CHAPTER 1: INTRODUCTION

A substantial amount of research has been devoted to whether firms target an optimal capital structure, the factors that determine a firm's optimal capital structure, the speed at which firms adjust towards these potential target structures, as well as what factors influence the speed at which firms adjust toward this optimal structure. In order to address these issues, numerous studies have examined the dynamics and determinants of leverage in firms' capital structures. In this chapter, a brief overview will be provided of the background and context of the study. This will lead to the clarification of the main objectives and scope of the current study. An outline of the rest of the paper follows -: Section 1.1 deals with the background to the study, section, 1.2 identifies the problem statement and primary research objectives, section 1.3 outlines the scope and the method that will be used to conduct the study, and section 1.4 provides an outline of the structure of the paper.

1.1 BACKGROUND TO THE STUDY

1.1.1 BACKGROUND AND MOTIVATION FOR THE STUDY

Numerous studies have attempted to identify the factors that determine capital structure choice in firms. Among such studies, particular attention has been devoted to ascertaining the determinants of leverage in capital structure. While most capital structure studies address the firm-level determinants of leverage such as the size, profitability and tangibility of a firm (Titman & Wessels, 1988; Rajan & Zingales, 1995; Frank & Goyal, 2003), they ignore the potential macroeconomic factors influencing capital structure choice. Yet there is substantial evidence to indicate that macroeconomic conditions do indeed determine the level of debt a firm chooses to possess.

Research suggests that the examination of exogenous shocks provides important insight into the capital structure dynamics of firms (Welch, 2004; Flannery & Rangan, 2006). Examples of such shocks include equity value shocks, major real investments, ratings changes or regulatory changes, and macroeconomic shocks (Welch, 2004; Elsas, Flannery and Garfinkel, 2007; Kisgen, 2006). In relation to this, various studies highlight the fact that macroeconomic conditions related to the business cycle affect the probability of default for a firm and hence its leverage (Hackbarth, Miao & Morellec, 2006; Fama, 1986). Moreover, Korajczyk and Levy (2003) find evidence that firms time their equity and debt issuances according to macroeconomic conditions. In addition, Baum, Chakraborthy and Lui (2009) note that macroeconomic uncertainty influences the level of capital investment for a firm, as well as how the firm is financed.

A related stream of literature explores the concept of capital structure optimality (Modigliani & Miller, 1963; Jensen & Meckling, 1976; Marsh, 1982; Opler & Titman, 1994, among others). The issue of whether or not there exists an optimal level of debt which firms target has been the subject of much debate. Various theories have also been developed (which will be explored in more detail later in the text) – some of which argue in favour of and others which contend the idea of capital structure targeting. In light of this notion, numerous authors have undertaken to examine the speed at which firms adjust their capital structures towards these potential targets, as well as the factors that affect the adjustment speed.

Again, while most research has addressed the issue of adjustment speed in the context of firm-level factors, few have studied the effect of macroeconomic conditions on adjustment speed (Drobetz, Pensa & Wanzenried, 2007; Cook & Tang; 2010, Halling, Yu & Zechner, 2011). Furthermore, there is evidence to indicate that the speed at which firms adjust toward their target capital structures is dependent on macroeconomic conditions. For example, Stephan and Talavera (2004) find evidence that the optimal level of debt for a firm is negatively related to the level of macroeconomic uncertainty in the economy. Intuitively, variations in macroeconomic conditions should thus induce variations in optimal leverage which would in turn affect the rate at which firms adjust their capital structure to meet their potential leverage targets.

In addition, leverage dynamics and adjustment speed have been known to differ depending on a firm's financial status or the definition of leverage used. Specifically, financially constrained and unconstrained firms may react differently to changes in macroeconomic conditions (Korajczyk & Levy, 2003; Leary & Roberts, 2005; Hackbarth et al., 2006). Similarly, changes in macroeconomic conditions may have implications for a firm's debt capacity and could thus influence the type of debt firms prefer (Schleifer & Vishny, 1992; Hackbarth et al., 2006; Halling et al., 2011). Thus adjustment speeds could differ in these respects.

In spite of this, few studies have focused on this aspect of leverage dynamics. Furthermore, from a review of the literature it appears that no such published studies have been conducted purely in a South African context. This study therefore seeks to determine the effect of macroeconomic conditions on the leverage-targeting behaviour – and in particular, the speed of adjustment - of South African firms. The following touches on a brief background to the South African economy, in order to outline the various macroeconomic changes that have occurred in the last decade which may have had an effect on firms' financing policies.

1.1.2 BACKGROUND TO THE SOUTH AFRICAN ECONOMY OVER THE LAST DECADE

Over the last decade, the South African economy has undergone numerous changes – as a result of policy implementations, political and environmental factors as well as changes in the global economic outlook.

The 2000's saw some major transitions in the South African economy, stemming from the effects of the post-Apartheid government – amongst other factors. In 2001, a general downturn occurred as a result of the aftermath of the September 11th terrorist attacks in the United States. This resulted in weaker but still positive GDP growth, reflecting the resilience of the South African economy. In 2005, South Africa experienced high growth, increased capital inflows, and a general strengthening of the rand – fuelled by increased private investment. In addition, inflation and interests rates were relatively low (Frankel, Smit and Sturzenegger; 2006). In 2006, the government launched the Accelerated and Shared Growth Initiative for South Africa (ASGI-SA) strategy with the intention of increasing growth and promoting employment. The effects of the strategy continued into later years. In addition, commodity prices at the time were at unusually high levels due to trade shocks resulting from increased trade volatility.

In 2008, the economy slowed as a result of increased inflation and interest rates. This situation was exacerbated due to the general decline in global growth as a result of the 2007-2009 global financial crisis. As a result of the culmination of these effects, South Africa experienced an abrupt deceleration of growth from over 5% in 2007 to about 2% in 2009

(OECD, 2010). In late 2009, the repercussions of the European sovereign debt crisis resulted in further negative repercussions, such as a general increase in risk and uncertainty in the economy. However, South Africa's relatively strong exchange controls mitigated the exposure to the crisis, resulting in positive growth towards the end of 2009. This strengthening resulted in increased global trade and commodity prices in 2010. The positive repercussions of South Africa's hosting of the Soccer World Cup added to this. In late 2010, South Africa was grouped into the BRIC (Brazil, Russia, India, China) countries to form the BRICS (Brazil, Russia, India, China, South Africa), which increased the country's international exposure had a considerable influence on economic sentiment and the economic outlook at large.

In summary, it is evident that the South African economy has undergone considerable macroeconomic changes in recent years. The current paper focuses on macroeconomic changes in the most recent decade. By examining the effect of various macroeconomic variables (which capture these changes) on adjustment speed, one may be able to assess the potential effect of these changes on capital structure.

1.2 RESEARCH PROBLEM AND OBJECTIVES

1.2.1 CORE RESEARCH PROBLEM

As mentioned in the preceding sections, there is no complete consensus as to what the determinants of capital structure are. More specifically, there is a lack of certainty as to what factors affect the speed at which firms adjust to their potential target capital structures. Most capital structure-related studies to date that have examined the leverage-targeting behaviour of firms have focused on the effect of firm-characteristic determinants on the speed at which firms adjust to their target structures. There is a lack of literature concerning the potential effect of macroeconomic conditions on capital structure. The few studies that have examined the impact of macroeconomic conditions on capital structure have generally neglected to examine the effects of macroeconomic conditions on the adjustment speed toward target capital structures. This lack of evidence is particularly evident in the South African context – where there appears to be few or no published studies regarding this concept.

This paper aims to address this problem by ultimately investigating whether or not changes in macroeconomic conditions affect the speed at which South African firms adjust toward their optimal (or target) capital structures. Specifically, the study will incorporate both firm-characteristic effects and macroeconomic factors into assessing the dynamics of leverage in capital structure for South African firms. In particular, the main focus will be the effect of the macroeconomic factors on the adjustment speed. Moreover, this paper aims to provide more precise results by improving on the methodology commonly found in previous literature. This will be accomplished by employing a generalised method of moments (GMM) estimation approach, while correcting for the potential effects of mean-reversion and the fractional nature of leverage ratios, as well as extreme leverage observations. Furthermore, the paper builds on previous research by assessing whether these findings are robust to various definitions of leverage, and whether financial constraints affect leverage dynamics of South African firms. In addition - to provide more current evidence on the topic - a more recent time period (2000 to 2010) will be examined.

By examining this aspect of the leverage-targeting behaviour of firms, perhaps some insight may be gained as to whether or not South African firms reach their optimal capital structures - and if not - whether macroeconomic conditions prevent them from doing so. Moreover, by determining how these dynamics differ among financially constrained and unconstrained firms, it may pave the way for future research to assess how constrained firms can adjust their capital structures so as to mitigate risk related to changes in the macro-economy. In doing so, it may also provide a basis for future research to assess how firms in general should adjust their capital structures in response to macroeconomic conditions in order to operate at an optimal level.

1.2.2 RESEARCH OBJECTIVES

The main objective of this paper is to assess whether macroeconomic conditions affect the speed at which South African firms adjust toward their target capital structures. In addition, this study aims to achieve the following sub objectives:

- Ascertain whether macroeconomic conditions (as evidenced by changes in macroeconomic variables) affect the speed at which South African firms adjust to their target leverage ratios.
- Determine whether the effect of changes in macroeconomic variables on capital structure adjustment speed is different for that of financially constrained firms relative to financially unconstrained firms.
- Determine whether these findings are robust to various definitions of leverage.

The additional objectives – including an explanation of how they were formulated – will be discussed in more detail Chapter 2. The following section outlines the scope of the study as well as the manner in which it was conducted.

