-1}$ | -0.059*** (-16.02) | 0.018*** (10.72) |
| $Working\ Capital_{t-1}$ | 0.001 (0.91) | -0.001 (-1.46) |
| $Deficit/\ Surplus_{t-1}$ | 0.000 (0.63) | -0.000 (-1.30) |
| $Size_{t-1}$ | -0.212*** (-7.94) | 0.089*** (4.69) |
| Probability level | 22.89% | 55.57% |
| Number of observations | 421 | 1,022 |

*Notes:* The table reports the results from probit regressions of two debt-equity choice variables on possible determinants of each choice. The debt-equity choice variables are: no change in debt; and an increase or reduction in debt, with no change in equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the change in the book value of the firm's assets from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}$, where $Div_{i,t}$ are the dividend payments of firm *i* at time *t*, $I_{i,t}$ is the net investment of firm *i* at time *t*, and $OCF_{i,t}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value of the firm's assets. Observations for all determinants other than size are lagged one year. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively.

**Table 8.** Probit regressions for determinants of two decisions consistently made by firms, controlling for differences between the sub-periods 1984-1999 and 2000-2009

| | No change in debt | Increase or reduction in debt, with no change in equity |
|---|---|---|
| Period Dummy | -0.613<br>(1.23) | -0.298<br>(-0.86) |
| Period Dummy x Profitability$_{t-1}$ | 0.004*<br>(1.75) | -0.003<br>(-1.30) |
| Period Dummy x Growth$_{t-1}$ | 0.078**<br>(1.99) | -0.055<br>(-1.53) |
| Period Dummy x Debt Ratio$_{t-1}$ | 0.059***<br>(5.11) | -0.006<br>(-1.61) |
| Period Dummy x Working Capital$_{t-1}$ | 0.003*<br>(1.83) | -0.002<br>(-1.58) |
| Period Dummy x Deficit/ Surplus$_{t-1}$ | 0.000<br>(0.27) | -0.000<br>(-0.33) |
| Period Dummy x Size$_t$ | 0.021<br>(0.36) | 0.062<br>(1.56) |
| Probability level | 22.89% | 55.57% |
| Number of observations | 421 | 1,022 |

*Notes:* The table reports the results from probit regressions of two debt-equity choice variables on possible determinants of each choice, controlling for differences between the sub-periods 1984-1999 and 2000-2009. The debt-equity choice variables are: no change in debt; and an increase or reduction in debt, with no change in equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets. Growth is the change in the book value of the firm's assets from year *t-1* to year *t* divided by the book value of the firm's assets at *t-1*. Debt ratio is the book value of the firm's long-term debt divided by the book value of the firm's assets. Working capital is the firm's current assets less its current liabilities divided by the book value of the firm's assets. A financing deficit or surplus is the firm's financial deficit or surplus divided by the book value of the firm's assets. We define financial deficits as positive values and financial surpluses as negative values calculated from the identity $Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t}$, where $Div_{i,t}$ are the dividend payments of firm *i* at time *t*, $I_{i,t}$ is the net investment of firm *i* at time *t*, and $OCF_{i,t}$ are operating cash flows after interest and taxes for firm *i* at time *t*. Size is the natural log of the book value

of the firm's assets. Observations for all determinants other than size are lagged one year. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively.

# Chapter Four

## Essay Three

The third essay on partial adjustment toward target capital structure is presented in Chapter Four. The literature review briefly outlines the different adjustment speeds reported in previous studies and some of the factors that may influence the speed of adjustment. The review also discusses papers that question the existence of target debt ratios and some of the studies that have attempted to deal with this methodological issue. The next section of the essay discusses the variables used in the analysis. The methodology section presents the two partial adjustment models that are used to estimate the speed of adjustment for the New Zealand market as a whole and for particular industries within that market. The reference list for the essay is reproduced in the final section of this thesis.

# Partial adjustment towards target capital structure: Evidence from New Zealand

**Abstract**

We find that between 1984 and 2009 New Zealand firms adjust towards target ratios at a rate of approximately 21 to 23 percent a year, which is consistent with relatively moderate speeds reported for United States firms. We then investigate whether industry differences, financing deficits, and financing policies influence adjustment speed. Our first significant finding is that different industries adjust towards target debt ratios at different speeds. Industry risk and competitiveness are investigated as possible explanations for these differences. Our second finding is that firms with financial deficits adjust more quickly towards a target debt ratio. The need by firms to visit capital markets to cover a financing gap provides a possible explanation for this result. Our final significant finding is that firms' financing policies influence adjustment speed. New Zealand firms that neither issue nor repay debt adjust towards target debt ratios more slowly than other firms. It is possible that these firms have already achieved or are close to their ideal level of debt. Firms that issue or repay debt, but undertake no change in equity, adjust towards target debt ratios more quickly than other firms. The need to access capital markets may again be an explanation for this result.

*Key words:* Capital structure; speed of adjustment

*JEL classification:* G32

## 1.0 Introduction

We investigate how quickly New Zealand firms adjust toward target debt ratios between 1984 and 2009. Previous literature presents evidence that firms do adjust toward targets but also report a wide range of adjustment speeds (see, for example, Fama and French (2002) and Flannery and Rangan (2006)). We find that New Zealand firms adjust towards target ratios at a rate of approximately 21 to 23 percent per year, which is consistent with relatively moderate speeds reported for United States firms in papers such as Lemmon et al. (2008) and Huang and Ritter (2009).

A number of papers also examine the influence of specific factors on the speed of adjustment, including macroeconomic variables (Drobetz and Wanzenried (2006) and Cook and Tang (2008)) and financial deficits (Byoun (2008)). We extend the literature by first examining whether adjustment speeds vary from industry to industry and the possible reasons for such variations, using evidence from New Zealand. Although some previous studies control for industry effects on adjustment speed (see, for example, Hovakimian et al. (2001) and Flannery and Rangan (2006)), they do not explicitly examine industry differences.

There are two reasons why New Zealand industries in particular may show evidence of differing adjustment speeds. First, since the mid 1980s widespread reforms have taken place in the New Zealand economy. One of the main consequences of these reforms has been the deregulation of New Zealand industries (Ratnayake (1999)). We suggest that deregulation tends to allow greater scope for firms within industries to select target debt ratios and to adjust toward those ratios as

they deem appropriate. Second, New Zealand is a small economy and therefore the industries that operate within it contain relatively few firms. Consequently we tend to see wide variations in the degree of competition within New Zealand industries. Some industries, such as telecommunications, are dominated by two or three firms while others, such as agriculture and fisheries, are more competitive. It is possible that differences in competitiveness may affect adjustment speed. For example, firms in more competitive industries may not regard rapid adjustment toward a target ratio as a priority if such a policy constrains strategies that help to boost their competitiveness.

Our results support our hypothesis with respect to New Zealand industries. We find that different New Zealand industries do indeed have different speeds of adjustment. Speeds range from as low as seven percent per year for the mining industry to as high as 52 percent per year for the transport industry. Industry risk and competitiveness are investigated as possible explanations for differences in industry adjustment speeds, but we conclude that further research is required to explain our industry results.

We extend our analysis by investigating the influence of financial deficits on the speed of capital structure adjustment. Byoun (2008) argues that funding imbalances in the form of financial deficits and surpluses are likely to influence adjustment speed. We find that New Zealand firms adjust towards a target debt ratio more quickly when the firms are experiencing a financial deficit. Following Dang et al. (2011), we suggest that New Zealand firms are resorting to capital markets to cover financing gaps and using the opportunities provided by capital raising to adjust towards target debt ratios more quickly than firms with surpluses.

Finally, we examine the influence of firms' financing policies on the speed of adjustment. As far as we are aware, no previous literature has explored the extent to which a firm's use of debt or equity to finance its activities has an impact on how quickly a firm reverts to a target capital structure. Our first result is that New Zealand firms that neither issue nor repay debt adjust towards target debt ratios more slowly than other firms. A suggested explanation for this result is that firms not actively issuing or repaying debt have already achieved or are close to their ideal level of leverage. Our second result is that New Zealand firms that issue or repay debt, but undertake no change in equity, adjust towards target debt ratios more quickly than other firms. The explanation for this result may be similar in nature to that put forward for firms with financing deficits. Firms that are actively engaged in issuing or repaying debt, and therefore accessing capital markets to facilitate debt issues, have more opportunities to quickly move back to a leverage target.

