School of Economics and Finance

Essays on Capital Structure

Joye Khoo

This thesis is presented for the Degree of

Doctor of Philosophy
of
Curtin University

December 2013

DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university.

Signature: ______________________

Date: 28th November 2013

ACKNOWLEGEMENTS

Pursuing a PhD has been both challenging and enjoyable experience. Though it will not be enough to express my appreciation and gratitude in words, I would like to offer many thanks to all those people who have helped, supported and encouraged me throughout the years and who have contributed to making this thesis possible.

First and foremost, I would like to express my deepest gratitude to my supervisors, Professor Robert Durand and Associate Professor Subhrendu Rath for their valuable guidance, encouragement, and support throughout my PhD study. This thesis would not have been possible without their help, patience, and immense knowledge. I particularly thank Associate Professor Subhrendu Rath for leading me into one of the most exciting areas of corporate finance and introducing me to one of the most challenging software programming. He has patiently supervised me and always guided me in the right direction and therefore I have gained enormous research skills and knowledge from him. I am also indebted to Professor Robert Durand for accepting me as his PhD student. Robert has always been there to guide me when I needed him. Apart from being my mentor, his in-depth knowledge, valuable research experience and constant guidance have kept me going ahead. I believe I could not have accomplished this thesis without such a close association with my supervisors. All the time, ideas and insightful advice they have contributed during this long journey are greatly appreciated.

I am thankful to Dr. John Gould for the encouragement and invaluable advice he has provided. My sincere thanks to Associate Professor Felix Chan for his valuable econometric and statistic comments. I especially thank Donna who looked closely at my papers, checked my English grammar mistakes and offered suggestions for possible improvements and corrections. I also appreciate the advice and critical comment from the academic staff at Curtin Business School (CBS) who helped me identify deficiencies in my paper. Furthermore, I would like to thank CBS for granting me a PhD scholarship and offering me a comfortable environment in which to concentrate on my research.

I offer a special, deeply heartfelt thank you to my good friend Simon, who has been my friend, guide and philosopher. The joy, humour and laughter he brought me during tough times in the PhD pursuit are indeed memorable. I am deeply grateful to my friend Zi for being so kind and supportive and for believing that I could do it. Thank all my friends and buddies for their blessings.

My deepest thought is devoted to my family: my parents James and Jody, my brother John, and my cousins Quentin, Daphne and Helen, for their care and never-ending support. Thank you for always being there for me, loving me and supporting me in all my pursuits. Without your understanding and encouragement it would have been impossible for me to finish this thesis on time.

ABSTRACT

The concept of target leverage has attracted increasing attention in the literature of capital structure. Earlier studies focus primarily on the existence of leverage targets, but recently the emphasis has moved to the importance of maintaining these targets. With a growing body of evidence indicating that firms are adjusting toward these targets, this thesis undertakes empirical investigations into whether or not firms pursue target leverage and, if so, why some firms adjust more rapidly than others. Addressing the issues of maintaining target leverage has the potential to enrich our understanding and development of capital structure heterogeneity, and to make a distinct contribution to the literature on corporate financing decisions. The empirical analysis undertaken here covers two different markets: Australia and the United States of America (US).

The empirical findings of this dissertation may be found in Chapters 5 and 6. In Chapter 5, I undertake an empirical investigation of leverage adjustment behaviour by examining Australian firms whose structure is disrupted through a major corporate event. If trade-off theory holds, then firms which find themselves further from their targets should adjust faster. The analysis confirms this prediction. Furthermore analysis of each firm's level leverage adjustment rates identifies profitability, cash balances, firm size and being overleveraged as important drivers of the speed of leverage adjustment (SOA).

With a large strand of US evidence supporting heterogeneity in SOA, Chapter 6 examines whether or not the differential levels of leverage are related to the SOA using a sample of US firms. I consider that a firm's leverage level is itself a determinant of both its speed of adjustment and the importance or relevance of the influences on leverage adjustment. I find that the *level* of a firm's leverage affects the speed of its adjustment towards its target debt level. Further, the characteristics which lead firms to adjust more quickly (or slowly) to these targets are conditional on their level of leverage. The firm-specific characteristics driving high and low leveraged firms are different from those affecting firms with medium levels of leverage.

TABLE OF CONTENTS

DECLARATION....................i

ACKNOWLEGEMENTS.................... ii

ABSTRACT....................iv

TABLE OF CONTENTS....................vi

LIST OF TABLES....................x

LIST OF FIGURES....................xi

LIST OF ABBREVIATIONS....................xii

CHAPTER 1....................1

INTRODUCTION....................1

1.1 Background and motivation....................1

1.2 Structure of thesis and overview of findings....................4

1.3 Contribution to the literature....................9

CHAPTER 2....................11

TRADE-OFF THEORY....................11

2.1 Introduction....................11

2.2 The choice of debt versus equity....................14

2.3 Leverage adjustment to target leverage....................17

2.4 Dynamic trade-off theory....................26

2.4.1 Implications of adjustment costs....................27

2.4.2 Endogenous investment models....................30

2.5 Mechanical mean reversion....................32

2.6 Modified partial adjustment model....................34

2.7 Heterogeneous speeds of leverage adjustment....37

2.8 Conclusion....41

CHAPTER 3....48

PECKING ORDER THEORY....48

3.1 Introduction....48

3.2 Adverse selection costs....50

3.3 Agency costs....52

3.4 Tests of the pecking order theory....54

3.5 Conclusion....56

CHAPTER 4....59

MARKET TIMING MODEL....59

4.1 Introduction....59

4.2 Tests of equity market timing....60

4.3 Conclusion....66

CHAPTER 5....68

LEVERAGE ADJUSTMENT *IN EXTREMIS*: THE CASE OF ACQUISITIONS....68

5.1 Introduction....68

5.2 Target adjustment behaviour....70

5.3 Data and sample characteristics....74

5.4 Measuring the speed of leverage adjustment....83

5.5 Empirical analyses....86

5.5.1 Capital issues surrounding acquisitions....86

5.5.2 Leverage adjustments surrounding acquisitions....87

5.5.3 Adjustment rate and firm characteristics 93

5.5.3.1 Fast acquirers 98

5.5.3.2 Slow adjusters 103

5.6 Conclusion 105

CHAPTER 6 107

LEVERAGE HETEROGENEITY AND ASYMMETRIC SPEED OF ADJUSTMENT 107

6.1 Introduction 107

6.2 Data 110

6.2.1 Sample selection 110

6.2.2 Summary statistics 114

6.3 Speed of leverage adjustment estimation 119

6.4 Empirical analyses 125

6.4.1 Heterogeneity in the speeds of leverage adjustment 125

6.4.2 The evolution of leverage 129

6.4.3 The effects of firm-specific characteristics on leverage ratios 134

6.4.3.1 Empirical specification 135

6.4.3.2 Analyses and results 136

6.5 Conclusion 144

CHAPTER 7 146

CONCLUSION 146

7.1 Introduction 146

7.2 Summary of major findings 147

7.3 Directions for future research 151

APPENDICES 152

Appendix A – Predicted leverage ratios for deciles 152

Appendix B – Transition matrix 154

REFERENCES 156

LIST OF TABLES

Table 2.1: Estimated SOA in empirical studies of capital structure..........................44

Table 5.1: Variable sources and definitions..75

Table 5.2: Sample selection for Australian M&A data..77

Table 5.3: Descriptive statistics of Australian M&A sample...................................81

Table 5.4: Correlation matrix 82

Table 5.5: Capital issues surrounding acquisitions..87

Table 5.6: Leverage adjustments surrounding acquisitions 89

Table 5.7: Analysis of fast adjusters...99

Table 5.8: Analysis of slow adjusters 104

Table 6.1: Variables sources and definitions for US accounting data 112

Table 6.2: Sample selection for US data..113

Table 6.3: Summary statistics for US sample 116

Table 6.4: Correlation matrix for US sample 117

Table 6.5: Summary statistics for deciles 118

Table 6.6: Speeds of adjustment to target leverage 127

Table 6.7: The effects of firm-specific characteristics on deciles' leverage ratios...136

LIST OF FIGURES

Figure 6.1: Predicted leverage evolution 133

Figure 6.2: Model generated regressions coefficients 138

LIST OF ABBREVIATIONS

CRSP	Centre Research in Security Prices
DPF	Dynamic Panel data with a Fractional dependent variable
EFWA	External Finance Weighted Average
FM	Fama and MacBeth
GLS	Generalized Least Square
GMM	Generalized Method of Moments
IPO	Initial Public Offering
IV	Instrument Variables
LD	Long Differencing
LSDVC	Bias-corrected Least Squares Dummy Variable approach
M&A	Merger and Acquisition activity
M&M	Modigliani and Miller
NPV	Net Present Value
OLS	Ordinary Least Square
SEO	Seasoned Equity Offering
SOA	Speed of leverage Adjustment
UK	United Kingdom
US	United States of America
VAR	Vector Autoregression
WRDS	Wharton Research Data Service

CHAPTER 1

INTRODUCTION

1.1 Background and motivation

There are three preeminent theories of capital structure: trade-off theory, pecking order theory and market timing model. Trade-off theory postulates that firms have optimal leverage ratios that balance the marginal tax benefits of debt financing against the marginal costs of financial bankruptcy. Firms therefore seek to achieve a target mix of debt and equity. They act to minimize short-term deviations from these targets. Pecking order theory argues that, due to asymmetric information between managers and investors, firms adopt a hierarchical order of financing preferences and that internal financing is preferred over external financing (Myers and Majluf 1984; Myers 1984). The market timing model states that firms tend to issue equity when the cost of equity is low, or when market values are relatively higher than the book values or previous market values.

Capital structure literature has been dominated by pecking order and trade-off theories. Although pecking order theory gained attention in the 1990s, a number of studies have found that pecking order financing hierarchy can also be generated from frictions other than the adverse selection models of Myers and Majluf (1984), for instance, firms appear to adhere to the pecking order's financing hierarchy due to the presence of transaction costs (Shyam-Sunder and Myers 1999; Altinkilic and Hansen 2000), agency costs (Jensen and Meckling 1976), and corporate taxes (Stiglitz 1973). I will discuss this further in Chapter 3.

A number of studies support trade-off theory and this is discussed further in Chapter 2. One group of studies investigates whether the security issuance and repurchase decisions of firms are consistent with the idea that firms have leverage targets (see, e.g., Martin and Scott 1974; Taub 1975; Taggart 1977; Hovakimian, Opler, and Titman 2001). They find that firms tend to make financing decisions that move them towards their target leverages. Another group of studies employs the partial adjustment model to examine the speed with which firms adjust toward their target leverages and finds that, when firms deviate from their target leverages they seek to achieve those targets (see, e.g., Fama and French 2002; Flannery and Rangan 2006; Kayhan and Titman 2007).

The speed of leverage adjustment (SOA) towards these targets has recently become a topic of debate. The estimates of SOA could be biased in favour of the target adjustment behaviour. A number of studies (Shyam-Sunder and Myers 1999; Chang and Dasgupta 2009) argue that the fact that a firm's leverage ratios are limited between zero and one can lead to mechanical mean reversion and hence the estimated SOA is biased. Chang and Dasgupta (2009) find that the estimated SOAs from the partial adjustment model are indistinguishable from estimates derived using randomly-generated inputs. Hence, studies using the partial adjustment model which support the notion that firms have leverage targets have become controversial.

The primary objective of this thesis is to quantify the magnitude of SOAs in two different markets: Australia and the US. The motivations for this thesis are threefold. Firstly, it examines whether or not firms pursue target leverage by utilizing a recent technique introduced by Hovakimian and Li (2011) to address potential biases in estimating the SOA. Hence, the estimated SOAs in this thesis are unaffected by the econometric issues that bedevil previous analyses.

Secondly, although many studies have attempted to address the question of whether or not firms pursue target leverage, most of them are based primarily on US (see, e.g., Flannery and Rangan 2006) and United Kingdom (UK) data (see, e.g, Ozkan 2001). There is little empirical research on trade-off theory in Australia has been so far conducted.[1] A recent Australian study in this area is presented by Koh, Durand, and Watson (2011), who provide evidence to support the theory that firms have leverage targets. It is therefore important to extend the current literature and contribute to the ongoing general debate on the validity of the trade-off theory of capital structure in Australia.

Thirdly, previous studies have generally assumed that firms adjust at a homogeneous rate (see, e.g., Fama and French 2002; Flannery and Rangan 2006; Kayhan and Titman 2007; Lemmon, Roberts, and Zender 2008). A limitation of these studies is that they do not consider that firms facing different leverage adjustment costs may take different paths toward their target leverages. Recent US studies find that transaction costs (see, e.g., Leary and Roberts 2005; Strebulaev 2007), firm-specific characteristics (see, e.g., Drobetz and Wanzenried 2006;

[1] Published studies include Allen (1991), Cassar and Holmes (2003), Deesomsak, Paudyal, and Pescetto (2004) for Australian firms.

Hanousek and Shamshur 2011; Dang, Kim, and Shin 2012), financial deficits/surpluses (Byoun 2008) and cash flow and financial constraints (Faulkender et al. 2012) are all associated with the costs and the benefits of leverage adjustments. This thesis contribute to the literature of capital structure by considering whether or not a firm's leverage level is itself a determinant of both its SOA and the importance or relevance of particular influences on leverage adjustment.

1.2 Structure of thesis and overview of findings

This thesis consists of seven chapters including this one. Chapter 2 reviews the international and Australian literature related to trade-off theory and serves as a refined introduction to the empirical analyses in Chapters 5 and 6. Chapter 2 first provides an overview of early empirical studies examines and uses discrete choice models of debt versus equity to examine whether or not firms have leverage targets. It then discusses empirical studies which employ partial adjustment models. A concise discussion of dynamic trade-off theory is presented in the next section, followed by a detailed discussion of the evidence of mean mechanical reversion. The modified partial adjustment model proposed by Hovakimian and Li (2011) is subsequently discussed. The last section reviews the literature for evidence of heterogeneous speed of leverage adjustment.

Chapters 3 and 4 present critical reviews of literature that examines firms' financing behaviour with regard to pecking order theory and market timing model.

Pecking order theory is not examined in this thesis because pecking order financing hierarchy can also be generated from assumptions other than the original motivation of adverse selection costs outlined in Myers and Majluf (1984). For this reason, exploring the validity of pecking order theory may not be helpful to the overall argument.

The empirical analyses are presented in Chapters 5 and 6. In Australia, researchers have found support for pecking order theory (see, e.g., Gatward and Sharpe 1996; Suchard and Singh 2006). Given that empirical research on trade-off theory in Australia is very limited,[2] Chapter 5 examines whether Australian firms pursue target leverage by considering firms whose structures are disrupted by major corporate events: merger and acquisition activity (M&A). The capital structure of a firm engaging in M&A will most probably deviate from its target leverage due to financing transactions necessitated by the acquisition. A US study by Harford, Klasa, and Walcott (2009) provides evidence that, following debt-financed acquisitions, firms actively adjust toward their target leverages by reversing more than 75 percent of the acquisition effect within five years. Hence the empirical design of leverage changes surrounding M&A allows me to provide insights into the leverage rebalancing of Australian firms.

The preliminary analysis indicates that the sources of net equity issue, net debt issue and retained earnings are noticeably different in the acquisition year from the years surrounding M&A. This supports my conjecture that acquisitions act as a shock to the capital structure of the acquirers. Conditioning the sample on the basis

[2] Empirical studies such as Cassar and Holmes (2003), Deesomsak, Paudyal, and Pescetto (2004), Koh, Durand and Watson (2011). Koh, Durand and Watson (2011) find that firms have leverage targets.

of financing methods to pay for the acquisition, the results show that acquirers issue debt subsequent to equity-financed transactions, which appears to be consistent with trade-off theory. In the next stage of analysis, the speed with which acquirers adjust toward their target leverages is estimated. Using the modified partial adjustment model in Hovakimian and Li (2011), firms appear to actively rebalance their leverage ratios by incorporating 42 percent, 49 percent, and 63 percent of the leverage deviation, for cash, stock and mixed acquirers, respectively, immediately following the acquisition. More importantly, the estimated SOAs are higher than the rates reported in Koh, Durand, and Watson (2011), indicating the importance managers place on maintaining the target leverage. This is consistent with my expectation that the firms in the sample experience shocks and therefore adjust more quickly than the average firm in the market would.

Given the evidence that some acquirers adjust more quickly than others, the next stage of the study analyses how firm-specific characteristics can explain variations in leverage adjustment rates. The estimation of leverage adjustment rates is designed to measure the reaction speed of an individual firm in adjusting to its target leverage, which allows consideration of subtleties determining the SOAs of individual firms. After controlling the effects of market timing and acquisition waves, the results indicate that, the size of the firm, its cash reserves and its profitability play key roles in leverage adjustment. Furthermore, the results also show that these firm-specific characteristics affect the adjustment rates differently depending on whether a firm is over- or underleveraged. The firm-specific characteristics provide evidence supporting the hypothesis that acquirers adjust more quickly to their target leverages when they are overleveraged. Overall, the results confirm that when adjusting leverages, firms are cognizant of their target leverages.

Using a comprehensive database of US firms, Chapter 6 considers the heterogeneity in the SOAs toward the target leverage and examines whether a firm's leverage level is itself a determinant of both its SOA and the importance of the effects on leverage adjustment. I adopt a sample-splitting approach to sort firms into deciles each year according to their leverage ratios in that fiscal year. According to trade-off theory, high leverage ratios are associated with high financial costs (Kraus and Litzenberger 1973). If firms have substantial debt relative to their assets, their financial distress costs potentially outweigh the interest tax shield benefits of debt. Firms with high leverage face higher levels of financial distress costs and greater agency conflicts issues than those with low leverage. Such firms are under pressure to decrease their leverage ratios, thus implying more incentive for them to undertake leverage adjustment toward the target leverage.

The preliminary analysis confirms my conjecture that the estimated SOAs vary with each firm's leverage levels. Firms with high leverage adjust toward their target leverages by adjusting, on average, between 7.15 percent and 17.06 percent of the deviation from their target leverages each year. In contrast, firms with low leverage move toward their target leverages by adjusting, on average, only between 3.16 percent and 4.21 percent of the leverage deviation each year. Thus, accounting for firms' leverage levels provides new evidence that the SOA is conditional on the degree of financial distress costs facing the firm. Firms appear to be keener and adjust at faster rates when they are under pressure to reduce their financial distress burden.

However, the estimated SOAs do not incorporate information about how firms manage their leverage ratios over time. The next stage of analysis examines the evolution of leverage for the cross-section of firms by predicting leverage ratios based on their estimated SOAs, which allows me to provide some insights into whether or not firms with high (low) leverage decrease (increase) their leverage ratios to approach their target leverages, as predicted by trade-off theory. The level of convergence on the *predicted* leverage ratios, firms adjusting towards their target leverages by design, does not appear to be random. The results show that firms with high (low) leverage reduce (increase) their leverage ratios in the short run. In particular, firms with high leverage appear to be more inclined to lower their leverage ratios compared to firms with low leverage. Therefore, the results highlight the fact that the estimated SOAs play an important role in explaining the convergence of leverage ratios.

Given that there is no information about what, other than high or low leverage, drives firms to adjust their leverage ratios, I then investigate the impact of firm-specific characteristics on leverage variation between firms with different levels of leverage. The results show that when considering levels of leverage, the effects of firm characteristics are asymmetric. Hence it highlights the importance of considering the level of leverage when considering capital structure theories. For instance, both high and low leveraged firms tend to utilize higher profitability to reduce their leverage ratios. This is consistent with pecking order theory (Titman and Wessels 1988). On the other hand, firms with medium leverage increase their debt. This is consistent with trade-off theory. Further, the effects of market-to-book ratio are stronger for high leveraged firms than low leveraged firms; firms issue more debt, when market valuations are high, when they are relatively more leveraged compared to when they are less leveraged. Previous studies tend to 'lump in' an undifferentiated group rather than analyse sub-samples based on their leverage. This study reveals that such an approach misses nuances in the data.

Chapter 7 presents a summary of major empirical findings. The chapter also provides overall conclusions from this thesis and discusses directions for future research.

1.3 Contribution to the literature

The research presented in this thesis makes several contributions to the literature of capital structure. The thesis utilizes a new measure of the partial adjustment model introduced by Hovakimian and Li (2011) which addresses biases commonly found in estimating the SOA. Therefore, this thesis presents estimates without they being plagued by econometric issues.

I find that managers place importance on maintaining target leverage: firms experience shocks and therefore adjust faster than the average firm in the market. To the best of my knowledge, Chapter 5 is the first to estimate the average speed with which firms adjust toward their target leverage in the context of Australia M&A activity. A further contribution is that the analysis in this thesis validates the trade-off model in a more refined environment than similar studies which estimate the adjustment speed across *all* firms. This thesis is able to provide new analysis on leverage adjustment rates for *individual* firms and to link the rates to their individual characteristics. By utilizing firm-specific characteristics commonly used to explain capital structure, the leverage adjustment rate model allows me to draw inferences about the motivations of firms to restructure capital.

Chapter 6 analyses whether the variations in levels of leverage are related to a firm's SOA and its influences on leverage adjustment. The findings indicate that adjustment speeds are due to heterogeneity in the levels of leverage. I further investigate whether or not firm-specific characteristics have effects on the variation leverage ratios. Thus this thesis highlights the loss of important information in extant capital structure studies when firms are lumped in an undifferentiated group.

CHAPTER 2

TRADE-OFF THEORY

2.1 Introduction

A firm's capital structure is the way it finances its assets through a combination of various financing choices. Modigliani and Miller (M&M) irrelevance theorem asserts that, under perfect capital market assumptions, a firm's capital structure does not affect its value.[3] Regardless how a firm finances its operations, the value of the firm is invariant to its financing policy. However, M&M irrelevance theorem does not accurately explain the real world when the assumptions are violated. Hence a number of capital structure theories have been introduced to show that capital structure does matter in the presence of capital market frictions and imperfections: they are trade-off theory, pecking order theory, and the market timing model.

Due to the existence of market imperfections such as transaction costs, subsequent research focuses on what motivates the financing decisions of a firm. What factors influence these decisions? To answer these questions, academics have undertaken empirical tests of capital structure theories and provided mixed results. In the context of existing literature, the three models have produced successes,

[3] A perfect capital market is a market in which there are no transaction costs, bankruptcy costs, taxes, or asymmetric information (Modigliani and Miller 1958).

failures and still more challenges. Each model has successfully explained the variation in observed capital structure, the choice of different funding sources and the association between a firm's leverage and its characteristics. However, none has succeeded in fully capturing the variations in capital structure or financing decisions. This thesis provides an in-depth overview of empirical capital structure research on trade-off theory (Chapter 2), pecking order theory (Chapter 3), and market timing model (Chapter 4) to highlight the successes and failures of each model.

According to the trade-off theory of capital structure, firms have leverage targets. Each firm chooses its target leverage by balancing the various benefits and costs of an additional dollar of debt (Modigliani and Miller 1963; Jensen and Meckling 1976; Myers 1977; Jensen 1986). The benefits of debt include the interest tax shield [4] and the reduction of problems with free cash flow.[5] The costs of debt include potential bankruptcy costs [6] and conflicts between stockholder and bondholder agencies.[7] According to trade-off theory, the greater the financial distress costs or the greater the agency problems that firm has to deal with, the less debt the firm can afford to undertake. The empirical implication is that the firms' leverage ratio should exhibit mean reversion to the target leverage as they undertake leverage adjustment toward their target leverages.

---

4 Modigliani and Miller's (1963) model with corporate taxes suggests that the value of a leveraged firm is equal to the value of an unleveraged firm plus the present value of the interest tax shield (the tax rate times the face value of the debt outstanding). Firms can deduct their interest payments because interest payments on debt are tax deductible. Hence, adding debt to a firm's capital structure can increase its value by lowering the government's tax claim on the firm's cash flows.

5 Jensen and Meckling (1976) and Jensen (1986) find that debt acts to discipline the management and force them to pay out their free cash flow.

6 When cash flows in a high leveraged firm are low, it is very likely to fail to make interest and principal payments than a low leveraged firm. Hence, high leverage could cause firms to default on their debts, which in turn, could force them into bankruptcy.

7 Myers (1977) suggests that stockholders have an incentive to undertake riskier projects and pay larger dividends to expropriate wealth from the bondholders.

The following example illustrates a firm's target adjustment behaviour. Consider two firms, both Firm X and Y, which are comparable in all other ways except for their leverage levels. Furthermore, assume that Firm X has a higher leverage ratio than Firm Y. Firm X therefore faces a higher level of financial distress cost and greater agency conflict issues than Firm Y. When Firm X's financial distress costs outweigh the interest tax shield benefits of its debt, Firm X should adjust its leverage to a lower level not only to reduce its financial distress costs, but also, and more importantly, to maximize its value. Firm X is said to exhibit target adjustment behaviour if the gap between its actual and target leverages is gradually removed over time.

There are two views of trade-off theory: the static trade-off model and the dynamic trade-off model. Static trade-off theory suggests that firms choose their capital structures by a single period of trade-off between the benefits and the distress costs of debt financing (Bradley, Jarrell, and Kim 1984).[8] Given the fact that firms often survive for more than a single period, dynamic trade-off theory recognizes the role of time and identifies a number of aspects that have been ignored in static trade-off theory, such as the presence of adjustment costs and the expectation of future investment opportunities. A detailed discussion of dynamic trade-off theory is presented in Section 2.4.

The concept of target leverage has attracted increasing attention in capital structure literature. Earlier studies focus primarily on the existence of leverage targets. Research designs in previous studies vary from the discrete choice models of

---

[8] Studies of static trade-off theory include Kraus and Litzenberger (1973), Brenna and Schwartz (1978), Castanias (1983), Ross (1985), Jensen and Meckling (1976), Myers (1977), Bradley, Jarrell and Kim (1984).

debt versus equity (see, e.g., Hovakimian, Opler, and Titman 2001) to partial adjustment models (see, e.g., Fama and French 2002). The new emphases are on the importance of choosing an appropriate estimation method for a dynamic panel model of corporate leverage (Flannery and Hankins 2013), such as the modified adjustment models (Hovakimian and Li 2011), long differencing (LD) estimator (Huang and Ritter 2009), generalized method of moments (GMM) estimator (Antoniou, Guney, and Paudyal 2008).

This chapter provides a literature review of the developments and empirical tests related to trade-off theory, which serves as a refined introduction to the empirical analyses presented in Chapters 5 and 6. The following section provides an overview of studies that examine whether or not the issuance and repurchase decisions of firms are consistent with the idea that firms have leverage targets (see, e.g., Marsh 1982; Hovakimian, Opler, and Titman 2001). Section 2.3 discusses a group of studies that use partial adjustment models to investigate the average speed at which firms adjust toward their target leverages (see, e.g., Fama and French 2002; Flannery and Rangan 2006).

2.2 The choice of debt versus equity

If maintaining leverage close to a target is important, a firm should select the form of financing that will offset the gap between actual and target leverages. Firms should either repurchase equity or issue debt when they are below the target leverage and issue equity or retire debt when they are above the target leverage. This section discusses empirical studies that investigate whether the security issuance and repurchase decisions of firms are consistent with the idea that firms have leverage targets.

Research examining the financing decisions between the choice of debt and equity can be traced to Baxter and Cragg (1970), Martin and Scott (1974), Taub (1975), Taggart (1977), and Marsh (1982) [9]. Baxter and Cragg (1970) examine the choice between types of securities when firms resort to long-term capital markets. They find that a firm's financing choices are not entirely random and claim that an optimal financial structure, which would vary between firms, does exist. Taggart (1977) finds that firms are concerned with their debt capacity. If debt issues lead to an excessive level of debt, equity issues will be simulated as a countermeasure. MacKie-Mason (1990) focuses on the effects of tax on firms' financing decisions. He provides evidence that firms with high marginal tax rates are more likely to issue debt. When firms have nearly exhausted their investment tax credits they appear to reduce the probability of debt issuance. On the other hand, firms with high tax loss carry-forwards are less likely to issue debt because they are less likely to be able to deduct interest.

As noted by Hovakimian, Opler, and Titman (2001), firms should make financing decisions that move them towards their target leverages. Using a discrete

[9] Marsh (1982) is one of the very first studies focusing on the financing choices. Consistent with trade-off theory, he finds that, in a sample of UK data, firms which are below their long term debt targets are more likely to issue debt whereas firms with greater bankruptcy risk are more likely to issue equity. His results show that, although they deviate from these targets in the short run in response to capital market conditions, firms tend to maintain long term target leverage.

choice model, Hovakimian, Opler, and Titman (2001) provide evidence that the gap between actual and target leverages is the dominant economic factor in determining whether a firm repurchases equity or retires debt. Consistent with trade-off theory, underleveraged firms tend to repurchase equity and overleveraged firms tend to retire debt, which will in each case move their leverage ratios toward their targets.

Korajczyk and Levy (2003) find that the deviations from target leverage explain a larger percentage of security issuance choices for financially constrained firms than for financially unconstrained firms.[10] Their findings are consistent with trade-off theory. Financially constrained firms may find it expensive to issue securities that would move them toward their target leverage because they have restricted access to capital markets. Hence, financially constrained firms are less likely than financially unconstrained firms to deviate from their target leverage and their issue choice is more sensitive to deviations from target leverage. Furthermore, Frank and Goyal (2004) find that the leverage deviations from target leverage affect debt adjustment and, more importantly, adjustments are undertaken (in order to move) toward the target leverage.[11]

Leary and Roberts (2005) find that if a firm experiences a positive shock on its leverage, or its leverage has been accumulating or is relatively high, the firm is more likely to reduce its leverage ratio. Using a sample of initial public offering (IPO) firms, Alti (2006) finds that firms go public when the market is hot. In the two years following the IPO, firms issue debt to reverse the effects of market timing on

10 A firm is defined as financially constrained if it does not have sufficient cash to undertake investment opportunities and if it faces severe agency costs when accessing financial markets. A firm is defined as financially unconstrained if it does not meet these criteria.

11 Frank and Goyal (2004) employ a Vector Autoregression (VAR) framework in which debt and equity adjustments are analysed separately rather than in the form of a leverage ratio.

their leverage. Using a sample of firms with investment grade ratings, de Jong, Verbeek, and Verwijmeren (2011) find that underleveraged firms repurchase equity to move toward their target leverages.[12]

This section reviews the empirical studies which examine whether or not the issuance and repurchase decisions of firms are consistent with the idea that firms have leverage targets. Another group of studies examine the average speed with which firms adjust toward their target leverage using the partial adjustment model (see, e.g., Fama and French 2002; Flannery and Rangan 2006). This is discussed further in Section 2.3.

2.3 Leverage adjustment to target leverage

Rather than looking at the choice of debt versus equity as discussed in the previous section, a large strand of studies has been dedicated to investigating the validity of trade-off theory by focusing on how fast firms move toward their target leverages. For instance, a firm's leverage may temporarily deviate from its target leverage due to a shock to asset values or a short-term market timing opportunity. If firms have leverage targets, there should be evidence that they return towards the target leverage following such shocks. The speed with which firms adjust toward their target leverage is likely to be higher for those further away from their target leverages, known as Speed of leverage Adjustment (SOA). Therefore, the SOA

[12] de Jong, Verbeek, and Verwijmeren (2011) limit their sample to firms with investment grade ratings because it reduces the probability that the firms are constrained by their debt capacity.

demonstrates the existence of leverage targets and, importantly, quantifies the importance of maintaining target leverage. Using partial adjustment models, the existing literature has provided mixed results on the SOA toward the target leverage. This thesis focuses discussion on recent empirical studies, paying attention to alternative estimation techniques of partial adjustment models that lead to differences in estimated SOAs.

Using data on US firms, Spies (1974), Taggart (1977), Jalilvand and Harris (1984), and Auerbach (1985) are among the early studies that use the partial adjustment models, which takes variants of the following specification:

$$Lev_{i,t} = \alpha + \beta X_{i,t-1} + \varepsilon_{i,t} \qquad [2.1]$$

Where:

α = The intercept;

$Lev_{i,t}$ = The leverage ratio for firm *i* in year *t*;

$X_{i,t-1}$ = A vector of observable capital structure determinants for firm *i* in year *t*;

β = The coefficients of $X_{i,t-1}$;

$\varepsilon_{i,t}$ = The residual term.

$$Lev_{i,t} - Lev_{i,t-1} = \alpha + \lambda(Lev^{*}_{i,t} - Lev_{i,t-1}) + \varepsilon_{i,t} \qquad [2.2]$$

Where:

$Lev_{i,t-1}$ = The leverage ratio for firm *i* in year *t-1*;

$Lev^{*}_{i,t}$ = The target leverage proxy for firm *i* in year *t*;

λ = The average speed of adjustment to the target leverage.