1.3 SCOPE AND METHOD OF STUDY

As a result of globalisation, political transitions and policy changes, the South African economy has undergone numerous changes in the past decade. In particular, there have been major events in the past decade (such as the sub-prime crisis) that have had considerable impacts on the economy at large – causing firms to restructure and change their financial policies in order to accommodate these effects. Thus, this would clearly have implications for a firm's financing choices and in turn could enhance or impede the time it takes firms to reach their optimal capital structures – if this is indeed a priority for South African firms.

Thus it would be of interest to examine the effects of such macroeconomic events on firms' financial structures by examining the effect of macroeconomic variables (which incorporate these effects) on the speed at which firms adjust toward their optimal capital structures.

Studies regarding capital structure adjustment speed are largely quantitative. Thus this study was conducted in the form of a dynamic panel data regression analysis. The following section provides a brief outline of how the paper will be structured.

1.4 CHAPTER OUTLINE OF RESEARCH REPORT

The rest of the paper will be set out as follows: Chapter 2 describes the context of the study, concepts related to capital structure adjustment, and provides a review of the existing literature in relation to capital structure and macroeconomic conditions. This aids the formulation of the relevant hypotheses. Chapter 3 provides a description of the sample selection procedure and data for the empirical analysis. A discussion of the dynamic partial adjustment model follows this – including an explanation of the model and specifications to be used in the current paper. The relevant research questions and hypotheses to be addressed will then be explained. Chapter 4 includes the empirical analysis which explores the effect of macroeconomic conditions and financial constraints on adjustment speed, as well as additional robustness tests. Lastly, Chapter 5 concludes the paper.

1.5 CHAPTER CONCLUSION

This concludes the introduction to the research. Now that the research objectives have been established, it would be pertinent to explore in more detail the relevant literature and fundamental concepts related to the study. This will be discussed in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Research regarding capital structure is extensive. Before addressing the evidence regarding macroeconomic conditions and adjustment speed, it would be appropriate to review how this concept originated. Studies involving adjustment speed naturally revolve around the notion that firms potentially target an optimal capital structure. The debate concerning whether or not firms target an optimal structure dates back to 1958, when Modigliani and Miller first touched on the idea of an optimal level of debt. They hypothesised that in the presence of market imperfections (such as taxes, bankruptcy costs and conflicts of interests between managers and owners), the average cost of capital for a firm should fall as the amount of leverage in a firm's structure increases – within a certain range of debt ratios. The implication of this was that at a certain level of debt, firm value could be maximised, giving firms the incentive to move towards a target debt ratio. This led them to extend this concept, and gave rise to numerous theories attempting to explain leverage dynamics and capital structure targeting.

Firms may opt to move towards the target capital structure for various reasons. Zurigat and Al-Mwalla (2011) maintain that firms will choose to move toward the target level if the cost of deviation from the target level is higher than that of moving towards that target. They add that the process will persist until the benefits of the adjustment process surpass the costs of the adjustment. Benefits of adjusting toward the target include tax savings, while costs generally comprise bankruptcy costs, agency costs related to debt and equity (Jensen & Meckling, 1976), opportunity costs related to forgoing investment opportunities (in the case of over-levered firms; Myers 1977) and financial distress costs. In moving towards the target debt level, firms may reduce their debt tax-shields while simultaneously increasing potential bankruptcy costs (assuming the firm is currently below target) which may lessen the incentive for (and speed at which) firms adjust toward the target. The costs and benefits of debt are difficult to define with certainty as they may differ depending on a country's legal and regulatory environment (Halling et al., 2011; Brounen et al., 2005). Certain studies have incorporated firm-level characteristics to proxy for the costs and benefits associated with adjustment (Flannery & Hankins, 2007).

Much research has been devoted to analysing the determinants of this potential optimal capital structure. From this stems implications regarding the speed at which firms adjust toward their target capital structure, and the factors that affect this speed of adjustment. Studies have yielded considerably mixed conclusions in this regard.

This chapter provides a brief background to capital structure research in general. This includes a discussion of the findings to date in relation to the determinants of capital structure and adjustment speed. Particular attention will then be given to the fundamental concepts related to the research topic in order to aid the development of the hypotheses - which will follow at the end of the chapter. Section 2.2 focuses on the background to the topic – including how the concept of capital structure targeting has evolved over time. Following this is a general review of the findings regarding capital structure determinants, adjustment speed and macroeconomic conditions. The theoretical concepts behind capital structure will also be discussed. Section 2.3 then concludes the chapter.

2.2 GENERAL BACKGROUND, THEORETICAL FRAMEWORK AND FUNDAMENTAL CONCEPTS

Views and evidence on capital structure dynamics are mixed. This section discusses the evolution of capital structure research and the theoretical foundations that it centres on.

2.2.1 THE CAPITAL STRUCTURE DEBATE

Certain views hold that capital structure is irrelevant (Modigliani & Miller, 1958)), while others argue in favour of the existence of an optimal debt-equity ratio for firms (Marsh, 1982; Graham & Harvey, 2001; Elsas & Florysiak, 2008) - implying firms make adjustments towards these optimal targets. Myers (1984), in his Presidential Address to the American Finance Association, refers to this lack of consensus concerning capital structure theories as the "capital structure puzzle".

In their seminal paper, Modigliani and Miller (1958) propose a static model of partial equilibrium analysis, arguing that capital structure is irrelevant in perfect capital markets.

However, their theory failed to account for market imperfections, rendering it impractical. They later adjusted their model to account for this (Modigliani & Miller, 1963)) and developed the static trade-off hypothesis, which states that a firm's optimal leverage ratio is a function of the bankruptcy costs and corporate tax benefits associated with debt. (This will be discussed in more detail further in the text). This was later disputed by Miller (1977), who contended that the tax advantage of debt as a result of corporate tax is offset by the effects of personal taxes.

Alternative trade-off models include that of Jensen and Meckling (1976) who discuss optimal capital structure as a function of the agency costs associated with outside equity, and Myers (1977) who attempted to improve upon Modigliani and Miller's work by developing a theory of optimal capital structure that incorporates market values, as well as potential future states. Myers (1977) argued that the current equilibrium market value of debt a firm chooses to have in its capital structure should be inversely related to the value of the investment or growth opportunities[1] available to the firm.

Aside from the trade-off hypothesis, numerous alternative theories have been developed to explain capital structure choice. Donaldson (1961) first observed evidence of the "pecking order hypothesis," which was later explored by Myers and Majluf (1984), who propose that equity is subordinate to debt due to its associated information costs. Behavioural views such as the "market timing hypothesis" of Baker and Wurgler (2002) suggest that managers will prefer equity when investors perceived it to be overvalued. "Signalling theory" supports this view and purports that this results from managers having more information than outside investors.

The three main theories prevalent in the literature, along with their implications for optimal capital structure, are outlined below.

2.2.1.1 Trade-off Theory

The trade-off theory is based on the fact that corporate profit tax allows for the deduction of

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[1] The present value of growth opportunities is defined by Myers (1977) as the value of the firm that is dependent on future discretionary expenditures by the firm, specifically all future investment and variable costs.

interest payments associated with debt. This results in somewhat of a tax advantage of debt over equity. This suggests that the existence of debt in capital structure should result in lower tax liabilities and increased after-tax cash flow to the firm. Moreover, it suggests that debt may serve to reduce conflicts of interest between managers and shareholders through reducing free cash flow. This implies that (with the assumption of market efficiency and no information asymmetries) in the absence of transaction costs, a firm would possess enough debt in its capital structure to completely offset its taxes (Modigliani & Miller, 1963). Thus the trade-off theory supports the existence of a target, or optimal capital structure. However, the theory recognises that there are in fact costs associated with debt - namely those related to financial distress, bankruptcy costs, agency costs associated with differing interests of equity and debt-holders - that could potentially offset the said benefits. Essentially, Modigliani and Miller (1963) propose that this optimal capital structure is that which results in the tax benefits of debt just being offset by the associated costs of financial distress (such as bankruptcy costs).

Several authors find support for the trade-off theory (Marsh, 1982; Fischer, Heinkel & Zechner, 1989; Opler & Titman, 1994). Alternatively, numerous studies have reported finding a negative relationship between profitability and leverage, which is contradictory to the trade-off theory as the benefit of debt tax-shields should be greater for such firms (Titman & Wessels, 1988; Rajan & Zingales, 1995; Graham & Leary, 2011). Moreover, such evidence is supportive of the pecking-order theory, which will be mentioned in the following sub-section. Correia and Cramer (2008) note that, due to high domestic profitability levels combined with low growth prospects and the inability of firms to expand into offshore markets, target debt-equity ratios of South African listed firms appear to be lower than what is implied by trade-off theory.

2.2.1.2 Pecking Order Theory

Pecking order theory is based on the assumption that there is information asymmetry between managers and outside investors: namely, managers are thought to have better information about the value of their companies than outside investors (Barclay & Smith, 1999). Myers and Majluf (1984) first mention the concept of pecking order in financing, whereby they propose that firms will prefer the "cheapest" source of funds when considering how to finance a new investment. This implies that internal funds (retained earnings) would be favoured over external financing. Further, if external financing were required, it follows that debt would be favoured over equity due to its "lower flotation and information costs" (Barclay, Smith & Watts, 1995).

The pecking order concept applies in the event that the costs of issuing new securities are higher than alternative financing costs, and higher than the benefits of dividends and debt. Transaction costs related to new issues and costs resulting from management possessing superior information (regarding the prospects of the firm and the value of the firm's securities) instigate pecking order behaviour (Fama & French, 2002). These costs result from adverse selection: investors assume that managers will issue equity only when the firm is thought to be overvalued, resulting in a reduction in the share price (Myers, 1984). Alternatively, the issuance of debt increases the firm's cost of capital through increasing the probability of financial distress (Myers, 1984). As a result of such costs, firms would thus opt to finance new investments first with retained earnings, then with safe debt, then risky debt and as a last resort, with equity (Fama & French, 2002). This implies that variation in a firm's leverage is determined by the firm's net cash flows (cash earnings net of investment outlays).