Previous research indicates that the choice of econometric model is crucial to determining whether and how quickly firms adjust towards target debt ratios (see, for example, Chen and Zhao (2007)). In our analysis we therefore employ both two-step and integrated partial adjustment models, as recommended by Hovakimian and Li (2009). Hovakimian and Li argue that these models have the power to reject the target-adjustment model when it is false and that the models therefore produce unbiased estimates of adjustment speeds. Consistent with previous research (see, for example, Fama and French (2002)), we also use measures of both book and market leverage.

The remainder of the paper is structured as follows. Section 2 reviews relevant literature. Sections 3 and 4 describe the variables used in the analysis and the methodology used. Section 5 outlines how the data was collected for the study. Section 6 presents the results from the analysis of the data. Section 7 summarises our findings.

## 2.0 Literature

Modern capital structure theory begins with Modigliani and Miller (1958) who show that in perfect markets, capital structure should have no influence on the value of a firm. However capital market imperfections, such as taxes and bankruptcy costs, imply that the choice of capital structure does have an impact on value, that firms will trade off the costs and benefits of debt and that they will have a target debt-equity ratio. In a survey of American firms, Graham and Harvey (2001) find that 71 percent of CFOs have a target range for a debt-equity ratio and a further 10 percent have a definite target ratio, which appears to be consistent with the trade-off theory of capital structure.

Consistent with the trade-off theory, a large body of research presents evidence that firms adjust toward a target capital structure. However the speeds of adjustment reported vary considerably from study to study. A number of papers find evidence of relatively low adjustment speeds. For example, Fama and French (2002) find that firms move towards target debt ratios at speeds ranging from 7 to 17 percent per year, while Hovakimian and Li (2009) estimate adjustment speeds ranging from 6 to 13 percent. Flannery and Rangan (2006), in contrast, find that the rate of adjustment is 34 percent per year, which is consistent with faster speeds reported in earlier

studies such as that of Jalilvand and Harris (1984). Other papers, such as Lemmon et al. (2008) and Huang and Ritter (2009), report adjustment speeds that lie between these extremes.

Some recent literature examines the influence of specific factors on the speed of adjustment toward a target debt ratio. Drobetz and Wanzenried (2006) and Cook and Tang (2008) investigate how macroeconomic factors influence adjustment speed. Drobetz and Wanzenried find that firms that are further away from their target debt ratio and that have better growth opportunities, adjust more quickly to the target. The speed of adjustment is also higher during economic booms and when the term spread on interest rates is wider. Consistent with Drobetz and Wanzenried (2006), Cook and Tang find that firms adjust more quickly during good economic times than during bad.

Byoun (2008) argues that the financial needs of firms should be a critical determinant of adjustment speeds. In particular the author predicts that firms with a financing deficit and below-target debt or with a financing surplus and above-target debt are likely to adjust more rapidly toward their target debt ratio than firms with a financing deficit and above-target debt or a financing surplus and below-target debt. Consistent with these predictions he finds that firms with a financing surplus and above-target debt adjust at a rate of approximately 33 percent per year and firms with a financing deficit and below-target debt at a rate of approximately 20 percent. The adjustment speeds for firms with a financing deficit and above-target debt or a financing surplus and below-target debt are substantially lower (two percent and five percent respectively). Dang et al. (2011) find that firms with financing deficits adjust towards target capital structures faster than firms with financing surpluses. Their explanation of this finding is that firms with deficits have greater incentives to issue new debt or equity, and that accessing

capital markets to facilitate security issues provides more opportunities to quickly move back to a leverage target.

However a number of papers question whether firms do in fact have target debt ratios. Shyam-Sunder and Myers (1999) and Chen and Zhao (2007) argue that apparent evidence of firms reverting to targets may be partly the result of mechanical mean reversion rather than deliberate firm policy. Chen and Zhao (2007) suggest that future studies must control for this mechanical effect without offering specific suggestions as to how this might be done. Chang and Dasgupta (2009) maintain that previous tests of adjustment toward target debt ratios, where the tests are based on changes in leverage ratios, do not provide conclusive evidence of target behaviour. Rather than look at leverage ratios, Chang and Dasgupta suggest that a more fruitful line of research may be to examine firms' issuance activity and why they choose to use debt rather than equity.

Hovakimian and Li (2009) acknowledge the issues raised by Shyam-Sunder and Myers (1999) and Chang and Dasgupta (2009). They also show that capital structure models, including partial adjustment models, may produce results that appear to confirm targeting behaviour but which are in fact spurious. However after examining a number of partial adjustment models, they find that a two-step regression technique with firm fixed effects and a one-step GMM technique have the power to reject the target-adjustment model when it is false. Their tests estimate adjustment speeds ranging from 6 to 13 percent per year.

In summary, it remains an open question as to whether firms have target debt ratios and, if they do, how quickly firms adjust toward these targets and which factors influence the speed of adjustment. It is evident that the choice of econometric procedure may have a significant influence on adjustment speed.

## 3.0 Variables

### 3.1 Determinants of capital structure

We first define our choices of proxy for leverage. We then discuss the variables we have chosen to include as potential determinants of the target debt ratio: profitability, growth opportunities, firm size, and tangibility of assets. We focus on these four factors for similar reasons to those given by Rajan and Zingales (1995). First, a relationship between these variables and leverage has been demonstrated most consistently in previous research (see, for example, Harris and Raviv (1991)). Second, limitations in our data restrict our ability to construct meaningful proxies for other potential determinants, such as nondebt tax shields and R & D expenditure. However we also control for industry effects not captured by our main explanatory variables.

*Leverage*

An issue that arises in the capital structure literature is whether to use book or market leverage. Fama and French (2002) argue that most predictions of the tradeoff and pecking order theories apply to book leverage. However they also note that some predictions are ambiguous and

therefore they present results for market leverage as well as book leverage. Following Fama and French, we report results for both types of leverage.

Our proxy for book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. Following Drobetz and Wanzenried (2006), we use a quasi-market proxy for market leverage. The book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. Market value of equity is calculated as the product of the number of shares on issue and the market price of the firm's share as at the firm's balance date.

*Profitability*

According to the pecking order model of capital structure, greater profitability should lead to less use of debt. Myers (1984) argues that as firms' profits increase, there are more retained earnings available to finance investments. Consequently firms do not have the need to employ as much leverage. On the other hand, Drobetz and Wanzenried (2006) note that the trade-off model implies that more profitable firms will use more debt. For example, when earnings are higher, there is a decline in expected bankruptcy costs and therefore firms are in a better position to use more leverage. Our proxy for profitability is earnings before interest and tax (EBIT) divided by the book value of the firm's assets.

*Growth opportunities*

Jensen and Meckling (1976) and Myers (1977) argue that firms may invest in unnecessarily risky projects in order to reduce the returns to the firm's creditors. This strategy may be particularly costly for firms with growth opportunities that have a wider range of future investments to choose from and therefore firms with growth opportunities may use less debt. On the other hand, consistent with the trade-off model, firms with more growth opportunities may find that their financing needs exceed retained earnings and that they must therefore use more leverage. Following Drobetz and Wanzenried (2006), our proxy for growth opportunities is the ratio of the market value of equity to the book value of equity.

*Size*

Warner (1977) and Ang et al. (1982) argue that the bankruptcy costs associated with carrying debt tend to decline as firms become larger, and therefore large firms carry more debt. This line of reasoning is consistent with the trade-off model. Our proxy for firm size is the natural log of the book value of the firm's assets.

*Tangibility*

Work by Jensen and Meckling (1976) and Myers (1977) suggests that as firms use more fixed assets, the cost of financing with debt declines and firms therefore use more leverage. This argument is consistent with the trade-off model. On the other hand, Titman and Wessels (1988)

note that bondholders monitor highly-levered firms more closely and that the monitoring costs for firms with less collateral tend to be higher. Consequently in highly-levered firms with fewer fixed assets there tend to be higher monitoring costs and therefore fewer resources available for managers to waste on perquisites. Therefore firms with fewer fixed assets may use more leverage. Our proxy for tangibility is the book value of the firm's plant and vehicles divided by the book value of the firm's assets.