The examination of target adjustment behaviour can be complicated because a firm's target leverage is unobservable and a proxy for target leverage has to be used. Equation [2.1] is designed to provide a target leverage proxy for firm *i* in year *t*. According to trade-off theory, a firm's target leverage is supposed to be the result of trading off the costs and benefits of debt. Equation [2.1] estimates the target leverage as the predicted value of a vector of observable capital structure determinants, *X* in year *t-1*. The underlying determinants of capital structure employed to provide an estimate of target leverage for each firm include asset tangibility, firm size, growth opportunities, profitability, industry effects, available tax shield and uniqueness. [13] The capital structure determinants employed in this thesis are discussed in Chapters 5 and 6.

Equation [2.2] is the partial adjustment model which is designed to capture how well the temporary deviations from the target leverage predict changes in the leverage ratio. $Lev^{*}_{i,t}$ is the predicted target leverage obtained from Equation [2.1]. The main coefficient of interest is λ, which captures the SOA toward the target leverage over a year. In the absence of frictions, for instance information asymmetries, transaction costs and other adjustment costs, firms should fully adjust toward their target leverages and hence λ should equal one. However, in the

[13] These capital structure determinants have been considered by Titman and Wessels (1988), Rajan and Zingales (1995), Fama and French (2002), and others.

presence of adjustment costs (a discussion of costly leverage adjustments is presented in Section 2.4), firms may not fully adjust their leverage continuously from year *t-1* to the target leverage in year *t*, therefore λ should not be equal to one. Furthermore, the larger the λ, the faster the SOA will be toward the target leverage.

Taggart (1977) and Jalilvand and Harris (1984) find significant adjustment coefficients, which they interpret as support for target adjustment behaviour.[14] Taggart (1977) finds long term debt adjustment speed is around 13 percent per year, which implies that on average firms move toward their target leverage by adjusting 13 percent of the gap between actual and target leverages each year. Jalilvand and Harris (1984) use the average of leverage over three years to estimate target leverage, and allow the SOA to vary between firms and over time depending on firm size and capital market conditions. They find that a firm adjusts about 37.36 percent per year towards its target level of long term debt. Auerbach (1985) shows that the firms in his sample adjust 30.4 percent per year towards the target level of long term debt.

Note that previous studies are limited to small samples: 108 firms in Jalilvand and Harris (1984) and 143 firms in Auerbach (1985). Fama and French (2002) examine firms' target adjustment behaviour with a sample of more than 3000 firms. Their study implements the approach of Fama and MacBeth (1973) (FM (1973)) in that the partial adjustment model is estimated annually on cross-sectional data and the time-series standard errors of the average SOA are used to draw inferences.[15] Fama and French (2002) state that average SOA from FM's (1973) captures the same

---

14 Taggart (1977) and Jalilvand and Harris (1984) utilize Generalized Least Squares (GLS) technique to estimate several equations at once when contemporaneous disturbances across the equations may be assumed to have non-zero correlation.

15 In FM's (1973) approach, the *t*-statistics are based on the time-series standard error of the average SOA.

information as the SOA from a panel regression. Large annual cross-sections can reduce the variation in the year-by-year SOA and lower the standard errors of the average SOA.[16] Fama and French (2002) find that statistically significant estimated SOAs are low, between 7 percent and 10 percent per year for dividend payers and between 15 percent and 18 percent per year for non-dividend payers, indicating that firms adjust at a snail's pace toward their target leverages. Such slow adjustment speeds suggest that convergence toward target leverage is not a high priority. Hence maintaining a close to target leverage does not fully explain the variation in firms' leverage.

Similarly, Kayhan and Titman (2007) also find that firms have leverage targets but slow rates of adjustment. Their estimated SOAs imply that firms manage to close between 35 percent (based on market leverage) and 41 percent (based on book leverage) of the gap between the actual and target leverages over a five year period. Although cash flows, investment needs and stock prices realizations lead to significant deviations from target leverage, underleveraged (overleveraged) firms tend to increase (reduce) their leverage over the subsequent 10 years. Titman and Tsyplakov (2007) find an estimated SOA of 7.1 percent per year, which is within the range of the empirically estimated SOAs reported in Fama and French (2002) and Kayhan and Titman (2007).

A number of studies (see, e.g., Flannery and Rangan 2006) employ a one-step approach to estimating SOA by substituting Equation [2.1] for Equation [2.2] and obtaining the following reduced-form partial adjustment model:

---

16 The standard errors of the average SOA are also robust with respect to heteroscedasticity.

$$Lev_{i,t} = \alpha + \lambda\beta X_{i,t-1} + (1-\lambda)\, Lev_{i,t-1} + \varepsilon_{i,t} \qquad [2.3]$$

Flannery and Rangan (2006) employ alternate estimation methods for the partial adjustment model in Equation [2.3] and show that their estimated SOAs are robust across various estimation methods. Their primary leverage measure is a firm's market leverage. Using the FM (1973) approach, firms appear to adjust toward their target leverages by adjusting 13.3 percent of the gap between actual and target leverages within a single year. At this rate, a firm takes approximately five years to close half the gap between its current and target leverages.[17] Given that the FM (1973) approach potentially ignores the panel characteristics, Flannery and Rangan (2006) estimate panel regressions with unobserved fixed effects.[18] The estimated SOA increases to 38 percent per year when fixed effects are included. This estimated SOA implies that a firm can offset on average more than half its leverage gap in less than two years.[19] They also find estimated SOAs of 36.1 percent [20], 38 percent [21], 34.4 percent [22], and 36.4 percent[23] using alternative

[17] The calculation of half-life is ln(0.5)/ln(1-λ), the time required to reduce the leverage deviation between actual and target leverages to be halved. The estimated SOA in Flannery and Rangan (2006) is 13.3 percent per year. Hence, the calculation is ln(0.5)/ln(1-0.133). Firms close half of the leverage gap in approximately five years.

[18] Lemmon, Roberts, and Zender (2008) suggest that firm fixed effects can control for unobserved, time-invariant differences across firms. Therefore, if firms have relatively stable and unobserved variables affecting their target leverages, panel regressions with unobserved fixed effects are more appropriate than FM's (1973) approach.

[19] The calculation of half-life is ln(0.5)/ln(1-0.38), given the estimated SOA is 38 percent. Hence, firms close half of the leverage gap in approximately one and a half year.

[20] Flannery and Rangan (2006) apply FM's (1973) approach to demeaned data. In demeaned data, each variable in the partial adjustment regression is transformed into a deviation from that firm's mean value.

[21] Flannery and Rangan (2006) estimate a revised panel model, which includes a separate dummy variable for each year in their sample.

[22] Given the correlation between a panel's lagged dependent variable and the regression's error term can bias the estimated SOA, Flannery and Rangan (2006) estimate an instrumental variables model by substituting a fitted value for the lagged dependent variable, using the lagged book leverage and lagged capital structure determinants as instruments.

[23] To address the issue that leverage is bounded between zero and one, Flannery and Rangan (2006) estimate the IV model for firms with the middle 50% of leverage ratio.

estimation methods. Given that their estimated SOAs are far faster than those estimated by Fama and French (2002), they conclude that the adjustment toward target leverage do dominates most of the variations in firms' leverages.

Similarly, Lemmon, Roberts, and Zender (2008) show that firms manage to adjust toward their target leverages by adjusting between 13 percent and 17 percent (based on pooled OLS estimation) or between 36 percent and 39 percent (when firm fixed effects are incorporated in the estimation) of the gap between actual and target leverages per year. These closely match the estimates presented in Fama and French (2002), Kayhan and Titman (2007) and Flannery and Rangan (2006).

Furthermore, Huang and Ritter (2009) show that the dynamic panel model with firm fixed effects may produce biased SOAs in which many firms have only a few years of data (i.e., a short time dimension). Econometric techniques have been derived to reduce the short panel bias. Huang and Ritter (2009) employ a long differencing (LD) estimator, Flannery and Rangan (2006) and Dang, Kim, and Shin (2012) utilize an instrumental variable (IV) model estimator, while Ozkan (2001), Antoniou, Guney, and Paudyal (2008) and Lemmon, Roberts, and Zender (2008) use a system generalized method of moments (GMM) estimator.

Anderson and Hsiao (1982) suggest that the IV estimation technique produces a consistent estimate if the error term is not serially correlated in the regressions. The IV estimation uses a second lagged variable (i.e., $Lev_{i,t-2}$) as an instrument for the first difference of the lagged dependent variable (i.e., $\Delta Lev_{i,t-1}$) where it is correlated with the change in independent variable ($Lev_{i,t-1}$ - $Lev_{i,t-2}$) but not with the change in error terms ($\varepsilon_{i,t}$ - $\varepsilon_{i,t-1}$) (Ozkan 2001). Flannery and Rangan (2006) employ a IV estimator with the lagged market leverage ratio as an instrument for the lagged book leverage ratio. However, Ozkan (2001) compares the Arellano and Bond's (1991) GMM and IV estimates and finds that the estimate under IV is less efficient than the GMM estimates. They find that IV has a larger variance than that associated with the GMM, revealing that a loss in efficiency compared to the GMM estimates.

To avoid the short time dimension bias, several authors have turned to the GMM estimator. Arellano and Bond (1991) propose a GMM first-differenced estimation technique. They first-difference the panel data to remove the time-invariant fixed effect and deploy lagged dependent variable levels as instruments for the first difference of the lag. They show that the lagged dependent variable's values (in levels) constitute instruments for the first-differenced variable, provided that the residuals are free from second-order serial correlation (Flannery and Hankins 2013). For instance, Ozkan (2001) estimates in first differences where $Lev_{i,t-2}$ and further lags are used as instruments. They carry out the Arellano and Bond's (1991) difference GMM estimation and finds SOAs of above 50 percent per year.

However, Blundell and Bond (1998) suggest that if the lagged dependent variables are serially correlated they contain little information about the first-differenced variable. Furthermore, they propose system GMM estimation and prove that when lagged first-differenced and lagged levels instruments are included in the regression it can substantially reduce the finite sample bias by exploiting the additional moment conditions in this approach. Hence the lagged first-differences are informative instruments for the endogenous variables in levels equation. This is the procedure used by Lemmon, Roberts, and Zender (2008) and Antoniou, Guney, and Paudyal (2008). Lemmon, Roberts, and Zender (2008) employ Blundell and Bond's (1998) system GMM estimator and find that firms appear to adjust between 22 percent and 25 percent per year. Similarly, Antoniou, Guney, and Paudyal (2008) investigate how firms operating in capital market-oriented and bank-oriented economies determine their capital structures using the system GMM estimator. Although the estimated SOAs vary across different countries, Antoniou, Guney, and Paudyal (2008) confirm the existence of target leverage.[24]

Hahn, Hausman, and Kuersteiner (2007) propose a LD estimator for highly persistent series of data. In the LD estimator, the model takes a multi-year difference rather than a one year difference. Hahn, Hausman, and Kuersteiner (2007) show that the LD estimator is less biased than the system GMM estimator when the dependent variable is highly persistent.[25] Huang and Ritter (2009) implement the LD technique and find that firms appear to slowly re-balance the effects of shocks on their leverages. The estimated SOAs are 17 percent per year for book leverage and 23.2 percent per year for market leverage, respectively. These estimates suggest that it takes between three and four years for a firm to remove half the effect of a shock on its book and market leverage.[26] Huang and Ritter (2009) also show the LD estimator of Hahn, Hausman, and Kuersteiner (2007) is less biased than the OLS estimator.

---

24 French firms appear to adjust 39.35 percent per year while Japanese firms only manage to adjust 11 percent per year to achieve their target leverage.

25 Hahn, Hausman, and Kuersteiner (2007) show that combined multi-period differencing with longer lagged instrument choices can produce less biased estimated than the first-differenced GMM and system GMM estimators.

26 The calculation of half-life for estimated SOA of 17 percent is ln(0.5)/ln(1-0.17) = 3.72 years. The calculation of half-life for estimated SOA of 23.2 percent is ln(0.5)/ln(1-0.232) = 2.63 years.

Elsas and Florysiak (2011) propose an estimator designed to be unbiased in the context of unbalanced dynamic panel data with a fractional dependent variable (DPF estimator) to account for the mean mechanical effect. A discussion of mean mechanical reversion is presented in Section 2.5.[27] They find an estimated SOA of 26 percent per year, which is in neighbourhood of the estimated SOA (based on system GMM estimation) in Lemmon, Roberts, and Zender (2008).

Note that the estimated SOAs in this section vary between 7 percent and 39.35 percent, implying that the estimated SOAs vary in response to the alternative estimation techniques of the partial adjustment model. This clearly indicates the potential importance of choosing an appropriate estimation method for the partial adjustment model. Chang and Dasgupta (2009) suggest that one of the reasons for this disparity in estimated SOAs is the fact that the leverage ratios are bounded between zero and one. More importantly, they show that the findings in Kayhan and Titman (2007) and Flannery and Rangan (2006) could be affected by mechanical mean reversion. I discuss this further in Section 2.5.

2.4 Dynamic trade-off theory

As discussed in the preceding section, even if firms do have leverage targets they move towards them slowly. Consequently they are likely to deviate from their target leverages most of the time. Academics argue that static trade-off theory lacks

[27] The DPF estimator is a doubly-censored tobit estimator, which relies on a latent variable approach to account for the fractional nature of leverage ratio (leverage ratio is bounded between zero and one).

a comprehensive consideration of capital structure dynamics (that is, traditional market frictions such as transaction costs). The dynamic trade-off model considers that the role of time requires specification of aspects that have been ignored in static trade-off theory, such as the presence of adjustment costs and endogenous investment.[28] As documented in Section 2.3, the notion of the estimated SOA is closely associated with the partial adjustment model which implicitly assumes that the leverage ratios are driven by target adjustment behaviour where in each period a firm undertakes financing decisions to offset deviation from its target leverage. However, this may not always be the case. Firstly, in the presence of costly adjustment a firm's financing behaviour is driven by the comparison between the benefits and costs of adjusting toward its target leverage, as in Fischer, Heinkel, and Zechner (1989). Secondly, a firm's financing decisions also depend on both current and anticipated financing margins (Hennessy and Whited 2005). In Section 2.4.1 and Section 2.4.2, I discuss the evidence of capital structure adjustment which, coupled with the presence of adjustment costs and anticipated financing margins, may prevent firms from constantly maintaining leverage ratios close to their target leverages.

2.4.1 Implications of adjustment costs

A number of studies have found evidence that transaction costs are potentially important in financing policy. Fama and French (2005) suggest that there

[28] In static trade-off theory, a firm's capital structure is determined by a single period trading off between the tax benefits and the distress costs of debt financing.

are various ways to issue equity, and these are associated with different levels of transaction costs. In general, the transaction costs faced by firms issuing securities are different from the transaction costs associated with repurchasing those same securities. Thus, it is likely that firms face different transaction costs at different points in time.

Assuming that adjustment costs do not exist in the markets, firms can continuously adjust their leverage ratios toward the target leverage, hence leverage deviations should reverse rapidly when leverage ratios are above or below the firm's target leverage. However, firms may not react accordingly in the presence of such costs. A growing body of literature cites transaction costs as the reason why firms do not instantly adjust toward their target leverages (Goldstein, Nengjiu, and Leland 2001; Strebulaev 2007). Firms have to face the transaction costs of adjusting toward their target leverages and therefore they adjust relatively slowly. As a result, approaching target leverage can involve long waiting times (as documented in Section 2.3), an idea proposed by Fischer, Heinkel, and Zechner (1989) and, more recently, consistent with the findings of Leary and Roberts (2005).

As Fischer, Heinkel, and Zechner (1989) and Leland (1994) demonstrate, shocks to asset value and recapitalization are costly and may prevent firms from adjusting continuously towards their target leverages. The effect of adjustment costs is seen most clearly during the period of financing inactivity. Firms wait until the adjustment benefits outweigh the costs before recapitalizing, which resulting in short-term deviations from their target leverages. They undertake adjustments only when the benefits of doing so exceed the costs of reducing the deviation from target leverage, and they remain inactive when they are within the optimal range. These studies suggest that firms choose to have optimal ranges of leverage rather than optimal levels of leverage.

Goldstein, Nengjiu, and Leland (2001) observe that when firms have the option to increase their leverage in the future, they will opt for lower leverage initially and wait until the firm's value rises to a level where it is optimal to exercise that option. Similarly, Ju et al. (2005) demonstrate that moderate deviations away from target leverage have only a very small impact on a firm's value. Therefore, in the presence of transaction costs it may be optimal for firms to let their leverages deviate from target leverage by substantial amounts. Altinkilic and Hansen (2000) and Leary and Roberts (2005) find that issuance costs consist of both fixed and convex variable costs. Leary and Roberts (2005) further find that, in the presence of adjustment costs, firms appear to make leverage adjustments infrequently and when they do adjust their leverages move toward an optimal range rather than a specific target leverage.

Hackbarth, Miao, and Morellec (2006) and Bhamra, Kuehn, and Strebulaev (2010) present costly adjustment models that can account for the dynamic relationships between leverage and macroeconomic characteristics. After accounting for adjustment costs they find that macroeconomic conditions affect both the pace and the size of leverage adjustment rates: firms adjust their leverage ratios more often and by smaller amounts in boom times than in recessions. Byoun (2008) finds that firms making the most adjustment toward their target leverages are overleveraged firms with financial surpluses, implying that the adjustment cost of reducing debt from above-target leverage is lower than the cost of issuing debt with below-target leverage. Using a sample of M&A transactions, Harford, Klasa, and Walcott (2009) find that, after accounting for adjustment costs, acquirers reverse more than 75 percent of the acquisition effect within five years after large acquisitions. Faulkender et al. (2012) find that leverage adjustments are more likely to be undertaken when adjustment costs are shared with transactions related to the firm's operating cash flows. On the other hand, the SOA appears to be slower when the adjustment cost is offset only by the benefits of approaching target leverage.

This section provides an overview of previous research evidence that adjustment costs may prevent firms from undertaking instant financing decisions that move them toward their target leverages. Furthermore, Mauer and Triantis (1994) and Hennessy and Whited (2005) find that a firm's financing decisions depend not only on its initial investment decisions, but also on its current and anticipated financing margins. I discuss this further in Section 2.4.2.

2.4.2 Endogenous investment models

M&M irrelevance theorem asserts that under perfect market assumptions a firm's corporate financing and investment decisions are separable. Since then, one of the central questions has been whether there is a relationship between financing and investment decisions when market assumptions are violated. Mauer and Triantis (1994) study the interaction between investment and financing decisions within a framework where the firm has the flexibility to dynamically manage both decisions dynamically over time. They find that financial policy has a minimal effect on the firm's initial investment decisions and its subsequent operating decisions. Hennessy and Whited (2005) find that a firm's financing decision also depends on its current and anticipated financing margins. Although they do not find support for the existence of target leverage, they find a negative correlation between leverage and lagged profitability that is inconsistent with static trade-off theory.[29] Furthermore, DeAngelo, DeAngelo, and Stulz (2010) find that firms may temporarily deviate from their target leverages by issuing debt to fund investment opportunities where equity issuance and cash holdings are costly.

Strebulaev (2007) shows that the cross-sectional relationships between leverage ratios and firm characteristics can be different when firms are changing their leverage (that is, using observation at refinancing points). Consistent with Hennessy and Whited (2005), Strebulaev (2007) and Alti (2006) find negative relationships between profitability and leverage. A more profitable firm tends to have performed well in the past, which will lower its observed leverage ratio by increasing its future profitability and therefore its value.[30] Tsyplakov (2008) incorporates the time-to-build feature in a dynamic model of capital structure and finds that when productive capacity takes time to build up, firms tend to stockpile their retained earnings (build up internal equity) until it is the right time to buy physical capacity. While firms are in the process of retaining their earnings, this

[29] According to static trade-off theory, more profitable firms can decrease their expected costs of distress and find valuable interest tax shields. More profitable firms therefore take on more debt, resulting in a positive relationship between profitability and leverage.

[30] When a firm experiences an increase in profitability, the financing frictions may prevent it from adjusting its leverage. Concurrently, these frictions also increase that the value of the firm's unexercised options. Therefore, its leverage ratio is a decreasing function of profitability.

shows as an increase in profit-reducing leverage. When firms purchase the physical capacity this shows as a decrease in profit-increasing leverage.

Sections 2.4.1 and 2.4.2 provide an overview of prior research evidence that a firm's financing decision depends not only on the adjustment costs, but also on the financing benefits and costs that the firm anticipates in the next period. These factors also play a role in determining the speed with which firms adjust their target leverage. However, the SOA toward these targets has recently become a topic of debate. The estimated SOAs could be biased in favour of the target adjustment behaviour due to mean mechanical reversion. I discuss this further in the following section.

2.5 Mechanical mean reversion

Shyam-Sunder and Myers (1999) and Chang and Dasgupta (2009) argue that the fact that firms' leverage ratios are limited between zero and one can lead to mechanical mean reversion, hence the estimated SOA is biased. For instance, a firm with a leverage ratio of 0.85 needs to issue securities to fund its financial deficit, the choice of equity and debt are equally weighted. Such a firm should issue equity rather than debt to reduce its leverage ratio to a lower level, and after the equity issuance the leverage ratio should be lower than 0.85. Given the leverage ratio is a fraction between zero and one, a firm with high (low) leverage may appear to be mean-reverting in the absence of target adjustment behaviour. Therefore, the SOA at which reversion to a target remains contentious in the literature.

Chang and Dasgupta (2009) question whether evidence of mean reversion in leverage is conclusive evidence of target adjustment behaviour. Using simulated data in which firms randomly choose between debt and equity to fund their financial deficits, they find that the estimated SOAs from the partial adjustment model are indistinguishable from estimates derived using randomly-generated inputs. In other words, simulated data produces a SOA which is similar to the SOA reported in the literature, therefore, the evidence of active target adjustment could be due to the fact that leverage ratio is bounded between zero and one.

Previous studies find support for the argument that leverage ratios may exhibit mean reverting behaviour for various reasons. Shyam-Sunder and Myers (1999) find that the partial adjustment model appears to produce significant positive SOA when underlying behaviour is purely based on the pecking order's financing hierarchy (a detailed discussion of pecking order theory is presented in Chapter 3).[31] Kayhan and Titman (2007) suggest that the relationship between changes in leverage and leverage deficit could be spurious. They explain that a firm with zero leverage cannot reduce its leverage anymore; such a firm can only increase its leverage. Since the leverage ratio must be bounded between zero and one, this could result a mechanical relationship between the leverage deficit and future changes in leverage. Chen and Zhao (2007) further support the mean reversion view by showing that the

[31] When the fluctuations in the capital expenditures are positively correlated, free cash flows vary over the business cycle, dividends are assumed to be 'sticky' in the short term, and the financing costs are higher for equity than for debt, leaving variation in earnings and investment to be absorbed largely by debt.

leverage ratio of a firm tends to revert mechanically to mean, even though the firm's financing preference might not be consistent with the target adjustment behaviour. Hovakimian and Li (2011) insert a random target leverage proxy into the partial adjustment model but find a statistically significant SOA toward the target leverage. Given that the random target leverage proxy does not relate to the true target leverage proxy, this suggests that the estimated SOA is mainly driven by mean reversion rather than reversion toward a target. Hovakimian and Li (2011) propose a methodology to control the possibility of mechanical mean reversion. I discuss this further in the following section.

2.6 Modified partial adjustment model

Hovakimian and Li (2011) employ simulation experiments and find that bias in favour of the target adjustment behaviour can be minimized by using target leverage estimated from historical fixed firm effects regressions, and including target leverage and lagged leverage ratio in the second stage regressions separately. Furthermore, they exclude very high leverage ratios of 0.8 to avoid biases arising from the mechanical mean reversion of leverage ratios in extreme cases.

Following Hovakimian and Li (2011), the first stage is a historical fixed firm effects regression to estimate a proxy for the target leverage based on a list of underlying capital structure determinants, which takes the following form:

$$Lev_{i,t} = \alpha + \beta X_{i,t-1} + v_i + \varepsilon_{i,t} \qquad [2.4]$$

For each firm, the target leverage is estimated by running annual regressions of leverage in year *t* on capital structure determinants in year *t-1* that are related to the trade-off between the costs and benefits of debt and equity. v_i refers to firm fixed effects. In Hovakimian and Li (2011), the capital structure determinants are firm size, asset tangibility, market-to-book ratio, research and development expenses, industry median leverage ratio, profitability, and depreciation.[32] The capital structure determinants employed in this thesis are discussed in Chapters 5 and 6. Target leverage ($Lev^*_{i,t}$) is given by

$$Lev^*_{i,t} = \hat{\beta} X_{i,t-1} \qquad [2.5]$$

Equation [2.5] states that $Lev^*_{i,t}$ is the predicted target leverage obtained from Equation [2.4]. The second stage is to include the target leverage proxy, Lev^*_{it}, and the lagged leverage ratio, $Lev_{i,t-1}$ as separate regressors in Equation [2.2] and hence obtain the modified partial adjustment model in Equation [2.6].

$$Lev_{i,t} - Lev_{i,t-1} = \alpha + \lambda_1 Lev^*_{i,t} + \lambda_2 Lev_{i,t-1} + \varepsilon_{i,t+1} \qquad [2.6]$$

[32] These variables are discussed on page 35 in Hovakimian and Li (2011).

Equation [2.6] corrects for the mechanical mean reversion found by Chen and Zhao (2007) and Chang and Dasgupta (2009) by including a specific proxy for the target leverage. Equation [2.6] provides two potential estimates of SOA: λ_1 and (1 - λ_2). As noted by Chang and Dasgupta (2009) and Hovakimian and Li (2011), the statistical significance of (1 - λ_2) may be due to the presence of mechanical mean reversion.[33] A positive λ_1 represents a leverage adjustment speed that is moving toward the direction of the target leverage, whereas a negative λ_1 indicates a leverage adjustment in the opposite direction of the target leverage. Considering the levels of adjustment speed, a high estimate of λ_1 implies that firms, on average, undertake a relatively more rapid adjustment.

This section discusses the modified partial adjustment model in Hovakimian and Li (2011) which controls for the possibility of mechanical mean reversion. Hovakimian and Li (2011) find an estimate SOA of 8.8 percent and assume that all firms adjust at the same rate toward target leverage. However, a growing body of evidence indicates that firms adjust at heterogeneous speed toward these targets; I discuss this further in the following section.

---

[33] Hovakimian and Li (2011) and Chang and Dasgupta (2007) demonstrate that the coefficient on the lagged leverage ratio in Equation [2.2] is likely to represent mechanical mean reversion. Hovakimian and Li (2011) show that the mechanical mean reversion makes the coefficient on the lagged leverage ratio a strong predictor and remains statistically significant even with a random target leverage proxy.

2.7 Heterogeneous speeds of leverage adjustment

As discussed in Section 2.3, many empirical studies (see, e.g., Fama and French 2002; Flannery and Rangan 2006) have found supportive evidence of target adjustment behaviour by showing the estimated SOA is significantly different from zero. These studies do not explore cross-sectional differences and assume that all firms adjust at the same rate. The dynamic trade-off theory, however, implies that firms facing differential firm-specific adjustment costs may follow different paths toward their target leverages. It is therefore likely that estimated SOAs are heterogeneous across firms. A number of studies (see, e.g., Dang, Kim, and Shin 2012; Faulkender et al. 2012) raise the important issue of speed of adjustments. They address cross-sectional heterogeneity in adjustment speeds and claim that such heterogeneity is driven by an economical concept: adjustment costs.

Empirical studies have suggested that the differential adjustment costs with regard to a broad set of firm characteristics and positions relative to their target leverages are important factors linking the heterogeneous adjustment process toward the target leverage. For instance, the speeds with which firms adjust toward target leverage are associated with their cash flows, financial constraints and market timing considerations (Faulkender et al. 2012), firm-specific characteristics (Drobetz and Wanzenried 2006) and gap between actual and target leverages (Byoun 2008).

A number of studies provide evidence that the tendency to adjust toward the target leverage for overleveraged firms is higher than for underleveraged firms. Drobetz and Wanzenried (2006) are consistent with Byoun (2008) in finding that estimated SOAs are higher both for overleveraged firms with financial surpluses and underleveraged firms with financial deficits. Elsas and Florysiak (2011) analyse cross-sectional heterogeneity in SOAs. They find evidence for heterogeneity in adjustment speeds, where the estimated SOA is highest for firms with high default risk or expected bankruptcy costs, and where the opportunity costs of deviating from the target leverage are high. This is consistent with the predictions of trade-off theory. However, their findings show that those highly overleveraged and highly underleveraged firms appear to adjust fastest and at a similar pace. Warr et al. (2012) provide a different perspective by finding that underleveraged and overleveraged firms adjust their leverage at statistically significant different rates. They suggest that equity mispricing plays an important role by varying the cost of undertaking leverage adjustments; firms with overpriced equity adjust more rapidly toward their target leverage than firms with underpriced equity because they find it cheaper to issue equity when their equity is overvalued. Warr et al. (2012) also find that when firms have a cash surplus and their equity is undervalued, the cost to repurchase equity is lower, firms in this situation appear to move quickly toward their target leverage by repurchasing equity.

Focusing on the characteristics of firms, Fama and French (2002) find that dividend payers tend to adjust more slowly than those not paying dividends. Titman and Tsyplakov (2007) find that the estimated SOA for value-maximizing firms is higher than for equity-maximizing firms. The value-maximizing firms always appear to move toward their target leverages when the net increase in their values after adjustment is greater than their transaction costs.[34] Faulkender et al. (2012) find that in the group of overleveraged firms, firms that pay dividends or have credit ratings tend to adjust faster than those which do not pay dividends. Faulkender et al. (2012) and Flannery and Rangan (2006) both provide evidence that larger firms adjust excess leverage more slowly, and this is consistent either with the cost of excess leverage being smaller for larger firms or with the external pressures for larger firms being less intense than for smaller firms. Drobetz and Wanzenried (2006) also find that firms with higher growth opportunities appear to adjust more quickly.

Dang, Kim, and Shin (2012) suggest that firms with large financing deficits, large investment or low earnings volatility tend to adjust more quickly than those with the opposite characteristics.[35] They also note that the tendency to adjust toward the target leverage is stronger in financially distressed firms. Such firms have incentives to lower their leverage and, more importantly, to avert bankruptcy in order to reduce the costs of financial distress and deviating from the target leverage. McMillan and Camara (2012) investigate differences in the SOAs between multinational and domestic firms based in the US. Their results indicate that domestic firms adjust more quickly on average than their multinational counterparts, especially when they are overleveraged.

Dudley (2012) finds that large investment projects provide firms with opportunities to adjust at a low marginal cost, hence they appear to move toward

---

34 Equity-maximizing firms are firms that invest to offset depreciation only when their leverage ratios are very low, and otherwise invest nothing. They appear to be slow to reduce the size of their debt when their distress trigger are high

35 Dang, Kim, and Shin (2012) use a sample of UK firms.

their target leverages during periods of large project investment. Faulkender et al. (2012) conjecture that the cost of adjusting leverage depends not only on transaction costs, but also on the firm's incentive to access capital markets.[36] Consistent with this, they find that the cost of accessing capital markets influences leverage adjustment. Firms with high absolute cash flows and high absolute leverage deviations appear to make larger leverage adjustments than firms which have similar leverage deviations but bear-zero cash flow realizations.

After this discussion of the characteristics of firms, I turn to the macroeconomic factors affecting heterogeneous adjustment speeds. Drobetz and Wanzenried (2006) note that the estimated SOAs appear to be higher during economic booms than during recessions. Using international data, Antoniou, Guney, and Paudyal (2008) find that firms do have leverage targets but the speed at which they adjust their leverage toward the target leverage varies between countries.[37] Öztekin and Flannery (2012) suggest that the capital structure decisions of a firm relate to the environment and traditions in which it operates, hence firms in different countries have different adjustment speeds.

[36] When firms face profitable investment opportunities, they may choose to raise capital through debt and equity issue. When firms routinely generate cash, they may choose to repurchase equity, retire debt, or pay dividends to shareholder. Therefore, any sort of capital market access can be used to adjust their leverage toward the target leverage, if firms wish to do so.

[37] Antoniou, Guney, and Paudyal (2008) find that French firms appear to adjust quicker than Japanese firms.