Essentially, the concepts of the theory imply that information asymmetry, along with a firm's financing deficit, are the main factors influencing security issuance, suggesting that firms will resort to equity financing only if the firm does not have adequate internal funds to finance growth opportunities and if costs of information asymmetry are low (Shyam-Sunder & Myers, 1999).

The theory also suggests that firms with few investment opportunities and considerable free cash flow will have little debt in their capital structures, while firms with substantial growth opportunities and little operating cash flow will have large debt ratios (Barclay, Smith & Watts, 1995). This reasoning implies that profitable firms (which would have more retained earnings) would have less leverage in their capital structure.

Consequently, the pecking order theory has implications that are in complete contrast to those posited by the trade-off hypothesis. The underlying implications for pecking order are that firms do not target an optimum debt ratio. Alternatively, it suggests that if there were an optimal debt ratio, the cost of moving away from this target would be outweighed by the costs of raising external financing. This essentially amounts to a generalised version of the trade-off theory (Frank & Goyal, 2003). Numerous studies examining variations in leverage ratios have found evidence supporting the pecking order theory (Shyam-Sunder & Myers, 1999; Fama & French, 2002; Akhtar, 2011)

2.2.1.3 Market Timing Theories

Market timing theories centre on the notion that managers base their financing decisions on current capital market conditions. Such theories maintain that managers do not target an optimal capital structure. Various studies examining capital structure have also documented evidence in support of the theory (Marsh, 1982; Graham & Harvey, 2001; Akhtar, 2011).

A frequently discussed theory is the "market timing hypothesis" (Baker & Wurgler, 2002). Baker and Wurgler (2002) maintain that a firm's capital structure depends on managers' ability to sell overvalued equity: specifically, managers will issue shares when the firm has a high market-to-book ratio. Essentially, managers take advantage of information asymmetries and act in the interests of current shareholders. In essence, this implies that managers will only issue equity when the market overvalues equity and repurchase stock when equity is undervalued.

In a similar manner, Welch (2004) contends that market debt ratios are primarily affected by stock price changes as a result of such managerial behaviour. He goes so far as to insinuate that these stock price effects are more influential determinants of debt-equity ratios than conventional determinants. However, Baker and Wurgler (2002) argue that if firms regularly rebalance their capital structures in order to counteract the effects of financing decisions arising from market timing behaviour (which is an implication of normative capital structure theory), then market timing should not have an impact on capital structure in the long run.

Despite the ongoing debate, numerous studies indicate that firms do indeed have long-run leverage targets. In a survey conducted on 392 Chief Financial Officers, Graham and Harvey (2001) find that 81% of respondents confirmed having an optimal or target debt-to-equity ratio. In a similar survey conducted on South African listed firms, Correia and Cramer (2008) find that 79% of South African firm managers apply some form of debt ratio targeting. In addition, 29% of these firms were found to adhere to a strict target. Moreover, Lemmon, Roberts and Zender (2008) find that firms' leverage ratios converge towards an industry mean in the long run.

In relation to this, Myers (1984) calls attention to the fact that the presence of adjustment costs could prevent firms from adjusting toward their long-term targets immediately. This prompted research to move away from static trade-off models and develop a more dynamic theory of targeting, allowing for changing debt ratios over time.

In the light of this evidence, models have evolved to incorporate the concept of dynamic adjustments towards a target capital structure. Certain empirical studies have attempted to examine the adjustment behaviour of firms following shocks to their capital structure. Some studies still argue against an optimal capital structure: Welch (2004) observes equity value shocks to firms in a dynamic context in order to examine whether firms adjust their capital structures in relation to this to maintain a target level of leverage. He finds no evidence of adjustment. In contrast, some studies still advocate an optimal debt-over-equity ratio: Flannery and Rangan (2006) analyse U.S. firms for dynamic adjustments and find that a firm closes approximately one third of the "gap" between their actual and target ratios in a particular year.

Such evidence has prompted researchers to investigate the determinants of observed capital structures and optimal capital structures (many focusing on leverage in particular) in order to assess the factors affecting firms' adjustment towards their optimal capital structures, as well as the speed at which firms adjust toward these target capital structures.

The following section explores the findings to date on capital structure determinants – or more specifically, the determinants of leverage in capital structure.

2.2.2 THE DETERMINANTS OF LEVERAGE IN CAPITAL STRUCTURE

2.2.2.1 Firm-level determinants of leverage

Majority of studies concerning capital structure determinants have identified various firm-level factors as key determinants of leverage. One of the earliest studies of capital structure determinants is that of Bradley, Jarrell and Kim (1984), who examine various firm-characteristic determinants of leverage – including firm earnings volatility, non-debt tax shields, and research and development and advertising costs. More importantly, they find that industry-specific effects account for 54% of the variation in leverage ratios. Titman and Wessels (1988) examine additional determinants such as firm uniqueness, profitability, size, growth and the collateral value of assets. They find that size, profitability and uniqueness significantly affect capital structure choice.

Rajan and Zingales (1995) extend their study to public firms beyond the U.S. and find that the primary determinants of capital structure in major industrialised countries are size, profitability, market-to-book ratios and tangibility. Frank and Goyal (2003) examine a sample of publicly traded American firms over 1971 to 1998 and confirm the significance of these four factors in determining leverage.

Fama and French (2002) find that the change in the level of leverage is negatively related to the investment opportunities available to a firm. They also find that a firm's financing decisions are affected by whether or not the firm is a dividend payer.

Somewhat in support of Bradley et al. (1984), recent studies – such as that of Flannery and Rangan (2006), Frank and Goyal (2007) and Elsas and Florysiak (2008) have documented the importance of industry median debt ratios in determining capital structure. This is supported by Lemmon et al. (2008), who report that firms in the same industry possess a common leverage ratio which remains relatively stable over time.

Despite the fact that most studies examine firm-characteristic effects as capital structure determinants, Lemmon et al. (2008) find that majority of the variation in capital structure is explained by the unobserved, permanent component (or time-invariant component) of leverage. Specifically, they find that, when incorporating both conventional firm-characteristic variables and firm fixed effects (believed to be a proxy for the time-invariant factor) into their model, 60% of the variation in book leverage is accounted for by these firm fixed effects. Chang and Dasgupta (2011) confirm these findings and report that firm fixed effects account for as much as 95% of the variation in leverage. Moreover, Graham and Leary (2011) report that traditional firm-level determinants only explain 6 percent of the variation in book leverage ratios within firms. In addition, they find that the explanatory power of these determinants in explaining leverage variation has decreased over time.

Thus, in recent years studies have begun to investigate alternative determinants of leverage, as well as the effect of these factors on target adjustment speed. Specifically, a growing amount of literature has attempted to analyse the effects of macroeconomic conditions on leverage dynamics and adjustment speed (Korajczyk & Levy, 2003; Hackbarth, Miao & Morellec, 2006; Drobetz & Wanzenreid, 2006; Cook & Tang, 2010; Akhtar; 2011). This is explored further in the following section.

2.2.2.2 Macroeconomic determinants of leverage

Various studies have suggested that uncertainty related to the macro-economy may be a significant determinant of a firm's leverage (Stephan & Talavera, 2004; Baum, Chakraborthy & Liu, 2009). In line with this, Yeh and Roca (2010) call attention to the fact that firm-level determinants such as growth opportunities change in response to macroeconomic fluctuations. Akhtar (2011) also acknowledges this, and adds that macroeconomic conditions may indirectly affect leverage through their effect on firm-level factors. Halling et al. (2011) note that macroeconomic conditions also affect many theoretical determinants of a firm's financial structure. Specifically, in the event of a recession, many firms experience reduced cash flows, reduced equity capital (in the case of financial intermediaries) and changes in equity valuations (Halling et al., 2011). Thus it is implicit that firms should take macroeconomic factors into account when determining their capital structures.

In addition, Akhtar (2011) notes that the unobserved time-invariant component of leverage observed in previous studies could be related to the business cycle. He lists two potential reasons: firstly, the fact that phases of the business cycle encompass a time-invariant feature suggests that leverage ratios could potentially move together with business cycles. Secondly, the business cycle is a time-related variable, and prior studies have noted that the evolution of leverage in capital structure is time-related. Again, this suggests that incorporating macroeconomic variables (which are driven by the business cycle) into a model could possibly better explain how leverage changes over time.

Previous literature has utilised a variety of proxies for macroeconomic conditions. Typically, macroeconomic variables may be used as indicators of economic recessions (or downturns) and expansions (or downturns).

Traditionally, an economic recession has been defined as a decline in real gross domestic product (GDP) for two or more successive quarters of a year (Mahakud & Mukherjee, 2011; Cook & Tang, 2010), with a boom being defined as a positive growth rate. Thus the growth rate in real GDP is often used as an indicator of macroeconomic conditions. GDP may also serve as a proxy for growth opportunities (Huang & Ritter, 2009). Huang and Ritter find evidence that firms are more likely to finance their current growth opportunities with debt.

Chen (2010) defines a recession according to three criteria, the first being periods when the marginal utilities of investors are high, as at such times, potential default losses are liable to have a greater impact on investors. Secondly, he proposes that recessions may be classified as periods when firm cash flows are expected to experience slower growth, higher volatility, and higher correlation with the general market. This increases the price of risk, which in turn increases the likelihood of a recession. Thirdly, he adds that due to firms experiencing relatively poor performance in recessions, the cost of liquidating assets would be higher during such periods, leading to higher default losses and high credit spreads (indication of a recession).