*Industry classification*

Showalter (1999) notes that unobservable characteristics specific to a particular industry may influence the levels of debt within that industry. We therefore include dummy variables for each of the industries in our sample.

**3.2 Determinants of the speed of adjustment**

The three possible determinants of adjustment speed that we examine are industry differences, financing deficits, and financing policies.

*Industry differences*

To examine whether the speed of adjustment varies across industries, we calculate adjustment speeds for each of the 15 industries represented in our sample.

*Financing deficits*

Byoun (2008) argues that funding imbalances in the form of financing deficits and surpluses are likely to influence adjustment speed. For example, a firm that faces a deficit or surplus, and therefore needs to increase or reduce its debt or equity financing, might see this situation as an opportunity to adjust to a target debt ratio, at a relatively low cost in terms of transaction fees. We define a financial deficit as a positive value calculated using the following identity:

$$Def_{i,t} = Div_{i,t} + I_{i,t} - OCF_{i,t} \quad (1)$$

where $Div_{i,t}$ are the dividend payments of firm *i* at time *t*, $I_{i,t}$ is the net investment of firm *i* at time *t*, and $OCF_{i,t}$ are operating cash flows after interest and taxes for firm *i* at time *t*. A financial deficit must be covered by either debt or equity. The variable we use in our analysis is a deficit dummy which takes the value 1 when $Def_{i,t}$ is greater than zero and the value 0 when $Def_{i,t}$ is less than or equal to zero.

*Financing policies*

No previous literature has explored the extent to which a firm's use of debt or equity to finance its activities has an impact on how quickly a firm reverts to a target capital structure. Smith et al. (2011) find that a significant proportion of New Zealand firms are consistent non-issuers of debt over the years from 1984 to 2009, while others consistently prefer to use debt financing while

neither issuing or retiring equity. We suggest that each of these groups of firms may display significant differences in how quickly they adjust towards target debt ratios.

We use two financing policy dummy variables in our analysis. A dummy for non-debt issuers takes the value 1 when firms neither issue nor repay debt and the value 0 otherwise. A dummy for debt issuers takes the value 1 when firms either issue or repay debt, but undertake no change in equity, and the value 0 otherwise.

## 4.0 Model specification

Both two-step and integrated partial adjustment models are used in the literature. Following the examples of Cook and Tang (2008) and Hovakimian and Li (2009), we employ both approaches.

### 4.1 Two-step partial adjustment model

Our formulation of a two-step partial adjustment model is consistent with the approach employed in studies such as Fama and French (2002) and Kayhan and Titman (2007). We first specify the target debt ratio as a function of explanatory variables:

Step 1:

$$DR_{i,t}^{*} = \beta X_{i,t-1} \qquad (2)$$

where $DR^*_{i,t}$ is the optimal or target debt ratio of firm *i* at time *t*, and $X_{i,t-1}$ are potential determinants of the target debt ratio (described in detail in Section 3.1).

If the costs of adjusting to the target debt ratio are zero, then the actual debt ratio of a firm, $DR_{i,t}$, should be the same as the target debt ratio, that is, $DR_{i,t}$=$DR^*_{i,t}$. However in the presence of adjustment costs, adjustment to the target ratio from time *t-1* to time *t* is not complete. Therefore, in the second stage of the model, we estimate the partial speed of adjustment as follows:

Step 2:

$$(DR_{i,t} - DR_{i,t-1}) = \delta_{i,t}\left(DR^*_{i,t} - DR_{i,t-1}\right) + u_{i,t} \quad (3)$$

where $\delta_{i,t}$ represents the estimated speed of adjustment towards the target debt ratio from time *t-1* to time *t,* and $DR^*_{i,t}$ is the target debt ratio estimated in Step 1. Rearranging terms, we obtain the following testable model:

$$DR_{i,t} = \delta_{i,t}DR^*_{i,t} + \left(1 - \delta_{i,t}\right)DR_{i,t-1} + u_{i,t} \quad (4)$$

The adjustment speed is calculated by subtracting the estimated coefficient of $DR_{i,t-1}$ from 1. The model implies that the adjustment speed is the same for all firms. Following Hovakimian and Li (2009), we estimate the target debt ratio in equation (2) using a fixed effects panel regression. Hovakimian and Li argue that a two-step regression technique with firm fixed effects has the

power to reject the target-adjustment model when it is false and therefore produces unbiased estimates of adjustment speeds.

### 4.2 Integrated partial adjustment model

An integrated partial adjustment model estimates the speed of adjustment in a single step. Kayhan and Titman (2007) note that this approach may reduce estimation errors. Following the approach outlined in papers such as Drobetz and Wanzenried (2006) and Flannery and Rangan (2006), we substitute equation (2) into equation (3) and rearrange terms, to obtain the following testable model:

$$DR_{i,t} = \delta_{i,t}\,\beta X_{i,t-1} + \left(1 - \delta_{i,t}\right) DR_{i,t-1} + u_{i,t} \qquad (5)$$

The adjustment speed is calculated by subtracting the estimated coefficient of $DR_{i,t-1}$ from 1. Following Hovakimian and Li (2009), we estimate equation (5) using a generalised method of moments (GMM) regression. Again, Hovakimian and Li argue that an integrated GMM model has the power to reject the target-adjustment model when it is false.

### 4.3 Industry variations in the speed of adjustment

To test whether the speed of adjustment varies from industry to industry, we apply each partial adjustment model to firms in each of the 15 industries represented in our sample.

### 4.4 The influence of financing deficits and financing policies on the speed of adjustment

Following Drobetz and Wanzenried (2006), we test whether particular variables affect the speed of adjustment, by first assuming adjustment speed is a linear function of each of the variables of interest. The relationship is expressed as follows:

$$\delta_{i,t} = \gamma_0 + \gamma_1 Y_{i,t} \quad (6)$$

where $\delta_{i,t}$ is the speed of adjustment and $Y_{i,t}$ represents either a financing deficit variable or a financing policy variable that may affect adjustment speed. To simplify the analysis, each variable is applied separately. Substituting equation (6) into equation (5) and rearranging terms, we obtain the following testable model:

$$DR_{i,t} = (1 - \gamma_0)DR_{i,t-1} - \gamma_1 Y_{i,t} DR_{i,t-1} + \gamma_0 \beta X_{i,t-1} + \gamma_1 \beta Y_{i,t} X_{i,t-1} + u_{i,t} \quad (7)$$

We are principally interested in the second term of the equation, that is, the interaction between the potential determinant of adjustment speed, $Y_{i,t}$, and lagged leverage, $DR_{i,t-1}$.

### 5.0 Data

Data for New Zealand companies was supplied to us by the New Zealand stock exchange (NZX). The original data set contains 390 New Zealand companies, including both listed and delisted firms. It has 3,564 company-years of data for the years from 1984 to 2009. From this data set we

excluded firms for which market prices and full accounting data could not be provided. We also excluded overseas issuers. This left a data set of 227 companies and 2,482 company-years of data. We exclude finance firms on the grounds that their decisions with respect to capital structure may reflect special considerations. For example, Fama and French (1992) note that high leverage usually indicates distress in nonfinancial firms, but not necessarily in financial firms. We also exclude company years for which the book value of assets and the book value of equity are non-negative. Byoun (2008) note that when these variables are used to deflate other variables, as they are in our paper, results obtained using negative values may be difficult to interpret.

Most variables in our model are expressed as ratios. However this is not the case for the size variable, which is defined as the natural log of the book value of the firm's assets. We therefore inflation-deflate book assets using the Consumer Price Index obtained from the Global Financial Database, before taking the natural log. The profitability variable displays evidence of extreme negative values and the growth variable displays evidence of extreme positive values. We winsorise these two variables at the 1$^{st}$ and 99$^{th}$ percentiles respectively, in order to reduce the impact of the extreme observations. The final sample has 205 companies and 2,224 company-years of data.

Table 1 summarises the final sample of firms broken down by industry and the number of company years of data available for each industry. We use the NZX's industry classification. Analysis of the data is performed using SAS.