2.8 Conclusion

This chapter presents a review of the literature related to the trade-off theory of capital structure. In Section 2.1, it introduces trade-off theory. According to trade-off theory, firms have leverage targets and each firm chooses its target leverage by balancing the various benefits and costs of an additional dollar of debt (see, e.g., Modigliani and Miller 1963; Jensen and Meckling 1976; Myers 1977). The greater the financial distress costs or the greater the agency problems the firm has to deal with, it can afford less debt. The empirical implication is that leverage ratio should exhibit mean reversion to the target leverage as firm undertake leverage adjustment toward their target leverages.

In testing trade-off theory, previous studies use discrete choice models of debt versus equity to examine whether or not firms have leverage targets. Section 2.2 reviews these empirical studies. Using discrete choice models, a large body of empirical studies find supportive evidence of trade-off theory (Hovakimian, Opler, and Titman 2001; Leary and Roberts 2005; Alti 2006).

Rather than looking at the choice of debt versus equity, another group of studies has been dedicated to investigating the validity of trade-off theory using partial adjustment models to focus on the average speed with which firms adjust toward their target leverages (see, e.g., Fama and French 2002; Flannery and Rangan 2006; Kayhan and Titman 2007). The further away the firms are from their target leverages, the higher the SOA is likely to be. Therefore, the SOA exhibits the existence of leverage targets and quantifies the importance of maintaining target leverage. This discussion focuses on recent empirical studies using the partial adjustment model in Section 2.3, while paying attention to alternative estimation techniques that lead to differences in estimated SOA. The review of empirical studies shows that the estimated SOAs vary in response to alternative estimation techniques, and this clearly indicates the potential importance of choosing an appropriate estimation method for the partial adjustment model.

This chapter also discusses dynamic trade-off theory. Academics argue that static trade-off theory lacks a comprehensive consideration of capital structure dynamics such as transaction costs. In dynamic trade-off theory, a firm's financing decision depends on the financing costs and benefits anticipated in the next period. The dynamic trade-off model considers that the role of time requires specific aspects that have been ignored in static trade-off theory, such as adjustment costs and endogenous investment. Firstly, Section 2.4.1 discusses the prior research evidence that adjustment costs may prevent firms from instantly undertaking financing decisions that move toward their target leverages. Secondly, Section 2.4.2 discusses the empirical studies examining linkages between corporate financing and investment decisions, which may prevent firms from constantly maintaining leverage ratios close to their target leverages.

Chang and Dasgupta (2009) suggest that one of the reasons for variation in SOA estimates is that the leverage ratios are bounded between zero and one. Given that leverage ratio is a fraction between zero and one, a firm with high (low) leverage may appear to be mean-reverted in the absence of target adjustment behaviour. Therefore, the SOA at which a firm reverts to target leverage remains controversial in the literature. Section 2.5 of this chapter covers the mechanical mean reversion. Section 2.6 discusses the modified partial adjustment model, in Hovakimian and Li (2011), which controls for the possibility of mechanical mean reversion.

Many empirical studies (see, e.g., Fama and French 2002; Flannery and Rangan 2006) have found supportive evidence of target adjustment behaviour by showing that the estimated SOA is significantly different from zero. However, they assume firms adjust at the same rate. It is likely that estimated SOAs are heterogeneous across firms because firms facing differential firm-specific adjustment costs may follow different paths toward their target leverages. Section 2.7 discusses a number of studies (see, e.g., Dang, Kim, and Shin 2012; Faulkender et al. 2012) that address cross-sectional heterogeneity in adjustment speeds and raises the important issue of how rapidly the leverage adjustment takes place. Table 2.1 shows a chronological summary of the estimated SOAs discussed in this chapter.

Table 2.1: Estimated SOA in empirical studies of capital structure

Data	Article	Estimator	Estimated SOA (per year)	
			Book leverage	Market leverage
US	Taggart (1977)[38]	GLS	13% [a]	
US	Jalilvand and Harris (1984)[36]	GLS	37.36% [a]	
US	Auerbach (1985)	OLS	27.4% [b]; 30.4% [a]	
UK	Ozkan (2001)	Difference GMM[39]	51.5% [c]; 56.9% [b]	
US	Fama and French (2002)	FM	10% [b,d];18% [b,e]	7% [f,d]; 15% [f,e]
		FM		13.3% [f]
US	Flannery and Rangan (2006)	Fixed effects		38% [f]
		IV[40]		34.4%; 36.4% [g]
US	Kayhan and Titman (2007)[41]	OLS	41% in 5 years [b]	35% in 5 years [f]
US	Titman and Tsyplakov (2007)	OLS		7.1% [h]

38 Taggart (1977) and Jalilvand and Harris (1984) utilize GLS procedure, where contemporaneous disturbances across the equations may be assumed to have non-zero correlation.

39 Ozkan (2001) carries out the Arellano and Bond's (1991) difference GMM estimation.

40 Flannery and Rangan (2006) employ Anderson and Hsiao's (1981) instrumental-variable estimator.

41 Kayhan and Titman (2007) estimate the SOA with standard OLS regressions and use bootstrapping technique to determine the statistical significance of the estimated SOA.

Data	Article	Estimator	Estimated SOA (per year)	
			Book leverage	Market leverage
US	Lemmon, Roberts, and Zender (2008)[42]	OLS	13% [a]; 17% [a]	
		Fixed effects	36% [a]; 39% [a]	
		System GMM	22% [a]; 25% [a]	
International	Antoniou, Guney, and Paudyal (2008)	System GMM		11.07% [f]; 39.35% [f]
US	Byoun (2008)	OLS	22.17% [a]; 22.58% [b]	21.47% [i]; 21.57% [f]
		Mixed effects	23.96% [a]; 39.47% [b]	21.75% [i]; 32.27% [f]
US	Huang and Ritter (2009)	LD	17% [b]	23.2% [f]
US	Harford, Klasa, and Walcott (2009)[43]	Evolution of leverage deviations		between 15.3% and 24.5% [f]
Australia	Koh, Durand, and Watson (2011)	OLS	-5.03% [b,j]; 8.21% [b,m]; 12.84% [b,l]; 22.31% [b,k]	
US	Hovakimian and Li (2011)	OLS	9.7% [b]	
		Fixed effects	8.8% [b]	
US	Elsas and Florysiak (2011)	Fixed effects		39.1%
		DPF		26.3%

42 Lemmon, Roberts, and Zender (2008) and Antoniou, Guney, and Paudyal (2008) employ Blundell and Bond's (1998) system GMM estimator.

43 Harford, Klasa, and Walcott (2009) measure the SOA using the median leverage deviation values over the first five years subsequent to large acquisitions paid for with cash. The SOA are 24.5 percent, 23.3 percent, 17.8 percent, 18.7 percent, and 15.3 percent, respectively, over the one, two, three, four, and five years subsequent to large acquisitions.

Data	Article	Estimator	Estimated SOA (per year)	
			Book leverage	Market leverage
US	Faulkender et al. (2012)	System GMM	21.9%	22.3%
UK	Dang, Kim, and Shin (2012)	IV[44]		53% [f]
		Difference GMM		59% [f]
US	Warr et al. (2012)[45]	FM	33.25% [b]	35.36% [f]
		System GMM	27.70% [b]	29.25% [f]
International	Öztekin and Flannery (2012)[46]	System GMM	between 4.03% and 40.61% [b]	between 10.87% and 52.86% [f]
		LSDVC [47]	between 3.65% and 43.25% [b]	between 4.56% and 51.64% [f]
US	McMillan and Camara (2012)	FE IV [48]		53% [f,n]; 58%[f,o]
		Difference GMM		48% [f,n]; 54%[f,o]
		LSDVC		34% [f,n]; 41%[f,o]

44 Dang, Kim, and Shin (2012) employ Anderson and Hsiao's (1982) instrumental-variable estimator.

45 To reduce concerns of endogeneity, Warr et al. (2012) estimate SOA over the year following the stock mispricing estimation.

46 For each country, its estimated SOA is presented in Table 2 on page 93 of Öztekin and Flannery (2012).

47 Öztekin and Flannery (2012) employ the Bruno and Giovanni's (2005) biased corrected least squares dummy variable (LSDVC) to estimate the SOA, for each country, using book and market leverage.

48 McMillan and Camara (2012) suggest that the fixed effect instrumental variables (FE IV) estimator tends to perform better with unbalanced panel data without generating too many instruments.

[a] Long term debt scaled by book assets.

[b] Book debt scaled by book assets.

[c] Preferred capital is included in the total debt, scaled by book assets.

[d] Dividend payer.

[e] Non dividend payer.

[f] Book debt scaled by market value of assets.

[g] Only for firms with the middle 50% of leverage ratio.

[h] Face value of debt scaled by the market value of equity plus face value of debt.

[i] Long term debt scaled by market value of assets.

[j] Firms that issue debt.

[k] Firms that issue equity.

[l] Firms that issue both debt and equity.

[m] Firms that issue neither debt nor equity.

[n] Domestic corporations.

[o] Multinational corporations.

CHAPTER 3

PECKING ORDER THEORY

3.1 Introduction

Pecking order theory is an alternative view of capital structure. According to pecking order theory, firms adopt a hierarchical order of financing preferences where internal financing is preferred over external financing (Myers and Majluf 1984; Myers 1984). If external financing is needed, firms pursue 'safe' debt financing first, then 'risky' debt. Equity financing is considered as a last financing resort. Therefore, a firm's capital structure is driven by its net cash flows, rather by the costs and benefits of debt as predicted by trade-off theory (discuss in detail in Chapter 2) or market timing behaviour (discuss in Chapter 4).

The origin of pecking order theory lies in the adverse selection model of Myers and Majluf (1984).[49] However, a number of studies have shown that other frictions can generate similar hierarchies of financing. For instance, Altinkilic and Hansen (2000) find that transaction costs can generate pecking order hierarchy.

[49] In Myers and Majluf (1984), adverse selection costs stemming from asymmetric information between managers and outside investors motivate pecking order behavior. Managers have superior information about the true value of the firm's assets and growth opportunities, while such information is undisclosed to outside investors. Given that outside investors have limited information, managers are more likely to finance the investment with overvalued equity. If managers act this way, it will convey negative information to the market and the price will drop at the announcement.

Issuance costs increase between debt and equity financing so that internal financing is cheaper than external financing, while debt is cheaper than equity when external financing is undertaken. Shyam-Sunder and Myers (1999) find that firms prefer debt to equity issuance because the financing costs for equity issuance are higher, and equity is issued only when firms are so financially constrained that their debt capacity is full. Jensen and Meckling (1976) suggest that the agency conflict between parties that manage a firm's resources and those that own the firm can lead to a pecking order financing hierarchy. Funding with debt can align the interest of managers and shareholders by forcing managers to disgorge cash flow to meet fixed obligations. La Porta et al. (1997) point out that the agency costs of equity could generate a similar pecking order financing hierarchy. Similarly, Stiglitz (1973) shows that corporate taxes can generate similar predictions, in which debt is preferred to equity. Lambrecht and Myers (2012) find that firms follow pecking order financing hierarchy, but are not reliant on asymmetric information and adverse selection.

Given that pecking order financing hierarchy can be generated in other ways than Myers and Majluf's (1984) adverse selection model, this chapter is organized around a framework to provide an overview of previous research evidence on pecking order theory. The following sections review the literature of the pecking order model based on adverse selection costs and, agency costs, and discuss the respective empirical tests of pecking order theory.

3.2 Adverse selection costs

The original motivation for pecking order behaviour comes from the adverse selection models developed by Myers and Majluf (1984) and Myers (1984), who are in turn influenced by an earlier study by Donaldson (1961). Donaldson (1961) observes that managers prefer to fund new investments with retained earnings. After exhausting the supply of retained earnings, they issue debt. They issue equity only after the ability to secure debt is exhausted.

Myers and Majluf (1984) suggest that pecking order behaviour is motivated by adverse selection costs stemming from asymmetric information between managers and outside investors. The key idea is that managers have superior information about the true value of the firm's assets and growth opportunities and that such information is not disclosed to outside investors. Traditionally, outside investors require managers to explain the investment details when they need external financing, but managers do not like this process as it would expose them to investor monitoring. Given that outside investors have limited information, managers are more likely to finance the investment with overvalued equity. Such actions will convey negative information to the market and the price will drop.

Three sources of funding available to firms are retained earnings, debt and equity. When there is asymmetric information between managers and investors, a firm raising external capital to fund a new project faces an adverse selection problem, however funding it with retained earnings avoids this problem. Thus, due to adverse selection considerations, firms adopt a hierarchical order of financing in which internal financing is preferred over external financing. Firms therefore finance new investments firstly with retained earnings, which involve no asymmetric information problem, then with debt in increasing order of risk. Finally, equity is used as a last resort to avoid the distortion of investment decisions or minimize the adverse selection costs of security issuance that arise as a result of information asymmetry between better-informed managers and less-informed outside investors (Myers and Majluf 1984; Myers 1984).

A number of studies examine different aspects of adverse selection problems. In their adverse selection model, Myers and Majluf's (1984) assume a one-sided asymmetric information situation in which managers have superior information. Eckbo, Giammarino, and Heinkel (1990) find that, in a model of takeovers, the two-sided asymmetric information situation between acquirers and targets can lead to the firm's preference for a combination of stock and cash over retained earnings. Eckbo and Masulis (1992) extend the basic adverse selection model to allow for current shareholders to participate in rights offers and underwriter quality certification. They find that adverse selection costs between shareholders and outside investors can be proportionally reduced according to the degree of current shareholder participation in the rights issue or by costly underwriting fees.

In contrast, a number of studies show that information asymmetry may not lead to a financing preference for debt over equity, a finding which is inconsistent with pecking order theory. For instance, Viswanath (1993) shows that the pecking order hypothesis does not always hold. He suggests that when the potential loss of future projects is too great, managers may opt to issue equity to finance a current investment even though they have the options of issuing debt or using cash. Furthermore, Ravid and Spiegel (1997) suggest that uncertainty between potential investors and entrepreneurs can lead to equity and riskless debt issues. Fulghieri and Lukin (2001) also find that firms preferring equity over debt which is concerned with the costs of information production, the precision of the information-production technology, and the extent of the information asymmetry.

This section provides an overview of previous research evidence relating to adverse selection costs. Pecking order financing hierarchy can also be generated by agency cost between shareholders and debt-holders, and the next section reviews the literature on pecking order models based on agency costs.

3.3 Agency costs

Agency-based models associate the costs of debt with asset substitution (see, e.g., Jensen and Meckling 1976; Jensen 1986) and underinvestment (see, e.g., Myers 1977). Asset substitution and underinvestment problems arise because of agency problems, which exist between shareholders and debt-holders. Jensen and Meckling (1976) suggest that in good times shareholders tend to accept high risk projects with large payoffs. The increased level of risk affects the debt-holders because it places them at more risk without providing them with additional compensation, and increases the chance of firm defaulting on its debt. Hence, the firm's increase in value may benefit only the shareholders, as the debt-holders require only a fixed return. Myers (1977) argues that shareholders may require managers to undertake projects only if the expected benefits exceed the payments to debt-holders. Underinvestment problems arise because managers may give up positive net present value (NPV) projects if all the expected benefits are paid to the debt-holder and leaving little or no return to the shareholders.

Jensen and Meckling (1976) propose an agency cost model of financial distress. When there is no separation between corporate ownership and control, entrepreneurs bear, and gain, all the costs and benefits of their decisions. Agency costs arise when entrepreneurs sell some of their stock to outside investors. Jensen and Meckling (1976) suggest that debt financing can help overcome the agency costs of external equity in two ways. Firstly, employing debt instead of equity financing implies that less equity will be issued for capital funding and it helps constrain managerial discretion. Secondly, employing debt financing rather than equity helps to mitigate problems of free cash flow by imposing fixed obligations on the use of the firms' cash flow.

The preceding and present sections both show that pecking order behaviour arises in the presence of adverse selection costs and agency costs between shareholders and debt-holders. However, these sections do not provide an overview of recent literature that examines pecking order behaviour. The following section reviews the recent empirical studies related to pecking order theory.

3.4 Tests of the pecking order theory

A series of related studies begins with Shyam-Sunder and Myers (1999), who examine whether pecking order theory is sufficient to explain the time-series patterns of firms' financing decisions. In the pecking order model, a substantial amount of variation in net debt issue should be explained by the financial deficit.[50] If firms meet their financial deficits by relying on debt issue, then the estimated slope coefficient, b_{PO} (coefficient of financial deficit), should be one.[51] Shyam-Sunder and Myers (1999) find a coefficient of 0.75 which strongly supports the pecking order theory that new debt issues are associated with financial deficits.

There are a number of studies which provide supportive evidence of pecking order theory. Leary and Roberts (2005) find evidence that firms are less likely to conduct external financing when they have sufficient internal funds. Firms utilize external capital when they need to outlay large investments. Gomes and Phillips (2012) show that the asymmetric information affects firm issuance decisions differently in the public and private markets. Depending on security issuances in the public market, they find support for the idea that the probability of equity issue declines with asymmetric information while it increases with public debt. This indicates that firms issue debt to avoid asymmetric information problems.

Bharath, Pasquariello, and Wu (2009) find that firms with large adverse selection problems tend to issue 30 percent more debt than firms with less adverse

[50] Financial deficit is measured as the sum of capital expenditures, change in working capital, dividend payments, and current portion of long term debt at the beginning period minus operating cash flows after interest and taxes.

[51] b_{PO} is an estimated slope coefficient in Equation (2) on page 224 in Shyam-Sunder and Myers (1999).

selection problems. Lemmon and Zender (2010) consider a firm's debt capacity. Generally, when a firm is constrained by debt it issues equity. When a firm is unconstrained it should issue debt. They suggest that those firms with rated debt are unconstrained by debt capacity while firms without rated debt are constrained. Lemmon and Zender (2010) find that the coefficient of financing deficit for firms with rated debt is larger than for firms without rating. Their findings suggest that firms without rated debt are small high growth firm; such firms are debt capacity constrained and therefore issue equity to finance their financial deficits. An alternative explanation is that firms with substantial growth opportunities are more likely to be small and young firms and adopt a low leverage to control the underinvestment problems (see, e.g., Myers 1977; Hovakimian, Hovakimian, and Tehranian 2004). Furthermore, de Jong, Verbeek, and Verwijmeren (2011) find that pecking order theory is a better descriptor of firms' issuance decisions than trade-off theory. Dong et al. (2012) find that the pecking order of financing is more likely to be observed among undervalued Canadian firms.

In contrast, a number of studies cast doubt on pecking order theory. Helwege and Liang (1996) and Jung, Kim, and Stulz (1996) find that firms access capital markets to raise external funds but do not follow pecking order theory. Note that the evidence in Shyam-Sunder and Myers (1999) is based on only a small sample of 157 firms between 1971 and 1989, but Frank and Goyal (2003) test pecking order theory on a large cross-section of over 50,000 US listed firms. They provide evidence that although external financing is heavily used by these firms, net equity issues appear to track the financial deficit more closely than net debt issues, which is inconsistent with the predictions of pecking order theory. Thus, they conclude that pecking order theory does not explain broad patterns in the data.

Fama and French (2005) also find that firms appear to issue or repurchase equity each year, and that many firms that repurchase equity have financial deficits, which violates pecking order theory. Kayhan and Titman (2007) find that although pecking order behaviour has a long term effect on observed capital structures, financing choices over long time intervals offset this effect. Leary and Roberts (2010) find evidence that pecking order is unable to account for more than half the observed financing decisions. Although they find little evidence for pecking order theory, such behaviour appears to be driven by incentive conflicts rather than information asymmetry. de Jong, Verbeek, and Verwijmeren (2010) find that although smaller firms have the highest potential for asymmetric information, they do not follow pecking order theory.

3.5 Conclusion

This chapter presents a review of literature related to the pecking order of capital structure. In Section 3.1, it introduces pecking order theory. According to this theory, firms adopt a hierarchical order of financing preferences where internal financing is preferred over external financing (Donaldson 1961; Myers and Majluf 1984). If external financing is needed, firms pursue ‘safe’ debt financing first, then ‘risky’ debt financing. Equity financing is considered as a last financing resort.

The origin of pecking order theory lies in the adverse selection model of Myers and Majluf (1984) and is discussed in Section 3.2. Myers and Majluf (1984) suggest that adverse selection costs, stemming from asymmetric information between managers and outside investors motivate pecking order behaviour. A firm may fund a new project with its retained earnings to avoid the problem of asymmetry information between managers and investors. Hence the firm finances new project first with retained earnings, then with debt in increasing order of risk, and finally with equity which is a last resort to avoid the distortion of investment decisions.

Jensen and Meckling (1976) propose an agency cost model of financial distress, as discussed in Section 3.3. Agency costs of equity arise when entrepreneurs sell some of their stock to outside investors. Debt financing can help overcome the agency costs of external equity in two ways: by helping to constrain managerial discretion and by imposing fixed obligations on the use of firms' cash flow in order to mitigate free cash flow problems.

Section 3.4 provides an overview of recent literature that examines pecking order behaviour. There are a number of studies that provide supportive evidence of pecking order theory (see, e.g., Shyam-Sunder and Myers 1999; Leary and Roberts 2005). Although pecking order theory gained attention in the 1990s, a number of studies have in turn found contradictory evidence of the theory. A number of studies cast doubt on pecking order theory (see, e.g., Fama and French 2005; Kayhan and Titman 2007). More importantly, pecking order financing hierarchy can also be generated from assumptions other than the adverse selection costs in Myers and

Majluf (1984). Pecking order theory has fallen out of favour and thus it has become more difficult to explore its validity.

CHAPTER 4

MARKET TIMING MODEL

4.1 Introduction

Market timing is one of the primary factors that shape financing decisions. The market timing model does not appear to contradict trade-off theory. Both models predict that firms issue equity when their market performance is high. The market timing model states that firms have incentives to issue equity when their market valuations are relatively higher than their book values or past market values (Taggart 1977; Baker and Wurgler 2002). Most direct tests of market timing behaviour are based on the positive relationship between market valuation, or past stock returns, and equity issuance activities. There is well-documented evidence that firms time their security issuance decisions according to equity markets. Firms tend to issue equity when the cost of equity is low, or when market values are relatively higher than their book values or past market values. This chapter provides a brief review of the literature relating to equity market timing.

4.2 Tests of equity market timing

Equity market timing mainly involves investors' perceptions of mispricing. Equity market timing predicts a positive relationship between market valuations and equity issuance activities because managers may take advantage of equity mispricing by issuing equity when they perceive its stock is relatively cheap.

Early studies which detect market timing behaviour on the basis of the past stock returns include Taggart (1977), Marsh (1982), Jalilvand and Harris (1984), Asquith and Mullins (1986), and Korajczyk, Lucas, and McDonald (1991). Taggart (1977) demonstrates that firms' financing decisions are heavily influenced by market conditions and by their past histories of security prices. Jalilvand and Harris (1984) find that when firms' stock prices are relatively higher than their historical levels, there is a higher probability that they will fund their remaining financing needs with equity. Asquith and Mullins (1986) find that firms tend to issue equity following a rise in their stock prices. Hovakimian, Hovakimian, and Tehranian (2004) support the premise that high stock returns increase the probability of equity issue. Gomes and Phillips (2012) find that market timing behaviour is an important characteristic of public equity markets and demonstrate that the probability of a firm issuing equity increases with higher stock return in the previous year.

Rajan and Zingales (1995), Pagano, Panetta, and Zingales (1998), and Hovakimian, Opler, and Titman (2001) focus on the market-to-book ratio to capture market timing attempts, and find that equity issuances coincide with high market valuations of equity. Rajan and Zingales (1995) find that firms with high market-to-book ratios hold low debt and suggest that firms time the market by issuing equity when their prices are perceived to be high. Pagano, Panetta, and Zingales (1998) find that the probability of an IPO is positively influenced by the stock market valuation of other firms in the same industry.[52] Hovakimian, Opler, and Titman (2001) confirm that firms with higher current stock prices relative to their past stock prices are more likely to issue equity than debt.

The evidence that low (high) long-term performance follows equity issues (repurchases) distinctly supports equity mispricing, and such asymmetric effects imply managers' timed equity issues. If managers exploit equity mispricing, net equity issues will be positively related to market-to-book ratios. For this reason, it is well-known that a firm's market to book ratio is negatively related to its future equity performance, as shown in La Porta (1996), La Porta et al. (1997), Frankel and Lee (1998), and Denis and Sarin (2001). Investors in firms with higher market-to-book ratios tend to be more optimistic and usually do not fully assimilate all the information conveyed in equity issuance announcements. Investors are more likely to overestimate such a firm's future earnings performance when formulating prices. They slowly realize that earnings growth rates are lower than initially expected and this explains the lower subsequent returns.

The following studies find that firms issuing equity have poor subsequent performance. Masulis and Korwar (1986), Asquith and Mullins (1986), Spiess and Affleck-Graves (1995), and Graham and Harvey (2001), and Hovakimian, Opler, and Titman (2001) find evidence of market timing with seasoned equity; firms that

[52] Pagano, Panetta, and Zingales (1998) employ a large database of private firms in Italy.

conduct seasoned equity offerings (SEOs) have high share valuations before the SEO but experience poor long-term performance afterwards. Other studies such as Ritter (1991), Loughran and Ritter (1995), Ritter and Welch (2002), Jegadeesh (2000) indicate that firms experience long-term underperformance after IPOs. This evidence goes back to Lerner (1994) who focuses on a biotechnology industry and shows that industry market-to-book ratios have a substantial effect on the decision to go public. He reports returns of 10 percent and -5 percent respectively in the sixty days before and after the offers. The reverse is true for equity repurchases, as Ikenberry, Lakonishok, and Vermaelen (1995) demonstrate; those firms with low market-to-book ratios that announce open market share repurchases outperform firms with the opposite characteristics in the four years following the announcement.

Although numerous studies find that market valuation negatively predicts post-equity issuance performance, equity market timing is potentially consistent with the market timing view based on time-varying asymmetric information about assets-in-place (Korajczyk, Lucas, and McDonald 1992), dynamic adverse selection model (Lucas and McDonald 1990), and adverse selection arguments in which firms exercise growth options through equity issuance (Carlson, Fisher, and Giammarino 2006; Li, Livdan, and Zhang 2009).

Korajczyk, Lucas, and McDonald (1992) suggest that firms can control the magnitude of adverse selection costs, they will choose a time to issue equity when there is relatively little information asymmetry. Therefore, the probability of issuing equity increases with low information asymmetry. Lucas and McDonald (1990) explain in their model that when firms are undervalued they postpone issuing equity to finance a profitable project. While they wait, their stock prices increase in response to favourable news of the profitable project at hand. The firms then raise funds through equity financing, therefore equity issuances are preceded by stock price run-ups. Li, Livdan, and Zhang (2009) and Carlson, Fisher, and Giammarino (2006) demonstrate that subsequent stock performance should be lower in firms that exercise growth options through equity issuance, because risky growth options are converted into less risky assets.

Choe, Masulis, and Nanda (1993) and Bayless and Chaplinsky (1996) find that the effects of announcement following equity issues are better during business cycle expansions and significantly greater during high volume equity issuing periods than during low periods. Similarly, Jung et al. (1996) find that, although the market-to-book ratios and stock prices for equity issuers are higher than for debt issuers, there is no evidence that equity issuers experience a more negative post-issuance performance than debt issuers do. Their study suggests an agency perspective and argues that the agency costs of debt for firms with better investment opportunities are higher, therefore the probability of issuing equity increases with investment opportunities if managers pursue growth objectives. Equity is valuable for shareholders in a firm with better investment opportunities.

In an influential study, Baker and Wurgler (2002) ask how equity market timing affects capital structure. If equity market timing has only a short-term impact on capital structure and firms subsequently rebalance away the effects of market timing decisions, market timing would have no persistent effect on capital structure over long time horizons. Whether or not market timing attempts have a lasting impact on capital structure is the key point of contention in Baker and Wurgler (2002). They measure the EFWA (External Finance Weighted-Average) market-to-book ratio, which summarizes the relevant historical variation in market valuation.[53] They find that the explanatory power of EFWA market-to-book ratios increases with the time horizon and it remains highly significant even when the market timing variable alone is lagged ten years. These results lead Baker and Wurgler (2002) to conclude that managers prefer to raise capital when the market values are high relative to the book values. More importantly, capital structure is the cumulative result of attempts to time equity markets rather than the result of dynamic adjustments toward the target leverage.

Similarly, Welch (2004) puts forth the inertia theory and presents evidence that firms tend to issue (repurchase) equity following a increase (decrease) in stock price, implying that leverage ratios are likely to be negatively related to past stock returns. Firms with high stock returns are likely to have high growth opportunities so they may prefer to fund these opportunities with equity. They also suggest that firms fail to rebalance their capital strucures in response to shocks on the market value of their equity, hence equity price shocks have a long-lasting effect on firms' capital structures similar to the implications of market timing.

Since the publication of Baker and Wurgler (2002), a wide body of literature records evidence consistent with market timing behaviour. Henderson, Jegadeesh, and Weisbach (2006) find evidence that equity issues tend to occur in 'hot' markets and that post issuance returns are generally low following equity issues. Elliott,

53 The EFWA market to book ratio is defined on page 12 in Baker and Wurgler (2002).

Koëter-Kant, and Warr (2007) find a strong positive relationship between equity market mispricing and the proportion of the firm's financing deficit that is funded with equity. Huang and Ritter (2009) demonstrate that the propensity to issue equity increases by 14.7 percent and 9.9 percent, respectively when either Tobin's Q or the past market-adjusted return for a firm increases from one standard deviation below to one standard deviation above its sample value. Dong et al. (2012) find that firms issue (repurchase) equity when their shares are overvalued (undervalued) only when firms are not financially constrained.

A potential criticism of Baker and Wurgler (2002) findings is that the market-to-book ratio indicates mis-valuation based on public information only but ignores the probability that managers have private information which allows them to time their equity issues. Jenter (2005) finds supportive evidence that market-to-book ratio is also a strong indicator of insider trading and documents more equity issues among firms with high market-to-book ratios. Furthermore, Chang, Dasgupta, and Hilary (2006) support the view that Baker and Wurgler's (2002) market timing variable best explains the capital structures for firms with fewer analysts.

Leary and Roberts (2005) find that the market timing or equity stock price effect on leverage revealed by Baker and Wurgler (2002) and Welch (2004) is more likely to be due to adjustment costs, and demonstrate that the effect of equity issues on firms' leverage is erased within two to four years by debt issues. This is inconsistent with the conclusion in Baker and Wurgler (2002). Hovakimian (2006) further comments on Baker and Wurgler's (2002) finding that although firms have the incentive to time the market, the effects of equity transactions on capital structure are small and transitory and this indicates that equity timing issues transactions are unlikely to be responsible for long-lived effects of market-to-book ratios on firms' capital structure.

Alti (2006) suggests that the effects of market timing are short-lived for IPO firms by showing that the effect of equity market timing on IPO firms' leverage has vanished by the end of the second year. Similarly, DeAngelo, DeAngelo, and Stulz (2010) find that equity issuers are not in fact firms with more investment opportunities and that those firms with high market-to-book ratios fail to issue stock, which is inconsistent with the market timing model. Using international data, Kim and Weisbach (2008) show that when firms have higher market-to-book ratios, insiders are more likely to take advantage of the high valuations to sell off some of their shares.

4.3 Conclusion

This chapter reviews the previous evidence of the market timing model. First, it introduces the market timing model in Section 4.1. A brief review of literature related to equity market timing is presented in Section 4.2. Early studies detect market timing behaviour on the basis of the past stock returns (Jalilvand and Harris 1984; Asquith and Mullins 1986; Korajczyk, Lucas, and McDonald 1991). Subsequent studies focus on the market-to-book ratio to capture market timing attempts, and find that equity issuances coincide with high market valuations of equity (Rajan and Zingales 1995; Pagano, Panetta, and Zingales 1998; Hovakimian, Opler, and Titman 2001).

A firm's market-to-book ratio is well known to be negatively related to its future equity performance. If managers exploit equity mispricing, net equity issues will be positively related to market-to-book ratios, but low (high) long-term performance follows equity issues (repurchases) (see, e.g., Ritter and Welch 2002; Graham and Harvey 2001). Such asymmetric effects imply managers' time equity issues.