Interest rates (both short-term and long term) are also seen as indicators of macroeconomic conditions. In line with this, Drobetz and Wanzenried (2006) mention that the three-month money market interest rate may proxy for the cost of raising external capital and thus directly influences a firm's investment decision. Similarly corporate executives often interpret the real interest rate as a proxy for the time-varying cost of debt (Huang & Ritter, 2009). Generally, higher interest rates (assumed to occur during a monetary contraction) make leverage more costly, reducing the amount of debt in a firm's capital structure. The opposite would hold for lower interest rates (common during a monetary expansion). Alternatively, the spread between short and long term interest rates - the term spread - could be used as a macroeconomic indicator. Specifically, a high term spread is seen as an efficient predictor of a good economy, (Cook & Tang, 2010). Drobetz and Wanzenreid (2006) observe the effect of both firm-level and macroeconomic factors on the leverage ratios of Swiss firms and document a positive association between the term spread and adjustment speed. In contrast, short-term interest rates and the rate of corporate growth were found to negatively influence adjustment speed.

Cook and Tang (2010) employ four macroeconomic factors in their model. Aside from GDP growth rate and the term spread of interest rates, they include the default spread as an additional macroeconomic factor – also investigated by Fama and French (1989) and Korajczyk and Levy (2003). The default spread is typically defined as the difference between investment-grade and below-investment-grade bonds. The default spread may also serve as a proxy for the cost of debt (Huang & Ritter, 2009). In addition, Huang and Ritter (2009) note that the cost of equity (as evidenced by the equity risk premium on a stock market index) is positively correlated with the default spread and negatively correlated with the real interest rate. This would clearly have implications for the debt-equity choice of a firm. Typically, the default spread is a long-term indicator of macroeconomic states. It is expected to be higher during recessions and lower during expansions. Lastly, they examine the market dividend yield (defined as the yearly dividend yield according to the sum of dividend payments of all the companies comprising a value-weighted stock market index). They argue that due to the stickiness of dividends, a high dividend yield is an indication of low stock prices, which are assumed to be more likely during an economic downturn.

Yan (2010) incorporates the inflation rate as an additional macroeconomic factor. As the real interest rate constitutes the nominal interest rate less inflation, these factors are related. Thus a relatively high inflation rate translates to a low real cost of debt (Yan, 2010). Generally, it would be preferable for the company to undertake or issue more debt when the inflation rate is relatively high, as this would result in a reduced real rate of interest. Frank and Goyal (2009) document a positive relationship between leverage and expected inflation – supporting the notion that firms may adjust their debt in accordance with inflation. . Similarly, inflation may push up the value of a firm's assets, encouraging firms to borrow against inflationary growth prospects, which could lead firms to opt for more debt in their capital structures (Booth, Aivazian, Demirguc-Kunt & Maksimovic, 2001). Thus higher rates of inflation may induce firms to take on more debt (and may also imply higher speeds of adjustment towards target ratios if firms are under-leveraged). Alternatively, higher levels of inflation induce higher levels of interest rate and monetary risk, which may result in lower book debt ratios (Booth et al., 2001). This would clearly affect a firm's financing decisions and capital structure.

Certain studies include the return on a value-weighted stock market index in their models to capture changes in macroeconomic conditions. Naturally, the intuition behind this is that increases in stock prices signal favourable conditions. Thus the stock market is expected to be a leading indicator of macroeconomic conditions, with increasing returns indicating upcoming good macroeconomic conditions and decreasing returns signalling bad states. Moreover, firms are typically more likely to issue equity following increases in the equity market (Lucas & McDonald, 1990; Korajczyk, Lucas and McDonald (1990) cited in Cook, Fu & Tang, 2009). This would have implications for the capital structure of a firm. In relation to this, Faulkender, Flannery, Hankins and Smith (2011) find evidence that adjustment speeds may increase by almost 12% in certain cases when equity valuations are high. On a related note, Yan (2010) proposes that the degree of capitalisation of the stock market is indicative of the development status of the stock market, which determines the ease with which a firm could obtain equity financing from the stock market – affecting its capital structure. As a proxy for the degree of capitalisation, he uses the total market value of the shares in a stock market scaled by the country's GDP.

In addition, the state of the economy could be described by phases of a country's business cycle. Akhtar (2011), reports that including business cycle factors into fixed effects regressions improves the models explanatory power by 14%. In South Africa, the Reserve Bank (SARB) makes use of three business cycle indicators to ascertain whether the economy is in an upturn or downturn – namely, the composite leading indicator, the composite coincident indicator, and the composite lagging indicator. These indicators incorporate a variety of economic indicators into a single index in order to determine the turning points of the business cycle.

Alternative measures that may be used as business cycle indicators include indicators of manager and consumer economic sentiment, such as the European managers' and consumer's Economic Sentiment Index (European Finance Association, 2011). Such measures encompass managers' and consumers' expectations regarding the state of the business cycle into two specific measures. It has been argued that measures of manager confidence are a more supply-side orientated proxy for economic conditions (European Finance Association, 2011). In addition, indexes related to manager sentiment may account for a larger portion of the information asymmetry that lead to increased agency costs, which in turn may influence firms' financial policies.

To summarise, it has been established thus far that macroeconomic conditions affect firms' capital structure choice. In addition, the definition of macroeconomic variables and how the literature defines these variables as indicators of macroeconomic conditions has been discussed. It would therefore be pertinent to discuss how macroeconomic conditions could affect firms' adjustment toward their target capital structures. Throughout the course of this paper, the terms "downturn", "recession", "bad states", "unfavourable states" and "contraction" will be used interchangeably to denote a period of macroeconomic decline. Similarly, the terms "upturn", "good states", "favourable states" and "expansion" will be used to denote a period of macroeconomic growth. It is acknowledged, however, that these terms are not necessarily the same in an economic sense. It must be noted that this will merely be used in the context of this study for ease of reference.

Before reviewing the findings regarding macroeconomic conditions and capital structure adjustment speed, however, it is necessary to discuss a relevant issue pertaining to these findings. This is the issue of financial constraints. Numerous studies observe that leverage dynamics and adjustment speed findings differ depending on whether or not a firm is financially constrained. This is explored in the following section.

2.2.3 FINANCIAL CONSTRAINTS, CAPITAL STRUCTURE ADJUSTMENT AND MACROECONOMIC CONDITIONS

Research suggests that adjustment speed dynamics in relation to macroeconomic conditions may differ in relation to various factors, such as a firm's ease of access to public debt markets or the firm's distance away from target (Drobetz and Wanzenried, 2006). More commonly, literature suggests – both theoretically and empirically - that leverage dynamics in relation to macroeconomic conditions differ considerably depending on whether a firm is financially constrained or not.

For example, Korajczyk and Levy (2003) maintain that financially constrained firms tend to borrow more when asset values are high (which increases the value of collateral) – which occurs after periods of high equity market returns and corporate profits. Thus they find that target debt ratios of constrained firms vary pro-cyclically[2]. In contrast, they argue that unconstrained firms are able to time their debt and equity issues to periods when the price of the relevant asset is most favourable. Their findings corroborate Levy's (2001) agency cost-related theory of managerial compensation: when managerial compensation is low – which occurs after periods of low equity market returns and profits – managers opt for debt financing. Thus they report that target leverage varies counter-cyclically for unconstrained firms. Moreover, they add that macroeconomic conditions are more significant in determining issue choice for unconstrained firms as constrained firms have less financial flexibility. These findings are supported by Hackbarth et al. (2006). In addition, Gertler and Gilchrist (1993) find evidence of increased aggregate net debt issues during recessions - for both private and public firms - in the case of unconstrained firms.

In contrast to Korajczyk and Levy (2003), Halling et al. (2011) find evidence that, in the case of book leverage, target debt ratios are pro-cyclical for unconstrained firms and countercyclical for constrained firms. This implies that constrained firms are less likely to issue additional debt in the event of an expansion than unconstrained firms (Halling et al., 2011). They list numerous possible reasons for this: Firstly, constrained firms tend to be more risky and are thus likely to recapitalise less often. Also, constrained firms may be obligated to issue more short-term debt which would have to be rolled over regularly. High short-term debt ratios could pose a funding risk as firms may have limited access to debt markets during recession periods. In addition, due to their financial status, access to debt markets during recession periods may be more limited for constrained firms than unconstrained firms. This indicates that constrained firms are less likely to issue additional debt in the event of an expansion than unconstrained firms.

Thus - as a firm's financial status clearly has an impact on how debt ratios vary with macroeconomic conditions - it would be pertinent to assess how the speed of adjustment is

[2] Leverage is defined as pro-cyclical if it increases during an expansion or economic upturn and decreases during a recession or economic downturn. Counter-cyclicality implies that leverage decreases during an upturn and increases during a downturn.

affected in this respect.

Regardless, evidence indicates that - macroeconomic conditions aside - financial constraints have a significant impact on adjustment speed. For example: Faulkender et al. (2011) find that when firms are over-levered, financially constrained firms adjust faster towards their optimal ratios in order to eliminate the excess debt than unconstrained firms. Alternatively, they note that when firms are under-levered, constrained firms adjust slower than unconstrained firms. Essentially, financial constraints affect capital structure adjustment costs, which in turn affect the speed at which firms adjust toward their target capital structures. Andrade and Kaplan (1998) estimate costs of financial distress to amount to 10 to 20% of a firm's assets. In addition, financing constraints may influence adjustment speed by affecting the ability of firms to repurchase shares or repay debt (Leary & Roberts, 2005). Moreover, incentive problems may manifest in distressed firms: managers may maintain control of the firm in an attempt to prevent liquidation, engaging in risky transactions in doing so (Graham & Leary, 2011). Similarly, debt-holders could seek to take control of the firm to prevent further distress (Graham & Leary, 2011).

Overall, it is evident that constrained and unconstrained firms are likely to respond differently to changes in macroeconomic conditions – which would have implications for adjustment speed. This paper therefore investigates the effect of financial constraints on adjustment speed in relation to changes in macroeconomic conditions. The following section explores the overall findings regarding the effect of macroeconomic conditions on the speed of adjustment, as well as how these findings differ among financially constrained and unconstrained firms.