**(Insert Table 1 about here)**

## 6.0 Results

### 6.1 Summary statistics of leverage and explanatory variables

Table 2 presents summary statistics for our two definitions of leverage and all explanatory variables. The mean value for book leverage is 27 percent and the mean value for market leverage is 23 percent. Average profitability (EBIT divided by the book value of assets) is four percent. The proxy for growth opportunities (the ratio of the market value of equity to the book value of equity) indicates that market equity is on average twice the size of book equity. The proxy for tangible assets indicates that plant and vehicles comprise on average 20 percent of book assets.

**(Insert Table 2 about here)**

### 6.2 Correlations between variables

Table 3 presents correlation coefficients for the leverage and explanatory variables. The highest correlation between independent variables is for size and both book and market leverage, with coefficients of 0.422 and 0.420 respectively. Consistent with Warner (1977) and Ang et al. (1982), larger firms tend to use more debt. Given the significant correlation between these variables, a potential problem is multicollinearity. Variance inflation factors (VIFs) were calculated for all independent variables, and the relatively low values of the VIFs (not reported but available from the authors on request) suggest that multicollinearity is not a serious issue.

**(Insert Table 3 about here)**

### 6.3 Determinants of capital structure

We first test whether our choice of capital structure determinants is appropriate for modelling a target debt ratio, by running fixed effects regressions of the leverage ratios on the independent variables lagged by one year (see Equation 1 in Section 4). Industry and year dummy variables are also included in the regression equations (their coefficients are not reported but are available from the authors on request). The results of the analysis are reported in Table 4.

**(Insert Table 4 about here)**

For both book leverage and market leverage, the profitability variable is significant at the one percent level and has a negative sign. The direction of this relationship is consistent with most previous empirical research. For book leverage, the growth variable is significant at the one percent level and has a positive sign, while for market leverage the growth variable is significant at the one percent level and has a negative sign. Drobetz and Wanzenried (2006) note that empirical results for the relationship between leverage and growth are mixed and the opposite signs we report for book and market leverage are consistent with results in Titman and Wessels (1988). For both book leverage and market leverage, the size variable is significant at the one percent level and has a positive sign. The direction of this relationship is consistent with most previous empirical research. For both book leverage and market leverage, the tangibility variable is significant at the one percent level and has a negative sign. The direction of this relationship is

not consistent with most previous empirical research; however Titman and Wessels (1988) note that the higher monitoring costs associated with having fewer fixed assets may encourage firms to use more debt (see Section 3 above for further exposition of their argument). Overall, the regression results indicate that the chosen capital structure determinants are appropriate for modelling firm leverage.

### 6.4 Estimating the speed of adjustment

Table 5 presents the results of estimating adjustment speeds for all New Zealand companies in our sample. All reported variables are lagged by one year. Consistent with the analysis in Section 4, the estimated adjustment speed is equal to 1 minus the estimated coefficient on leverage. Industry and year dummy variables are included in all of the regression equations (their coefficients are not reported but are available from the authors on request).

**(Insert Table 5 about here)**

In the first and second columns of Table 5 we present the results of estimating adjustment speed using the two-step partial adjustment model. Looking first at the book value of debt, the coefficient on the lagged leverage variable implies that New Zealand firms move towards their target debt ratio at a rate of 22.2 percent (1 - 0.778) per year. With respect to market leverage, the coefficient on the lagged leverage variable implies an adjustment speed of 22.6 percent (1 - 0.774) per year. In the third and fourth columns of the table we present the results of estimating adjustment speed using the integrated partial adjustment model. With respect to the book value of

debt, the coefficient on the lagged leverage variable implies that firms move towards their target debt ratio at a rate of 21.5 percent (1 - 0.785) per year. For market leverage, the coefficient on the lagged leverage variable implies an adjustment speed of 20.5 percent (1 - 0.795) per year. Thus the estimated adjustment speeds are similar irrespective of which adjustment speed model or leverage proxy is used and are consistent with relatively moderate speeds reported for United States firms in papers such as Lemmon et al. (2008) and Huang and Ritter (2009).

### 6.5 Industry differences as an influence on adjustment speed

We now turn to one of the main focuses of our paper, which is to investigate whether industry differences influence how quickly New Zealand firms adjust towards target capital structures. Table 6 presents summary statistics for our two definitions of leverage, subdivided by industry, over the sample period from 1984 to 2009. For each industry, the mean values for book leverage and market leverage are of a similar magnitude. The mean values range from five percent for market leverage in the mining industry to 42 percent for book leverage in the transport industry. A number of papers (see, for example, Gale (1972) and Esposito (1985)) note that some industries are likely to have more business risk than others, and therefore may try to decrease their financial risk by using less leverage in their capital structure. This appears to be reflected in the reported statistics for New Zealand industries. For example, the mining, forestry and investment industries are likely to have volatile cash flows and their higher business risk appears to be reflected in the relatively low levels of debt that they employ. On the other hand, higher levels of leverage are reported for more stable industries such as property, transport, and leisure and tourism.

**(Insert Table 6 about here)**

Regression results for the speed of adjustment towards target debt ratios in each industry are reported in Table 7. To make comparisons between industries easier, we report the lagged leverage coefficients only and do not report coefficients for the other explanatory variables. The estimated adjustment speed is equal to 1 minus the estimated coefficient on leverage.

**(Insert Table 7 about here)**

For 13 out of 15 industries, the adjustment speed estimates reported within each industry are consistent; the estimates for each industry lie within a narrow range (three to 11 percent), irrespective of which partial adjustment model or measure of leverage is used. For the remaining two industries, building and transport, the estimates range from 19 to 50 percent and from 24 to 52 percent respectively, depending on which model and measure of leverage is used. There are only 65 and 77 observations respectively for these two industries, which may be a possible explanation for their less consistent results.

Turning to the interpretation of our results, there is evidence that firms within different industries do adjust towards target debt ratios at different speeds. Firms within the agriculture and fisheries, mining, property, leisure and tourism, and consumer industries move towards their target debt ratios relatively slowly, in comparison to other industries. The adjustment speeds for these industries are between 16 and 19 percent per year for agriculture and fisheries, between seven and 11 percent per year for mining, between 18 and 21 percent per year for property, between 16

and 19 percent per year for leisure and tourism, and between 14 and 22 percent per year for consumer. In contrast, firms within the energy, ports, and media and communications industries move towards their target ratios relatively rapidly. The adjustment speeds for these industries are between 27 and 33 percent per year for energy, between 26 and 34 percent per year for ports, and between 27 and 35 percent per year for media and communications. For another five industries (forestry, food, textiles and apparel, intermediate, and investment), adjustment speeds tend to lie between these extremes.

Two of the industries (property and leisure and tourism) that have relatively slow adjustment speeds, also have relatively high levels of debt (based on the summary statistics in Table 6), which may indicate they are comparatively less risky. Therefore when firms in these industries deviate from their target debt ratio, and in particular take on additional debt, they may feel less pressure than firms in other industries to adjust back to target debt ratios quickly. On the other hand, one industry (ports) that has a relatively rapid adjustment speed also has a relatively low level of debt, which may indicate it is comparatively more risky. When firms in this industry deviate from their target debt ratio, and in particular take on additional debt, they may increase their risk still further and therefore try to adjust back towards their target ratios more quickly. However results for other industries are not consistent with an inverse relationship between levels of debt and speed of adjustment.

Three industries (agriculture and fisheries, leisure and tourism, and consumer) that have relatively slow adjustment speeds can be classified as competitive, based on competitiveness rankings reported in Smith et al. (2010). It is possible that firms in these more competitive

industries may not regard rapid adjustment toward a target ratio as a priority if such a policy constrains strategies that help to boost their competitiveness. However it is again the case that results for other industries cannot be interpreted in this way.

In summary, there is evidence of differing adjustment speeds in New Zealand industries. However possible explanations for the differences between industries need to be investigated further with different models or more comprehensive data.