An influential study by Baker and Wurgler (2002), find that managers prefer to raise capital when market values are high relative to book values. More importantly, capital structure is the cumulative result of attempts to time equity markets rather than the result of dynamic adjustments toward the target leverage. Since the publication of Baker and Wurgler (2002), a wide body of literature finds evidence consistent with market timing behaviour. On the other hand, a number of studies also find evidence inconsistent with market timing behaviour.

CHAPTER 5

LEVERAGE ADJUSTMENT *IN EXTREMIS*: THE CASE OF ACQUISITIONS ☆

5.1 Introduction

Trade-off theory postulates that firms have optimal debt-to-equity ratios that balance the marginal tax benefits of debt financing against the marginal costs of financial bankruptcy. Firms therefore seek to achieve target mixtures of debt and equity, and act to minimize short-term deviations from these targets. Empirical evidence to corroborate this notion of trade-off theory has been inconclusive.[54] In this chapter, I use a sample of Australian firms experiencing leverage deviations, and a new empirical methodology to confirm that firms pursue target leverage.

The capital structure of a firm engaging in M&A activity will most probably deviate from its target leverage, due to the financing transactions necessitated by the acquisition. I examine the leverage and financing of a sample of Australian firms making acquisitions between 2000 and 2010 and provide evidence that either reductions or increases in leverage caused by acquisition prompt firms to actively

☆ Earlier versions of this chapter were presented at the 2012 Financial Markets and Corporate Governance Conference and the joint conference of the 2012 Asian Finance Association and the Taiwan Finance Association.

[54] See Chang and Dasgupta (2009) for a review of problems associated with empirical tests of trade-off theory of capital structure in Section 2.5.

rebalance their capital structures toward leverage targets. Further, confirming the predictions of trade-off theory, I find that although acquirers experience significant changes in leverage during the acquisition year, the effect is transitory. I extend the literature by linking the characteristics of firms to their rates of leverage adjustment. In contrast to most studies of leverage adjustments that draw inferences from estimated SOAs across all firms, I estimate leverage adjustment rates for individual firms and link them to their characteristics.

The results add to the ongoing debate on the validity of trade-off theory and, by utilizing a recent technique addressing biases in estimating the SOA (Hovakimian and Li 2011), the results are unaffected by the econometric issues bedevilling previous analyses. Furthermore, the empirical design (similar to that of Harford, Klasa, and Walcott (2009)) of leverage changes surrounding takeovers enables me to provide insights into the active rebalancing of capital structures.

I find that acquirers, regardless of the way in which they finance the acquisitions, actively rebalance their leverage by incorporating 41 percent to 63 percent of the leverage deviation immediately following the acquisition. The leverage deviation caused by acquisition financing makes the firms to move back towards target leverage. The estimated SOA for mixed acquirers is higher than acquirers who utilize only cash or stock. The results for the mixed acquirers support the dynamics trade-off capital structure models of Fischer, Heinkel, and Zechner (1989) and Leland (1994).

An investigation of the relationship between firm characteristics and the rate at which the firms adjust toward their target leverages reveals that size, cash reserves and profitability play key roles in leverage adjustment. I also find that firm characteristics affect adjustment rates differently depending on whether a firm is over- or underleveraged.

Section 5.2 discusses the trade-off theory and the leverage adjustment process it predicts. This section also discusses empirical issues associated with tests of target leverage. Section 5.3 provides details of the data and variables used in this chapter. Section 5.4 explains the measurement of speed of leverage adjustment in this chapter. Sections 5.5.1 and 5.5.2 examine whether or not firms pursue target leverage and investigates how leverage evolves before and after acquisitions. Section 5.5.3 reports the way in which firm-specific characteristics affect firms' adjustment rates toward the target leverage. Section 5.6 concludes this chapter.

5.2 Target adjustment behaviour

A number of studies (see, e.g., Flannery and Rangan 2006; Kayhan and Titman 2007) have found evidence that, when firms undertake leverage adjustments, they tend to move toward their target leverage. Leary and Roberts (2005) and Harford, Klasa, and Walcott (2009) find that leverage adjustment is dynamic and converges toward the target leverage after accounting for adjustment costs. These studies utilize traditional target adjustment models to examine whether firms' leverages shift toward their target leverages in the long run. The most prominent test of the target adjustment model can be specified as:

$$Lev_{i,t} - Lev_{i,t-1} = \alpha + \lambda(Lev^{*}_{i,t} - Lev_{i,t-1}) + \varepsilon_{i,t} \qquad [5.1]$$

The coefficient of the target leverage ($Lev^{*}_{i,t}$), λ, may be interpreted as the SOA. λ will be greater than zero if firms adjust their leverages to the target leverage. Furthermore, higher estimates of λ imply that firms move more quickly toward the target leverage. However, Chang and Dasgupta (2009) demonstrate that the SOA estimates from this target adjustment model are indistinguishable from estimates derived using randomly generated inputs. Therefore, random changes in data could be interpreted as purposeful adjustments to the target leverage. Studies using traditional target adjustment models which support the notion that firms have leverage targets are now controversial.

Hovakimian and Li (2011) present a methodology to estimate SOA via a two-stage process that addresses Chang and Dasgupta's (2009) critique. Hovakimian and Li (2011) suggest a two-step method to avoid the issue of look-ahead bias and the effect of mechanical mean reversion. The first stage uses historical fixed firm effects regressions to estimate the target leverage. The second stage is a modified partial adjustment model that uses the estimate of the target leverage from stage one, which potentially corrects for the mean reversion. It also improves the ability to reject the target adjustment hypothesis when firms do not behave in a way which follows the target leverage. I utilize Hovakimian and Li's (2011) methodology in order to eliminate the bias in favour of target adjustment behaviour and avoid the risk of generating spuriously significant estimates of SOA when firms do not follow the target leverage.

Following Hovakimian and Li (2011), the first stage is a historical fixed firm effects regression to estimate the target leverage based on firm characteristics. This takes the following form:

$$BL_{i,t} = \alpha + \beta X_{i,t-1} + v_i + \varepsilon_{i,t} \qquad [5.2]$$

In Equation [5.2], the vector of independent variables, X, is the determinant of capital structure considered in previous literature (see, e.g., Fama and French 2002; Kayhan and Titman 2007; Koh, Durand, and Watson 2011), and ε is the residual term. The second stage of Hovakimian and Li's (2011) approach is to include the estimate of target leverage, $BL^{*}_{i,t+1}$, obtained from Equation [5.2] to model the deviation from the target leverage, Equation [5.3]. Given that high leverage ratios could potentially make the sample studied in this paper more susceptible to the mean reversion bias, I follow Hovakimian and Li's (2011) approach by dropping acquirers with book leverage ratios (*BL*) exceeding 0.8. The leverage deviation is estimated as:

$$BL_{i,t+1} - BL_{i,t} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} + \varepsilon_{i,t+1} \qquad [5.3]$$

Equation [5.3] above corrects for the mechanical mean reversion found by Chang and Dasgupta (2009) by including a specific proxy for the target leverage. According to Hovakimian and Li (2011), any statistical significance of $(1 - \lambda_2)$ may be due to mechanical mean reversion. Therefore, in all my subsequent empirical analyses I report the values of λ_1 and refer to it as the SOA. A positive SOA represents an adjustment speed that is moving toward the direction of the target leverage, whereas a negative SOA indicates adjustment in the opposite direction. Considering the levels of adjustment speed, a high estimate of SOA implies that firms on average undertake a relatively more rapid adjustment.

Koh, Durand, and Watson (2011) utilize Hovakimian and Li's (2011) methodology and provide evidence that Australian firms have leverage targets and take advantage of firm characteristics to raise capital in ideal circumstances. Like Koh, Durand, and Watson (2011) I adopt the modified partial adjustment model used by Hovakimian and Li (2011) but, unlike Koh, Durand, and Watson (2011) I examine Australian *acquirers*. If Koh, Durand, and Watson's (2011) arguments are sound I should find that the sample of acquirers, which potentially have *larger* shocks to their leverage, have faster estimates of SOA than the sample of all firms studied Koh, Durand, and Watson (2011).

5.3 Data and sample characteristics

Using the Zephyr database from Bureau van Dijk, I compile a list of merger and acquisition transactions completed in Australia from 2000 to 2010. For each observation in the acquisition sample I collect accounting data from the Morningstar DatAnalysis Premium database for the period 1996 to 2010. The definitions of the variables used in this chapter are presented in Table 5.1. These definitions follow those used in previous studies such as Fama and French (2002) and Hovakimian and Li (2011). All variables are scaled by total assets except for profitability (*PROFIT*) and depreciation (*DEP*) which are scaled by lagged total assets.

The sample selection is summarized in Table 5.2. Panel A of Table 5.2 shows that the initial sample starts with 2,185 acquisition observations. Because I examine the effects of acquisition payment methods on capital structure decisions, I collect the acquisitions that are paid for with cash only, equity only, or a mix of cash and equity. I define 'cash acquirers' as those acquirers who offer cash only to settle their acquisition transactions, 'stock acquirers' as those who pay with equity only and 'mixed acquirers' as those who pay with a combination of cash and equity.[55]

[55] My sampling procedure is similar to Harford, Klasa, and Walcott (2009) but I do not restrict my sample by requiring the target size to be at least 20 percent of the acquirer size. In contrast to the US market, the Australian market is composed of relatively small firms. In addition, since my primary focus is on the SOA, rather than leverage change, I do not impose the size restriction.

Table 5.1: Variable sources and definitions

Accounting data are collected from the Morningstar DatAnalysis Premium database. The accounting data in Panels A, B, C and D are collected from Balance Sheet, Ratio Analysis, Profit and Loss and Sundry Analysis, respectively.

Variable	**Definitions**
Panel A: Balance Sheet	
Book equity$_{i,t}$	Retained profits$_{i,t}$ + Paid in share capital$_{i,t}$
Book debt$_{i,t}$	Total assets$_{i,t}$ – Book equity$_{i,t}$
Book leverage$_{i,t}$ (*BL*)	Total debt$_{i,t}$/Total assets$_{i,t}$
Market-to-Book ratio$_{i,t}$ (*M/B*)	(Book debt$_{i,t}$ + Market equity$_{i,t}$)/Total assets$_{i,t}$
Firm Size$_{i,t}$ (*Ln(TA)*)	Natural logarithm of Total assets$_{i,t}$
Market value of assets$_{i,t}$	Book Debt$_{i,t}$ + Market equity$_{i,t}$
CASH$_{i,t}$	(Cash$_{i,t}$ + Current investment$_{i,t}$)/Total assets$_{i,t}$
Investment$_{i,t}$ (*INV*)	(Current investment$_{i,t}$ + Non-current investment$_{i,t}$)/Total assets$_{i,t}$
Net debt issued$_{i,t}$ (*d/A*)	(Total debt$_{i,t}$ – Total debt$_{i,t-1}$)/Total assets$_{i,t}$
Net equity issued$_{i,t}$ (*e/A*)	[(Book equity$_{i,t}$ – Book equity$_{i,t-1}$) – (Retained profits$_{i,t}$ – Retained profits$_{i,t-1}$)]/Total assets$_{i,t}$
New retained earnings$_{i,t}$ (*RE/A*)	(Retained profits$_{i,t}$ – Retained profits$_{i,t-1}$)/Total assets$_{i,t}$
Panel B: Ratio Analysis	
Market equity$_{i,t}$	Share outstanding$_{i,t}$*Year end share price$_{i,t}$
Share Return$_{i,t}$	(Year end share price$_{i,t}$ – Year end share price$_{i,t-1}$)/Year end share price$_{i,t-1}$
Average Share Return$_{i,t}$ (*AVE RETURN*)	(Share return$_{i,t-1}$ + Share return$_{i,t}$)/2

Variable	**Definitions**
Panel C: Profit and Loss	
Profitability$_{i,t}$ (*PROFIT*)	Earnings before interest, tax, depreciation and amortisation$_{i,t}$(EBITDA)/Total assets$_{i,t-1}$
Average Profitability$_{i,t}$ (*AVE PROFIT*)	[(EBITDA$_{i,t-2}$/Total assets$_{i,t-3}$) + (EBITDA$_{i,t-1}$/Total assets$_{i,t-2}$) + (EBITDA$_{i,t}$/Total assets$_{i,t-1}$)]/3
Size$_{i,t}$ (*REV*)	Operating Revenue$_{i,t}$/Total assets$_{i,t}$
Panel D: Sundry Analysis	
Asset Tangibility$_{i,t}$ (*PPE*)	Net plant, property and equipment$_{i,t}$/Total assets$_{i,t}$
Depreciation$_{i,t}$ (*DEP*)	(Depreciation$_{i,t}$ + Amortization$_{i,t}$)/Total assets$_{i,t-1}$

Table 5.2: Sample selection for Australian M&A data

The sample is collected from the Zephyr database from Bureau van Dijk. The final sample consists of 309 Australian firms completing an acquisition from 2000 to 2010. Accounting variables are taken from the Morningstar DatAnalysis Premium database.

Panel A: Sample selection

Criteria	N
Number of acquisition observations	2,185
Less:	
Acquirers where the ASX code is unavailable (privately held or data unavailable)	(896)
Acquirers from financial and utilities sector	(5)
Sample observations	1,284

Panel B: Year wise distribution

Acquisition year		Number of acquisitions conducted by acquirers: One	Two	Three	Four or more	Total
2000		51	2	1	1	62
2001		61	5	2	1	81
2002		53	4	-	-	61
2003		100	17	1	1	142
2004		104	23	5	2	176
2005		96	26	3	1	161
2006		70	9	2	2	102
2007		113	11	4	5	178
2008		95	15	2	1	136
2009		52	3	-	-	58
2010		93	11	2	1	127
Final Sample	N	888	252	66	78	1,284
	%	69.2%	19.6%	5.1%	6.1%	

Criteria	N
	1,284
Less:	
Acquirers with multiple acquisition transactions each year[56]	(233)
Acquirers with multiple acquisition transactions over the sample period	(387)
Acquirers with book leverage ratio (*BL*) exceeds 0.8	(4)
Acquirers with profitability ratio (*PROFIT*) greater than 1 or less than -1	(138)
Acquirers with market-to-book ratio (*M/B*) exceeds 10	(7)
Acquirers without accounting data between years ± 2, relative to acquisition year, $t = 0$	(206)
Final sample	309

56 1,284 acquisitions – (888 + 126 + 22 + 15) acquisitions = 233 acquisitions are conducted by acquirers who conducted one acquisition in a year.

Panel C: Sample firms by the method of payment

	Cash acquirers	Stock acquirers	Mixed acquirers	Total
N	130	80	99	309
%	42.1%	25.9%	32.0%	100%

Following previous capital structure studies (see, e.g., Hovakimian, Opler, and Titman 2001; Koh, Durand, and Watson 2011), I exclude privately-held firms.[57] Furthermore, I exclude financial firms from the sample (e.g. banks, diversified financial, insurance and real estate industry groups) because their leverage ratios are subject to regulatory oversight and this will likely cause them to behave differently from other firms in managing their leverage ratios. Accordingly, I delete 41 percent of the sample, which leaves me with a sample of 1,284 acquisitions. Panel B shows that 69.2 percent of the sample of 1,284 acquirers make only one acquisition over the sample period. In addition, 19.6 percent, 5.1 percent and 6.1 percent of the sample comprises acquirers who conduct two, three and four or more acquisitions respectively over the sample period. I select firms making only one acquisition during the sample period, because it is important to remove acquirers making multiple acquisitions to avoid estimation biases in the cross sectional regressions (Harford, Klasa, and Walcott 2009; Klasa and Stegemoller 2007). I also acquire accounting data for each firm during the two years before and after the acquisition to examine leverages in pre- and post-acquisition periods.

Following Hovakimian and Li (2011), I exclude acquirers whose *BL* exceeds 0.8 to avoid biases arising from the mechanical mean reversion of leverage ratios in

[57] Only 18.45% of the sample consists of public-market acquisition. There are insufficient observations (57) to observe the capital structure of the target in the analysis.

extreme cases (Chang and Dasgupta 2009). Consistent with previous capital structure studies such as Baker and Wurgler (2002) in the US market and Koh, Durand, and Watson (2011) for the Australian market, I exclude acquirers whose market-to-book ratio (*M/B*) exceeds ten and whose profitability ratio (*PROFIT*) is greater than one or less than negative one. Following these criteria, the final sample for the analysis comprises 309 acquisitions. Panel C in Table 1 shows that there are 130 (42.1 percent of the sample) cash acquirers, 80 (25.9 percent) stock acquirers and 99 (32 percent) mixed acquirers in the final sample of 309 acquisitions.

Table 5.3 reports the descriptive statistics of acquirers' characteristics in the pre-acquisition year. The variable of *REV* suggests that cash acquirers appear to be larger (1.0863) than stock acquirers (0.4931), while stock acquirers appear to be smaller than mixed acquirers (0.9344). Both cash acquirers (0.0862) and mixed acquirers (0.0746) have higher levels of profitability than stock acquirers (-0.0783). This is consistent with the notion that more profitable firms move toward higher levels of leverage, due to expected bankruptcy costs decreasing and debt interest tax shields increasing with increases in profitability (e.g., Jensen and Meckling 1976; DeAngelo and Masulis 1980). Therefore, it is not surprising that cash acquirers have higher book leverage (0.1775) than other acquirers (mixed acquirers = 0.1576; stock acquirers = 0.1184). On the other hand, the lower cash balance (0.1466) for cash acquirers, indicates that they prefer to hold proportionally less cash, as they are likely to have better access to capital markets (Opler et al. 1999). Of the firm characteristics considered in Table 5.3, cash, profitability, size and average stock return play important roles and vary across the acquisition categories in the year prior to acquisitions. These characteristics are explored further in the cross sectional analyses of SOAs.

Table 5.4 presents a correlation matrix for the sample. The relationship between leverage (*BL*) and asset tangibility (*PPE*), profitability (*PROFIT*) and firm size (*Ln(TA)*) is positive, and there is a negative relationship between leverage and growth opportunities (*M/B*). These results are consistent with previous evidence (Titman and Wessels 1988; Rajan and Zingales 1995). The correlation coefficients between book leverage and determinants are relatively low, hence multicollinearity should not be a major problem.

Table 5.3: Descriptive statistics of Australian M&A sample

Table 5.3 reports the averages and standard deviations (S.D.) in parenthesis of acquirers' characteristics in the pre-acquisition year. Book leverage (*BL*) is total debt divided by total assets. Profitability (*PROFIT*) is earnings before interest, tax, depreciation and amortization, divided by lagged total assets. Firm size (*Ln(TA)*) is the natural logarithm of total assets. Market-to-book ratio (*M/B*) is book debt plus market equity, divided by total assets. Asset tangibility (*PPE*) is net plant, property and equipment, divided by total assets. *CASH* equals the sum of cash and current investment, divided by total assets. Average share return (*AVE RETURN*) is the average of the past 2 years' share returns (measured in percent). *REV* is the operating revenue divided by total assets. Average profitability (*AVE PROFIT*) is the average of 3 years' profitability (*PROFIT*). *, **, and *** denote statistical significance of the difference between cash acquirers and stock acquirers at the 10%, 5% and 1% confidence levels respectively. ^{X}, ^{XX}, and ^{XXX} denote statistical significance of the difference between cash acquirers and mixed acquirers at the 10%, 5% and 1% confidence levels respectively. $^{\#}$, $^{\#\#}$, and $^{\#\#\#}$ denote statistical significance of the difference between stock acquirers and mixed acquirers at the 10%, 5% and 1% confidence levels respectively

	N		*BL*	*PROFIT*	*Ln(TA)*	*M/B*	*PPE*	*CASH*	*REV*	*AVE RETURN*	*AVE PROFIT*
Cash acquirers	130	Average	0.1775	0.0862	18.8902^{XXX}	1.7555	0.2681	0.1466^{X}	1.0863	0.3310	0.0911
		S.D.	(0.1493)	(0.2175)	(2.2865)	(1.1303)	(0.2334)	(0.2073)	(1.0958)	(1.1773)	(0.1927)
Stock acquirers	99	Average	0.1184***	-0.0703***	17.1108***	1.7934	0.1631***	0.2652***	0.4931***	0.4172	-0.0679***
		S.D.	(0.1543)	(0.2876)	(1.7288)	(1.3252)	(0.2175)	(0.2858)	(0.6509)	(1.5743)	(0.2736)
Mixed acquirers	80	Average	0.1576$^{\#\#}$	0.0746$^{\#\#\#}$	17.8785$^{\#\#\#}$	2.0305	0.2224$^{\#\#}$	0.1989	0.9344$^{\#\#\#}$	0.7069$^{\#\#}$	0.0468$^{\#\#\#}$
		S.D.	(0.1612)	(0.2556)	(2.2916)	(1.3822)	(0.2373)	(0.2107)	(1.2749)	(1.7869)	(0.2134)

Table 5.4: Correlation matrix

Table 5.4 reports the correlation coefficients between the book leverage ratio and determinants. Coefficients of correlation that are significantly different from zero at the 10%, 5% and 1% confidence level are marked with *, ** and ***, respectively.

	BL	*PROFIT*	*Ln(TA)*	*M/B*
BL	1			
PROFIT	0.2945***	1		
Ln(TA)	0.4589***	0.5096***	1	
M/B	-0.1300***	-0.0766***	-0.1254***	1
PPE	0.3544***	0.2724***	0.3742***	-0.0567***

5.4 Measuring the speed of leverage adjustment

As discussed earlier in Section 5.2, I use the Hovakimian and Li (2011) measure of SOA surrounding the acquisition year. This is a departure from the methodologies traditionally employed to estimate SOA and allows a valid estimation of SOA in the light of Chang and Dasgupta's (2009) critique. In the first stage, historical fixed firm effects regressions based on firm characteristics are employed to estimate the target leverage.[58] This takes the following form:

$$BL_{i,t+1} = \alpha + \beta_1 M/B_{i,t} + \beta_2 Ln(TA)_{i,t} + \beta_3 PROFIT_{i,t} + \beta_4 PPE_{i,t} + \beta_5 DEP_{i,t} + \beta_6 IndDummy + v_i + \delta_{i,t+1} \quad [5.4]$$

I measure book leverage ratio (*BL*) as the total debt scaled by the total assets and use it as my measure of leverage. The subscripts *i* and *t* denote firm and time and δ is the residual term. I estimate the target leverage for every firm in the sample by running annual regressions of book leverage in year *t+1* on the capital structure determinants in year *t* considered in prior literature (e.g., Fama and French 2002; Hovakimian, Opler, and Titman 2001; Kayhan and Titman 2007; Koh, Durand, and Watson 2011). The second stage is to input the target leverage proxy, $BL^*_{i,t+1}$, into Equation [5.3] to estimate the average speed of leverage adjustment toward the target leverage for all financing groups. I describe below the independent variables

58 Equation [5.4] (on page 83 of the dissertation) reflects not only the characteristics of the acquirers *before* the acquisitions, but also the merged firms *after* the acquisitions. Therefore, the estimate of target leverage in the post-acquisition year incorporates acquisition effects and characteristics of target firms. The SOAs account for both impacts caused by acquisitions and the characteristics of target firms.

appearing in Equation [5.4] and the definitions of these determinants are presented in the Table 5.1.

M/B: Firms with potentially profitable investment opportunities have an incentive to avoid raising funds through debt; this maintains financial flexibility. Hovakimian, Hovakimian, and Tehranian (2004) support the premise that high stock returns increase the probability of equity issue. Therefore, the target leverage is likely to be lower for these firms. To capture the effect of growth opportunities on leverage, I use the market-to-book ratio (*M/B*) for the firms to proxy for this effect. *M/B* is defined as book debt plus market equity divided by total assets.

Ln(TA): Larger firms are more diversified, tend to have less volatile cash flows and have greater access to debt markets (Rajan and Zingales 1995). Therefore, large firms can afford more debt and can increase leverage. To capture the effect of firm size on leverage, I include the natural logarithm of total assets.

PROFIT: According to trade-off theory, high profitability could be associated with high target leverage. More profitable firms may have higher tax savings from debt, lower financial distress costs, and find interest tax shields more valuable (e.g., DeAngelo and Masulis 1980). If target leverage is important, they will issue debt rather than equity and have higher leverage ratios. Hovakimian, Opler, and Titman (2001) find, in a sample of firms that raise significant amounts of new capital, that those with high (low) past profitability tend to issue debt (equity). However, Kayhan and Titman (2007) find that firms which passively accumulate profit tend to invest more and thus have less cash to pay down debt.[59] I use the ratio of earnings before interest, tax, depreciation and amortization (*EBITDA*) over lagged total assets as an indicator of profitability (*PROFIT*).

PPE: Firms with more tangible assets can use these assets as collateral to take on more debt (Frank and Goyal 2009). To capture the role of tangibility, I use the ratio of net plant, property and equipment over total assets as an indicator of tangible assets (*PPE*).

DEP: High tax rates increase the interest tax shields benefits of debt financing. Firms are likely to borrow more when tax rates are higher. DeAngelo and Masulis (1980) argue that depreciation tax deductions, or investment tax credits, are substitutes for the interest tax shields benefits of debt financing. I include an indicator of depreciation and amortization over lagged total assets (*DEP*) to capture the effect of the interest deductibility.

IndDummy: Finally, I also include industry dummies (*IndDummy*) to control for industry effects not captured in Equation [5.4] by other independent variables.

[59] Studies that incorporate adjustment costs (e.g., Leary and Robert, 2005; Strebulaev, 2007) show a negative relation between profitability and observed leverage which could be consistent with the dynamic trade-off theory.

5.5 Empirical analyses

5.5.1 Capital issues surrounding acquisitions

This subsection analyses a firm's financing activity in response to the shock to capital structure due to acquisition. This allows me to look closely at the interaction between the change in leverage caused by the acquisition and the firm's attempts to move toward the target leverage. Table 5.5 reports the changes in net financing over the period between years -2 and +2, where the acquisition year is zero. I report changes in financing activities from three possible sources of capital for a public firm: net debt issued (*d/A*), net equity issued (*e/A*) and change in retained earnings (*RE/A*). Following convention, a firm is classified as a net issuer if it issues debt or equity greater than five percent of the previous year's total assets (Hovakimian, Opler, and Titman 2001).

The source of financing in all forms (equity, debt and retained earnings) is noticeably different in the acquisition year compared to the years surrounding it. This supports my conjecture that acquisitions act as a shock to the acquirers' capital structures. Net debt issued in the acquisition year for cash acquirers is 0.1572 and is relatively higher when compared to those observed in the years before or after the acquisition year: this indicates that cash acquirers finance their acquisitions via debt. The net equity issued in the acquisition year is 0.4130 for stock acquirers and is also higher than the corresponding values in the years surrounding the acquisition year. Taken together, the results confirm that cash acquirers appear to use debt to finance their acquisitions while stock acquirers pay with equity.

Table 5.5: Capital issues surrounding acquisitions

Table 5.5 shows net equity issued, net debt issued and newly retained earnings between year -2 and year +2, where the acquisition year is zero. Following Hovakimian, Opler, and Titman (2001), an acquirer is defined as a net issuer if it issues debt or equity greater than five percent of pre-issue total assets. Net equity issue (*e/A*) is measured as the change in total debt divided by total assets. Net debt issue (*d/A*) is measured as the change in book equity minus the change in retained earnings, divided by total assets. Newly retained earnings (*RE/A*) is measured as the change in retained profits divided by total assets. *, **, and *** denotes the significance of any difference between the acquisition year and other years surrounding it at the 10%, 5% and 1% confidence levels respectively.

		Years relative to acquisition				
		-2	*-1*	*0*	*+1*	*+2*
Cash	*e/A*	0.2593	0.2472	0.2897	0.2579	0.2954
acquirers	*d/A*	0.1310	0.1398	0.1572	0.1554	0.1285
N=130	*RE/A*	-0.0384	-0.0858	-0.0483	0.0145	0.0019
Stock	*e/A*	0.3221	0.3544	0.4130	0.3071**	0.3008*
acquirers	*d/A*	0.1350	0.1557	0.1298	0.1245	0.1320
N=99	*RE/A*	-0.2259	-0.2391	-0.1612	0.1953	-0.2662
Mixed	*e/A*	0.2903	0.2847	0.3266	0.2881	0.2845
acquirers	*d/A*	0.1375	0.1671	0.1344	0.1537	0.1360
N=80	*RE/A*	-0.1646***	-0.0890	-0.0583	-0.1159	-0.2313**

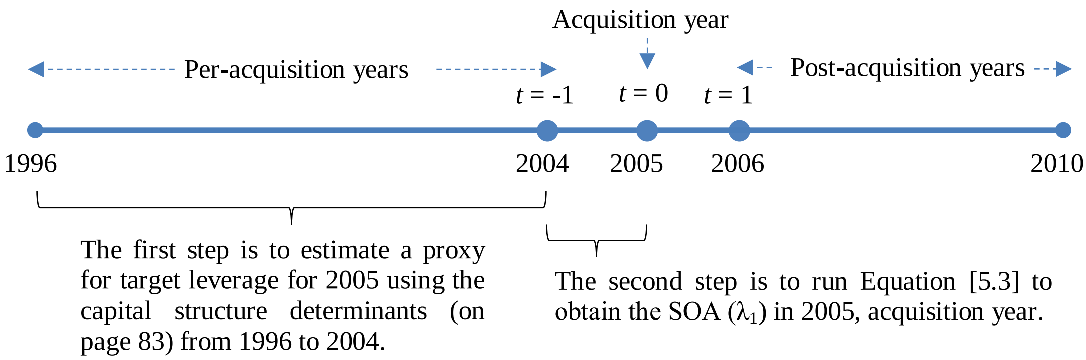
5.5.2 Leverage adjustments surrounding acquisitions

Table 5.6 shows the SOA, leverage and change in leverage of acquirers between years -2 and +2, where the acquisition year is zero. Table 5.6 provides SOA estimates for subgroups based on the financing method employed for the acquisition. Grouping according to the financing method allows me to examine leverage adjustments conditional on the anticipated direction of leverage rebalancing. The estimate of SOA in the acquisition year is significantly larger than the corresponding values in years surrounding the acquisition, implying that acquirers are cognizant of leverage effects caused by the acquisition and make leverage adjustments immediately after the acquisition.

I find that the general pattern of active leverage adjustment movement holds for all financing groups. In the acquisition year, the estimates of SOA are 0.4162, 0.4884 and 0.6334 for cash, stock and mixed acquirers, respectively.[60] The SOA appears to be particularly strong for mixed acquirers. Specifically, mixed acquirers appear to close, on average, 63.34 percent of the gap between actual and target leverages in the acquisition year. On the other hand, cash and stock acquirers adjust to close 41.62 percent and 48.84 percent respectively of the leverage gap in the acquisition year, at relatively slower speeds than mixed acquirers. A likely explanation for the greater activity of mixed acquirers in their leverage adjustment is

[60] The measurement of the speed of leverage adjustment (SOA) is discussed in Sections 5.2 (on page 70) and 5.4 (on page 83). For each acquirer in the sample, I collect accounting data for the period 1996 to 2010. Following Hovakimian and Li's (2011) approach, Equation [5.4] is estimated using all the historical data, for each acquirer, available at a point in time in order to avoid look-ahead bias. For example, my first step is to run Equation [5.4] for the firm-year observations for 1996 and 1997 (using at least 2 years) to obtain the target leverage for 1998. My second step is to run Equation [5.3] to obtain the SOA (λ_1) for 1998. I then re-run Equation [5.4] for the firm-year observations for 1996, 1997 and 1998 to obtain the target leverage for 1999 and re-run Equation [5.3] to obtain the SOA for 1999. Next, I re-run Equation [5.4] for the firm-year observations for 1996, 1997, 1998 and 1999 to obtain the target leverage for 2000 and then re-run Equation [5.3] to obtain the SOA for 2000. I repeat the first and second steps until I complete both Equations [5.3] and [5.4] for all firm-years observations between 1996 and 2010. Given Equation [5.3] is estimated annually on cross-sectional data, the reported SOAs are the average of λ_1 estimates between 1998 and 2010.

The following example illustrates the measurement of SOA in the acquisition year (t = 0). Firm X has completed an acquisition transaction in year 2005. The measurement of SOA in year 2005 is measured as follows.



that they can select an appropriate mix of debt and equity financing that will bring them closer to their target leverages, therefore they appear to adjust more quickly than other acquirers (Hovakimian, Hovakimian, and Tehranian 2004).