2.2.4 CAPITAL STRUCTURE ADJUSTMENT SPEED AND MACROECONOMIC CONDITIONS

Stemming from the findings discussed thus far, many studies have adapted dynamic capital structure models to incorporate a measure of the speed at which firms adjust toward their target debt ratios. As mentioned previously, as most literature only accounts for the effect of firm-level factors, the existing literature regarding the effect of macroeconomic conditions on adjustment speed is very limited. The few existing studies have resulted in contrasting implications regarding how capital structure (leverage in particular) should evolve in response to changes in macroeconomic conditions – including how macroeconomic conditions affect the speed at which firms adjust toward their target debt ratios. In this section, the findings to date in relation to this will be reviewed in order to aid the development of the hypotheses.

Generally, slower speeds of adjustment are expected when adjustment costs are high. Similarly, faster adjustment speeds are expected when the costs of deviating from the target are relatively higher. Factors such as external financing costs, financing deficits and surpluses (pecking-order related concepts) costs of financial distress, financial constraints, and macroeconomic conditions influence adjustment costs (Faulkender et al., 2011 and Mahakud & Mukherjee, 2011). This in turn affects a firm's speed of adjustment toward its target capital structure. Byoun (2008) suggests that there is asymmetry in target adjustment; maintaining that the incentive to reduce leverage is greater than that of increasing leverage. This implies that firms would adjust faster downward than upward.

Previous research has yielded a variety of adjustment speed estimates. Fama and French (2002) find adjustment speed estimates ranging from 7 to 18% per year. Kayhan and Titman (2007) report an adjustment speed of 10% using book leverage. Huang and Ritter (2009) find slightly higher speeds on average of about 17% when considering book leverage and 23.2% when using market leverage. Lemmon et al. (2008) find an annual adjustment speed of 25% when using book leverage as a debt definition. Considerably higher speeds are reported by Flannery and Rangan (2006), specifically 34.2% when using book leverage as a dependent variable and 35.5% per year when using market leverage. Alternatively, Welch (2004) maintains that firms simply do not adjust toward a target. In addition, Iliev and Welch (2010) find evidence of negative adjustment speeds of up to -7%. They contend that negative adjustment speeds indicate that managers "amplify the effects of shocks" (p.4). However, these studies do not explicitly take macroeconomic conditions into account.

The general pattern observed by much literature is that firms adjust faster in favourable macroeconomic conditions (Drobetz et al., 2007; Halling et al., 2011).

In relation to this, Hackbarth et al. (2006) construct a partial equilibrium contingent claims model which allows them to replicate the observed term structure of credit spreads and debt ratios in order to assess the potential effects of macroeconomic conditions on capital structure choice. Their framework predicts that the speed of adjustment towards a firm's target leverage should be higher when economic prospects are favourable (i.e. during expansions). They propose that operating cash flows are related to current economic conditions, implying that the present value of operating cash flows should be higher during expansions. Higher operating cash flows in turn imply a lower aggregate target market debt ratio. This suggests that a firm's restructuring threshold should thus be lower in an expansion relative to a recession. It follows that firms should adjust their capital structures more frequently in expansions – implying that adjustment speeds should be relatively higher in expansions.

This is supported by the findings of Cook and Tang (2010) who find that – regardless of whether or not a firm is financially constrained – firms tend to adjust faster in good macroeconomic states than bad states. When using book leverage, they find significant speeds ranging from 40% to 74.9% in good states and 33.4% to 72.9% in bad states using an integrated dynamic partial adjustment model. Using a two-stage model, they find significantly lower speeds ranging from 16.7% to 20.4% in good states and 14.5% to 17.3% in bad states.

In contrast to the above findings, Hess and Immenkötter (2011) propose a parsimonious model which proposes that the cost to a firm of not being at its "optimal level" of leverage is higher during recessions, which purports that the capital structure adjustments to such costs should be more prevalent around the turning points of business cycles, as well as in recessions. This implicitly suggests that the speed of adjustment towards the target leverage should be higher during recessions or economic downturns.

Many studies maintain that financial constraints may impede the adjustment process and thus affect the adjustment speed. Overall, there are mixed conclusions in this respect.

Korajczyk and Levy (2003) propose that unconstrained firms have the ability to time their issue choices to coincide with favourable macroeconomic periods whereas constrained firms do not. This suggests that unconstrained firms should adjust relatively faster towards their targets than constrained firms. This notion is supported by the findings of Cook and Tang (2010). Another implication of Korajczyk and Levy's (2003) proposition is that constrained firms should be less sensitive to changes in macroeconomic conditions as they are limited in their ability to time the market.

The latter is refuted by Halling et al. (2011), who propose that constrained firms should be more sensitive to business cycle variation, causing the speed of adjustment to decrease more during recessions for constrained than unconstrained firms. Furthermore - in support of their proposition - they note that for market leverage estimates, the differences in adjustment speeds across expansions and recessions are more extreme for constrained firms than unconstrained firms. This is particularly severe in the case of short-term leverage, where the adjustment speed for constrained firms is found to be 32.6% lower in the event of a recession. However, when investigating the differences in speed of adjustment in recessions relative to expansions across both types of firms, they find some support for Korajczky and Levy's (2003) proposition: the speed-of-adjustment (SOA) estimates are consistently lower for constrained firms relative to unconstrained firms when using book leverage ratios.

The focus of most capital structure studies to date has been on developed markets. However, research indicates that findings in developing markets may differ from that of developed markets. For example, Halling et al. (2011) find evidence of significantly lower adjustment speeds during recessions relative to expansions: but in particular, they find that the decrease in adjustment speed during recessions is less extreme in countries where public markets are well developed. They add that this is due to the fact that developed markets are less subject to freezes in the event of a recession – meaning firms can adjust to target levels more readily.

The few existing findings on developing economies appear to yield mixed results in relation to those of developed economies.

Mahakud and Mukherjee (2011) conduct a study on Indian manufacturing firms: using a Generalised Method of Moments (GMM) technique, they find that firms adjust faster in good macroeconomic states relative to bad states - as defined by the real contemporaneous GDP growth rate. In addition, they observe faster adjustment speeds for unconstrained firms. Huang (2010), using GMM estimation, examines Chinese firms and reports adjustment speeds of 75.6% in good macroeconomic conditions and 69.6% in bad conditions, lending further support to the theory that firms adjust faster in good states than bad states. These findings are robust to both book and market debt definitions. Drobetz, Pensa and Wanzenried (2007) study a sample of 706 European firms and find further support for the notion that firms adjust faster in favourable macroeconomic conditions – as evidenced by the credit spread, term spread and TED spread. They also note that the former holds particularly in the presence of low interest rates and negligible disruption risk in the global financial system. In addition, they investigate the issue of financial constraints and note that constrained firms are more adversely affected by bad macroeconomic states than unconstrained firms. However, they find little support for Korajczyk and Levy's (2003) proposition that constrained firms adjust more slowly than unconstrained firms – although they do acknowledge that the determinants of adjustment behaviour does differ among the two samples.

In contrast, Rubio and Sogorb (2011) report that firms adjust faster during macroeconomic contractions than expansions – as defined by the price-earnings ratio, GDP growth rate and term spread. Using a long difference estimation technique, Rubio and Sogorb (2011) find an average speed of adjustment of 17.5% for Spanish public firms – slower than the adjustment speeds found in most studies of U.S firms. Moreover, they conclude that adjustment speeds are driven by a firm's distance away from target rather than macroeconomic conditions.

Table 1 summarises the existing findings on the adjustment speed estimates obtained in relation to macroeconomic conditions. As evident from the table, the existing findings are scarce. Aside from these findings, capital structure-related theories also have implications as to how the speed at which firms adjust their capital structures should vary with macroeconomic conditions. Thus, in the following section the implications of the main theories in this regard will be discussed briefly.

2.2.5 IMPLICATIONS OF CAPITAL STRUCTURE THEORIES FOR MACROECONOMIC CONDITIONS AND ADJUSTMENT SPEED

The main capital structure theories prevalent in the literature have different implications as to how debt should evolve with changes in macroeconomic conditions. This section will briefly review some of the main theories related to capital structure choice and their implications for capital structure adjustment in relation to macroeconomic conditions.

2.2.5.1 Trade-off Theory

Research in support of the notion that there is a target capital structure suggests that the speed of adjustment towards the target is dependent on both the adjustment costs as well as the cost of deviating from the target (Flannery & Hankins, 2007). Ideally, if there were no adjustment costs, firms would not deviate from their target debt ratios. In reality, however, this is not the case. More specifically, adjustment costs are influenced by transaction costs and the market value of the firm's stock (Getzmann, Lang & Spremann, 2010) – which would likely be affected by the state of the macro-economy. In addition, the costs of deviating from the target are dependent on the probability of financial distress and the present value of the debt tax shield (Flannery & Hankins, 2007). Thus changes in macroeconomic variables – through affecting costs of adjustment - would have implications for the speed at which firms adjust toward their target leverage.

Applying this to a dynamic setting including macroeconomic factors, trade-off theory implies that debt should be pro-cyclical. During expansions equity market conditions are favourable, thus firms would be inclined to have more taxable income to shield as well as more free cash flow. Bankruptcy costs would also be lower, making debt more attractive (Jensen & Meckling, 1976, Korajczyk & Levy, 2003). The opposite would hold for contractions. Therefore, trade-off theory implies that the speed of adjustment should increase in the event of a market upturn, and decrease in the event of a market downturn.

A point to note is that extremely low adjustment speed estimates may suggest that it is unlikely that firms adjust toward a long-run target (Flannery & Rangan, 2006). A potential reasoning for this is that the effects of pecking order and market timing behaviour overshadow the costs of deviating from optimal leverage (Flannery & Rangan, 2006).