### 6.6 The effect of financial deficits and financing policies on the speed of adjustment

Table 8 reports regression results for the speed of adjustment towards target debt ratios, controlling for financial deficits and financing policies. To make analysis simpler, we report only the coefficients for lagged leverage and the interactions between the possible determinants of adjustment speed and lagged leverage. Equation 7 in Section 4.4 specifies a negative sign on the interaction between adjustment speed determinants and lagged leverage. Consequently the signs on the interaction term coefficients reported in the table must be reversed when interpreting the results.

**(Insert Table 8 about here)**

Panel A in Table 8 reports the results for the influence of financing deficits on adjustment speed. Consistent with Byoun (2008) and Dang et al. (2011), our results suggest that the speed at which a firm adjusts towards a target capital structure is influenced by whether or not the firm has a

financing deficit. Employing the two-step partial adjustment model, and both book and market leverage, the interaction between financing deficits and lagged leverage has a negative sign and is significant at the one percent level. For the integrated partial adjustment model, and book leverage, the interaction between financing deficits and lagged leverage also has a negative sign and is significant at the five percent level; for market leverage, the interaction variable has a negative sign but is not significant. Thus there is evidence that New Zealand firms with financing deficits adjust towards target debt ratios more quickly than firms that do not have deficits. Following the argument in Dang et al. (2011), we suggest that New Zealand firms are resorting to capital markets to cover financing gaps and using these opportunities to adjust towards target debt ratios more quickly than firms with surpluses.

Panel B in Table 8 reports results for the influence of two financing policy variables on the speed of adjustment. First, we examine whether firms that neither issue nor repay debt adjust more quickly or more slowly towards target debt ratios than other firms. Employing the two-step partial adjustment model and book leverage, the interaction between non-debt issuers and lagged leverage has a positive sign and is significant at the five percent level; for market leverage, the interaction variable also has a positive sign and is significant at the one percent level. For the integrated partial adjustment model, and market leverage, the interaction between non-debt issuers and lagged leverage has a positive sign and is significant at the five percent level; for book leverage, the interaction variable also has a positive sign but is not significant. Thus there is evidence that New Zealand firms that neither issue nor repay debt adjust towards target debt ratios more slowly than other firms. A possible explanation for this result is that firms not

actively issuing or repaying debt have already achieved or are close to their ideal level of leverage.

Second, we examine whether firms that either issue or repay debt, but undertake no change in equity, adjust more quickly or more slowly towards target debt ratios than other firms. Employing the two-step partial adjustment model, and both book and market leverage, the interaction between debt issuers and lagged leverage has a negative sign and is significant at the one percent level. For the integrated partial adjustment model, and book leverage, the interaction between debt issuers and lagged leverage has a negative sign and is significant at the five percent level; for market leverage, the interaction variable also has a negative sign and is significant at the one percent level. Thus there is evidence that New Zealand firms that issue or repay debt, but undertake no change in equity, adjust towards target debt ratios more quickly than other firms. The explanation for this result may be similar to that proposed above for firms with financing deficits. Firms that are actively engaged in issuing or repaying debt, and therefore accessing capital markets to facilitate debt issues, have more opportunities to quickly move back to a leverage target.

## 7.0 Conclusion

We find that New Zealand firms adjust towards target debt ratios at a rate of approximately 21 to 23 percent a year, which is consistent with relatively moderate speeds reported for United States firms. We then investigate whether industry differences, financing deficits and financing policies influence adjustment speed. Our first significant finding is that different New Zealand industries

adjust towards target ratios at varying speeds. Industry risk and competitiveness are possible explanations for differences in industry adjustment speeds. However further research is required to provide an explanation for our result. Our second significant finding is that New Zealand firms with financing deficits adjust towards target debt ratios more quickly than firms that do not have deficits. It is possible that New Zealand firms are going to capital markets to cover financing gaps and are able to use the opportunities provided by this capital raising to adjust towards target debt ratios more quickly than firms with surpluses.

Our final significant finding is that the financing policies of New Zealand firms influence the speed of adjustment. New Zealand firms that neither issue nor repay debt adjust towards target debt ratios more slowly than other firms. We suggest that firms not actively issuing or repaying debt have already achieved or are close to their ideal level of leverage. On the other hand, New Zealand firms that issue or repay debt, but undertake no change in equity, adjust towards target debt ratios more quickly than other firms. Analogous to the explanation for firms with financing deficits, we argue that firms that are actively engaged in issuing or repaying debt, and therefore accessing capital markets to facilitate debt issues, have more opportunities to quickly move back to a leverage target.

**Table 1.** Number of firms and company years by industry

| | *Firms* | *Years* |
|---|---|---|
| *Primary* | | |
| Agriculture and Fish | 19 | 182 |
| Mining | 8 | 102 |
| Forestry | 6 | 95 |
| Building | 4 | 69 |
| *Energy* | 16 | 169 |
| *Goods* | | |
| Food | 15 | 129 |
| Textiles and Apparel | 7 | 81 |
| Intermediate | 25 | 288 |
| *Property* | 21 | 222 |
| *Services* | | |
| Transport | 6 | 83 |
| Ports | 6 | 86 |
| Leisure and Tourism | 10 | 124 |
| Consumer | 21 | 243 |
| Media and Communications | 19 | 154 |
| *Investment* | 22 | 197 |
| *Total* | 205 | 2,224 |

**Table 2.** Summary statistics of leverage and explanatory variables

| *Variable* | *N* | *Mean* | *Median* | *Std Dev* | *Min* | *Max* |
|---|---|---|---|---|---|---|
| Book leverage | 2,224 | 0.268 | 0.255 | 0.226 | 0.000 | 0.981 |
| Market leverage | 2,224 | 0.233 | 0.191 | 0.223 | 0.000 | 0.981 |
| Profitability | 2,224 | 0.038 | 0.094 | 0.341 | -2.128 | 1.232 |
| Growth | 2,224 | 2.044 | 1.267 | 2.533 | 0.036 | 18.381 |
| Size | 2,224 | 8.839 | 8.910 | 1.966 | 1.888 | 13.763 |
| Tangibility | 2,224 | 0.204 | 0.102 | 0.563 | 0.000 | 12.185 |

*Notes:* The table displays descriptive statistics of the leverage and explanatory variables used in the analysis. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of assets. Growth is the ratio of the market value of equity to the book value of equity. Size is the natural log of the book value of the firm's assets. Tangibility is the book value of the firm's plant and vehicles divided by the book value of the firm's assets.

**Table 3.** Correlation matrix

| | Book leverage $_{t-1}$ | Market leverage $_{t-1}$ | Profitability $_{t-1}$ | Growth $_{t-1}$ | Size $_{t-1}$ |
|---|---|---|---|---|---|
| Market leverage$_{t-1}$ | 0.859 | | | | |
| | <.0001 | | | | |
| Profitability $_{t-1}$ | 0.079 | 0.065 | | | |
| | 0.000 | 0.003 | | | |
| Growth $_{t-1}$ | 0.004 | -0.268 | -0.309 | | |
| | 0.873 | <.0001 | <.0001 | | |
| Size $_{t-1}$ | 0.422 | 0.420 | 0.374 | -0.285 | |
| | <.0001 | <.0001 | <.0001 | <.0001 | |
| Tangibility $_{t-1}$ | -0.027 | -0.044 | 0.088 | 0.058 | 0.090 |
| | 0.233 | 0.046 | <.0001 | 0.009 | <.0001 |

*Notes:* The table displays correlation coefficients for the leverage variables and explanatory variables used in the regression equations. For each correlation between different variables, the first line gives the coefficient, and the second line gives the p-value for testing whether the absolute value of the coefficient is greater than zero.

**Table 4.** Fixed effects regressions for capital structure determinants

| | Book value | Market value |
|---|---|---|
| Intercept | -0.208*** | -0.159*** |
| | (-6.21) | (-4.94) |
| $Profitability_{t-1}$ | -0.040*** | -0.087*** |
| | (-2.56) | (-5.87) |
| $Growth\ Opportunities_{t-1}$ | 0.010*** | -0.010*** |
| | (4.79) | (-5.03) |
| $Size_{t-1}$ | 0.048*** | 0.045*** |
| | (17.77) | (17.16) |
| $Tangibility_{t-1}$ | -0.031*** | -0.027*** |
| | (-3.93) | (-3.51) |
| $R^2$ | 0.2467 | 0.2963 |
| Adjusted $R^2$ | 0.2307 | 0.2813 |
| F Statistic | 15.41*** | 19.81*** |
| Number of observations | 2,019 | 2,019 |

*Notes:* The table reports the results from fixed effects regressions of leverage on capital structure determinants. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of assets. Growth is the ratio of the market value of equity to the book value of equity. Size is the natural log of the book value of the firm's assets. Tangibility is the book value of the firm's plant and vehicles divided by the book value of the firm's assets. Results for industry and time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. *t*-values are in brackets.