Table 5.6: Leverage adjustments surrounding acquisitions

Table 5.6 shows the means of speed of leverage adjustment estimates (SOA), Fama-Macbeth t-statistics, the average of book leverage and changes in book leverage (measured in percent) and number of acquirers between year -2 and year +2, where the acquisition year is 0. The SOA is equal to the average of λ_1 in the following equation:

$$BL_{i,t+1} - BL_{i,t} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} + \varepsilon_{i,t+1}$$

The specification is discussed in Section 5.2. The reported *t*-statistics are Fama-Macbeth t-statistics (Newey West heteroskedasticity-consistent standard errors and covariance adjusted). *, ** and *** denote significance at the 10%, 5% and 1% confidence levels respectively. ^{Y}, ^{YY}, and ^{YYY} denote statistical significance of the difference between cash acquirers and stock acquirers at the 10%, 5% and 1% confidence levels respectively. ^{X}, ^{XX}, and ^{XXX} denote statistical significance of the difference between cash acquirers and mixed acquirers at the 10%, 5% and 1% confidence levels respectively. $^{\#}$, $^{\#\#}$, and $^{\#\#\#}$ denote statistical significance of the difference between stock acquirers and mixed acquirers at the 10%, 5% and 1% confidence levels respectively.

		Year relative to acquisition				
		-2	*-1*	*0*	*+1*	*+2*
Cash acquirers	SOA	0.3150***,^{YY}	0.1359	0.4162**,^{Y}	0.3191***,^{Y}	0.4728
	t-stat	5.33	0.89	2.28	3.50	*0.21*
N = 130	*BL*	0.1844^{YYY}	0.1775^{YYY}	0.1946^{YYY}	0.2047^{YYY}	0.2121^{YYY}
	ΔBL	-6.28%	-4.02%	9.74%	5.23%	3.76%
Stock acquirers	SOA	0.4348$^{\#\#}$	0.1366	0.4884**,$^{\#}$	0.3563***,$^{\#}$	0.2831$^{\#}$
	t-stat	*1.26*	*0.66*	*2.27*	*4.58*	*1.72*
N = 99	*BL*	0.0925$^{\#\#\#}$	0.1184$^{\#\#}$	0.1077$^{\#\#}$	0.1145$^{\#\#\#}$	0.1307$^{\#\#\#}$
	ΔBL	-6.04%	34.20%	-10.32%	4.08%	12.18%
Mixed acquirers	SOA	0.0957	0.2306*	0.6334**	0.5466	0.0404^{X}
	t-stat	*0.53*	*1.92*	*2.85*	*0.90*	*0.25*
N = 80	*BL*	0.1479	0.1576	0.1544^{XXX}	0.1795	0.1887
	ΔBL	10.25%	6.57%	-2.58%	17.73%	5.34%

The estimated SOAs are higher than the rates reported in Koh, Durand, and Watson (2011), indicating the importance managers place on maintaining the target leverage: this is consistent with my expectation that the firms in my sample experience shocks on adjust faster than the average firm in the market. Australian firms undertaking acquisition activity are more active in leverage adjustments and appear to adjust more quickly following the shock to their capital structures. Also in keeping with my expectations, I find that there is there is a positive relationship between acquisition shocks to leverage and SOAs. It is instructive to compare the results to the SOAs reported in Koh, Durand, and Watson (2011), who examine all Australian firms rather than acquisition transactions. In effect, Koh, Durand, and Watson (2011) form control groups and find that equity issuers (SOA = 0.2231) wish to return to the target leverage more quickly than dual issuers (SOA = 0.1284) while debt issuers (SOA = -0.0503) appear to adjust away from their target leverages.

The results in Table 5.6 also show that both cash and stock acquirers undertake leverage adjustments not only in the acquisition year, but also after the acquisitions.[61] In the post-acquisition year (t = 1), SOAs are 0.3191 for cash acquirers and 0.3563 for stock acquirers and both estimates are statistically

[61] In Table 5.6, both cash acquirers and stock acquirers undertake leverage adjustments and appear to adjust more quickly following the shocks to their capital structure. In the sample, the date that acquisition is completed can be before or after the fiscal year. Hence, some acquirers have time to undertake financing decisions and move toward their target leverage. Some acquirers do not have time for leverage adjustment and their leverage may deviate from the target leverage due to the financing transactions necessitated by the acquisition.

If the latter is true, the acquisition itself moves the acquirers away from their target leverage. I would expect that acquirers make an effort to reverse the effect of the acquisition on their leverage in year *+1* (post-acquisition year). The SOAs for cash acquirers (0.3191) and stock acquirers (0.3563) in year *+1* are positive and statistically significant, indicating that acquirers have leverage targets. Furthermore, these estimated SOAs are higher than the rates reported in Koh, Durand, and Watson (2011), indicating the importance managers place on maintaining the target leverage: this is consistent with my expectation that the firms in my sample experience shocks on adjust faster than the average firm in the market.

significant, suggesting that stock acquirers adjust more quickly than cash acquirers after the acquisition. Comparing the estimated SOAs between cash acquirers (0.3150 and 0.4162) and stock acquirers (0.3563 and 0.4884), stock acquirers tend to adjust more quickly on average than cash acquirers. This observation is consistent with Byoun (2008) and Dang, Kim, and Shin (2012). Byoun (2008) and Dang, Kim, and Shin (2012) find that high-growth firms are usually overleveraged with a financing deficit and they offset their leverage deviation (the difference between actual and target leverage) by making equity issues to avoid the large financial distress costs associated with having above-target leverage. In the sample, stock acquirers have higher levels of *M/B* ratios than cash acquirers, indicating larger growth opportunities for stock acquirers. Stock acquirers appear to take their pre-acquisition leverage deviations into account when structuring their acquisitions. The acquisition transactions provide stock acquirers with opportunities to rebalance their capital structures. Therefore, they appear to adjust more quickly than other acquirers.

Moving from the SOA to the change in leverage, I find that the percentage change in leverage is noticeably different in the acquisition year for cash and stock acquirers. For example, the leverage change in the acquisition year is positive for cash acquirers (9.74 percent) while the corresponding change for the stock acquirers is negative (-10.32 percent). These directional changes, conditioned on the method of financing of acquisitions, confirm my postulated link between the form of financing and leverage change. While it is clear that stock acquirers undergo downward change in leverage, the evidence of leverage change shows that cash acquirers issue debt to finance their acquisitions and experience an upward change in leverage. The leverage change in the pre-acquisition year is positive (34.2%) for the stock acquirers, indicating stock acquirers issue a substantial amount of debt before conducting the acquisitions. This is consistent with Myers (1977) who shows that firms with high investment opportunities should use stock as their chosen method of payment, either to save cash or to avoid incurring a debt overhang problem.

Under trade-off theory, firms should undertake leverage adjustment following shocks to their capital structures. In the context of acquisitions, if an acquirer pays for an acquisition with cash (equity), I would expect that it to make an effort to reverse the effect of the acquisition on its leverage by issuing equity (debt) or retiring debt (repurchasing equity). In other words, the acquirer should engage in a leverage-increasing (leverage-decreasing) acquisition transaction to decrease (increase) leverage in order to rebalance its capital structures toward the target leverage. It is evident that the effect of acquisition-induced leverage is a transitory component of the acquirer's capital structure. It is also evident that immediately subsequent to the acquisitions, stock acquirers increase their leverages by 4.08 percent and 12.18 percent during the post-acquisition years, consistent with target adjustment behaviour and the empirical evidence in Leary and Roberts (2005) and Flannery and Rangan (2006).

For cash acquirers, the general level of debt is comparatively higher both prior to, and following, the acquisition year, that of stock and mixed acquirers. Book leverage ranges from 0.1775 to 0.2121 for cash acquirers, while the corresponding range for stock acquirers is between 0.0925 and 0.1307. This can be explained by the fact that cash acquirers are generally larger, with high tangibility and profitability, and less severe asymmetric information (Harris and Raviv 1991).

Therefore, cash acquirers are able to borrow at more favourable interest rates and have better access to capital markets (Ferri and Jones 1979). The cost of external financing is likely to be relatively less for cash acquirers, hence they prefer to sustain higher debt levels. This result is also consistent with the empirical work presented by Flannery and Rangan (2006) who argue that large firms face less external pressure (e.g. banks enforcing relatively tight covenants) to undertake leverage adjustment than smaller firms and, consequently, they adjust less rapidly.

For the subgroup of firms using mixed financing, the results in Table 5.6 do not convey any consistent or clear pattern. Since the directional effects of mixed forms of financing on the level of leverage are neither clear in theory nor apparent in our analysis, I do not use results from this subgroup to draw inferences regarding leverage change. Nonetheless, I include this sample in my later analyses to draw implications regarding the SOA. Overall, the findings in Table 5.6 support the argument that Australian acquirers have leverage targets, and also support trade-off theory.

5.5.3 Adjustment rate and firm characteristics

So far, I have provided general evidence to support my conjecture that acquirers have leverage targets and they adjust more readily in the acquisition year. However, some acquirers may adjust more quickly than others. In this section I study how firm characteristics can explain variations in leverage adjustment rates.

Such an analysis is potentially important to understanding *why* some acquirers adjust more quickly than others. Studies by Hovakimian, Opler, and Titman (2001) and Elsas and Florysiak (2011) suggest that firm characteristics not only reflect fundamental determinants of target leverage, but also affect the issuing (repurchasing) firm's debt versus equity choice. Hence, these firm characteristics may also determine the pressure to stay close or deviate from the target leverage.

I begin my analysis by defining a cross sectional variable $AR_{i,t}$ as

$$AR_{i,t} = \text{Log}\left(\left|\frac{BL_{i,t} - BL_{i,t-1}}{BL^*_{i,t} - BL_{i,t-1}}\right|\right) \qquad [5.5]$$

where $BL_{i,t}$ and $BL_{i,t-1}$ are the values of book leverage for firm *i* at time *t* and *t-1*, respectively. $BL^*_{i,t}$ is the expected leverage in year *t* as predicted by Equation [5.4] and used in [5.3]. Therefore, the numerator of [5.5] represents 'the actual change in leverage'. The denominator of [5.5] represents the change that should be observed if the firm is to achieve its target. If $AR_{i,t}$ is 1, the firm will have perfectly achieved its target leverage in one year. I use the absolute value of this ratio as our focus is on the speed of this adjustment rather than the direction of adjustment. Assuming that firms adjust their leverage according to trade-off theory, $AR_{i,t}$ in absolute value, measures the reaction speed of a firm in adjusting to a target leverage whether the firm is over- or underleveraged. I take a logarithm transformation to account for outliers and firms with no adjustments.

I sort and rank the acquirers into two groups based on $AR_{i,t}$, which I classify as fast or slow adjusters. Fast adjusters are the firms above the median value of $AR_{i,t}$ and the slow adjusters are below the median value of $AR_{i,t}$. In our sample, 51 firms have no change in leverage from *t-1* to *t* and thus drop out of the sample leaving 129 firms in each group.[62] For each adjustment group, I conduct a set of regressions for each type of acquisition financing (cash, stock, and mixed). The regression takes the form:

$$AR_{i,t} = \alpha_{i,t} + \sum_{j=1}^{4} \beta_j * X_{i,t-1} + \sum_{j=5}^{8} \beta_j * X_{i,t-1} * OVER_{i,t-1} + \beta_9 OVER_{i,t-1} + \beta_{10} WAVE_{i,t} + \mu_{i,t} \quad [5.6]$$

$X_{i,t-1}$ is a vector of lagged firm-specific variables that are known to impact firm leverage dynamics. Our choice of these variables is determined by previous literature (Hovakimian, Opler, and Titman 2001; Flannery and Rangan 2006; Faulkender et al. 2012) but exclude variables already used to estimate leverage deviation in Equation [5.4]. I include a dummy variable ($OVER_{i,t-1}$) to represent overleveraged firms in the year prior to leverage adjustment. Firms are overleveraged if their leverage ratios are higher than target leverage. Faulkender et al. (2012) and Harford, Klasa, and Walcott (2009) show, respectively, that firms in general, and acquirers in particular, are more likely to reduce leverage deviations. I interact $OVER_{i,t-1}$ with my primary variables of interest ($X_{i,t-1}$). I also include a

62 Because of missing values, there are only 114 acquisitions for analysis of fast adjusters and 112 acquisitions for slow adjusters, rather than 129 acquisitions for each group.

dummy variable ($WAVE_{i,t}$) to control for acquisition wave. $WAVE_{i,t}$ is one when the number of acquisitions in a calendar year is greater than the average of all acquisitions over the sample period (Duong and Izan 2012).

The rationale and measurement of variables for the vector of independent variables, $X_{i,t-1}$, are as follows.

AVE RETURN: Hovakimian, Opler, and Titman (2001) find that high stock returns are associated with improved growth opportunities. They find that high stock returns are associated with the issuance of equity rather than debt, and the retirement of debt rather than repurchase of equity. This is consistent with Myers (1977) who finds that high-growth firms are likely to adopt a low leverage policy to control underinvestment problems. Higher equity valuations make it more enticing for an overleveraged firm to close its leverage gap when the firm has sufficient cash flow to do so (Faulkender et al. 2012). Therefore, I would expect to find that firms that are overleveraged and whose past share returns are higher will adjust more rapidly by issuing equity and/or repurchasing debt. I measure the past two-year stock returns to consider whether acquirers which are overleveraged take advantage of higher stock prices to adjust quickly to close their leverage gaps. *AVE RETURN* is defined as the average of the past two years' annual percentage share returns.[63]

[63] Capitalisation adjustments (such as right issues) are not available.

REV: Fischer, Heinkel, and Zechner (1989) and Leary and Roberts (2005) suggest that capital structure adjustments involve transaction costs which are smaller for large firms. Larger firms face lower default risk and have better access to debt markets (e.g., Frank and Goyal 2009). Therefore, larger firms can undertake a more rapid adjustment than smaller firms, because their cost of external financing is lower. However, an opposite prediction can also be justified. Flannery and Rangan (2006) find evidence that larger firms tend to adjust more slowly than smaller firms. Large firms tend to use public debt which is more expensive to adjust; therefore they have less incentive to adjust their capital structures, but external pressure to do so. To control for acquirers' size (*REV*), I use operating revenue divided by total assets.[64]

AVE PROFIT: Profitable firms are likely to have available retained earnings so they are less likely to suffer from severe financial constraints. These firms also have an incentive to take advantage of debt interest tax shields and are able to issue securities at a low cost. Therefore, more profitable firms are more likely to make adjustments more quickly. Less profitable firms, or the other hand, are likely to have limited internal funds. Such firms potentially face financial instability and constraints which prevent them from making fast leverage adjustments. Dang, Kim, and Shin (2012) suggest that less profitable firms are more leveraged. Therefore less profitable firms have more incentive to revert toward their target leverages in order to avoid

64 Leverage ratios are specified in book value terms following the approach adopted in almost all paper in corporate finance. Book value facilities the comparison of the accounting based metrics used in the dissertation as well as the literature in this area. For example, Lin, Zhang, and Zhu (2009) and Koh, Durand, and Watson (2011) use the operating revenue divided by total assets as indicators of firm size.

financial distress. I measure the average past profitability as the average of the past three years of profitability.

CASH: When cash flows are low or external financing is expensive, firms with sufficient cash holdings can make sure they have sufficient funds to meet unexpected contingencies or exploit profitable investment opportunities (Opler et al. 1999). Therefore, overleveraged firms have more incentive to undertake leverage adjustment when cash is available. *CASH* is the sum of cash and current investment scaled by total assets.

5.5.3.1 Fast acquirers

Table 5.7 presents the results of multivariate analyses for fast acquirers. That is, firms where $AR_{i,t}$ is higher than the median. Our discussion starts with the variable *OVER*. I find that none of the acquirers in the mixed category is overleveraged and hence estimates for the coefficients of *OVER* and the interaction terms are not available. The positive coefficients of *OVER* indicate that overleveraged acquirers are likely to adjust more quickly. This result is consistent with the empirical evidence of Harford, Klasa, and Walcott (2009), Dang, Kim, and Shin (2012), and Faulkender et al. (2012): to avoid financial distress costs firms tend to make adjustments more quickly when they are overleveraged. The coefficient estimates of the variable *OVER* are particularly strong for cash acquirers (1.5380), suggesting that overleveraged acquirers undertake quick adjustments when acquisitions are paid for with cash. Overall, the results for the variable *OVER* are supportive of the prediction of trade-off theory. When firms are overleveraged, they are more likely to place importance in maintaining their target leverage and hence they will increase the SOA.

Table 5.7: Analysis of fast adjusters

Table 5.7 presents the parameter estimates using the adjustment rate as a dependent variable. The regression follows an OLS model analysing the acquirers that adjust more quickly in the acquisition year. The specification is discussed in Section 5.5.3. All accounting variables are measured in the pre-acquisition year, except the high acquisition wave dummy variable (*WAVE*), which is measured in the acquisition year. The overleveraged dummy (*OVER*) equals one when the book leverage is higher than the target leverage, and 0 otherwise. The average share return (*AVE RETURN*) is the average of the past two years' share returns (measured in percent). *REV* is the operating revenue divided by total assets. The average profitability (*AVE PROFIT*) is the average of three years' profitability (*PROFIT*). Cash (*CASH*) equals the sum of cash and current investment divided by total assets. The high acquisition wave dummy (*WAVE*) equals one when the number of merger and acquisition observations in the calendar year is higher than the sample average, and zero otherwise. The *t*-statistics are calculated following White standard errors and covariance is adjusted in italics. *, ** and *** denote significance at the 10%, 5% and 1% confidence levels respectively.

	Cash acquirers	Stock acquirers	Mixed acquirers
Constant	-0.8781*** *-3.40*	-0.9364*** *-2.28*	0.1781 *0.39*
OVER	1.5380*** *7.75*	1.1030*** *6.76*	
AVE RETURN	0.3136*** *2.48*	0.0633 *0.33*	0.1805*** *7.47*
REV	-0.0344 *-0.39*	0.3110** *2.53*	-0.3717** *-2.58*
AVE PROFIT	-0.0372 *-0.03*	-1.2958* *-1.82*	-0.5287 *-0.86*
CASH	-0.4592 *-0.66*	-0.2440 *-0.51*	0.4587 *0.77*
WAVE	0.0616 *0.33*	-0.1358 *-0.37*	-0.4268 *-1.00*
*AVE PROFIT*OVER*	4.3531*** *3.8*	35.6014*** *49.93*	

*CASH*OVER*	3.2461*** *4.68*	71.3917*** *148.2*	
*AVE RETURN*OVER*	-0.3643*** *-2.89*	1.1580*** *6.08*	
*REV*OVER*	-2.0936*** *-23.52*	-8.3244*** *-67.79*	
Adjusted R^2	0.4002	0.2348	0.2971
N	52	33	29

Next, I examine the analogous effects of past share returns on adjustment rates. Higher stock returns are associated with higher growth opportunities and firms with higher returns are likely to issue equity rather than debt. The findings support Hovakimian, Opler, and Titman (2001). I find that acquirers are likely to adjust leverage more quickly, presumably by issuing equity when their stock returns are high. The statistically significant positive coefficients of the variable *AVE RETURN* for cash and mixed acquirers are 0.3136 and 0.1805, respectively, revealing that firms in both subgroups find higher stock prices valuable and hence increase their adjustment speed.

I also examine the impact of asset size on the adjustment rate. The negative coefficient of the variable *REV* for cash acquirers is statistically insignificant, revealing that cash acquirers are not likely to adjust more quickly when they are relatively larger. The statistically significant positive coefficient (0.3110) for stock acquirers indicates that large stock acquirers are more likely to adjust at a quicker rate than small stock acquirers, which is consistent with the cost of issuing equity is higher for small firms (Smith 1977). However, the statistically significant negative coefficient of the variable *REV* for mixed acquirers (-0.3717) suggests that large mixed acquirers are more likely to adjust at a slower rate than small mixed acquirers. This finding is supportive of Flannery and Rangan's (2006) argument that the external pressure on larger firms to adjust their leverage is not as intense as the pressure on smaller firms.

The coefficients for the interaction variable of *AVE PROFIT* and *OVER* are positive and statistically significant (cash acquirers = 4.3532; stock acquirers = 35.6014), showing the positive effect of past profitability on the adjustment rate when acquirers are overleveraged. This evidence supports the idea that more profitable firms are likely to have higher levels of retained earnings and are less likely to suffer from financial constraints. As a result, their financial flexibility and adjustment benefits (i.e., ability to issue securities at low cost) allow them to adjust more quickly.

The positive and statistically significant coefficients of the interaction variable of *CASH* and *OVER* suggest that overleveraged cash (3.2461) and stock acquirers (71.3917) tend to adjust at a faster pace when they hold high levels of cash. These estimates appear to be consistent with the notion that overleveraged firms have more incentive to undertake leverage adjustment when excess cash is available. In addition, I observe that the coefficient of the interaction variable of *CASH* and *OVER* is particularly strong for stock acquirers as well. A comparison between the interaction coefficients of cash and stock acquirers implies that stock acquirers tend to adjust more quickly than cash acquirers when they are overleveraged with higher past profitability or larger cash reserves. In general, acquirers who are overleveraged have to issue equity *or* retire debt to achieve their target leverages, while overleveraged stock acquirers have the ability to offset their leverage gaps by financing their acquisitions with equity. Our results imply that stock acquirers manage to take their pre-acquisition leverage gap into account when structuring their financing decisions. Given that they are already overleveraged before the acquisitions, and that equity financed transactions should lower the leverage gap, they should find higher profitability or larger cash reserves more valuable; they will adjust more quickly than overleveraged cash acquirers.

The negative and statistically significant coefficients of the interaction variable of *REV* and *OVER* suggest that cash (-2.0936) and stock acquirers (-8.3244) which are overleveraged in the pre-acquisition year tend to adjust at a slower pace when they are relatively larger. These results suggest that larger firms, due to the fact that they have access to public debt, have less incentive as well as external pressure to adjust their capital structures (Flannery and Rangan 2006). For these firms the benefits of reducing the deviation from the target leverage are probably less than the financial distress costs of being overleveraged.[65]

The positive coefficients of *AVE RETURN* for cash and mixed acquirers indicate that higher stock prices help firms to adjust to target leverage quickly. This is consistent with Faulkender et al. (2012): higher market valuations make it more enticing for overleveraged firms to adjust quickly towards their target leverages. However, the opposite signs of the coefficients of the interaction term *AVE RETURN* and *OVER* for stock versus cash acquirers (1.1580 versus -0.3643) indicate that

[65] See Fischer, Heinkel, and Zechner (1989) and Leary and Roberts (2005) for evidence that financing behaviour is related to adjustment costs.

target adjustment behaviour differs according to the method of financing when firms are overleveraged. It is possible that cash acquirers who already have significant debt levels due to the acquisition find it more difficult to take advantage of market conditions than stock acquirers do. The evidence for stock acquirers is consistent with Warr et al. (2012). Firms that are overleveraged adjust more rapidly to their target leverage when their equity is overvalued.

5.5.3.2 Slow adjusters

I now turn our attention to the regression analyses of acquirers adjusting relatively slowly (characterized as *slow* adjusters) in Table 5.8. In this sample, none of the acquirers is overleveraged, therefore the variable *OVER* and the interaction terms are dropped from regression Equation [5.6]. This complements the result reported in Table 5.8, that underleveraged firms have less incentive to undertake adjustment.

Discussion of results in Table 5.8 is limited, as most of the results are consistent with the results for fast adjusters reported in Table 5.7 and discussed in the previous sub-section. The analysis of slow adjusters confirms my argument that large firms adjust more slowly: large firms have less volatile cash flows and the consequence of being away from their target leverages is less severe, *ceteris paribus* (Flannery and Rangan 2006). The coefficient of the variable *REV* is positive and statistically significant (1.0305) for stock acquirers only, suggesting that larger firms tend to adjust more slowly than smaller firms.

Table 5.8: Analysis of slow adjusters

Table 5.8 presents the parameter estimates using the adjustment rate as a dependent variable. The regression follows an OLS model analysing the acquirers adjusting more slowly in the acquisition year. The specification is discussed in Section 5.5.3. All accounting variables are measured in the pre-acquisition year, except the high acquisition wave dummy variable (*WAVE*), which is measured in the acquisition year. The average share return (*AVE RETURN*) is the average of the past two years' share returns (measured in percent). *REV* is the operating revenue divided by total assets. The average profitability (*AVE PROFIT*) is the average of three years' profitability (*PROFIT*). Cash (*CASH*) equals the sum of cash and current investment divided by total assets. The high acquisition wave dummy (*WAVE*) equals one when the number of merger and acquisition observations in the calendar year is higher than the sample average, and zero otherwise. The *t*-statistics are calculated following White standard errors and covariance adjusted in italics. *, ** and *** denote significance at the 10%, 5% and 1% confidence levels respectively.

	Cash acquirers	Stock acquirers	Mixed acquirers
Constant	-2.7821***	-4.7789***	-4.1346***
	-8.46	*-7.02*	*-5.78*
AVE RETURN	-0.0252	0.0174	0.1139
	-0.73	*0.04*	*1.02*
REV	0.1206	1.0305**	0.1079
	0.93	*2.49*	*1.06*
AVE PROFIT	-0.1462	-0.9605	0.6531
	-0.14	*-1.25*	*0.33*
CASH	-1.0622	1.7418*	0.8360
	-0.95	*1.76*	*0.60*
WAVE	-0.2672	-0.3519	0.8691
	-1.01	*-0.67*	*1.43*
Adjusted R^2	-0.0344	0.0011	-0.0760
N	52	33	27

The *CASH* variable produces a statistically significant positive coefficient (at the 10% level) of 1.7418 for stock acquirers only. This suggests that stock acquirers who are adjusting more slowly appear to be less willing to adjust their leverage when they hold higher levels of cash reserves. When firms have adequate amounts of cash for their normal operations, they are less likely to undertake external financing. They prefer to maintain cash balances when the benefits of cash balances outweigh the costs of external financing (Opler et al. 1999). An alternative explanation could be that the benefits of cash holdings might be higher than leverage adjustment costs, causing the leverage adjustments to proceed at a slower pace (Leary and Roberts 2005).

5.6 Conclusion

If trade-off theory is an adequate model of corporate capital structure, firms will adjust leverages to reach their target leverage. The further away firms are from their target leverage, the greater their SOA will be. Acquisition activities can drive firms away from their target leverage. This chapter exploits this idea and, utilizing a sample of Australian acquirers from 2000 to 2010, confirms that Australian acquirers adjust their leverages in a way which implies that they have leverage targets. In addition, the extreme leverages, arising out of acquisition financing, are associated with high SOAs.[66]

This utilization of individual firms' adjustment rates, $AR_{i,t}$, allows consideration of subtleties determining individual firms' SOAs. I consider the

[66] The estimated SOA presented in this chapter are all greater than those reported in Koh, Durand, and Watson (2011).

adjustment rate in the acquisition year and find that separately analysing higher and lower adjustment rates allows me to draw out the finer structure of leverage adjustment and speed at individual firm level. Further, utilizing variables commonly used to explain capital structure, the adjustment rate model allow me to draw inference on motivations of firms as well as on the applicability of a range of capital structure theories. I find that firm-specific characteristics can provide evidence supporting the hypothesis that acquirers adjust more quickly to approach their target leverages when they are overleveraged. These findings confirm that when firms adjust leverages they are cognizant of their leverage targets.

CHAPTER 6

LEVERAGE HETEROGENEITY AND ASYMMETRIC SPEED OF ADJUSTMENT[☆]

6.1 Introduction

Many studies have attempted to address the question of whether firms pursue target leverage by estimating the speed with which firms adjust toward their target leverages (Fama and French 2002; Flannery and Rangan 2006; Kayhan and Titman 2007; Lemmon, Roberts, and Zender 2008). They generally document evidence that firms adjust toward targets. This behaviour is consistent with trade-off theory. However, a limitation of these studies is that they impose the same adjustment speed on all sample firms. They do not consider that firms facing different leverage adjustment costs may take different paths toward their target leverages.[67]

Recent studies have investigated the sources of leverage adjustment costs and found that transaction costs (see, e.g.,Leary and Roberts 2005; Strebulaev 2007), firm-specific characteristics (see, e.g., Drobetz and Wanzenried 2006; Dang, Kim, and Shin 2012; Hanousek and Shamshur 2011), financial deficits/surpluses (Byoun

☆ At the time of submission, a version of this chapter had been accepted for presentation at the 2013 Asian Finance Association Conference. This chapter will also be presented at the 2013 Accounting and Finance Association of Australia and New Zealand (AFAANZ) Conference.

67 See Section 2.7 for a review of studies that address heterogeneity in speeds of leverage adjustment.

2008) and cash flow and financial constraints (Faulkender et al. 2012) are associated with the costs and the benefits of leverage adjustments. Such influences may affect the strategies firms adopt to reach their targets. However, they fail to consider whether a firm's leverage level is itself a determinant of both its speed of adjustment and the importance, or relevance, of the influences on leverage adjustment.

According to trade-off theory, high leverage ratios are associated with high financial costs (Kraus and Litzenberger 1973). If firms have substantial debt relative to their assets, their financial distress costs potentially outweigh the interest tax shield benefits of debt. Firms with high leverage face higher levels of financial distress costs and greater agency conflicts issues than those with low leverage. Such firms are under pressure to decrease their leverage ratios, thus implying more incentive for them to undertake leverage adjustment toward the target leverage.

Analysing US firms for the period 1961 to 2010 allows us to analyse whether the differential levels of leverage are related to the adjustment. I find that the estimated SOAs appear to vary with firms' leverage levels. Firms with high leverage adjust toward their target leverages by offsetting, on average, between 7.15 percent and 17.06 percent of the deviation from their target leverages each year. In contrast, firms with low leverage move toward their target leverages by offsetting only, on average, between 3.16 percent and 4.21 percent of the leverage deviation each year. Using the estimated SOAs, I find support for trade-off theory: firms with high leverage decrease their leverage ratios to reduce their financial distress costs.

I also investigate the way in which firm-specific characteristics interact with differing levels of leverage to influence SOA. Firms with high leverage are found to be larger with more tangible assets. Firms with low leverage, on the other hand, are likely to be high-growth and highly profitable firms. Therefore it is likely that these characteristics apply pressure in different ways for them to undertake leverage adjustment.

This investigation of the sensitivity of firms' leverage to firm-specific characteristics highlights the importance of considering the level of leverage when considering capital structure theories. For example, both high and low leveraged firms tend to utilize higher profitability to reduce their leverage ratios. This is consistent with pecking order theory (Titman and Wessels 1988). On the other hand, firms with medium leverage increase their debt. This is consistent with trade-off theory. Further, the effects of market-to-book ratio are stronger for high leveraged firms than low leveraged firms: when firms are relatively more leveraged they issue more debt when market valuations are high. These findings highlight the fact that the way in which different characteristics systematically affect firm's adjustment to its target leverage is conditional on its level of leverage. A number of studies have considered how the characteristics of firm affect capital structure and adjustments to leverage targets, yet these studies tend to 'lump' in an undifferentiated group rather than analyse sub-samples based on their leverage. This chapter reveals that such an approach misses nuances in the data.

The remainder of this chapter is as follows. Section 6.2 describes the data sources and provides the summary statistics of the sample. Section 6.3 introduces the modified partial adjustment model framework used to estimate firms' SOAs toward target leverage. Section 6.4.1 analyses whether the SOAs differ when firms are differentiated according to their leverage ratios. Section 6.4.2 examines the ways in which firms manage their leverage ratios in approaching the target leverage. Section 6.4.3 compares the leverage variations between firms that can be explained by their different characteristics. Section 6.5 concludes this chapter.

6.2 Data

6.2.1 Sample selection

Using the Compustat and Centre for Research in Security Prices (CRSP) database from Wharton Research Data Services (WRDS), I collect firms' annual accounting data between the period 1961 to 2010 and construct an unbalanced panel of 200,183 firm-year observations. The definitions of the variables used in this chapter are presented in Table 6.1. These definitions follow previous capital structure studies such as Hovakimian and Li (2011) and Lemmon, Roberts, and Zender (2008).

I apply a number of data restrictions. First, I exclude firm-year observations with values of total assets or sales less than one million dollars to mitigate the potential effect of outliers. Second, my research design requires the calculation of changes in leverage ratios and use of firm's lagged leverage ratios, hence only firms with at least two years of continuous leverage ratio are retained in the sample.