Table 1: Summary of adjustment speed estimates found in previous literature

Study	Model	Sample period	Country of sample	Definition of macroeconomic states	Leverage definition	SOA estimate					
						Full sample		Constrained		Unconstrained	
						Good	Bad	Good	Bad	Good	Bad
Rubio and Sogorb (2011)	Integrated DPACS, long-difference estimates	1995-2007	Spanish firms	Price earnings ratio, GDP growth rate, term spread		63..9-79.53% higher	NA	NA	NA	NA	NA
Halling, Yu, Zechner (2011)	Integrated DPACS, OLS estimates	1983-2009	19 countries, developed and developing	Business cycle	Total debt to total assets	41.1%	34.6%	9.1%	4%	42.8%	35.9%
					Long-term debt to total assets	48%	44.8%	25.2%	22.5%	49.3%	45.8%
					Short-term debt to total assets	61.9%	51.4%	47.9%	28.6%	62.7%	52%
					Net debt (total debt less cash) to total assets	48.3%	43.4%	50.5%	44.5%	49.3%	43.5%
Cook and Tang (2010)	Integrated DPACS, OLS estimates	1977-2006	U.S. firms	Term spread, default spread GDP growth rate, dividend yield	Total interest-bearing debt to total assets	40-74.9%	33.4-72.9%	57.4-81.4%	38.6-62.4%	55.9-84.2%	39.4-68.2%

Continuation of table 1:

Study	**Model**	**Sample period**	**Country of sample**	**Definition of macroeconomic states**	**Leverage definition**	**SOA estimate**					
						Full sample		Constrained		Unconstrained	
						Good	Bad	Good	Bad	Good	Bad
Huang (2010)	Integrated DPACS, GMM estimates	1997-2006	Chinese listed firms	GDP growth rate	Total debt to total assets	75.6%	69.6%	NA	NA	NA	NA
	Two-stage DPACS, OLS estimates				Total interest bearing debt to total assets	16.7-20.4%	14.5-17.3%	NA	NA	NA	NA
Drobetz, Pensa and Wanzenried (2007)	Integrated DPACS, GMM estimates	1983-2002	European firms (France, Germany, Italy, U.K.)	Credit spread, term spread, TED spread	Total liabilities to total assets; Total debt to total capital	NA (higher)	NA (lower)	NA	NA	NA	NA

This table summarises the available findings on adjustment speeds in relation to macroeconomic conditions. All estimates are those reported for book debt ratios for comparison purposes, aside from that of Rubio and Sogorb (2011) who use only market debt ratios in their study. As is evident from the table, findings on such studies are scarce. “NA” indicates that the estimates are not available (most likely because they were not investigated directly in the study). “Higher” or “lower” refers to the adjustment speed in good states relative to bad states. “Good” refers to the adjustment speed in good states (upturns, expansions or favourable macroeconomic conditions) while “Bad” refers to the adjustment speed in bad states (downturns, recessions or unfavourable macroeconomic conditions). “Unconstrained” refers to adjustment speed estimates for unconstrained firms, while “constrained” refers to adjustment speed estimates for constrained firms.

2.2.5.2 Pecking Order Theory and Market Timing Theories

Assuming firms are less profitable during contractions and more so during expansions pecking order concepts would imply that leverage is counter-cyclical. Both market timing theory (mentioned in the next section) and pecking order theory imply that speed-of-adjustment should be slow (Cook et al., 2009), as adjustment towards a target is not considered a priority in these contexts. Thus very low SOA estimates may indicate support for the pecking order theory.

Flannery and Rangan (2006) reiterate that many previous studies (e.g. Baker & Wurgler, 2002; Frank & Goyal, 2003) assert that if a specific theory holds true, the variables associated with that particular theory should be more prominent than other variables in explaining capital structure. Conceptually, these variables "compete with each other" (Flannery & Rangan, 2006, p.486). Flannery and Rangan (2006) apply this principal to test whether variables associated with pecking order or market-timing concepts decrease the significance of variables connected with trade-off theory. They employ financing deficit as a pecking-order related variable, as the theory indicates that a firm's financing deficit explains concurrent changes in its book debt ratio. In relation to market-timing theory, they include an "external finance weighted average" book to market ratio (p.487). This is in accordance with Baker and Wurgler (2002), who maintain that managers issue securities when they are overvalued (as mentioned previously). Specifically, managers would issue debt when a firm's market-to-book ratio (Tobin's Q) is low or equity when a firm's market-to-book ratio is high (Baker & Wurgler, 2002). They find a correlation between this backward-looking "external finance weighted average book-market ratio" and a firm's debt ratio that persists for up to ten years (cited in Flannery & Rangan, 2006).

Flannery and Rangan then regress book leverage against these two variables using a partial adjustment model, with lagged firm-level variables and lagged book leverage as additional regressors. They find that there is minimal change in the leverage coefficients of the lagged leverage and firm-level variables, which are associated with trade-off theory. In separate regressions, they find that target leverage causes larger changes in actual leverage ratios than the weighted average book-to-market ratio and the financing deficit. They conclude that, while these market-timing and pecking order-related variables to contribute somewhat to the regressions, trade-off theory-related targeting behavior accounts for majority of the variation in observed capital structure.

Therefore the current paper follows this reasoning and capital structure adjustment will be examined based on the assumption that firms do adjust toward a target debt ratio. Furthermore, Graham and Leary (2011) raise the point that no theory was created to apply to all firms; rather, specific theories are more relevant to some firms than others. Thus, one cannot completely dispute the validity of a specific theory. Hence, this paper does not seek to prove or refute the existence of the respective capital structure theories. The primary focus is instead on the speed of adjustment.

2.3 CHAPTER CONCLUSION

Thus far the literature and theoretical underpinnings relevant to the research have been highlighted. This forms the basis of the empirical analysis. It has been established that macroeconomic conditions have been found to affect the speed at which firms adjust toward their target capital structures. In addition, it is evident that financial constraints may influence how quickly firms adjust toward their targets. Also, capital structure theory has further implications regarding the adjustment behaviour of firms. It is evident that the literature has yielded mixed results with respect to all of the above. Stemming from this, various hypotheses can now be formulated to test whether these previous findings will hold in a South African context. The following chapter introduces the methodology and sample to be used in order to test these hypotheses, as well as the econometric issues associated therewith. The research questions (hypotheses) to be addressed will then briefly be discussed, which will form the basis for the empirical analysis in chapter 4.

CHAPTER 3: DATA AND METHODOLOGY

3.1 INTRODUCTION

This chapter reviews the nature of the data, sample selection procedure, the properties of the sample selected for the current study, as well as possible econometric issues that may be encountered with the data. In addition, an introduction to the standard dynamic partial adjustment model (the methodology used for the study) will be provided, which will lead to the econometric specification of the specific model to be used in this study.

The section that follows below discusses the nature of the data and potential problems that may arise as a result. Following from this, the motivation for the chosen methodology and econometric specification will be discussed, as well as relevant econometric issues.

3.2 METHODOLOGY

Before discussing the methodology to be used in the study, it is relevant to mention a few concepts in order to justify the reasoning behind the chosen method and specification. First, the nature of the data to be used in the study, along with potential econometric problems will be discussed.

3.2.1 NATURE OF THE DATA AND RELATED ECONOMETRIC ISSUES

The data used in capital structure research are typically of a panel nature. It involves examining a cross-section of firm-specific variables over a period of time. Empirical evidence in the context of panel data is summarised almost solely by the t-statistics[3] of the coefficients of the variables under examination in the panel regression, thus t-statistics are often the only means by which the effects of these variables can be judged (Skoulakis, 2006). This necessitates that the models used to estimate these t-statistics be accurate. As pointed out by Skoulakis (2006), accurate computation of the t-statistics rests on accurate computation of the standard errors of the regression variables, and the accuracy of the

[3] The relevant statistic naturally varies according to the distribution of the data.

standard errors is in turn affected by potential cross-sectional and serial correlation of the residuals and independent variables in the panel regression.

According to Elsas and Florysiak (2008) problems such as cross-sectional and serial correlation are a result of the fact that many studies do not adapt their econometric specifications to suit the panel nature of their data. As described by the authors, cross-sectional correlation is the occurrence of the error terms in the regression being correlated for a cross-section in time. Another problem that may be encountered with panel data is serial correlation – which may arise due to firm heterogeneity. Serial correlation occurs when an incorrect specification fails to account for potential unobserved time-invariant (firm-specific) variables that may be constant through the cross-section, which causes the error term (or residuals) for a specific variable (in this case, a firm observation) to be correlated over time. The correlation of residuals across time causes a bias in the standard errors of the slopes (coefficients) of the regression (Fama & French, 2002). Specifically, ignoring correlations inherent in the data may lead to underestimation of the standard errors, resulting in inflation of the corresponding t-statistics - rendering spurious results. Thus it is essential that the econometric specification and estimation technique used to analyse the data addresses these issues.

There are various estimation techniques available to analyse panel data. Common estimation techniques include Ordinary Least Squares regressions, Fama-MacBeth regressions, Generalized Method of Moments (GMM) regressions and Fixed Effects regressions. These estimation techniques will be touched on further on in the paper.

First, however, it is necessary to understand the workings of the basic dynamic partial adjustment model in order to explain the chosen estimation technique and econometric specification to be used in this study. This is explained in the section that follows.

3.2.2 DYNAMIC PARTIAL ADJUSTMENT MODELS

As mentioned previously, Titman and Wessels (1988) show that transaction costs may be an important determinant of capital structure choice. If such costs prevent firms from attaining their target debt ratio in the short run, the necessary model should allow for dynamic adjustments of capital structure (Leary & Roberts, 2005). In particular, adjustments may occur gradually over time depending on the trade-off between these adjustment costs and that of not operating at optimal leverage (Flannery & Rangan, 2006).

Dynamic partial adjustment models adhere to this logic and assume that adjustment costs may prevent a firm from reaching its target level of debt in the short run. Thus a partial adjustment model is ideal as it estimates this "incomplete" or "partial" adjustment (as opposed to static models which assume immediate and complete adjustment) of the initial leverage ratio towards its target for each period (in the case of this study, each year).