**Table 5.** Regression results for estimates of adjustment speed

| | Two-step model | | Integrated model | |
|---|---|---|---|---|
| | Book value of leverage | Market value of leverage | Book value of leverage | Market value of leverage |
| Intercept | -0.208*** | -0.159*** | 0.011 | -0.006 |
| | (-6.21) | (-4.94) | (0.48) | (0.33) |
| $Leverage_{t-1}$ | 0.778*** | 0.774*** | 0.785*** | 0.795*** |
| | (52.44) | (52.37) | (38.12) | (36.23) |
| $Profitability_{t-1}$ | -0.040*** | -0.087*** | 0.006 | -0.004 |
| | (-2.56) | (-5.87) | (0.50) | (-0.40) |
| Growth $opportunities_{t-1}$ | 0.010*** | -0.010*** | 0.003 | 0.002 |
| | (4.79) | (-5.03) | (1.44) | (1.52) |
| $Size_{t-1}$ | 0.048*** | 0.045*** | 0.005** | 0.008*** |
| | (17.77) | (17.16) | (2.36) | (4.43) |
| $Tangibility_{t-1}$ | -0.031*** | -0.027*** | -0.007*** | -0.008*** |
| | (-3.93) | (-3.51) | (-2.81) | (-3.24) |
| $R^2$ | 0.6813 | 0.7018 | 0.6854 | 0.7131 |
| Adjusted $R^2$ | 0.6811 | 0.7016 | 0.6784 | 0.7067 |
| F Statistic | 4,311.45*** | 4,746.13*** | - | - |
| Number of observations | 2,019 | 2,019 | 2,019 | 2,019 |

*Notes:* The table reports the results for adjustment speed estimates using two-step and integrated partial adjustment models. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. Profitability is earnings before interest and tax (EBIT) divided by the book value of assets. Growth is the ratio of the market value of equity to the book value of equity. Size is the natural log of the book value of the firm's assets. Tangibility is the book value of the firm's plant and vehicles divided by the book value of the firm's assets. Coefficients for profitability, growth, size and tangibility are first-stage estimates. Results for industry and time dummies are not reported. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. *t*-values are in brackets.

**Table 6.** Summary statistics of leverage by industry

| *Variable* | *N* | *Mean* | *Median* | *Std Dev* | *Min* | *Max* |
|---|---|---|---|---|---|---|
| **Agriculture & Fish** | | | | | | |
| Book leverage | 182 | 0.263 | 0.223 | 0.223 | 0.000 | 0.925 |
| Market leverage | 182 | 0.271 | 0.232 | 0.226 | 0.000 | 0.889 |
| **Mining** | | | | | | |
| Book leverage | 102 | 0.052 | 0.000 | 0.122 | 0.000 | 0.764 |
| Market leverage | 102 | 0.050 | 0.000 | 0.124 | 0.000 | 0.761 |
| **Forestry** | | | | | | |
| Book leverage | 95 | 0.197 | 0.211 | 0.193 | 0.000 | 0.673 |
| Market leverage | 95 | 0.204 | 0.176 | 0.208 | 0.000 | 0.750 |
| **Building** | | | | | | |
| Book leverage | 69 | 0.283 | 0.288 | 0.195 | 0.000 | 0.583 |
| Market leverage | 69 | 0.235 | 0.234 | 0.181 | 0.000 | 0.672 |
| **Energy** | | | | | | |
| Book leverage | 169 | 0.264 | 0.233 | 0.257 | 0.000 | 0.943 |
| Market leverage | 169 | 0.235 | 0.192 | 0.245 | 0.000 | 0.981 |
| **Food** | | | | | | |
| Book leverage | 129 | 0.265 | 0.252 | 0.202 | 0.000 | 0.759 |
| Market leverage | 129 | 0.219 | 0.202 | 0.189 | 0.000 | 0.780 |
| **Textiles & Apparel** | | | | | | |
| Book leverage | 81 | 0.233 | 0.237 | 0.170 | 0.000 | 0.614 |
| Market leverage | 81 | 0.206 | 0.202 | 0.164 | 0.000 | 0.742 |
| **Intermediate** | | | | | | |
| Book leverage | 288 | 0.278 | 0.285 | 0.210 | 0.000 | 0.954 |
| Market leverage | 288 | 0.217 | 0.186 | 0.199 | 0.000 | 0.924 |
| **Property** | | | | | | |
| Book leverage | 222 | 0.347 | 0.341 | 0.214 | 0.000 | 0.971 |
| Market leverage | 222 | 0.375 | 0.343 | 0.242 | 0.000 | 0.960 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Transport** | | | | | | |
| Book leverage | 83 | 0.418 | 0.404 | 0.156 | 0.028 | 0.895 |
| Market leverage | 83 | 0.368 | 0.344 | 0.190 | 0.049 | 0.846 |
| **Ports** | | | | | | |
| Book leverage | 86 | 0.220 | 0.233 | 0.151 | 0.000 | 0.589 |
| Market leverage | 86 | 0.143 | 0.139 | 0.112 | 0.000 | 0.407 |
| **Leisure & Tourism** | | | | | | |
| Book leverage | 124 | 0.401 | 0.377 | 0.278 | 0.000 | 0.981 |
| Market leverage | 124 | 0.353 | 0.305 | 0.264 | 0.000 | 0.946 |
| **Consumer** | | | | | | |
| Book leverage | 243 | 0.277 | 0.261 | 0.215 | 0.000 | 0.838 |
| Market leverage | 243 | 0.221 | 0.181 | 0.213 | 0.000 | 0.870 |
| **Media & Comm** | | | | | | |
| Book leverage | 154 | 0.282 | 0.244 | 0.240 | 0.000 | 0.951 |
| Market leverage | 154 | 0.178 | 0.147 | 0.184 | 0.000 | 0.946 |
| **Investment** | | | | | | |
| Book leverage | 197 | 0.181 | 0.068 | 0.222 | 0.000 | 0.885 |
| Market leverage | 197 | 0.152 | 0.025 | 0.221 | 0.000 | 0.819 |

*Notes:* The table displays descriptive statistics of the leverage variables, for each of the 15 industries represented in our sample. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity.

**Table 7.** Industry speed of adjustment regression results

| | Two-step model | | Integrated model | |
|---|---|---|---|---|
| Industry | Book value of leverage | Market value of leverage | Book value of leverage | Market value of leverage |
| **Agriculture & Fish** | 0.834*** | 0.810*** | 0.840*** | 0.817*** |
| | (18.08) | (16.27) | (13.33) | (13.43) |
| Number of observations | 163 | 163 | 163 | 163 |
| **Mining** | 0.901*** | 0.889*** | 0.928*** | 0.909*** |
| | (9.62) | (9.42) | (9.23) | (6.54) |
| Number of observations | 94 | 94 | 94 | 94 |
| **Forestry** | 0.747*** | 0.709*** | 0.755*** | 0.769*** |
| | (11.22) | (9.25) | (8.60) | (10.72) |
| Number of observations | 89 | 89 | 89 | 89 |
| **Building** | 0.741*** | 0.496*** | 0.806*** | 0.582*** |
| | (7.53) | (4.05) | (6.69) | (3.08) |
| Number of observations | 65 | 65 | 65 | 65 |
| **Energy** | 0.668*** | 0.728*** | 0.670*** | 0.730*** |
| | (11.55) | (13.84) | (7.74) | (8.34) |
| Number of observations | 153 | 153 | 153 | 153 |
| **Food** | 0.746*** | 0.711*** | 0.757*** | 0.739*** |
| | (12.86) | (10.35) | (12.28) | (8.17) |
| Number of observations | 114 | 114 | 114 | 114 |
| **Textiles & Apparel** | 0.768*** | 0.675*** | 0.784*** | 0.708*** |
| | (8.97) | (7.50) | (10.18) | (8.10) |
| Number of observations | 74 | 74 | 74 | 74 |
| **Intermediate** | 0.718*** | 0.776*** | 0.722*** | 0.779*** |
| | (15.12) | (18.03) | (11.53) | (13.24) |
| Number of observations | 263 | 263 | 263 | 263 |
| **Property** | 0.797*** | 0.794*** | 0.798*** | 0.823*** |
| | (19.14) | (20.07) | (12.36) | (17.95) |
| Number of observations | 201 | 201 | 201 | 201 |
| **Transport** | 0.657*** | 0.480*** | 0.759*** | 0.520 |
| | (7.46) | (4.15) | (9.45) | (3.47) |
| Number of observations | 77 | 77 | 77 | 77 |