Following Hovakimian and Li (2011), I also exclude firm-year observations where leverage ratio (*BL*) is greater than 0.8 to avoid biases arising from the mechanical mean reversion of leverage ratios in extreme cases (Chang and Dasgupta 2009). I also exclude firm-year observations where profitability ratio (*PROFIT*) is greater than one or less than negative one[68] and market-to-book ratio (*M/B*) exceeds ten[69]. Finally, firms operating in the financial sector (e.g. banks, insurance and life assurance firms and investment trusts) and firms in the utility sector (e.g. electricity, water and gas) are excluded from the sample because their leverage ratios differ from the leverage of other firms in the sample and are determined by other features of the market.

Table 6.2 illustrates the screening process for the firm-year observations, leaving a final sample of 131,662 firm-year observations for analysis. Using this final sample, I sort firms into deciles each year according to their leverage ratios in that fiscal year.[70] Decile 10 incorporates firms with the highest leverage; Decile 1 incorporates firms with the lowest leverage. To facilitate comparison, I further

68 I do not trim or winsorize my sample to remove the extreme firm-year observations, I therefore exclude firm-year observations where *PROFIT* is greater than one or less than negative one. The practical consequences of this decision are limited and I outline these in more detail in Footnote 72.

69 To reduce the effect of outliers, I exclude observations where *M/B* exceeds ten which have been considered by Baker and Wurgler (2002) and Hovakimian (2006), and others. As I noted in footnote 59, the consequences of this decision are limited and I outline these in more detail in Footnote 72.

70 Using the final sample of 131,662 firm-year observations from each year from 1961 to 2010, I sort into deciles each year according to their leverage ratios in that fiscal year. For example, there are 2882 firm-year observations in 1978. These 2882 firm-year observations are sorted into deciles according to their leverage ratios in 1978. In 1979, there are 2801 firm-year observations and these observations are then sorted into deciles according to their leverage ratios in 1979. I repeat the sorting procedure until I complete all firm-years observations between 1961 and 2010.

Table 6.1: Variables sources and definitions for US accounting data

Table 6.1 details the variable construction for analysis. Accounting data are collected from Center for Research in Security Prices (CRSP) and Compustat database between 1961 and 2010. The names in parentheses refer to the annual Compustat item name and CRSP item name.

Variables	Definitions
Market Equity$_{i,t}$	Close share Price$_{i,t}$ (Item PRC) x Outstanding common share$_{i,t}$ (Item SHROUT)
Preferred Stock$_{i,t}$	Redemption value$_{i,t}$ (Item PSTKRV) if available, else liquidating value$_{i,t}$ (Item PSTKL) if available, else par value$_{i,t}$ (Item PSTK)
Book Equity$_{i,t}$	Stockholders' equity$_{i,t}$ (Item SEQ) + deferred taxes and investment tax credit$_{i,t}$ (Item TXDITC) - Preferred Stock$_{i,t}$
Market Assets$_{i,t}$	Total liabilities$_{i,t}$ (Item LT) + Market Equity$_{i,t}$
Book Debt$_{i,t}$	Total assets$_{i,t}$ (Item AT) - Book Equity$_{i,t}$
Leverage$_{i,t}$ (*BL*)	(Short term debt$_{i,t}$ (Item DLC) + Long term debt$_{i,t}$ (Item DLTT)) scaled by total assets$_{i,t}$ (Item AT)
Firm Size$_{i,t}$ (*Ln(TA)*)	Natural logarithm of Total assets$_{i,t}$ (Item AT), adjusted for inflation
Tangibility$_{i,t}$ (*PPE*)	Plant, property and equipment expense$_{i,t}$ (Item PPENT) scaled by total assets$_{i,t}$ (Item AT)
Market-to-Book ratio$_{i,t}$ (*M/B*)	(Total assets$_{i,t}$ (Item AT) - Book equity$_{i,t}$ + Market equity$_{i,t}$) scaled by total assets$_{i,t}$ (Item AT)
Research & Development$_{i,t}$ (*R&D*)	Research & Development expense$_{i,t}$ (Item XRD) scaled by sales$_{i,t}$ (Item SALE)
Profitability$_{i,t}$ (*PROFIT*)	Operating income before depreciation$_{i,t}$ (Item OIBDP) scaled by total assets$_{i,t-1}$ (Item AT)
Depreciation$_{i,t}$ (*DRP*)	Depreciation and Amortisation$_{i,t}$ (Item DP) scaled by total assets$_{i,t-1}$ (Item AT)
Cash Flow Volatility$_{i,t}$ (*Volatility*)	Standard deviation of historical operating income, requiring at least three years of historical data
Dividend payer$_{i,t}$ (*DivPayer*)	A dummy variable equals to one if firm paid out dividends (Item DVT) during a fiscal year, otherwise zero

Table 6.2: Sample selection for US data

Table 6.2 presents the breakdown of the total sample firm-year observations. The sample is an unbalanced panel data which consists of 131,662 firm-year observations over the period 1961-2010.

	Sample		
	Initial	Excluded	Remaining
Number of firm-year observations	200,183		
Less:			
Firm-year observations with total assets less than 1 million		(727)	
Firm-year observations with sales less than 1 million		(8,018)	
Firm-year observations with book leverage ratio (*BL*) greater than 0.8		(2,163)	
Firm-year observations without 2 years of contiguous book leverage ratio		(17,493)	
Firm-year observations with market-to-book ratio (*M/B*) greater than ten		(1,091)	
Firm-year observations with profitability (*PROFIT*) greater than one		(287)	
Firm-year observations with profitability (*PROFIT*) less than negative one		(18,685)	
Financial firms (SIC code 6000 – 6900) and utilities firms (SIC code 4900 – 4999)		(20,057)	
Firm-year observations in the final sample			131,662

categorize the deciles into three broad groupings.[71] Deciles 1, 2 and 3 refer to firms with low leverage, Deciles 4, 5, 6 and 7 refer to firms with medium leverage, and Deciles 8, 9 and 10 refer to firms with high leverage. I estimate the SOA for each decile using the modified partial adjustment model in Section 6.3.

6.2.2 Summary statistics

Table 6.3 presents the summary statistics of the sample firms' characteristics. Overall, the findings in Table 6.3 are consistent with Hovakimian and Li (2011) except in the maximum values of the research and development ratio (*R&D*) and the depreciation ratio (*DEP*).[72]

---

71 A transition matrix is created to address the question whether the deciles are stable. The transition matrix shows the movement of firms over 1 year, 3 years and 5 years. For instance, 78.5% of the firms in Decile 1 remains in the same decile next year, 60.2% of the firms remain still in Decile 1 over 3 years and 50.8% over 5 years. For Decile 10, 74.9% of the firms remains in the same decile in a year, 55.8% over 3 years and 45.7% over 5 years. Transition matrix is presented in Appendix B.

72 Hovakimian and Li (2011) trim their accounting variables at one percent of both tails of the distribution. Hence, their maximum value of the *R&D* and the *DEP* are 1.2 and 0.213, which are lower than our observed maximum values (*R&D* = 85.891, *DEP* = 10.119) in Table 6.3. Firms have high *R&D* because they are operating in high research and development intensity sector and invest heavily on research and development for future operational needs (e.g. in the industry of manufacturing pharmaceutical products, medical equipment, measuring and control equipment). I also find that those firms operating in the industry of entertainment services, petroleum and natural gas, electronic equipment, measuring and control equipment are holding a large amount of fixed assets, the fixed assets will lose value over time and will need to be replaced, therefore these firms manage to write off portions of their fixed asset's value over time and appear to have high level of depreciation.

To confirm that I have employed Hovakimian and Li's (2011) approach and that my departures from it are only trivial. I replicated their study (which uses data from 1970 to 2007). I followed the sample selection procedure in Hovakimian and Li (2011) but not trim as they did. Overall the findings in Table 6.3 are consistent with Hovakimian and Li (2011) except in the maximum values of the research and development ratio and the depreciation ratio. I find SOA equals 8.47%, which is very close to the SOA reported in Hovakimian and Li (2011), 8.8%. Therefore, the impact of trimming is minor.

Table 6.4 reports the correlation coefficients between leverage ratio and the determinants used to estimate a proxy for target leverage in Equation [6.1]. The relationships between leverage (*BL*) and asset tangibility (*PPE*), firm size (*Ln(TA)*), industry median leverage (*IND MEDIAN BL*) and depreciation (*DEP*) are positive, and there is a negative relationship between leverage and growth opportunities (*M/B*), unique product (*R&D*) and profitability (*PROFIT*). These results are consistent with previous evidence (e.g. Titman and Wessels, 1988; Rajan and Zingales, 1995) and indicate that these variables are appropriate to model firms' target leverages. Furthermore, the correlation coefficients between book leverage and determinants are relatively low, therefore multicollinearity should not be a major problem.

Table 6.5 presents descriptive statistics of the deciles' characteristics. Firms with high leverage have higher levels of tangible assets (Decile 10 = 0.413) and are larger (Decile 10 = 5.227) than firms with lower leverage. Larger firms, or firms with greater asset tangibility, may be expected to hold higher levels of leverage as their tangible assets can serve as collateral thus increasing debt capacity. These findings are consistent with Titman and Wessels (1988) and Hovakimian, Hovakimian, and Tehranian (2004) who show that debt issuers hold more tangible assets and are significantly larger. The lower research and development ratio (Decile 10 = 0.061) and profitability ratio (Decile 10 = 0.111) for firms with high leverage suggest that they face tight cash flows and therefore invest less on research and development.

Table 6.3: Summary statistics for US sample

Table 6.3 presents the summary statistics for the determinants used to estimate a proxy for target leverage. The sample is an unbalanced panel data which consists of 131,662 firm year observations over the period 1961-2010. Leverage ratio (*BL*) is (short term debt + long term debt)/total assets. Firm size (*Ln(TA)*) is the natural log of total assets, adjusted for inflation. Tangibility (*PPE*) is the property, plant and equipment scaled by total assets. Market-to-Book ratio (*M/B*) is (total assets – book equity + market equity)/total assets. *R&D* is the research and development expenses scaled by sales. Profitability (*PROFIT*) is operating income before depreciation scaled by lagged total assets. Depreciation (*DEP*) is depreciation and amortization scaled by lagged total assets.

Variables	Mean	Median	S.D.	Min	Max	N
BL_t	0.225	0.210	0.178	0.000	0.800	131,662
$Ln(TA)_t$	4.954	4.746	2.089	0.038	13.627	131,662
PPE_t	0.312	0.263	0.221	0.000	1.000	131,557
M/B_t	1.616	1.237	1.173	0.042	9.988	108,784
$R\&D_t$	0.090	0.000	0.894	0.000	85.891	131,662
$PROFIT_t$	0.133	0.141	0.167	-0.999	1.000	131,662
DEP_t	0.052	0.043	0.055	0.000	10.119	131,632

Table 6.4: Correlation matrix for US sample

Table 6.4 reports the correlation coefficients between the book leverage ratio and determinants. Coefficients of correlation that are significantly different from zero at the 10%, 5% and 1% confidence level are marked with *, ** and ***, respectively.

	BL	*Ln(TA)*	*PPE*	*M/B*	*R&D*	*Ind median leverage*	*PROFIT*
BL	1						
Ln(TA)	0.1409***	1					
PPE	0.3067***	0.2022***	1				
M/B	-0.2743***	0.1269***	-0.1836***	1			
R&D	-0.0580***	-0.0248***	-0.0756***	0.1097***	1		
Ind median leverage	0.3620***	0.0757***	0.3912***	-0.3006***	-0.1351***	1	
PROFIT	-0.0132***	0.1824***	0.1645***	0.0677***	-0.2269***	0.1798***	1
DEP	0.0610***	0.0278***	0.3516***	0.0344***	-0.0241***	0.0268***	0.1577***

Table 6.5: Summary statistics for deciles

Table 6.5 presents the mean and the standard deviations of determinants of each decile. The sample is an unbalanced panel data which consists of 131,662 firm year observations over the period 1961-2009. Each calendar year, firms are ranked into deciles based on the leverage ratio. Deciles 1, 2 and 3 refers to firms with low leverage, Deciles 4, 5, 6 and 7 refers to firms with medium leverage and Deciles 8, 9 and 10 refers to firms with high leverage. Leverage ratio (*BL*) is (short term debt + long term debt)/total assets. Firm size (*Ln(TA)*) is the natural log of total assets, adjusted for inflation. Tangibility (*PPE*) is the property, plant and equipment, scaled by total assets. Market-to-Book ratio (*M/B*) is (total assets – book equity + market equity)/total assets. *R&D* is the research and development expenses, scaled by sales. Profitability (*PROFIT*) is operating income before depreciation, scaled by lagged total assets. Depreciation (*DEP*) is depreciation and amortization, scaled by lagged total assets. *, **, and *** denote statistical significance of the difference between Decile 1 and Decile 10 at the 10%, 5% and 1% confidence levels respectively.

Variables		Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
BL_t	Mean	0.003***	0.028	0.071	0.123	0.178	0.231	0.284	0.344	0.421	0.570
	S.D.	(0.007)	(0.031)	(0.049)	(0.050)	(0.043)	(0.036)	(0.031)	(0.031)	(0.036)	(0.080)
$Ln(TA)_t$	Mean	3.876***	4.326	4.607	4.874	5.190	5.359	5.442	5.368	5.272	5.227
	S.D.	(1.593)	(1.627)	(1.866)	(2.034)	(2.166)	(2.218)	(2.227)	(2.215)	(2.169)	(2.043)
PPE_t	Mean	0.210***	0.218	0.254	0.288	0.316	0.337	0.350	0.361	0.377	0.413
	S.D.	(0.186)	(0.182)	(0.184)	(0.191)	(0.201)	(0.209)	(0.219)	(0.229)	(0.238)	(0.261)
M/B_t	Mean	2.227***	2.177	1.878	1.687	1.502	1.439	1.372	1.317	1.284	1.306
	S.D.	(1.623)	(1.626)	(1.375)	(1.220)	(0.995)	(0.897)	(0.822)	(0.758)	(0.685)	(0.716)
$R\&D_t$	Mean	0.134***	0.201	0.149	0.120	0.069	0.049	0.044	0.034	0.039	0.061
	S.D.	(0.818)	(1.195)	(1.058)	(0.891)	(0.728)	(0.492)	(0.474)	(0.562)	(0.871)	(1.374)
$PROFIT_t$	Mean	0.150***	0.129	0.132	0.134	0.138	0.141	0.140	0.133	0.125	0.111
	S.D.	(0.219)	(0.221)	(0.198)	(0.178)	(0.156)	(0.138)	(0.129)	(0.126)	(0.127)	(0.138)
DEP_t	Mean	0.043***	0.048	0.050	0.052	0.053	0.053	0.053	0.054	0.054	0.057
	S.D.	(0.041)	(0.061)	(0.046)	(0.051)	(0.040)	(0.049)	(0.043)	(0.040)	(0.044)	(0.053)
N		13,146	13,167	13,172	13,174	13,159	13,180	13,177	13,169	13,170	13,148

Firms with low leverage appear to be more profitable (Decile 1 = 0.150) and have higher market-to-book ratios (Decile 1 = 2.227) than firms with high leverage. This is consistent with Frank and Goyal (2009) who find that more profitable firms have higher market valuations and therefore use less debt. Additionally, firms with higher market-to-book ratios are expected to have lower leverage ratios because they can raise capital through equity issues when the market values of their assets are relatively higher than their book values (see, e.g., Baker and Wurgler 2002).

6.3 Speed of leverage adjustment estimation

Using the partial adjustment model, many empirical studies find evidence in favour of firms' adjustment toward their target leverages (Jalilvand and Harris 1984; Flannery and Rangan 2006; Hovakimian, Opler, and Titman 2001). However, Chang and Dasgupta (2009) demonstrate that the estimated SOA from the standard partial adjustment model are indistinguishable from estimates derived using randomly generated inputs. Therefore, random changes in data could be interpreted as purposeful adjustments to the target leverage due to mean reversion, i.e. the leverage ratio is bounded between zero and one. Studies using the partial adjustment model which support the notion that firms have leverage targets are now controversial.

Hovakimian and Li (2011) present a modified methodology to estimate SOA via a two-stage process that addresses Chang and Dasgupta's (2009) critique.[73] Hovakimian and Li (2011) suggest a two-step method to avoid the issue of look-ahead bias and the effect of mechanical mean reversion (a detailed discussion is presented in Section 2.6). The first step is to use historical fixed firm effects regressions to estimate the target leverage for each firm in the sample. The second step is a modified partial adjustment model that uses the estimate of the target leverage from stage one. I utilize Hovakimian and Li's (2011) approach in order to eliminate the empirical bias in favour of target adjustment behaviour and avoid the risk of generating spuriously significant estimated SOAs when firms do not follow the target leverage.

The first stage of the Hovakimian and Li's (2011) methodology is a historical fixed firm effects regression to estimate a proxy for the target leverage based on firm characteristics variables, which takes the following form:

$$BL_{i,t+1} = \beta_1 M/B_{i,t} + \beta_2 PROFIT_{i,t} + \beta_3 Ln(TA)_{i,t} + \beta_4 PPE_{i,t} + \beta_5 R\&D_{i,t} + \beta_6 R\&D\ dummy + \beta_7 DEP_{i,t} + \beta_8 Ind\ median\ leverage_{i,t} + v_{i} + \delta_{i,t+1} \quad [6.1]$$

where, $BL_{i,t+1}$ is the leverage ratio for firm *i* in year, *t+1* and δ is the residual term. We measure leverage ratio (*BL*) as the total debt scaled by the total assets and use it

[73] Hovakimian and Li (2011) suggest that the modified partial adjustment model can potentially corrects for the mean reversion and improves the ability to reject the target adjustment hypothesis when firms do not behave in a way which follows the target leverage.

as our measure of a firm's leverage ratio. The independent variables used in Equation [6.1] are the determinants of capital structure considered in the previous literature that are related to the trade-off between the costs and benefits of debt and equity (Fama and French 2002; Hovakimian, Opler, and Titman 2001; Kayhan and Titman 2007; Rajan and Zingales 1995; Hovakimian and Li 2011; Lemmon, Roberts, and Zender 2008). The independent variables appearing in Equation [6.1] are described below and the definitions of these determinants are presented in Table 6.1.

Market-to-book ratio (*M/B*) is a commonly-used proxy for firm's growth opportunities. Trade-off, pecking order theory, and the market timing model provide different interpretations of growth opportunities. Trade-off theory predicts that firms with greater growth opportunities reduce leverage. A higher *M/B* indicates more attractive growth options in the future. In the market timing model, firms with greater growth opportunities tend to raise funds by issuing equity when their stock prices are relatively high (see, e.g., Hovakimian, Hovakimian, and Tehranian 2004). In contrast, pecking order theory implies that firms with more growth opportunities should accumulate more debt over time. Thus, pecking order theory positively associates growth opportunities and leverage. To capture the effect of growth opportunities on leverage, *M/B* is defined as book debt plus market equity divided by total assets.

Profitability (*PROFIT*): Highly profitable firms are less likely to face financial constraints. Trade-off theory suggests that more profitable firms are likely to have more retained earnings resulting in higher financial flexibility. More profitable firms have more incentive to take advantage of debt interest shield benefits. Therefore more profitable firms should have more debt. On the other hand, pecking order theory argues that more profitable firms should use their retained earnings to support their operations and investments. If pecking order theory holds, higher profitability should result in less leverage (Frank and Goyal 2009; Rajan and Zingales 1995). I use the ratio of earnings before interest, tax, depreciation and amortization divided by lagged total assets as an indicator of *PROFIT*.

Firm size (*Ln(TA)*): Large firms are more diversified and have easier access to debt markets; external financing costs are therefore lower for them (Titman and Wessels 1988). Thus, trade-off theory predicts that larger, more mature firms will tend to hold more debt. On the other hand, pecking order theory predicts an inverse relation between leverage and firm size because large firms are better known and have had the opportunity to retain earnings. To capture the effect of firm size on leverage, I include the natural logarithm of total assets.

Tangibility (*PPE*): Tangible assets, such as property, plant, and equipment, are easier for valuations than intangible assets. Hence, firms with higher level of tangible assets may use them as collateral to take on more debt (Rajan and Zingales 1995). The ratio of net plant, property and equipment divided by total assets is included to capture the role of tangibility on leverage.

Research and development (*R&D*): Firms that make large discretionary expenditures such as *R&D* expenses have more intangible assets and consequently have lower leverage. Firms with more intangible assets in the form of *R&D* expenses have incentive to issue capital via equity financing (Flannery and Rangan 2006). I capture the role of firm's intangible assets on leverage by including the ratio of net research and development expense divided by sales.

Research and development dummy (*R&D dummy*): Since not every firm in the sample reports *R&D*, an indicator dummy takes the value of one if the firm reports R&D, and zero otherwise.

Depreciation and amortization (*DEP*): Firms are likely to take on more debt when the tax rates are higher. DeAngelo and Masulis (1980) suggest that depreciation tax deductions or investment tax credits are substitutes for the tax shield benefits of debt. To capture the effect of interest deductions on debt, an indicator of depreciation and amortization divided by lagged total assets is included.

Industry median leverage ratio (*Ind median leverage)*: Bradley, Jarrell, and Kim (1984) document that firm' leverage ratios are strongly related to industry classification. I therefore include industry median leverage ratios to control for industry effects in Equation [6.1].[74]

[74] Following Hovakimian and Li (2011), I employ industry median leverage to control for industry effects not captured in Equation [6.1] by other independent variables.

$$BL^*_{i,t+1} = \widehat{\beta_1} M/B_{i,t} + \widehat{\beta_2} PROFIT_{i,t} + \widehat{\beta_3} Ln(TA)_{i,t} + \widehat{\beta_4} PPE_{i,t} + \widehat{\beta_5} R\&D_{i,t} + \widehat{\beta_6} R\&D\ dummy + \widehat{\beta_7} DEP_{i,t} + \widehat{\beta_8} Ind\ median\ leverage_{i,t} \quad [6.2]$$

Equation [6.2] states that $BL^*_{i,t+1}$ is the predicted target leverage obtained from Equation [6.1]. The second stage of Hovakimian and Li's (2011) methodology is to include the target leverage proxy, $BL^*_{i,t+1}$ to estimate the SOA, using the modified partial adjustment model in Equation [6.3].[75]

$$BL_{i,t+1} – BL_{i,t} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} + \varepsilon_{i,t+1} \quad [6.3]$$

Equation [6.3] corrects for the mechanical mean reversion found by Chang and Dasgupta (2009) by including a specific proxy for the target leverage. According to Hovakimian and Li (2011), any statistical significance of (1- λ_2) may be due to mechanical mean reversion. Therefore, in all subsequent empirical analyses I report the values of λ_1 and refer to it as the SOA.[76] A positive λ_1

[75] Equation [6.1] is estimated using all the historical data, for each decile, available at a point in time in order to avoid look-ahead bias. For example, my first step is to run Equation [6.1] for each decile using observations in 1961 and 1962 (using at least 2 years) to obtain the target leverage for 1963. My second step is to run Equation [6.3] to obtain the SOA for 1963. I then re-run Equation [6.1] for each decile using observations in 1961, 1962 and 1963 to obtain the target leverage for 1964, and re-run Equation [6.3] to obtain the SOA for 1964. Next, I re-run Equation [6.1] for each decile using observations in 1961, 1962, 1963 and 1964 to obtain the target leverage for 1965 and then re-run Equation [6.3] to obtain the SOA for 1965.

[76] I repeat the first and second steps until I complete both Equations [6.1] and [6.3] for each decile using all firm-years observations between 1961 and 2010. Following the first step (Equation [6.1]), there are there are target leverage proxies between 1961 and 2010. The second step, Equation [6.3] is estimated annually on cross-sectional data, the reported SOAs are the average of λ_1 estimates between 1961 and 2010.

represents a SOA that is moving toward the direction of the target leverage, whereas a negative λ_1 indicates a leverage adjustment in the opposite direction from the target leverage. Considering the levels of adjustment speed, a high estimate of λ_1 implies that firms, on average, undertake a relatively more rapid adjustment.

6.4 Empirical analyses

6.4.1 Heterogeneity in the speeds of leverage adjustment

This section discusses the estimated SOAs for the sample firms. The speed with which firms adjust toward their target leverages exhibits the existence of leverage targets and, importantly, quantifies the importance of maintaining target leverage. The SOA is likely to be positive, and the further away the firms are from their target leverage, the higher it is likely to be. Specifically, the magnitude of the SOA reveals firms' target adjustment behaviour; in each period, a firm closes a certain fraction of the deviation from the target leverage.

Panel A of Table 6.6 reports the SOA estimate for the entire sample. Panel A shows that firms have leverage targets but that they move toward them slowly. The result shows that firms adjust 7.63 percent of the gap between actual and target leverages each year which is comparable to the estimated SOA of 8.8 percent in Hovakimian and Li (2011). This suggests that firms take about thirteen years to move toward their target leverages and implies that moving toward their targets is not a high priority.

According to trade-off theory, each firm manages to reach its value-maximizing target leverage, and hence undertakes leverage adjustment to minimize the deviations when it is away from its target leverage. There is empirical evidence that when firms undertake leverage adjustments they tend to move towards their target leverages (Jalilvand and Harris 1984; Flannery and Rangan 2006; Hovakimian, Opler, and Titman 2001). Furthermore, firms adjust towards target leverage only spasmodically, when the benefits of being close to the target leverage outweigh the costs of such adjustment (Leary and Roberts 2005; Strebulaev 2007; Harford, Klasa, and Walcott 2009; Gungoraydinoglu and Öztekin 2011).

Speeds with which firms adjust toward target leverage are associated with firms' cash flows, financial constraints and market timing considerations (Faulkender et al. 2012), firm-specific characteristics (Drobetz and Wanzenried 2006; Dang, Kim, and Shin 2012), financial deficits/surpluses (Byoun 2008) and the institutional and legal arrangements across countries (Öztekin and Flannery 2012). I suspect that the SOA depends not only on the determinants that have been documented in the literature, but also on the degree of financial distress costs facing the firm.

Table 6.6: Speeds of adjustment to target leverage

Following the methodology of Hovakimian and Li (2011), Table 6.6 presents the Fama-Macbeth mean and *t*-statistics for coefficient estimates for α, λ_1 and λ_2. The reported coefficient estimates are the averages obtained from annual cross sectional partial adjustment regressions – a detailed discussion is presented in Section 6.3. Panel A presents the average SOA across all firms in the sample. Panel B reports the average SOA for each decile in the sample. The t-statistics in α, λ_1 and λ_2 are adjusted for autocorrelation and heteroscedasticity using the Newey-West (1987) approach. Coefficient estimates significantly different from 0 at the 10%, 5% and 1% confidence levels are denoted as *, ** and *** respectively.

Panel A: Full Sample		α	λ_1	λ_2
Mean		0.0158***	0.0763***	-0.1296***
t-stat.		*6.55*	*6.46*	*-18.08*

Panel B: Deciles		α	λ_1	λ_2
Decile 1	Mean	0.0163***	0.0421***	0.6645
	t-stat.	*12.13*	*4.20*	*1.06*
Decile 2	Mean	0.0252***	0.0316***	0.1699
	t-stat.	*6.81*	*2.79*	*-1.22*
Decile 3	Mean	0.0257***	0.0337**	-0.0533
	t-stat.	*5.28*	*2.05*	*-0.76*
Decile 4	Mean	0.0171	0.0510***	-0.1146
	t-stat.	*1.38*	*2.90*	*-1.54*
Decile 5	Mean	0.0212	0.0518***	-0.1206
	t-stat.	*1.50*	*3.00*	*-1.57*
Decile 6	Mean	0.0212	0.0674***	-0.1455**
	t-stat.	*1.33*	*3.20*	*-2.42*
Decile 7	Mean	-0.0173	0.0851***	-0.0329
	t-stat.	*-1.18*	*4.16*	*-0.61*
Decile 8	Mean	-0.0133	0.0715***	-0.0491
	t-stat.	*-0.64*	*3.78*	*-0.78*
Decile 9	Mean	-0.0098	0.1106***	-0.0872**
	t-stat.	*-0.64*	*6.81*	*-2.37*
Decile 10	Mean	0.0384***	0.1706***	-0.2135***
	t-stat.	*2.92*	*9.34*	*-9.42*

Firms with high leverage are under pressure to decrease their leverage ratios to reduce their potential financial distress costs, implying that they should undertake quicker adjustment than those with low leverage to maximize the value of the firm. Dang, Kim, and Shin (2012) suggest that firms with low profitability are typically high leveraged, which may result in large bankruptcy and liquidation costs, hence they undertake quicker adjustment toward their target leverages. Therefore, the need to adjust toward the target leverage, to lower their debt levels and, more importantly, to avert bankruptcy, is stronger for financially distressed firms because the consequent the financial distress costs and costs of deviating from the target leverage will be smaller. On the other hand, firms with low leverage are expected to incur higher costs of external financing and therefore appear to adjust at a slower pace than those with high leverage. I expect to find differences in the SOA between firms with different levels of leverage because the leverage level provides a good indicator for the level of costs of debt that firms face.

The SOA estimates are presented in Panel B of Table 6.6, where I present results for firms grouped into 10 deciles by leverage from lowest (Decile 1) to highest (Decile 10).[77] The estimated SOAs for each decile are all significantly positive. Firms follow their target leverages and the leverage level does matter in the leverage adjustment process. The near-monotonic positive association between firms' leverage levels and their estimated SOAs provides evidence of pronounced heterogeneity. The estimated SOAs are particularly strong for firms with high leverage (Deciles 8, 9 and 10). Firms with high leverage (Deciles 8, 9 and 10) appear to adjust between 7.15 percent and 17.06 percent of the deviation from the target leverage each year. Firms with medium leverage (Deciles 4, 5, 6 and 7) adjust by between 5.10 percent and 8.51 percent of the leverage gap each year, whereas firms with low leverage (Deciles 1, 2 and 3) adjust only between 3.16 percent and 4.21 percent of the leverage deviation each year. These estimates are consistent with

[77] The adjustment speed regression specified in Equation [6.1] is then run separately on each decile. For example, Faulkender et al. (2012) estimate the SOA for each subset in their sample. Flannery and Rangan (2006) run separate regressions on subsamples. This method assumes that firms can move from one decile to another through time, for example, a firm in Decile 1 later moves to Decile 2, or a firm in Decile 8 moves to Decile 6 next year).

my expectation that firms with higher leverage face higher levels of financial distress costs and greater agency conflicts issues. Firms behave as if they have targets but their SOA toward these targets is conditional on their leverage. Hence, firms with higher leverage undertake more rapid adjustment to avoid the potentially large financial distress costs.

Table 6.6 demonstrates heterogeneity in the adjustment speeds, confirming previous findings that firms do not adjust at the same rate. Heterogeneous leverage adjustment speeds are driven by different levels of leverage. It could be that financial distress costs are important drivers of leverage adjustment. Firms appear to be keener and adjust at faster rates when they are under pressure to reduce their financial distress burdens. Thus, accounting for firms' leverage levels provides new evidence that the SOA is conditional on the degree of financial distress costs facing the firm. However, the estimated SOA do not incorporate information about how firms manage their leverage ratios over time; this is further investigated in the next section.

6.4.2 The evolution of leverage

Under the trade-off framework, the classic argument is that when the costs of debt are greater than the benefits, firms respond to lower the financial distress level by decreasing their leverage ratios. Therefore, I would expect clear evidence that firms with high leverage lower their debt levels to achieve target leverage when their financial distress costs outweigh the interest tax shield benefits of debt. Firms with low leverage, on the other hand, can afford to take on more debt because of their low levels of financial distress. I suspect that firms with different levels of leverage manage their leverage ratios this way, assuming that they follow their target leverages (according to their estimated SOAs). Hence, studying the evolution of leverage for the cross-section of firms by predicting leverage ratios for each decile based on their SOAs, allows me to provide insights as in whether firms with high (low) leverage decrease (increase) their leverage ratios to approach their target leverages, as predicted by trade-off theory.

This hypothesis is tested by modifying the partial adjustment model in Equation [6.3]. The modification process is shown below.

$$BL_{i,t+1} - BLv_{i,t} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} + \varepsilon_{i,t+1} \quad [6.3]$$

$$BL_{i,t+1} - BL_{i,t} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} \quad [6.4]$$

$$\widehat{BL_{i,t+1}} = \alpha + \lambda_1 BL^*_{i,t+1} + \lambda_2 BL_{i,t} + BL_{i,t} \quad [6.5]$$

Using the partial adjustment model in Equation [6.3], I neglect the residual term, $\varepsilon_{i,t+1}$ to get Equation [6.4]. I then re-arrange Equation [6.4] to obtain the reduced-form partial adjustment model in Equation [6.5]. In Equation [6.5], for each decile in my sample, I start with its long run average leverage ratio ($BL_{i,t}$), long run average target leverage proxy ($BL^*_{i,t+1}$), and estimated SOA (λ_1 and λ_2 in Table 6.6) to simulate a path of future leverage ratios ($\widehat{BL_{i,t+1}}$, namely, the *predicted* leverage ratio) spanning 30 years. During the simulation process, I track the leverage evolution between deciles. When a decile's *predicted* leverage ratio crosses the barrier of another decile's long run average leverage ratio, its estimated SOA will be substituted by the estimated SOA of the corresponding decile.