Dynamic partial adjustment capital structure models which include firm fixed-effects allow for the assessment of both potential firm-level and macroeconomic determinants of leverage. Furthermore, such models are able to simultaneously estimate time-varying target leverage ratios and the speed of adjustment with which the actual leverage ratios move towards the target ratios (Halling et al., 2011). This enables one not only to examine the effect of macroeconomic conditions on a firm's target leverage ratio but also the speed at which the firm adjusts towards its target – which is the focus of the current study.

There are two dynamic partial adjustment capital structure models commonly used in the literature (Cook & Tang, 2010). These are:

3.2.2.1 The two-stage dynamic partial adjustment model

A standard partial adjustment model requires the specification of a target debt ratio. This allows one to estimate the speed of adjustment toward the target. The model must account for the fact that this target level of leverage may vary across firms or over time (Flannery & Rangan, 2006). Thus the target debt ratio is typically defined as a function of a lagged set of explanatory variables, as illustrated below:

$$DR^*_{i,t+1} = \beta X_{i,t} \quad (1)$$

where $DR^*_{i,t+1}$ is firm *i*'s target debt ratio at time *t+1*, $X_{i,t}$ is usually a vector of lagged firm characteristics dependent on the costs and benefits of operating with different leverage ratios. Lagged explanatory variables are generally used to account for the delay in adjustment towards the target ratio. Lagging the variables also ensures that the data was available to managers at the point in time being considered – preventing look-ahead bias. Research suggests this also reduces the effects of endogeneity or correlation between the error term and independent variables (Getzmann et al., 2010). The first stage of the model (the target leverage ratio) is typically estimated using a standard fixed effects regression. These regressions estimate a line of fit using the relevant data-points, which is used to indicate the target leverage for each firm.

Having specified the above, the second stage of the partial adjustment model is typically expressed as

$$DR_{i,t+1} - DR_{i,t} = \lambda\left(DR^*_{i,t+1} - DR_{i,t}\right) + \delta_{i,t+1}. \quad (2)$$

This specification implies that managers take action to close the gap between the debt level they are currently at ($DR_{i,t}$) and the level they wish to achieve ($DR^*_{i,t+1}$). Furthermore, the specification implies that the firm's actual debt ratio will eventually converge to its target ($DR^*_{i,t+1}$). Lastly, the specification assumes that all firms have the same adjustment speed (λ).

The symbol λ essentially represents the proportion of the "gap" between the firm's actual and target leverage level that the said firm closes each year, which is defined as the speed of adjustment. A value of λ =1 indicates perfect adjustment towards the target, whereas λ =0 would indicate perfect non-adjustment. Naturally, as one would expect adjustment costs to be present, λ would be expected to be less than 1. The second stage is typically estimated using a variety of estimation techniques.

Alternatively, one could estimate the model using a single-step procedure, using an integrated model:

3.2.2.2 The integrated dynamic partial adjustment model

By substituting equation (1) into (2), one can obtain

$$DR_{i,t+1} = (\lambda\beta)X_{i,t} + (1-\lambda)DR_{i,t} + \varepsilon_{i,t+1} \quad (3)$$

This is known as an integrated partial adjustment model. In this scenario, $DR_{i,t}$ and λ are as defined previously and $\varepsilon_{i,t+1}$ is an error component. This model yields a coefficient of$(1-\lambda)$ on the lagged debt ratio, which is used to calculate the speed of adjustment (λ).

The above models are standard models used in the literature. However, they may be adapted (and generally are) to specific situations. For the purposes of this paper, an adaptation of the two-stage model will be used as it is more widely used in previous literature and allows for better comparison of adjustment speed estimates. In addition, Cook and Tang (2010) report similar overall findings when using both the two-stage and integrated models. For the purposes of this paper, the second stage will be run using a generalised method of moments (GMM) regression technique. This will be discussed shortly.

Before proceeding, it should be noted that a partial adjustment model merely finds an approximation of a firm's adjustments, and not the exact amount. A more accurate model would allow for small deviations in the actual *target level* to persist. This is yet to be established.

This concludes the definition of the standard dynamic partial adjustment model. The following sections describe the specific model, estimation technique and associated statistical test to be used in this study. The possible econometric problems that are associated therewith will be explored, as well as the measures that will be taken to mitigate these problems.

3.2.3 ESTIMATION PROCEDURE AND STATISTICAL TESTS

3.2.3.1 Estimation procedure

As mentioned previously, there are various estimation techniques available to estimate adjustment speeds. The econometric issues related to these techniques will now be explored in order to justify the use of the chosen estimation procedure.

Firm debt is known to consist of a both a temporary time-varying component and a permanent, time-invariant component that can be attributed to firm fixed effects (Lemmon et al., 2008). Studies suggest that the inclusion of these firm fixed effects in regressions improves their explanatory power considerably (Flannery & Rangan, 2006; Lemmon et al., 2008; Getzmann et al., 2010). Fixed effects and OLS regressions include a term which incorporates these fixed effects. However, these time-invariant components may be correlated with the conventional determinants of capital structure (such as the firm-characteristic determinants mentioned previously), causing the parameter estimates of these regressions to be biased.

In addition, to account for dynamic adjustments to capital structure, the empirical model must incorporate a lagged dependent variable – in this case a lagged leverage ratio - as mentioned above (in the second stage of the two-stage model). Numerous studies contend that standard panel estimators such as OLS and fixed effects regressions are biased when a lagged dependent variable is incorporated in the model, leading to problems such as endogeneity. Endogeneity occurs when a regressor (or independent variable) in a regression is correlated with the error term of the data generating process in the population[4]. This is typically a result of omitted variables, errors in the measurement of explanatory variables, or reverse causality between the dependent and independent variables. In their summary of capital structure literature, Graham and Leary (2011) reiterate the bias associated with standard estimators: OLS regressions estimates result in speeds of adjustments that are too low (10 to 18% per year) whereas resultant fixed effects estimates are too high (almost 40% per year).

To resolve these problems, one can use dynamic panel estimators which estimate variables in

[4] Elsas and Florysiak (2008)

the Generalised Method of Moments (GMM) context. GMM regressions are a form of Instrumental-Variables (IV) regressions which are designed to alleviate the severity of endogeneity. The GMM regressions method is semi-parametric, thus it estimates several moments of the population distribution (Getzmann et al., 2010). In addition, GMM estimates are also more efficient as they are robust to heteroskedasticity.

A commonly used GMM technique is that of Arellano and Bond (1991). Arellano and Bond (1991) propose a form of GMM estimator that uses a first-differencing transformation to remove the influence of the unobserved firm-specific effects inherent in the data. They also use lagged values of predetermined or endogenous variables as instruments for these differences. However, first-differencing approaches are found to result in biased estimates when the data series under consideration is highly persistent - as in the case of leverage (Huang & Ritter, 2009).

An alternative GMM approach is that of Arellano and Bover (1995), also discussed by Blundell and Bond (1998). This method has been found to be an improvement over first-differencing techniques when dealing with a persistent data series. Thus, to correct for potential bias, the Arellano-Bover GMM estimation method will be employed in the current paper. Thus the estimation technique to be used has been established. The necessary tests and model specification follows.

3.2.3.2 Statistical tests

The reliability of GMM estimates is critically dependent on the validity of the instruments in the model. Moreover, the consistency of the model's estimates depends on the presence of serial correlation (autocorrelation) in the error terms. If the instruments are not valid, or autocorrelation is present, it would render the model estimates statistically erroneous.

Thus two tests were conducted in this respect:

a) The Sargan test

The validity of the instruments can be determined by means of the Sargan test for over-identifying restrictions. This tests the null hypothesis that the over-identifying restrictions on the model are valid – indicating that the instruments are correctly specified. Thus the significance of the test statistic would result in rejection of the null hypothesis and would lead one to question the validity of the instruments.

b) Tests for first- and second- order autocorrelation

To test for serial correlation, first-order and second-order autocorrelation *(AR*(1) and *AR*(2)*)* statistics are reported for each regression. This tests the null hypothesis of no serial correlation in the error terms. Thus significance of the test statistic results in rejection of the null hypothesis, which would indicate the presence of autocorrelation (serial correlation). In order for the model to be correctly specified, second-order serial correlation must not be present. As the Arellano-Bover method is based on a differencing procedure involving lagged values of the instruments in the regression, first-order autocorrelation is usually expected. Second-order serial correlation would be cause for concern.

In order to ensure that the model estimates are accurate, VIF (Variance inflation factor) tests should also be conducted. This is to ensure that the regression estimates are not confounded by multicollinearity between the explanatory variables in the regression. This is not specific to GMM regressions, but is generally required. A VIF statistic of greater than 10 is cause for concern as it indicates a high degree of multicollinearity between the explanatory variables.

3.2.4 MODEL SPECIFICATION

For the specification, the approach suggested by Hovakimian and Li (2009) was adapted to form the following model: In the first stage, the target ratio was estimated as a function of lagged firm-characteristic variables and macroeconomic control variables, using a fixed effects regression:

$$BDR_{i,t}^{*} = \gamma Macro_{t-1} + \beta X_{i,t-1} \qquad (4)$$

Where $BDR^*_{i,t}$ is the target debt ratio of firm *i* at time *t*, $Macro_{t-1}$ is a set of prior-period (lagged by one year) macroeconomic control variables affecting target leverage, and $X_{i,t-1}$ is a set of lagged firm-characteristic control variables. In addition, β is a vector of coefficients on the firm-characteristic variables and γ is a vector of coefficients on the macroeconomic variables. (According to the trade-off hypothesis, $\beta \neq 0$, and there should be substantial variation in $BDR^*_{i,t+1}$).