| | | | | |
|---|---|---|---|---|
| **Ports** | 0.657*** | 0.706*** | 0.681*** | 0.743*** |
| | (7.98) | (9.61) | (7.98) | (9.43) |
| Number of observations | 80 | 80 | 80 | 80 |
| **Leisure & Tourism** | 0.806*** | 0.836*** | 0.819*** | 0.841*** |
| | (12.51) | (15.16) | (11.65) | (16.05) |
| Number of observations | 114 | 114 | 114 | 114 |
| **Consumer** | 0.780*** | 0.856*** | 0.790*** | 0.862*** |
| | (17.48) | (19.53) | (14.36) | (14.50) |
| Number of observations | 222 | 222 | 222 | 222 |
| **Media & Communications** | 0.716*** | 0.647*** | 0.725*** | 0.663*** |
| | (11.28) | (9.62) | (8.87) | (4.92) |
| Number of observations | 135 | 135 | 135 | 135 |
| **Investment** | 0.678*** | 0.786*** | 0.696*** | 0.802*** |
| | (9.66) | (13.14) | (6.51) | (10.18) |
| Number of observations | 175 | 175 | 175 | 175 |

*Notes:* The table reports capital adjustment speeds estimated using the two-step and integrated partial adjustment models, for each of the 15 industries represented in our sample. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. Coefficients for other explanatory variables are omitted. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. *t*-values are in brackets.

**Table 8.** Regression results controlling for the influence of financing deficits and financing policies

| | Two-step model | | Integrated model | |
|---|---|---|---|---|
| | Book value of leverage | Market value of leverage | Book value of leverage | Market value of leverage |
| **Panel A: Financing deficits** | | | | |
| $Leverage_{t-1}$ | 0.765*** | 0.786*** | 0.771*** | 0.712*** |
| | (37.86) | (41.64) | (26.63) | (20.33) |
| Deficit dummy x $Leverage_{t-1}$ | -0.086*** | -0.094*** | -0.086** | -0.015 |
| | (-3.06) | (-3.34) | (-2.36) | (-0.36) |
| Number of observations | 2,019 | 2,019 | 2,019 | 2,019 |
| **Panel B: Financing policies** | | | | |
| $Leverage_{t-1}$ | 0.772*** | 0.797*** | 0.764*** | 0.684*** |
| | (47.69) | (51.31) | (35.04) | (24.02) |
| Non-debt issuer dummy x $Leverage_{t-1}$ | 0.102** | 0.212*** | 0.089 | 0.177** |
| | (2.17) | (4.14) | (0.86) | (2.30) |
| Number of observations | 2,019 | 2,019 | 2,019 | 2,019 |
| $Leverage_{t-1}$ | 0.770*** | 0.784*** | 0.777*** | 0.640*** |
| | (43.67) | (41.78) | (31.75) | (22.39) |
| Debt-issuer dummy x $Leverage_{t-1}$ | -0.099*** | -0.075*** | -0.078** | -0.178*** |
| | (-3.25) | (-2.53) | (-2.07) | (-3.96) |
| Number of observations | 2,019 | 2,019 | 2,019 | 2,019 |

*Notes:* The table reports capital adjustment speeds estimated using the two-step and integrated partial adjustment models, controlling for financing deficit and financing policy variables. Book leverage is the book value of the firm's long-term debt divided by the book value of the firm's assets. Book value of long-term debt is defined as the book value of the firm's capital notes, mortgages and debentures. Book value of assets is defined as the book value of the firm's interest-bearing short-term and long-term debt and shareholders' equity. For the market value of leverage, the book value of debt is retained, but the book value of shareholders' equity in the denominator is replaced by the market value of equity. The deficit dummy takes the value 1 when the firm's deficit is greater than zero and the value 0 when the firm's deficit is less than or equal to zero. The non-debt issuer dummy takes the value 1 when firms do not issue or repay debt and the value 0 otherwise. The debt issuer dummy takes the value 1 when firms either issue or repay debt, but undertake no change in equity, and the value 0 otherwise. Coefficients for other explanatory variables are omitted. Coefficients that are significantly different from zero are marked with ***, **, *, which indicate significance at the 1%, 5% and 10% levels respectively. *t*-values are in brackets.

# Chapter Five

# Conclusion

The final chapter of the thesis contains two sections. The first section briefly summarises the main findings from each of the three essays and discusses the implications of these findings. The second section examines possible areas for future research that are related to the essay topics.

## 1.0 Main Findings and Implications

The first essay in the thesis presents evidence of a significant relationship between the capital structure of publicly listed New Zealand companies and their product-market performance. Firms that make use of leverage to finance their activities experience an increase in relative-to-industry sales growth, but a decrease in relative-to-industry return on assets (ROA). Looking at this relationship in the other direction, there is no evidence that sales growth influences whether firms use debt, but significant evidence that ROA is negatively correlated with the amount of leverage that firms employ. Further tests find that results for the primary, energy, goods and services sectors are consistent with those for the sample as a whole. However there is some evidence that firms in more competitive industries may use leverage to compete more aggressively in their product markets. There is no evidence that the relationship between capital structure and product-market performance is significantly different in the period before 2000, when economic reforms were being introduced in New Zealand, and the period subsequent to reform.

The main implication of these results is that New Zealand firms are using more leverage to compete more aggressively in their product markets. This strategy gives firms the opportunity to increase their sales relative to rival firms in the same industry, and to increase their overall share of their market. However the cost of such a strategy is lower relative-to-industry profitability. Moreover the strategy does not necessarily give firms an advantage in following years. The results also indicate that increased sales growth does not release the pressure on firms to use debt, while lower profitability increases the requirement for more leverage. A question that naturally arises is why New Zealand firms are using debt to compete more intensively, particularly given the costs in terms of reduced profit margins. The economic reforms introduced in the 1980s and 1990s provide a possible answer. The more competitive trading environment that has developed over the last twenty five years may have encouraged firms to adopt aggressive but risky strategies.

The second essay in the thesis presents evidence on why New Zealand firms choose particular capital structures and how those structures change over time. The essay finds that there are consistent trends in the financing policies of New Zealand firms, and in the factors that influence those policies, during the years from 1984 to 2009. First, an analysis of New Zealand firms' capital structure decisions reveals that only a minority of New Zealand firms issue equity, while a significant proportion issues debt. Second, profitability, growth, levels of indebtedness and firm size are found to be key determinants of firms' financing policies. Thus, larger firms with increasing earnings and better growth opportunities tend to issue debt, while smaller firms that are already indebted are more likely to issue equity. Third, analysis of how financing decisions change from year to year indicates particular consistencies in firms' policies. Thus, most firms

that are non-issuers of debt have not issued debt in the previous year and do not issue debt in the following year. On the other hand, a majority of firms that employ debt financing have only issued or repaid debt in the preceding year and only issue or repay debt in the following year. Further analysis suggests that smaller firms with lower levels of debt tend not to issue or repay debt, while larger, more profitable firms with higher levels of debt, but reduced growth opportunities, are more likely to continue relying on leverage rather than equity to finance their activities. Finally, there is some evidence that firms' financing policies differ in the period after the year 2000.