Figure 6.1 represents the *predicted* leverage ratios obtained from the simulation process. The *predicted* leverage ratios are presented in Appendix A. The initial *predicted* leverage ratio for firms with high leverage (e.g. Decile 10) and firms with low leverage (e.g. Decile 1) are 53.53 percent and 2.68 percent respectively. The convergence occurs in the first few years as shown by the flattening slopes in Deciles 1 and 10. In the subsequent 30 years, the *predicted* leverages between firms with high leverage (Deciles 8, 9 and 10) and low leverage (Deciles 1, 2 and 3) merge toward a moderate level of leverage. As presented in Figure 6.1, the *predicted* leverage ratio of Decile 10 drops from 53.53 percent to 24.40 percent over 30 years whereas the *predicted* leverage ratio of Decile 1 increases from 2.68 percent to 25.21 percent. Taken together, the *predicted* leverage evolution in Figure 6.1 infers that firms with high leverage are required to lower their debt levels to achieve their target leverage, whereas firms with low leverage increase their debt levels which bring them closer to their target leverages. This appears to support the prediction of trade-off theory.

The level of convergence on the *predicted* leverage ratios in Figure 6.1, where by design, firms adjust toward their target leverages, does not appear to be random.[78] Firms with high (low) leverage reduce (increase) their leverage ratios in the short run. In particular, firms with high leverage appear to be more inclined to lower their leverage ratios than firms with low leverage. Figure 6.1 indicates that the estimated SOA plays an important role in explaining the convergence of leverage ratios. In other words, the capital structure adjustment toward the target leverage is, at least in part, the driver of the variation in capital structure in the short-term.

78 The pattern I see is reminiscent of Figure 1 on page 1580 in Lemmon, Roberts, and Zender (2008) although my figure shows a lower long run propensity for firms to converge to a global target.

Figure 6.1: Predicted leverage evolution

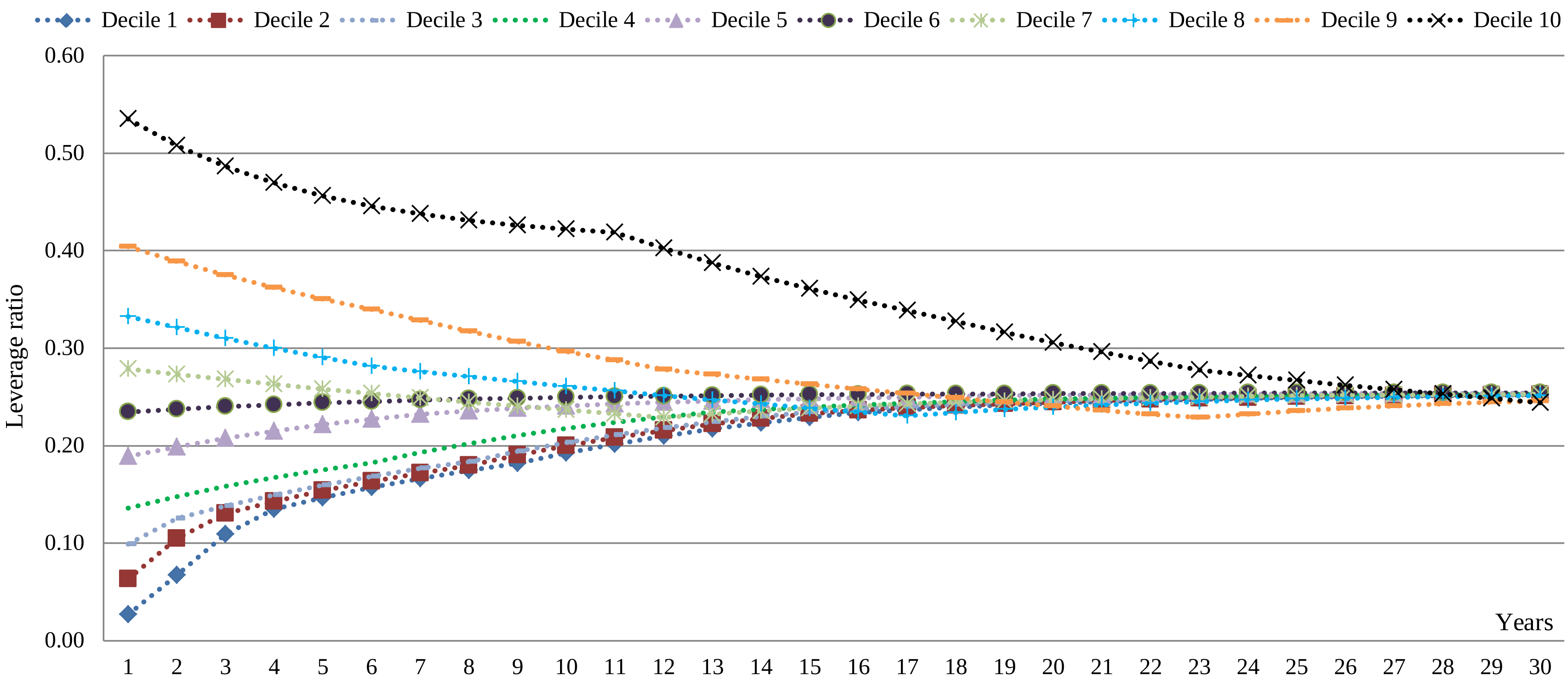


Figure 6.1 shows the predicted leverage ratio of estimating Equation [6.5] – refer to Section 6.4.2. I form the predicted leverage evolution that evolves from decile's initial long run average leverage ratio. Following the reduced-form partial adjustment model in Equation [6.5], I simulate a path of future leverage ratios spanning 30 years for each decile according to its estimated SOA presented in Table 6.6.

6.4.3 The effects of firm-specific characteristics on leverage ratios

One implication of the heterogeneous adjustment speeds presented in Table 6.6 is that the speeds with which firms adjust toward target leverage are related to their leverage levels. However, Table 6.6 provides no information about what drives firms to adjust their leverage ratios toward the target leverage other than higher or lower leverage. In this section, I investigate the impact of the firm-specific characteristics on leverage variation between firms with different levels of leverage. A number of studies have examined the effect of firm-specific characteristics on firms' capital structure (see, e.g., Flannery and Rangan 2006; Frank and Goyal 2009). However, this chapter adds to the literature by examining the impact of firm-specific characteristics on capital structure conditional on firms' leverage levels.

Clearly, firm characteristics factors have the power to explain firms' leverage ratios. I suspect that the firms with high leverage in the sample possess important firm-specific characteristics: they are typically larger, with greater tangible assets. Firms with low leverage, on the other hand, are likely to be high-growth and highly profitable firms. Since firms carrying differential levels of leverage possess different firm-specific characteristics, and many of these characteristics in turn affect leverage ratios when firms follow their target leverages, it seems likely that these characteristics also constitute differential pressure to undertake leverage adjustment.

6.4.3.1 Empirical specification

A thorough examination is necessary to explore the sensitivity of firms' leverage ratios to the variation in firm-specific characteristics. To examine the impact of firm-specific characteristics on leverage ratios for each decile, I propose Equation [6.6] which takes the following form:

$$BL_{i,t} = \alpha + \beta X_{i,t-1} + \gamma Decile + \delta Decile{*}X_{i,t-1} + v_t + \varepsilon_{i,t} \qquad [6.6]$$

In Equation [6.6], ε is the residual term and v_t is year fixed effects.[79] *Decile* is a vector of dummy variable (Deciles 2 to 10) and takes a value of 1 if the firm corresponds to a particular decile in a given year, otherwise zero. *X* is a vector of selected firm-specific characteristics factors (some factors are discussed in Section 6.3). The interaction variables, defined as the product between the given decile dummy and each selected firm-specific characteristic. Specifically, the coefficients δ are the main interest. The coefficients of δ capture the role that each selected firm-specific characteristic in each decile, whether or not it has differential or additional power in explaining the variation of firms' leverage ratios.

79 Recent studies have suggested that regression after accounting for firm fixed effects provides no additional explanatory power to explain firms' leverage ratios. Lemmon, Roberts, and Zender (2008) illustrate that the capital structure determinants account for a very small fraction of the explained variation in leverage ratios when firm fixed effects are considered. Chang and Dasgupta (2011) demonstrate that firm fixed effects contribute as much as 95 percent of the explained variation. These findings raise the concern that the much of the capital structure determinants explanatory power comes from cross-sectional variation and the importance of these capital structure determinants will fall after controlling for firm fixed effects. Therefore, we only control for year fixed effects in Equation [6.6].

6.4.3.2 Analyses and results

Table 6.7 reports the results of estimating Equation [6.6] for the interaction variables between the decile and the selected firm-specific characteristics. The interaction terms, defined as the product between each decile dummy and firm-specific characteristics, are designed to model how the effect of these firm-specific characteristics varies for each leverage decile.

Table 6.7: The effects of firm-specific characteristics on deciles' leverage ratios

Table 6.7 presents the results of estimating Equation [6.6] – refer to Section 6.4.3.1. The dependent variable is leverage ratio (*BL*), which is the ratio of total debt divided by total assets. Firm size (*Ln(TA)*) is the natural log of total assets. Market-to-Book ratio (*M/B*) is (total assets – book equity + market equity)/total assets. Tangibility (*PPE*) is the property, plant and equipment, scaled by total assets. Profitability (*PROFIT*) is operating income before depreciation, scaled by lagged total assets. Industry median leverage (*Ind median leverage*) is the median leverage in the industry and industry composition is determined by the forty-nine Fama-French industry definitions. Cash flow volatility (*Volatility*) is the standard deviation of historical operating income, requiring at least three years of historical data. Dividend payer (*DivPayer*) equals to one if firm paid out dividends during a fiscal year, otherwise zero. Year fixed (Firm fixed) effects denote whether the calendar year fixed (firm fixed) effects are included in the specification. The *t*-statistics are computed based on robust standard errors clustered at the firm level and reported in parentheses. *, ** and *** indicate statistical significance at the level of 10%, 5% and 1% respectively.

	Coefficient	*t-stat.*
Constant	0.0049***	*2.65*
Ln(TA)	0.0051***	*13.97*
M/B	0.0001	*0.31*
PPE	-0.0052	*-1.57*
PROFIT	-0.0160***	*-5.77*
Ind median leverage	-0.0901***	*-14.27*
Volatility	0.0000**	*-2.51*
DivPayer	-0.0099***	*-8.74*
Decile2*Constant	0.0235***	*8.17*
Decile2**Ln(TA)*	0.0010***	*-9.53*
Decile2**M/B*	-0.0003	*-1.33*
Decile2**PPE*	0.0038***	*2.17*
Decile2**PROFIT*	-0.0058***	*3.07*
Decile2**Ind median leverage*	-0.0199***	*9.35*
Decile2**Volatility*	0.0000	*0.99*
Decile2**DivPayer*	0.0029***	*9.32*

Decile3*Constant	0.0514***	*18.05*
Decile3**Ln(TA)*	-0.0016***	*-13.94*
Decile3**M/B*	-0.0019***	*-5.42*
Decile3**PPE*	0.0159***	*4.67*
Decile3**PROFIT*	0.0099***	*7.31*
Decile3**Ind median leverage*	0.0647***	*18.46*
Decile3**Volatility*	0.0000***	*2.68*
Decile3**DivPayer*	0.0151***	*16.42*
Decile4*Constant	0.1057***	*40.76*
Decile4**Ln(TA)*	-0.0020***	*-16.02*
Decile4**M/B*	-0.0026***	*-6.67*
Decile4**PPE*	0.0063***	*2.69*
Decile4**PROFIT*	0.0162***	*8.59*
Decile4**Ind median leverage*	0.0736***	*20.17*
Decile4**Volatility*	0.0000	*0.24*
Decile4**DivPayer*	0.0163***	*17.61*
Decile5*Constant	0.1671***	*73.02*
Decile5**Ln(TA)*	-0.0015***	*-16.32*
Decile5**M/B*	-0.0022***	*-6.08*
Decile5**PPE*	0.0045***	*2.60*
Decile5**PROFIT*	0.0160***	*8.98*
Decile5**Ind median leverage*	0.0451***	*18.42*
Decile5**Volatility*	0.0000	*0.64*
Decile5**DivPayer*	0.0097***	*14.77*
Decile6*Constant	0.2239***	*106.82*
Decile6**Ln(TA)*	-0.0008***	*-15.58*
Decile6**M/B*	-0.0001	*-0.61*
Decile6**PPE*	0.0006*	*1.65*
Decile6**PROFIT*	0.0001***	*4.77*
Decile6**Ind median leverage*	0.0295***	*17.80*
Decile6**Volatility*	0.0000**	*2.03*
Decile6**DivPayer*	0.0024***	*10.04*
Decile7*Constant	0.2765***	*130.84*
Decile7**Ln(TA)*	0.0005***	*-12.01*
Decile7**M/B*	0.0008*	*1.90*
Decile7**PPE*	-0.0002	*1.44*
Decile7**PROFIT*	-0.0079**	*2.28*
Decile7**Ind median leverage*	0.0136***	*15.23*
Decile7**Volatility*	0.0000**	*2.38*
Decile7**DivPayer*	-0.0029***	*5.70*
Decile8*Constant	0.3342***	*144.79*
Decile8**Ln(TA)*	0.0015***	*-9.29*
Decile8**M/B*	0.0017***	*3.59*
Decile8**PPE*	0.0020**	*2.02*

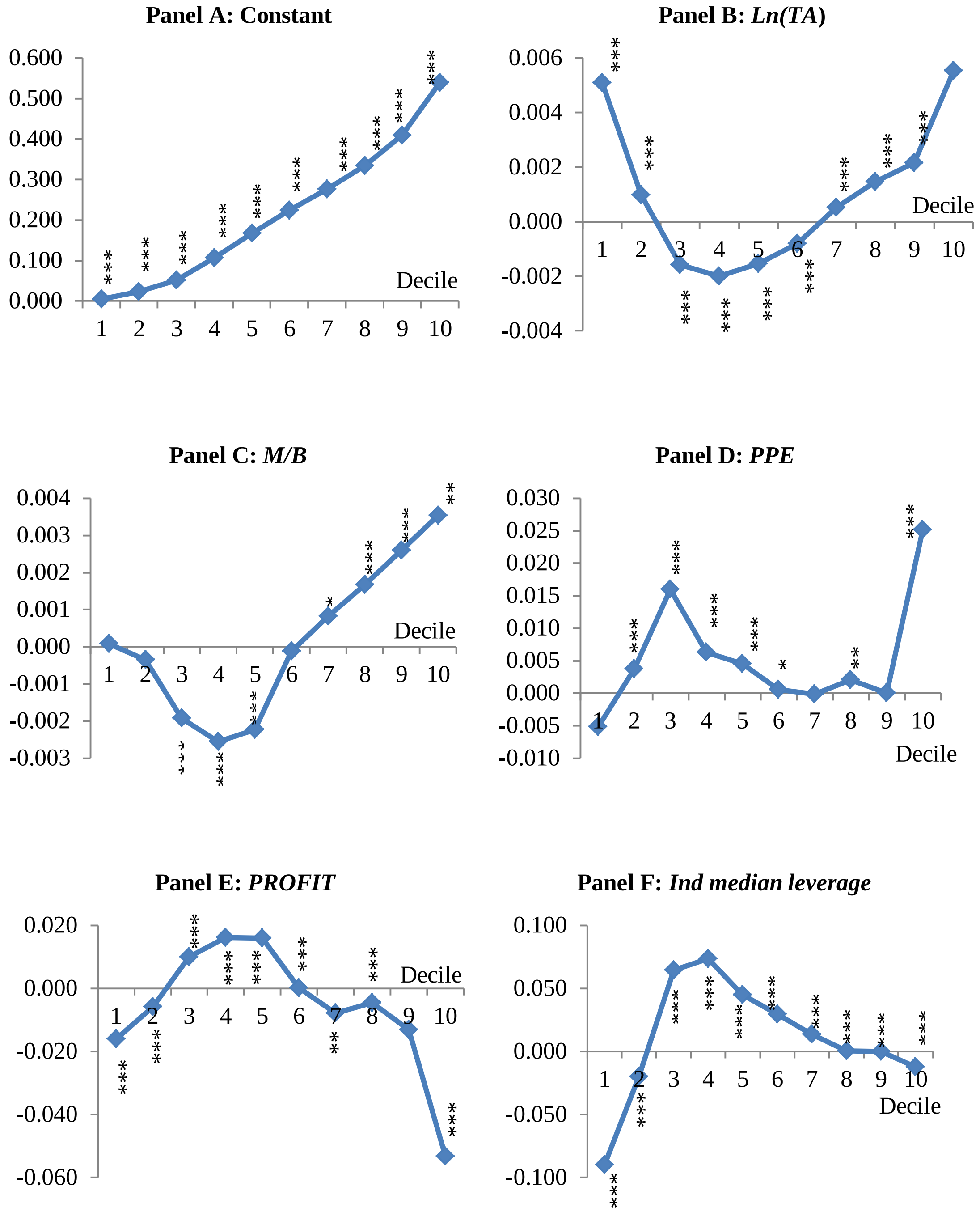
Decile8**PROFIT*	-0.0045***	*2.90*
Decile8**Ind median leverage*	0.0007***	*12.80*
Decile8**Volatility*	0.0000	*1.40*
Decile8**DivPayer*	-0.0068**	*2.39*
Decile9*Constant	0.4090***	*145.50*
Decile9**Ln(TA)*	0.0022***	*-6.81*
Decile9**M/B*	0.0026***	*3.97*
Decile9**PPE*	0.0000	*1.35*
Decile9**PROFIT*	-0.0130	*0.59*
Decile9**Ind median leverage*	0.0001***	*11.20*
Decile9**Volatility*	0.0000*	*1.65*
Decile9**DivPayer*	-0.0093	*0.40*
Decile10*Constant	0.5388***	*74.73*
Decile10**Ln(TA)*	0.0055	*0.450*
Decile10**M/B*	0.0035**	*2.13*
Decile10**PPE*	0.0251***	*4.18*
Decile10**PROFIT*	-0.0532***	*-3.45*
Decile10**Ind median leverage*	-0.0123***	*4.11*
Decile10**Volatility*	0.0000	*0.10*
Decile10**DivPayer*	-0.0248***	*-4.52*
Year fixed effect	Yes	
Firm fixed effect	No	
Adjusted R^2	0.968	
AIC	-4.126	

In order to draw a direct comparison, I also present the interaction coefficients δ in Figure 6.2. In Figure 6.2, there are eight panels, with each panel presenting the constant term and estimated coefficients of the interaction variables throughout the deciles. In each panel, the vertical axis indicates the coefficients δ, and the horizontal axis indicates the deciles.

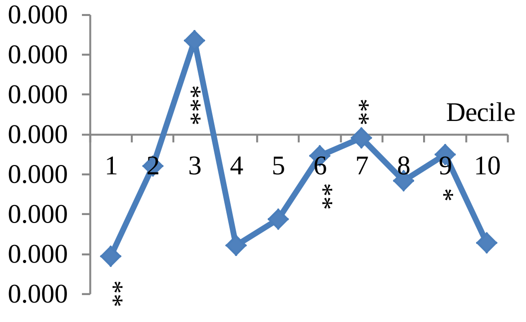
Figure 6.2: Model generated regressions coefficients

The estimated coefficients are the results of estimating Equation [6.6]. The dependent variable is book leverage ratio (*BL*), which is the ratio of total debt divided by total assets. Firm size (*Ln(TA)*) is the natural log of total assets. Market-to-Book ratio (*M/B*) is (total assets – book equity + market equity)/total assets. Tangibility (*PPE*) is the property, plant and equipment scaled by total assets. Profitability (*PROFIT*) is operating income before depreciation scaled by lagged total assets. Industry median leverage (*Ind median leverage*) is the median leverage in the industry and industry composition is determined by the forty-nine

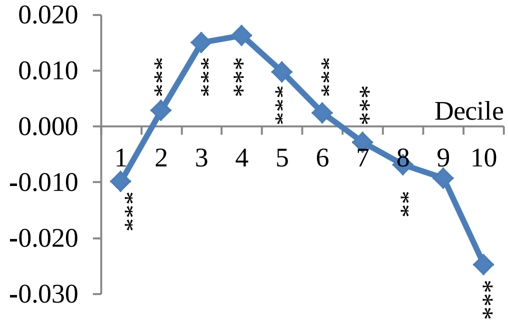
Fama-French industry definitions. Cash flow volatility (*Volatility*) is the standard deviation of historical operating income, requiring at least three years of historical data. Dividend payer (*DivPayer*) equals to one if firm paid out dividends during a fiscal year, otherwise zero. The *t*-statistics are computed based on robust standard errors clustered at the firm level and reported in parentheses. *, ** and *** indicate statistical significance at the level of 10%, 5% and 1% respectively.



Panel G: *Volatility*



Panel H: *DivPayer*



My discussion starts with the constant terms, which indicate the base leverage of each decile in the sample. As can be seen in Panel A in Figure 6.2, the magnitude of the base leverage increases as it shifts from low leverage firms (Deciles 1, 2 and 3) to high leverage firms (Deciles 8, 9 and 10). The upward slope shows that the base leverage in Decile 1 (0.0049) is lower than the base leverage in Decile 10 (0.5388). These results are consistent with the findings in Table 6.5.

Panel B shows the sensitivity of leverage to a change in firm size (*Ln(TA)* variable) across the deciles. There is a concave relationship between the sensitivity of leverage and the deciles, suggesting that low leverage firms (Deciles 1 and 2) and high leverage firms (Deciles 7, 8 and 9) are more likely to increase their leverage ratios when their assets are larger. In contrast, medium leverage firms (Deciles 4, 5 and 6) appear to decrease their leverage ratios when their assets are larger. The positive relationship between firm size and leverage (based on the statistically significant positive interaction coefficients) is consistent with the argument that larger firms have better access to capital markets (Titman and Wessels 1988). Additionally, larger firm size infers lower financial distress costs of debt, hence more debt that the firm can issue, indicating a positive relationship between firm size and leverage, according to trade-off theory. The negative relationship between firm size and leverage (based on the statistically significant negative interaction coefficients) appears to be consistent with pecking order, rather than trade-off theory. Larger firms have been around longer and have had an opportunity to retain earnings. Hence there is less chance that a larger firm will issue debt, resulting in a negative relationship between leverage and firm size.

Panel C displays the sensitivity of leverage to a change in market-to-book ratio (*M/B* variable) across the deciles. Firms with low leverage (Decile 3) and medium leverage (Deciles 4 and 5) are more likely to decrease their leverage ratios when they have higher market-to-book ratios. These findings appear to be consistent with Baker and Wurgler's (2002) market timing model and Myers (1977). Baker and Wurgler (2002) document that firms have less leverage because they exploit equity financing to take advantage of higher market values of share prices relative to book values, while Myers (1977) finds that high-growth firms are more likely to adopt a low leverage policy in order to control the underinvestment. On the other hand, we observe that firms with high leverage (Deciles 8, 9 and 10) undertake progressively more debt issuing activity when their market-to-book ratios are higher. This behaviour is consistent with the counter-cyclical pattern arguments of Korajczyk and Levy (2003). One possible explanation for the positive sign of *M/B* variable for highly leveraged firms may be that when a firm is highly valued in the market, managers face favourable or lower costs when raising debt.

In Panel D, a significant positive relationship between deciles and firms' tangibility (*PPE* variable) is observed. Two points concerning these results are of interest. Firstly, firms are more likely to increase their leverage ratios when their tangible assets are larger. This is in line with trade-off theory: tangibility can be used as a security to lessen the agency cost of debt and mitigate the asset substitution issue (Rajan and Zingales 1995). Secondly, the estimated interaction coefficients seem to be relatively larger in magnitude for firms in Decile 10.

Panel E shows the sensitivity of leverage to a change in Profitability (*PROFIT* variable) across the deciles. Unlike the firm size and market-to-book ratios, there is a convex relationship between the sensitivity of leverage and the deciles, indicating that firms with low leverage (Deciles 1 and 2) and high leverage (Deciles 8 and 9) are more likely to decrease their leverage ratios when their profitability is higher. In particular, the interaction coefficients seem to be relatively larger for firms in Decile 10. The negative relationship between profitability and leverage (based on the statistically significant negative interaction coefficients) appears to support the premise that profitability is related to the availability of internal funds leading to less leverage. An alternative view is that less profitable firms are more likely to be highly leveraged. Both interpretations are consistent with pecking order theory (Myers and Majluf 1984). On the other hand, the positive relationship for firms with medium leverage (Deciles 4, 5 and 6) appears to support the premise that, for firms in these deciles, profitability may be associated with free cash flow issues and hence results in more leverage (Jensen 1986).

In Panel F, as in the profitability results, there is a near-convex relationship between the sensitivity of industry median leverage and the deciles; the leverage ratios of low leveraged firms (Deciles 1 and 2) are negatively associated with the median leverage ratios in their industry (*Ind median leverage* variable). In the other deciles, firms react positively to movement in the median leverage ratios in the industry, which appears to be consistent with previous studies (e.g. Lemmon, Roberts, and Zender (2008)). The magnitude of the effect diminishes with higher leverage, suggesting that the impact of industry median leverage falls when firms' leverage ratios are increasing.

In Panel G, the sensitivities of leverage to a change in cash flow volatility (*Volatility* variable) are generally low and appear to differ in magnitude with different signs throughout the deciles. Given the absence of a clear pattern, it is difficult to draw any conclusions. I now turn to discuss the sensitivity of leverage to a change in the variable of dividend payer (*Div payer* variable) in Panel H. Like profitability, the convex relationship indicates that firms with low leverage (Decile 1) and high leverage (Deciles 8 and 10) (based on the statistically significant negative interaction coefficients) do not increase their leverage ratios when they pay out dividends: they appear to have sufficient funds for their regular dividend payment and do not need to raise funds via external financing. In contrast, the positive relationship between the variables of dividend payer and leverage (based on the statistically significant positive interaction coefficients) for firms with medium leverage (Deciles 4, 5 and 6) implies the opposite: firms in these deciles need to raise funds for their regular dividends, resulting in higher leverage ratios.

When considering levels of leverage, the effects of firm characteristics appear asymmetric. First, firms with different levels of leverage react differently to a change in firm-specific characteristics. Secondly, high leverage and low leverage firms tend to act in a similar fashion: the larger the firms' assets (include tangible assets) and the lower their profitability, the more likely they are to increase their leverage ratios. Third, the effects of tangibility, profitability, market-to-book ratios, and paying dividends on leverage are significantly stronger for firms in Decile 10 (the firms with highest leverage ratios in the sample), indicating that they are highly sensitive to changes in these features.

6.5 Conclusion

If firms have leverage targets, they will act to move toward these targets. I utilize a comprehensive database of US firms to study whether there is a relationship between firms' leverage levels and the heterogeneity in SOA. Firms with high leverage undertake significantly faster leverage adjustments than those with low leverage. Such firms appear concerned about potentially large financial distress burdens caused by having high levels of debt. They therefore revert to their target leverage at a faster pace. This behaviour is consistent with the predictions of trade-off theory. Hence, accounting for firms' leverage levels provides new evidence that the estimated SOA toward target leverage is conditional on the degree of financial distress costs facing the firm.

Further, I investigate whether firm-specific characteristics have different effects and significance that can explain the variation leverage ratios between firms with different levels of leverage. The analysis indicates that firms with different levels of leverage react differently to changes in firm-specific characteristics.

Interestingly, high and low leveraged firms tend to act in the same way: larger firms and less profitable firms are more likely to increase their leverage ratios. I find that firms with high leverage appear to increase their leverage ratios when their market-to-book ratios are high, which appears to contradict Baker and Wurgler's (2002) market timing theory. My results highlight the fact that important information is lost in capital structure studies when firms are lumped in an undifferentiated group rather than analysed in relevant sub-clusters.

CHAPTER 7

CONCLUSION

7.1 Introduction

Capital structure literature reflects an increasing interest in the concept of target leverage in trade-off theory. This thesis presents analyses which seek to achieve a better understanding of whether or not firms pursue target leverage and, if so, why some firms adjust more rapidly than others. The empirical analyses undertaken here cover two different geographic regions: Australia and the US.

The empirical research on trade-off theory in Australia is very limited. The only Australian study in this area is presented in Koh, Durand, and Watson (2011), whose study provides supportive evidence that firms have leverage targets. This thesis extends the current literature and contributes to the ongoing general debate on the validity of the trade-off theory of capital structure in Australia by estimating the average speed with which firms adjust toward their target leverage in the context of Australia M&A activity.

Earlier studies have generally assumed that firms adjust at a homogeneous rate. However, recent studies find evidence supporting heterogeneity in the SOA. This thesis examines asymmetric dynamic trade-off behaviour using a sample of US firms by considering whether or not a firm's leverage level is itself a determinant of both its SOA and the importance or relevance of particular influences on leverage adjustment.

Chapter 2 discusses international and Australian literature related to trade-off theory. Chapters 3 and 4 review the empirical studies related to pecking order theory and market timing model, respectively. Chapter 5 examines whether Australian firms pursue target leverage by discussing firms whose structures are disrupted through a major corporate event: M&A activity. Chapter 6 examines whether a firm's leverage level is itself a determinant of both its SOA and the importance of the effects on leverage adjustment. This chapter outlines the major findings in this thesis and discusses directions for future research.

7.2 Summary of major findings

The empirical analyses are presented in Chapters 5 and 6. Chapter 5 tests whether firms pursue target leverage by using a sample of Australian firms engage in M&A activity. The preliminary analysis indicates that the source of net equity issue, net debt issue, and retained earnings is noticeably different in the acquisition year from the years surrounding it. This finding appears to support my conjecture that acquisitions act as a shock to the capital structure of acquirers. Furthermore, when the sample is conditioned on the basis of financing methods to pay for the acquisition, acquirers appear to issue debt subsequent to equity-financed transactions.

This is consistent with trade-off theory. I subsequently estimate the speed with which acquirers adjust toward their target leverages, using the modified partial adjustment model in Hovakimian and Li (2011). Firms appear to actively rebalance their leverage by incorporating between 42 percent and 63 percent of the leverage deviation immediately following the acquisition. More importantly, the estimated SOAs are higher than the rates reported in Koh, Durand, and Watson (2011), indicating the importance managers place on maintaining target leverage: firms in my sample experience shocks and therefore adjust faster than the average firm in the market.

Given the evidence that some acquirers adjust more quickly than others, the subsequent stage of the analysis examines the way in which firm-specific characteristics can explain variations in leverage adjustment rates. The estimation of leverage adjustment rates is designed to measure the reaction speed of an individual firm in adjusting to its target, which allows consideration of subtleties determining individual firms' SOAs. After controlling for the effect of market timing and acquisition wave, the results indicate that, firm size, cash reserves and profitability play key roles in leverage adjustment. The results also show that these firm-specific characteristics affect the adjustment rates differently depending on whether a firm is over- or underleveraged. Overall, the results confirm that when adjusting leverages, firms are cognizant of their target leverages.

Given that heterogeneous leverage adjustment has recently gained attention in the literature, Chapter 6 presents an empirical analysis of the heterogeneous SOA among firms with different levels of leverage. I adopt a sample splitting approach to sort firms into deciles each year according to their leverage ratios in each fiscal year. According to trade-off theory, high leverage ratios are associated with high financial costs (Kraus and Litzenberger 1973). If firms have substantial debt relative to their assets, their financial distress costs potentially outweigh the interest tax shield benefits of debt. Firms with high leverage face higher levels of financial distress costs and greater agency conflicts issues than those with low leverage. Such firms are under pressure to decrease their leverage ratios, thus implying more incentive for them to undertake leverage adjustment toward the target leverage.

The preliminary analysis confirms my conjecture that the estimated SOAs vary with firms' leverage levels. The findings indicate that firms follow their target leverages and the leverage level does matter in the leverage adjustment process. The near-monotonic positive association between firms' leverage levels and their estimated SOAs provides evidence of pronounced heterogeneity. The estimated SOAs are particularly strong for firms with high leverage. Firms with high leverage appear to close between 7.15 percent and 17.06 percent of the deviation from the target leverage each year. Firms with medium leverage adjust by between 5.10 percent and 8.51 percent of the leverage gap each year, whereas firms with low leverage adjust to offset only 3.16 percent to 4.21 percent of the leverage deviation each year. Firms behave as if they have targets but their SOAs toward these targets is conditional on their leverage. Hence, firms with higher leverage undertake more rapid adjustment to avoid the potentially large financial distress costs.

The subsequent stage of the analysis examines the evolution of leverage for the cross-section of firms by predicting leverage ratios based on their estimated SOAs, which allows me to provide some insights into whether firms with high (low) leverage decrease (increase) their leverage ratios to approach their target leverages as predicted by trade-off theory. The results show that firms with high (low) leverage reduce (increase) their leverage ratios in the short-term. In particular, firms with high leverage appear to be more inclined to lower their leverage ratios than firms with low leverage. Therefore, it highlights the fact that estimated SOAs play an important role in explaining the convergence of leverage ratios.

Given that it is unclear what drives firms to adjust their leverage ratios toward the target leverage other than higher or lower leverage, I then investigate the impact firm-specific characteristics have on the leverage variation between firms with different levels of leverage. The results show that, when considering levels of leverage, the effects of firm characteristics appear asymmetric. Hence, it highlights the importance of considering the level of leverage when considering capital structure theories. For instance, both high and low leveraged firms tend to utilize higher profitability to reduce their leverage ratios. This is consistent with pecking order theory (Titman and Wessels 1988). On the other hand, firms with medium leverage increase their debt. This is consistent with trade-off theory. Previous studies tend to 'lump' firms in an undifferentiated group rather than analyse sub-samples based on their leverage. Therefore, it reveals that this approach misses nuances in the data.

7.3 Directions for future research

The main aim of this thesis is to quantify the magnitude of SOAs in Australia and US. The findings establish that firms in Australia and the US do have leverage targets. However, a few aspects of this thesis can be extended. Given that the number of M&A observations in Australia is limited, a similar empirical design can be tested using US M&A data. This will enable inferences to be drawn about adjustment differences toward the target leverage by Australian and US firms.

The evidence in this thesis indicates that US firms with high leverage appear to adjust quicker than others. For robustness check, one possible way around this is to classify firms according to their target leverage levels and investigate whether there are differences in behaviour between the groups. Furthermore, it is still unclear why such firms move so quickly and how they adjust more quickly than firms with lower leverage ratios. Although the findings suggest that these firms adjust to reduce their leverage ratios, there is potential for future research to explore *how* these firms reduce their leverage ratios and *what* the motivations for reducing leverage are. These ideas could be explored further using a sample of Japanese firms. Given the nature of cross-holding and the long period of economic stagnation in the Japanese market, it would be interesting to establish whether they maintain high levels of leverage over time.

APPENDICES

Appendix A – Predicted leverage ratios for deciles

		Low leveraged firms			Medium leveraged firms				High leveraged firms		
		Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Year	1	0.0268	0.0633	0.0988	0.1361	0.1891	0.2344	0.2785	0.3322	0.4042	0.5353
	2	0.0672	0.1042	0.1253	0.1478	0.1988	0.2373	0.2732	0.3210	0.3889	0.5080
	3	0.1088	0.1304	0.1382	0.1581	0.2073	0.2398	0.2680	0.3103	0.3750	0.4865
	4	0.1347	0.1427	0.1496	0.1672	0.2149	0.2419	0.2631	0.3002	0.3622	0.4696
	5	0.1465	0.1536	0.1597	0.1753	0.2215	0.2437	0.2582	0.2905	0.3506	0.4563
	6	0.1570	0.1632	0.1686	0.1824	0.2273	0.2453	0.2536	0.2814	0.3400	0.4458
	7	0.1662	0.1718	0.1765	0.1930	0.2324	0.2466	0.2491	0.2760	0.3284	0.4376
	8	0.1744	0.1793	0.1835	0.2022	0.2356	0.2477	0.2447	0.2707	0.3173	0.4311
	9	0.1817	0.1902	0.1939	0.2104	0.2383	0.2487	0.2405	0.2657	0.3069	0.4261
	10	0.1923	0.1998	0.2031	0.2175	0.2407	0.2495	0.2365	0.2608	0.2969	0.4221
	11	0.2016	0.2082	0.2111	0.2238	0.2427	0.2502	0.2325	0.2560	0.2874	0.4189
	12	0.2098	0.2157	0.2182	0.2293	0.2444	0.2508	0.2287	0.2514	0.2784	0.4023
	13	0.2170	0.2222	0.2244	0.2342	0.2458	0.2514	0.2325	0.2470	0.2731	0.3872
	14	0.2234	0.2279	0.2298	0.2371	0.2471	0.2518	0.2357	0.2427	0.2679	0.3734
	15	0.2290	0.2329	0.2347	0.2397	0.2481	0.2522	0.2384	0.2386	0.2630	0.3608
	16	0.2339	0.2361	0.2375	0.2418	0.2490	0.2525	0.2407	0.2346	0.2582	0.3493
	17	0.2369	0.2387	0.2400	0.2436	0.2498	0.2528	0.2427	0.2307	0.2535	0.3388
	18	0.2394	0.2410	0.2421	0.2452	0.2505	0.2530	0.2444	0.2342	0.2490	0.3272
	19	0.2416	0.2430	0.2439	0.2465	0.2511	0.2532	0.2459	0.2371	0.2447	0.3163
	20	0.2435	0.2446	0.2454	0.2477	0.2515	0.2534	0.2471	0.2396	0.2405	0.3058
	21	0.2451	0.2460	0.2467	0.2487	0.2520	0.2535	0.2482	0.2418	0.2364	0.2959

		Low leveraged firms			Medium leveraged firms				High leveraged firms		
		Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
	22	0.2464	0.2473	0.2478	0.2495	0.2523	0.2537	0.2491	0.2436	0.2325	0.2865
	23	0.2476	0.2483	0.2488	0.2502	0.2526	0.2538	0.2498	0.2452	0.2287	0.2775
	24	0.2486	0.2492	0.2496	0.2508	0.2529	0.2539	0.2505	0.2465	0.2324	0.2722
	25	0.2494	0.2499	0.2503	0.2513	0.2531	0.2539	0.2511	0.2477	0.2356	0.2671
Year	26	0.2501	0.2506	0.2509	0.2518	0.2533	0.2540	0.2515	0.2486	0.2383	0.2622
	27	0.2508	0.2511	0.2514	0.2522	0.2534	0.2541	0.2520	0.2495	0.2407	0.2574
	28	0.2513	0.2516	0.2518	0.2525	0.2536	0.2541	0.2523	0.2502	0.2427	0.2527
	29	0.2517	0.2520	0.2522	0.2528	0.2537	0.2541	0.2526	0.2508	0.2444	0.2483
	30	0.2521	0.2524	0.2525	0.2530	0.2538	0.2542	0.2529	0.2513	0.2458	0.2440

Appendix B – Transition matrix

		To:									
		Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
From:											
	over 1 year	78.5%	7.3%	5.3%	3.5%	1.9%	1.2%	0.8%	0.6%	0.5%	0.3%
Decile 1	over 3 years	60.2%	10.7%	9.3%	6.3%	4.2%	3.0%	2.2%	1.8%	1.3%	1.0%
	over 5 years	50.8%	12.0%	10.9%	7.8%	5.7%	4.1%	3.1%	2.2%	1.7%	1.6%
	over 1 year	15.0%	54.1%	16.5%	6.1%	3.5%	1.9%	1.2%	0.8%	0.6%	0.3%
Decile 2	over 3 years	19.5%	30.1%	19.0%	10.0%	7.2%	5.0%	3.8%	2.4%	1.8%	1.2%
	over 5 years	19.3%	21.1%	19.2%	11.8%	8.9%	6.8%	4.6%	3.6%	2.6%	2.0%
	over 1 year	5.6%	13.9%	49.0%	16.8%	7.1%	3.5%	2.0%	1.0%	0.8%	0.4%
Decile 3	over 3 years	9.4%	14.3%	28.5%	18.0%	11.6%	7.6%	4.4%	2.8%	2.1%	1.4%
	over 5 years	10.3%	12.4%	21.6%	18.8%	13.2%	9.3%	6.3%	3.7%	2.4%	2.0%
	over 1 year	3.1%	3.3%	19.2%	41.1%	18.1%	7.8%	3.6%	1.9%	1.1%	0.7%
Decile 4	over 3 years	6.0%	5.9%	17.8%	24.4%	17.7%	11.8%	7.1%	4.6%	3.0%	1.7%
	over 5 years	7.1%	6.2%	16.0%	19.9%	17.4%	12.6%	8.5%	5.8%	4.1%	2.4%
	over 1 year	1.6%	1.5%	5.5%	21.1%	37.8%	18.7%	7.9%	3.3%	2.0%	0.7%
Decile 5	over 3 years	3.6%	3.4%	9.5%	18.3%	22.6%	17.5%	11.6%	6.9%	4.2%	2.3%
	over 5 years	5.1%	4.3%	10.6%	16.4%	21.2%	18.5%	13.8%	0.9%	6.0%	3.3%
	over 1 year	0.9%	0.9%	2.3%	6.7%	21.8%	36.7%	18.8%	7.6%	3.1%	1.2%
Decile 6	over 3 years	2.4%	2.2%	5.2%	10.8%	18.9%	22.0%	17.5%	11.2%	6.5%	3.3%
	over 5 years	3.4%	2.8%	6.8%	11.5%	16.5%	18.9%	17.0%	11.5%	7.5%	4.0%

	over 1 year	0.6%	0.6%	1.1%	2.6%	6.7%	21.6%	37.7%	20.0%	7.0%	2.1%
Decile 7	over 3 years	1.6%	1.5%	3.3%	6.0%	11.3%	18.6%	23.6%	18.1%	11.0%	4.9%
	over 5 years	2.5%	2.2%	4.4%	7.2%	11.7%	16.3%	20.1%	17.9%	11.2%	6.6%
	over 1 year	0.3%	0.4%	0.6%	1.1%	2.5%	6.8%	22.0%	42.2%	19.5%	4.6%
Decile 8	over 3 years	1.3%	0.9%	2.0%	3.4%	5.8%	11.4%	20.1%	27.7%	18.9%	8.6%
	over 5 years	1.9%	1.6%	2.8%	4.7%	7.5%	11.7%	18.8%	22.9%	18.6%	9.5%
	over 1 year	0.3%	0.2%	0.3%	0.7%	1.1%	2.1%	5.8%	21.5%	50.8%	17.1%
Decile 9	over 3 years	0.8%	0.7%	1.5%	2.3%	3.2%	5.5%	10.3%	22.4%	33.9%	19.4%
	over 5 years	1.6%	1.1%	2.0%	3.2%	4.5%	7.2%	11.3%	22.0%	29.3%	17.8%
	over 1 year	0.2%	0.2%	0.3%	0.4%	0.6%	0.9%	1.6%	3.6%	17.3%	74.9%
Decile 10	over 3 years	0.9%	0.5%	1.2%	1.5%	2.1%	2.9%	4.9%	8.0%	22.2%	55.8%
	over 5 years	1.5%	0.9%	2.1%	2.4%	3.1%	4.6%	6.3%	10.9%	22.6%	45.7%

REFERENCES

Alti, A. 2006. How Persistent Is the Impact of Market Timing on Capital Structure? *The Journal of Finance* 61 (4):1681-1710.

Altinkilic, O., and R. S. Hansen. 2000. Are There Economies of Scale in Underwriting Fees? Evidence of Rising External Financing Costs. *The Review of Financial Studies* 13 (1):191-218.

Anderson, T. W., and C. Hsiao. 1982. Formulation and Estimation of Dynamic Models Using Panel Data. *Journal of Econometrics* 18 (1):47-82.

Antoniou, A., Y. Guney, and K. Paudyal. 2008. The Determinants of Capital Structure: Capital Market-Oriented versus Bank-Oriented Institutions. *Journal of Financial and Quantitative Analysis* 43 (1):59-92.

Arellano, M., and S. Bond. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies* 58 (2):277-297.

Asquith, P., and D. W. Mullins. 1986. Equity Issues and Offering Dilution. *Journal of Financial Economics* 15 (1-2):61-89.

Auerbach, A. J. 1985. Real Determinants of Corporate Leverage. In *Corporate Capital Structures in the United States*, edited by B. M. Friedman. Chicago: University of Chicago Press

Baker, M., and J. Wurgler. 2002. Market Timing and Capital Structure. *Journal of Finance* 57 (1):1-32.

Baxter, N. D., and J. G. Cragg. 1970. Corporate Choice Among Long-Term Financing Instruments. *The Review of Economics and Statistics* 52 (3):225-235.

Bayless, M., and S. Chaplinsky. 1996. Is There a Window of Opportunity for Seasoned Equity Issuance? *The Journal of Finance* 51 (1):253-278.

Bhamra, H. S., L. Kuehn, and I. A. Strebulaev. 2010. The Aggregate Dynamics of Capital Structure and Macroeconomic Risk. *Review of Financial Studies* 23 (12):4187-4241.

Bharath, S. T., P. Pasquariello, and G. Wu. 2009. Does Asymmetric Information Drive Capital Structure Decisions? *Review of Financial Studies* 22 (8):3211-3243.

Blundell, R., and S. Bond. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87 (1):115-143.

Bradley, M., G. A. Jarrell, and E. H. Kim. 1984. On the Existence of an Optimal Capital Structure: Theory and Evidence. *The Journal of Finance* 39 (3):857-878.

Bruno, G. S. F. 2005. Approximating the Bias of the LSDV Estimator for Dynamic Unbalanced Panel Data Models. *Economics Letters* 87 (3):361-366.

Byoun, S. 2008. How and When Do Firms Adjust Their Capital Structures toward Targets? *The Journal of Finance* 63 (6):3069-3096.

Carlson, M., A. Fisher, and R. Giammarino. 2006. Corporate Investment and Asset Price Dynamics: Implications for SEO Event Studies and Long-Run Performance. *The Journal of Finance* 61 (3):1009-1034.

Chang, X., and S. Dasgupta. 2009. Target Behavior and Financing: How Conclusive Is the Evidence? *The Journal of Finance* 64 (4):1767-1796.

Chang, X., S. Dasgupta, and G. Hilary. 2006. Analyst Coverage and Financing Decisions. *The Journal of Finance* 61 (6):3009-3048.

Chen, L., and X. Zhao. 2007. Mechanical Mean Reversion of Leverage Ratios. *Economics Letters* 95 (2):223-229.

Choe, H., R. W. Masulis, and V. Nanda. 1993. Common Stock Offerings Across the Business Cycle: Theory and Evidence. *Journal of Empirical Finance* 1 (1):3-31.

Dang, V. A., M. Kim, and Y. Shin. 2012. Asymmetric Capital Structure Adjustments: New Evidence from Dynamic Panel Threshold Models. *Journal of Empirical Finance* 19 (4):465-482.

de Jong, A., M. Verbeek, and P. Verwijmeren. 2010. The Impact of Financing Surpluses and Large Financing Deficits on Tests of the Pecking Order Theory. *Financial Management* 39 (2):733-756.

Repeated Author. 2011. Firms' Debt-Equity Decisions When the Static Trade-off Theory and the Pecking Order Theory Disagree. *Journal of Banking and Finance* 35 (5):1303-1314.

DeAngelo, H., L. DeAngelo, and R. M. Stulz. 2010. Seasoned Equity Offerings, Market Timing, and the Corporate Lifecycle. *Journal of Financial Economics* 95 (3):275-295.

DeAngelo, H., and R. W. Masulis. 1980. Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics* 8 (1):3-29.

Denis, D. J., and A. Sarin. 2001. Is the Market Surprised by Poor Earnings Realizations Following Seasoned Equity Offerings? *Journal of Financial and Quantitative Analysis* 36 (2):169-193.

Donaldson, G. 1961. *Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity*: Division of Research, Graduate School of Business Administration, Harvard University.

Dong, M., I. Loncarski, J. Horst, and C. Veld. 2012. What Drives Security Issuance Decisions: Market Timing, Pecking Order, or Both? *Financial Management* 41 (3):637-663.

Drobetz, W., and G. Wanzenried. 2006. What Determines the Speed of Adjustment to the Target Capital Structure? *Applied Financial Economics* 16 (13):941-958.

Dudley, E. 2012. Capital Structure and Large Investment Projects. *Journal of Corporate Finance* 18 (5):1168-1192.

Duong, L., and H. Y. Izan. 2012. Consequences of Riding Takeover Waves: Australian Evidence. *International Review of Finance* 12 (4):399-434.

Eckbo, B. E., R. M. Giammarino, and R. L. Heinkel. 1990. Asymmetric Information and the Medium of Exchange in Takeovers: Theory and Tests. *The Review of Financial Studies* 3 (4):651-675.

Eckbo, B. E., and R. W. Masulis. 1992. Adverse Selection and the Rights Offer Paradox. *Journal of Financial Economics* 32 (3):293-332.

Elliott, W. B., J. Koëter-Kant, and R. S. Warr. 2007. A Valuation-Based Test of Market Timing. *Journal of Corporate Finance* 13 (1):112-128.

Elsas, R., and D. Florysiak. 2011. Heterogeneity in the Speed of Adjustment toward Target Leverage. *International Review of Finance* 11 (2):181-211.

Fama, E. F., and K. R. French. 2002. Testing Trade-off and Pecking Order Predictions About Dividends and Debt. *Review of Financial Studies* 15 (1):1-33.

Repeated Author. 2005. Financing Decisions: Who Issues Stock? *Journal of Financial Economics* 76 (3):549-582.

Fama, E. F., and J. D. MacBeth. 1973. Risk, Return, and Equilibrium: Empirical Tests. *The Journal of Political Economy* 81 (3):607 - 636.

Faulkender, M., M. J. Flannery, K. W. Hankins, and J. M. Smith. 2012. Cash Flows and Leverage Adjustments. *Journal of Financial Economics* 103:632-646.

Ferri, Michael G., and Wesley H. Jones. 1979. Determinants of Financial Structure: a New Methodological Approach. *The Journal of Finance* 34 (3):631-644.

Fischer, E. O., R. Heinkel, and J. Zechner. 1989. Dynamic Capital Structure Choice: Theory and Tests. *The Journal of Finance* 44 (1):19-40.

Flannery, M. J., and K. W. Hankins. 2013. Estimating Dynamic Panel Models in Corporate Finance. *Journal of Corporate Finance* 19 (1):1-19.

Flannery, M. J., and K. P. Rangan. 2006. Partial Adjustment toward Target Capital Structures. *Journal of Financial Economics* 79 (3):469-506.

Frank, M. Z., and V. K. Goyal. 2003. Testing the Pecking Order Theory of Capital Structure. *Journal of Financial Economics* 67 (2):217-248.

Repeated Author. 2004. The Effect of Market Conditions on Capital Structure Adjustment. *Finance Research Letters* 1 (1):47-55.

Repeated Author. 2009. Capital Structure Decisions: Which Factors Are Reliably Important? *Financial Management* 38 (1):1-37.

Frankel, R., and C. M. C. Lee. 1998. Accounting Valuation, Market Expectation, and Cross-Sectional Stock Returns. *Journal of Accounting and Economics* 25 (3):283-319.

Fulghieri, P., and D. Lukin. 2001. Information Production, Dilution Costs, and Optimal Security Design. *Journal of Financial Economics* 61 (1):3-42.

Gatward, P., and I. G. Sharpe. 1996. Capital Structure Dynamics with Interrelated Adjustment: Australian Evidence. *Australian Journal of Management* 21 (2):89-112.

Goldstein, R., J. Nengjiu, and H. Leland. 2001. An EBIT-Based Model of Dynamic Capital Structure. *Journal of Business* 74 (4):483.

Gomes, A., and G. Phillips. 2012. Why Do Public Firms Issue Private and Public Securities? *Journal of Financial Intermediation* 21 (4):619-658.

Graham, J. R., and C. R. Harvey. 2001. The Theory and Practice of Corporate Finance: Evidence from the Field. *Journal of Financial Economics* 60 (2-3):187-243.

Gungoraydinoglu, A., and Ö. Öztekin. 2011. Firm- and Country-level Determinants of Corporate Leverage: Some New International Evidence. *Journal of Corporate Finance* 17 (5):1457-1474.

Hackbarth, D., J. Miao, and E. Morellec. 2006. Capital Structure, Credit Risk, and Macroeconomic Conditions. *Journal of Financial Economics* 82 (3):519-550.

Hahn, J., J. Hausman, and G. Kuersteiner. 2007. Long Difference Instrumental Variables Estimation for Dynamic Panel Models with Fixed Effects. *Journal of Econometrics* 140 (2):574-617.

Hanousek, J., and A. Shamshur. 2011. A Stubborn Persistence: Is the Stability of Leverage Ratios Determined by the Stability of the Economy? *Journal of Corporate Finance* 17 (5):1360-1376.

Harford, J., S. Klasa, and N. Walcott. 2009. Do Firms Have Leverage Targets? Evidence From Acquisitions. *Journal of Financial Economics* 93 (1):1-14.

Harris, M., and A. Raviv. 1991. The Theory of Capital Structure. *The Journal of Finance* 46 (1):297-355.

Helwege, J., and N. Liang. 1996. Is There a Pecking Order? Evidence from A Panel of IPO Firms. *Journal of Financial Economics* 40 (3):429-458.

Henderson, B. J., N. Jegadeesh, and M. S. Weisbach. 2006. World Markets for Raising New Capital. *Journal of Financial Economics* 82 (1):63-101.

Hennessy, C. A., and T. M. Whited. 2005. Debt Dynamics. *The Journal of Finance* 60 (3):1129-1165.

Hovakimian, A. 2006. Are Observed Capital Structures Determined by Equity Market Timing? *Journal of Financial and Quantitative Analysis* 41 (1):221-243.

Hovakimian, A., G. Hovakimian, and H. Tehranian. 2004. Determinants of Target Capital Structure: The Case of Dual Debt and Equity Issues. *Journal of Financial Economics* 71 (3):517-540.

Hovakimian, A., and G. Li. 2011. In Search of Conclusive Evidence: How to Test for Adjustment to Target Capital Structure. *Journal of Corporate Finance* 17 (1):33-44.

Hovakimian, A., T. Opler, and S. Titman. 2001. The Debt-Equity Choice. *Journal of Financial and Quantitative Analysis* 36 (1):1-24.

Huang, R., and J. R. Ritter. 2009. Testing Theories of Capital Structure and Estimating the Speed of Adjustment. *Journal of Financial and Quantitative Analysis* 44 (2):237-271.

Ikenberry, D., J. Lakonishok, and T. Vermaelen. 1995. Market Underreaction to Open Market Share Repurchases. *Journal of Financial Economics* 39 (2–3):181-208.

Jalilvand, A., and R. S. Harris. 1984. Corporate Behavior in Adjusting to Capital Structure and Dividend Targets: An Econometric Study. *The Journal of Finance* 39 (1):127-145.

Jegadeesh, N. 2000. Long-Term Performance of Seasoned Equity Offerings: Benchmark Errors and Biases in Expectations. *Financial Management* 29 (3):5-30.

Jensen, M. C. 1986. Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review* 76 (2):323-329.

Jensen, M. C., and W. H. Meckling. 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3 (4):305-360.

Jenter, D. 2005. Market Timing and Managerial Portfolio Decisions. *The Journal of Finance* 60 (4):1903-1949.

Ju, N., R. Parrino, A. M. Poteshman, and M. S. Weisbach. 2005. Horses and Rabbits? Trade-off Theory and Optimal Capital Structure. *Journal of Financial and Quantitative Analysis* 40 (2):259-281.

Jung, K., Y.-C. Kim, and R. M. Stulz. 1996. Timing, Investment Opportunities, Managerial Discretion, and the Security Issue Decision. *Journal of Financial Economics* 42 (2):159-185.

Kayhan, A., and S. Titman. 2007. Firms' Histories and Their Capital Structures. *Journal of Financial Economics* 83 (1):1-32.

Kim, W., and M. S. Weisbach. 2008. Motivations for Public Equity Offers: An International Perspective. *Journal of Financial Economics* 87 (2):281-307.

Klasa, S., and M. Stegemoller. 2007. Takeover Activity as a Response to Time-Varying Changes in Investment Opportunity Sets: Evidence from Takeover Sequences. *Financial Management* 36 (2):19-43.

Koh, S., R. B. Durand, and I. Watson. 2011. Seize the Moment: Opportunism in Australian Capital Markets. *Pacific Basin Finance Journal* 19 (4):374-389.

Korajczyk, R. A., and A. Levy. 2003. Capital Structure Choice: Macroeconomic Conditions and Financial Constraints. *Journal of Financial Economics* 68 (1):75-109.

Korajczyk, R. A., D. J. Lucas, and R. L. McDonald. 1991. The Effect of Information Releases on the Pricing and Timing of Equity Issues. *The Review of Financial Studies* 4 (4):685-708.

Repeated Author. 1992. Equity Issues with Time-Varying Asymmetric Information. *Journal of Financial and Quantitative Analysis* 27 (3):397-417.

Kraus, A., and R. H. Litzenberger. 1973. A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance* 28 (4):911-922.

La Porta, R. 1996. Expectations and the Cross-Section of Stock Returns. *The Journal of Finance* 51 (5):1715-1742.

La Porta, R., J. Lakonishok, A. Shleifer, and R. Vishny. 1997. Good News for Value Stocks: Further Evidence on Market Efficiency. *The Journal of Finance* 52 (2):859-874.

Lambrecht, B. M., and S. C. Myers. 2012. A Lintner Model of Payout and Managerial Rents. *The Journal of Finance* 67 (5):1761-1810.

Leary, M. T., and M. R. Roberts. 2005. Do Firms Rebalance Their Capital Structures? *The Journal of Finance* 60 (6):2575-2619.

Repeated Author. 2010. The Pecking Order, Debt Capacity, and Information Asymmetry. *Journal of Financial Economics* 95 (3):332-355.

Leland, H. E. 1994. Corporate Debt Value, Bond Covenants, and Optimal Capital Structure. *The Journal of Finance* 49 (4):1213-1252.

Lemmon, M. L., M. R. Roberts, and J. F. Zender. 2008. Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure. *The Journal of Finance* 63 (4):1575-1608.

Lemmon, M. L., and J. F. Zender. 2010. Debt Capacity and Tests of Capital Structure Theories. *Journal of Financial and Quantitative Analysis* 45 (5):1161-1187.

Lerner, J. 1994. Venture Capitalists and the Decision to Go Public. *Journal of Financial Economics* 35 (3):293-316.

Li, E. X. N., D. Livdan, and L. Zhang. 2009. Anomalies. *The Review of Financial Studies* 22 (11):4301-4334.

Lin, X., Y. Zhang, and N. Zhu. 2009. Does bank ownership increase firm value? Evidence from China. *Journal of International Money and Finance* 28 (4):720-737.

Loughran, T., and J. R. Ritter. 1995. The New Issues Puzzle. *The Journal of Finance* 50 (1):23-51.

Lucas, D. J., and R. L. McDonald. 1990. Equity Issues and Stock Price Dynamics. *The Journal of Finance* 45 (4):1019-1043.

MacKie-Mason, J. K. 1990. Do Taxes Affect Corporate Financing Decisions? *The Journal of Finance* 45 (5):1471-1493.

Marsh, P. 1982. The Choice Between Equity and Debt: An Empirical Study. *The Journal of Finance* 37 (1):121-144.

Martin, J. D., and D. F. Scott. 1974. A Discriminant Analysis of the Corporate Debt-Equity Decision. *Financial Management* 3 (4):71-79.

Masulis, R. W., and A. N. Korwar. 1986. Seasoned Equity Offerings. An Empirical Investigation. *Journal of Financial Economics* 15 (1-2):91-118.

Mauer, D. C., and A. J. Triantis. 1994. Interactions of Corporate Financing and Investment Decisions: A Dynamic Framework. *The Journal of Finance* 49 (4):1253-1277.

McMillan, D. G., and O. Camara. 2012. Dynamic Capital Structure Adjustment: US MNCs & DCs. *Journal of Multinational Financial Management* 22 (5):278-301.

Modigliani, F., and M. H. Miller. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review* 48 (3):261-297.

Repeated Author. 1963. Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review* 53 (3):433-443.

Myers, S. C. 1977. Determinants of Corporate Borrowing. *Journal of Financial Economics* 5 (2):147-175.

Repeated Author. 1984. The Capital Structure Puzzle. *The Journal of Finance* 39 (3):575-592.

Myers, S. C., and N. S. Majluf. 1984. Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have. *Journal of Financial Economics* 13 (2):187-221.

Opler, T., L. Pinkowitz, R. Stulz, and R. Williamson. 1999. The Determinants and Implications of Corporate Cash Holdings. *Journal of Financial Economics* 52 (1):3-46.

Ozkan, A. 2001. Determinants of Capital Structure and Adjustment to Long Run Target: Evidence from UK Company Panel Data. *Journal of Business Finance and Accounting* 28 (1-2):175-198.

Öztekin, Ö, and M. J. Flannery. 2012. Institutional Determinants of Capital Structure Adjustment Speeds. *Journal of Financial Economics* 103 (1):88-112.

Pagano, M., F. Panetta, and L. Zingales. 1998. Why Do Companies Go Public? An Empirical Analysis. *The Journal of Finance* 53 (1):27-64.

Rajan, R.G., and L. Zingales. 1995. What Do We Know about Capital Structure? Some Evidence from International Data. *The Journal of Finance* 50:1421-1460.

Ravid, S. A., and M. Spiegel. 1997. Optimal Financial Contracts for a Start-Up with Unlimited Operating Discretion. *Journal of Financial and Quantitative Analysis* 32 (3):269-286.

Ritter, J. R. 1991. The Long-Run Performance of Initial Public Offerings. *The Journal of Finance* 46 (1):3-27.

Ritter, J. R., and I. Welch. 2002. A Review of IPO Activity, Pricing, and Allocations. *The Journal of Finance* 57 (4):1795-1828.

Shyam-Sunder, L., and S. C. Myers. 1999. Testing Static Tradeoff Against Pecking Order Models of Capital Structure. *Journal of Financial Economics* 51 (2):219-244.

Smith, C. W. 1977. Alternative methods for raising capital. Rights versus underwritten offerings. *Journal of Financial Economics* 5 (3):273-307.

Spies, R. R. 1974. The Dynamics of Corporate Capital Budgeting. *The Journal of Finance* 29 (3):829-845.

Spiess, D. K., and J. Affleck-Graves. 1995. Underperformance in Long-Run Stock Returns Following Seasoned Equity Offerings. *Journal of Financial Economics* 38 (3):243-267.

Stiglitz, J. E. 1973. Taxation, Corporate Financial Policy, and the Cost of Capital. *Journal of Public Economics* 2 (1):1-34.

Strebulaev, I. A. 2007. Do Tests of Capital Structure Theory Mean What They Say? *The Journal of Finance* 62 (4):1747-1787.

Suchard, J.-A., and M. Singh. 2006. The Determinants of the Hybrid Security Issuance Decision for Australian Firms. *Pacific Basin Finance Journal* 14 (3):269-290.

Taggart, R. A. 1977. A Model of Corporate Financing Decisions. *The Journal of Finance* 32 (5):1467-1484.

Taub, A. J. 1975. Determinants of the Firm's Capital Structure. *The Review of Economics and Statistics* 57 (4):410-416.

Titman, S., and S. Tsyplakov. 2007. A Dynamic Model of Optimal Capital Structure. *Review of Finance* 11 (3):401-451.

Titman, S., and R. Wessels. 1988. The Determinants of Capital Structure Choice. *The Journal of Finance* 43 (1):1-19.

Tsyplakov, S. 2008. Investment Frictions and Leverage Dynamics. *Journal of Financial Economics* 89 (3):423-443.

Viswanath, P. V. 1993. Strategic Considerations, the Pecking Order Hypothesis, and Market Reactions to Equity Financing. *Journal of Financial and Quantitative Analysis* 28 (2):213-234.

Warr, R. S., W. B. Elliott, J. Koëter-Kant, and O. Öztekin. 2012. Equity Mispricing and Leverage Adjustment Costs. *Journal of Financial and Quantitative Analysis* 47 (3):589-616.

Welch, I. 2004. Capital structure and Stock Returns. *Journal of Political Economy* 112 (1):106-131.