An implication of the second essay is that New Zealand firms' capital structure choices cannot be fully explained by a single capital structure theory. Thus there is evidence that New Zealand firms with poorer earnings and higher levels of debt make capital structure decisions which result in a net increase in equity. This suggests that such firms may find it more difficult to access debt markets and therefore have to resort to issuing equity as a way of financing their activities, which tends to support the pecking order theory of capital structure. On the other hand, there is also some evidence to support the trade-off theory. For example, larger New Zealand firms, which are less vulnerable to the costs of bankruptcy, tend to employ more leverage than smaller firms.

The third essay in the thesis examines how quickly New Zealand firms adjust toward target debt ratios between 1984 and 2009. It finds that New Zealand firms adjust towards their targets at a rate of approximately 21 to 23 percent per year, which is consistent with relatively moderate speeds reported for United States firms in some previous studies. The essay then presents evidence of several factors that influence how quickly New Zealand firms adjust towards target

debt ratios. First, speeds of adjustment vary across New Zealand industries. Speeds range from a low of seven percent for the mining industry to a high of 52 percent for the transport industry. Second, New Zealand firms adjust towards a target debt ratio more quickly when the firms are experiencing a financial deficit. Finally, there is evidence that New Zealand firms' financing policies influence adjustment speed. In particular, firms that neither issue nor repay debt adjust towards target debt ratios more slowly than other firms; firms that issue or repay debt, but undertake no change in equity, adjust towards target debt ratios more rapidly.

The third essay adds to the body of knowledge on factors that influence how quickly firms adjust towards target capital structures. Although some previous literature controls for industry effects on adjustment speed, the essay is the first to explicitly examine the impact of industry differences. Industry risk and competitiveness are examined as possible explanations for the reported variations. The essay also makes a new contribution by exploring the extent to which firms' use of debt or equity influences how quickly firms revert to target debt ratios. The finding that non-debt issuers adjust more slowly to targets than other firms may imply that such firms are already close to their ideal level of leverage. On the other hand, firms actively engaged in issuing or repaying debt are likely to be accessing capital markets to facilitate debt issues, which may imply they have better opportunities to adjust more rapidly towards a leverage target.

## 2.0 Future Areas of Research

The essays contained in this thesis suggest a number of areas of research that might be usefully pursued in the future. The first essay presented in Chapter 2 on the relationship between capital

structure and product markets notes that it would be interesting to identify with more certainty why New Zealand firms choose particular product-market strategies, using different models and a more comprehensive data set. As Campello (2006) suggests, another fruitful line of enquiry would be to look beyond the relationship between sales and leverage and to examine particular strategies, such as pricing, research and development, and marketing, that firms might pursue subject to their own and rival firms' financing policies.

The second essay presented in Chapter 3 examines why firms choose particular capital structures. Part of the essay tabulates data on all possible debt-equity decisions preceding and following each possible debt-equity choice, to identify patterns in the way firms' decisions change from one period to the next. It is noted that the paper is the first to use this approach to the analysis of firms' capital structure choices. Future research might apply this methodology to larger markets, such as Australia and the United States, to determine whether the results are similar to those obtained for New Zealand. The essay also presents some evidence of differences in financing policies after 2000, possibly as a result of the recent global financial crisis in particular. An area for future research would be to explore in more detail how New Zealand firms' financing policies have been influenced by varying economic conditions.

The third essay presented in Chapter 4 examines factors that determine how quickly New Zealand firms adjust toward target capital structures. The essay investigates industry risk and competitiveness as possible explanations for the reported differences in industry adjustment speeds but the results of these tests are not conclusive. Consequently the differences between industries need to be investigated further with different models or more comprehensive data. It

would also be interesting to investigate whether there is evidence of industry differences in other markets and if so whether they are similar in nature to those reported for New Zealand. Finally, the essay notes that it may be the first to explore the extent to which a firm's use of debt or equity to finance its activities has an impact on how quickly a firm reverts to a target capital structure. In particular, firms that are consistent issuers or non-issuers of debt adjust towards targets at different speeds. Another line of enquiry would be to examine the reasons for these differences in more detail and to investigate whether other financing decisions influence adjustment speeds.

# Appendix

The proxies for short-term and long-term debt used in the thesis essays incorporate interest-bearing debt only. The research database contains a Current Liabilities classification called "Other" which was not initially considered when constructing the debt proxies. However an examination of this database item indicates that it includes the current portion of long-term interest-bearing loans. Such debt should be included in the proxy for long-term debt.

The following table shows the proportion of the "Other" item which should be classified as long-term debt, for 15 small, medium and large companies randomly chosen from our database. For a majority overall of the companies and years selected the proportion of the database component comprised of long-term debt is more than 50 percent. The remaining percentage consists of items such as derivative financial instruments, lease liabilities and short-term loans. Based on this sample, a more reasonable proxy for interest-bearing long-term debt should include the "Other" item. Such a proxy is therefore used in the analysis for the second and third essays in the thesis. The original proxy is retained for the first essay, which has been accepted for publication in *Review of Quantitative Finance and Accounting.*

**Table 1.** Proportion of "Other" Item in Database Constituting Long-Term Debt

| Year | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | *Avg* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Small*** | | | | | | | | | | | |
| **Allied Farmers** | 76% | 95% | 98% | 99% | 96% | 87% | 74% | 86% | 81% | 75% | **87%** |
| **NPT** | 0% | 98% | 0% | 83% | 0% | 0% | 0% | 0% | 0% | 100% | **28%** |
| **Genesis** | 100% | 100% | 100% | 100% | 0% | 0% | 0% | 0% | 0% | 0% | **40%** |
| **Scott Technology** | 20% | 11% | 40% | 0% | 100% | 100% | 100% | 100% | 0% | 100% | **57%** |
| **Mowbray Collectibles** | 100% | 100% | 100% | 99% | 97% | 98% | 0% | 100% | 100% | 100% | **89%** |
| ***Average*** | **59%** | **81%** | **68%** | **76%** | **59%** | **57%** | **35%** | **57%** | **36%** | **75%** | **60%** |
| ***Medium*** | | | | | | | | | | | |
| **Steel & Tube** | 96% | 98% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | **99%** |
| **Cavalier** | 0% | 78% | 12% | 21% | 0% | 0% | 0% | 0% | 25% | 0% | **13%** |
| **Ebos** | 0% | 35% | 99% | 87% | 83% | 100% | 42% | 58% | 99% | 12% | **62%** |
| **NZ Oil & Gas** | 30% | 0% | 0% | 100% | 100% | 100% | 100% | 0% | 0% | 100% | **53%** |
| **Port of Tauranga** | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | **0%** |
| ***Average*** | **25%** | **42%** | **42%** | **61%** | **57%** | **60%** | **48%** | **32%** | **45%** | **42%** | **45%** |
| ***Large*** | | | | | | | | | | | |
| **Sky City Entertainment** | 100% | 96% | 100% | 100% | 0% | 100% | 96% | 100% | 22% | 99% | **81%** |
| **Contact Energy** | 0% | 65% | 0% | 67% | 0% | 0% | 50% | 116% | 100% | 100% | **50%** |
| **Fletcher Building** | 20% | 30% | 28% | 29% | 31% | 59% | 39% | 43% | 35% | 0% | **31%** |
| **Telecom** | 9% | 4% | 58% | 30% | 49% | 57% | 85% | 70% | 46% | 27% | **44%** |
| **F & P Healthcare** | 93% | 64% | 99% | 100% | 100% | 100% | 0% | 100% | 100% | 7% | **76%** |
| ***Average*** | **44%** | **52%** | **57%** | **65%** | **36%** | **63%** | **54%** | **86%** | **61%** | **47%** | **56%** |
| ***Overall Average*** | **43%** | **58%** | **56%** | **68%** | **50%** | **60%** | **46%** | **58%** | **47%** | **55%** | **54%** |

Note: The table reports the proportion of the "Other" item in the research database that constitutes long-term debt, for 15 randomly chosen small, medium and large companies over the years from 2001 to 2010.

# References

The final section of the thesis contains all the references referred to in the thesis. Each essay was produced as a standalone paper and therefore the references for each paper (contained in Chapters 2 to 4) and for Chapters 1 and 5 are reproduced here and shown by paper.

# Introduction

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# Conclusion

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