In the second stage, the debt ratio was modelled as a function of the target debt ratio and a set of lagged firm-characteristic control variables. As many authors (Rajan & Zingales, 1995; Fama & French, 2002; Flannery & Rangan, 2006) find evidence that firm-level variables significantly affect adjustment speeds, lagged firm-characteristic variables were included in the second stage as a control, to ensure that the coefficient in front of the target interaction variable (explained below) is as a result of macroeconomic conditions, and not the influence of firm characteristics (essentially this is similar to a single-stage model). This was estimated using the Arellano-Bover/Blundell-Bond GMM regression method available in the STATA 11 package:

$$BDR_{i,t} - BDR_{i,t-1} = \lambda_1 BDR^*_{i,t} I^{up}_{i,t} + \lambda_2 BDR^*_{i,t} I^{dwn}_{i,t} + \beta X_{i,t-1} + \varepsilon_{i,t} \qquad (5)$$

Where $BDR_{i,t}$ represents the debt ratio (total, short-term or long-term) of firm *i* at time *t*, $BDR^*_{i,t}$ is the target debt ratio of firm *i* at time *t*, and $I^{up}_{i,t}$and $I^{dwn}_{i,t}$ are macroeconomic indicator variables interacted with the target debt ratio – the coefficients of which (as per a standard partial adjustment model) should yield speed-of-adjustment estimates. Specifically, $I^{up}_{i,t}$ is equal to 1 if the relevant firm year observation occurred during a macroeconomic upturn (as defined according to the respective indicators that will be used) and 0 otherwise. Similarly, $I^{dwn}_{i,t}$ is equal to 1 if the relevant firm year observation occurred during a macroeconomic downturn, and 0 otherwise. This yields two estimates of adjustment speed: λ_1 is the speed of adjustment during a macroeconomic upturn (a favourable macroeconomic state) and λ_2 is the speed of adjustment during a macroeconomic downturn (an unfavourable macroeconomic state). Lastly, $X_{i,t-1}$ is a set of lagged firm-characteristic control variables and $\varepsilon_{i,t}$ is the error term.

The choice of the above specification (and the departure from the standard model) can be justified as follows: Firstly, it has been documented that even GMM estimators may be biased, resulting from the fact that observed debt ratios usually lie between 0 and 1. Due to this bounded (fractional) nature of debt ratios, extremely high debt ratios can only move down, and extremely low ratios can only move up. This phenomenon is termed “mechanical mean reversion”. Shyam-Sunder and Myers (1999) state that mean reversion can also result from time patterns of operating income and capital expenditures. Standard estimators are not suited to estimate speeds of adjustment when the dependent variable is expressed as a ratio as this results in them mistaking mechanical mean reversion for adjusting towards target leverage (Iliev and Welch, 2010). This may result in a positive estimate for the speed of adjustment even if such changes occur at random (Shyam-Sunder & Myers, 1999; Elsas & Florysiak; 2011).

Hovakiman and Li (2009) propose that the issue of mean reversion can be solved by including the target leverage term and the lagged debt ratio as separate variables in the regression. Specifically, they prove that the estimate of speed of adjustment arising from the coefficient on the lagged debt ratio (used in standard models) is biased as it captures mean reversion effects, but the coefficient on the target leverage term does not. Thus the lagged debt ratio was excluded from the regressions in this paper (although they are implicitly included due to the differencing procedure in the regression – thus it does not detract from the accuracy of the model’s specification) as it is contended that the coefficient does not yield accurately interpretable results. Instead, a vector of lagged firm-characteristic variables was included to control for their potential effect on the adjustment towards the target.

Before discussing the definitions of the variables and sample selection used as inputs in this model, one last issue needs to be addressed. Hovakimian and Li (2009) further maintain that the impact of mean reversion can be particularly severe for extreme debt ratios that are close to the boundaries of 0 and 1. They contend that this can be corrected by removing leverage observations above 0.8 from the sample. For this reason, two sets of regressions were run in this paper: the first included all debt ratio observations while the second excluded observations above 0.8 in order to account for the potential effects of extreme observations.

Thus, to summarise, in order for the estimates of a model to be effective (as summed up by

Elsas & Florysiak, 2011) it should take into account:

(i) the panel nature of the data
(ii) the fact that adjustment towards the target occurs gradually over time (thus the dependent variables in the regression should be lagged)
(iii) the fractional nature of the dependent variable (in this case, leverage ratios) (Elsas & Florysiak, 2011).

By using a dynamic partial adjustment model with the Arellano-Bover GMM estimation technique suited to panel data, and by adapting the model to account for mean reversion (due to the fractional nature of leverage ratios), the model used in this paper meets these requirements.

In summary, now that the model specification has been defined, the definition of the variables to be used in the specification will be discussed in the sub-sections to follow.

3.2.5 DEFINITION OF INPUTS

3.2.5.1 Definition of Macroeconomic conditions

As mentioned previously, a variety of macroeconomic variables may be used as indicators of macroeconomic conditions. Seven variables were chosen for the purposes of this study due to data availability and their potential as economic indicators.

a) Equity Index

Research indicates that higher equity valuations should encourage firms to adjust toward their target debt (Faulkender et al., 2011). Changes in the equity market have been found to signal future changes in the economy. Thus, equity indexes (which proxy for such changes) are generally considered leading indicators. For the purposes of this study, the annual percentage change in the JSE All-Share index (ALSI) was used to proxy for equity market changes. As it is considered a leading indicator, the annual change in the ALSI was lagged by one period when defining macroeconomic states to assess the true macroeconomic state at time t (the current period). For the purposes of the paper, an annual increase in the ALSI is considered an indication of a favourable macroeconomic state (an "upturn"), while an annual decrease is considered an indication of an unfavourable macroeconomic state (a "downturn").

b) *Inflation (CPI)*

Inflation was measured as the annual percentage change in the South African Consumer Price Index as reported by the McGregor BFA database. CPI is computed with 2000 as the base year. Higher levels of inflation generally indicate greater economic activity (favourable macroeconomic states). Similarly, lower levels indicate periods of less activity (unfavourable macroeconomic states). For the purposes of the paper, a favourable state (an "upturn") will be defined as a year where the rate of inflation was higher than the median rate of inflation for the entire ten-year sample sub-period (2000-2010), whereas an unfavourable state (a "downturn") will be defined as year where the inflation rate was lower than the median inflation rate. It is often cautioned that the measure of CPI reported by many sources (including that which used in this paper) may overstate inflation as it includes food and energy prices which are generally highly volatile and somewhat distort the measure of inflation. This may thus distort the measure as an economic indicator, and it is acknowledged that the results of the study must therefore be interpreted with caution.

Inflation is generally considered a lagging indicator as it has been found to lag changes in the business cycle. Thus a lead of one period (one year) was put on this variable when classifying economic states to better assess the true economic state at time t (the current period).

c) *Term Spread*

The term structure is believed to be directly influenced by the expectations of market participants. For example: if market participants expect rates to fall (in the case of a downturn) they would seek to lock in higher current rates or increase potential capital gains through investing in longer term assets, which would affect the demand for certain assets – in turn influencing the term structure of interest rates (Shelile, 2006). Thus the term spread may contain information that can be utilised to forecast expected short-run changes in future economic activity (Shelile, 2006).

The term spread essentially represents changes in the yield curve, and changes in interest rates generally occur before equivalent changes in the business cycle. Therefore, a positively sloped yield curve - a positive term spread - signals a growth in real economic activity and hence an economic expansion (Shelile, 2006). Similarly one can deduce that a negatively sloped yield curve - a negative term spread - signals a recessionary phase. For this reason, the term spread can be regarded as a leading economic indicator. In relation to this, a given year was classified as a favourable macroeconomic state (an "upturn") if the term spread observation for the year was positive and unfavourable (a "downturn") if the term spread observation for the year was negative[5]. The term spread in the context of this paper is computed as the difference between the average yields on long-term South African Government bonds[6] and the 3-month (91-day) South African Treasury Bill. In addition, as the term spread is generally a predictor of macroeconomic states and thus changes ahead of changes in the business cycle, this variable was lagged by one year when assessing macroeconomic states in order to assess the true macroeconomic state in a given year (in the current period).

d) Gross Domestic Product (GDP)

GDP is a relatively broad measure of a country's economy and is often regarded as a coincident (contemporaneous) indicator as it changes concurrently with changes in the economy. The growth rate of South African real GDP (as per the SARB website) was used to represent economic conditions in this case. As GDP is considered a coincident indicator, this variable was not lagged or leaded when assessing the macroeconomic state for a given year. One would generally expect a faster speed of adjustment during good macroeconomic states as evidenced by higher growth rates of real GDP. A given year was classified as a favourable macroeconomic state (an "upturn") if the annual percentage change in real GDP for that year was positive and unfavourable (a "downturn") if the percentage change in real GDP was negative.

[5] The observed value of the term spread rather than the change in term spread were used, as a negative change in the term spread would not necessarily mean a negative term spread. A positive term spread – regardless of whether it is higher or lower than the previous year – could still indicate favourable conditions. It is recognised, however, that using an observation at a point in time could affect the validity of the state definitions.

[6] These include bonds with maturities from 2-years and over, as obtained from the South African Reserve Bank website. Data for 10-year and over bonds was not available, although this would have been more suitable.

e) Composite Business Cycle Indicators

The composite indicators published by the SARB are computed as a weighted average of numerous econometric time series indicators condensed into a single time series that distinguishes the turning points of the South African business cycle. Incidences such as structural changes in the economy or the recognition of new economic indicators result in the frequent revision of the constituents of the indicators. In 1994, both the composite coincident and leading indicators were revised to account for the significant political and economic structural changes that took place. This served to improve their reliability in predicting economic upturns and downturns. The leading, coincident and lagging indicators have been found to trail each other by an average of 14 to 15 months (SARB Quarterly Bulletin, December 2004). For the purposes of this paper, a given year was classified as a favourable macroeconomic state (an "upturn") if the annual percentage change in an indicator was positive, and unfavourable (a "downturn") if the annual percentage change in the indicator was negative.

i) Lagging Indicator

As the lagging indicator is said to trail the coincident indicator by 14 to 15 months on average (and the coincident indicator naturally changes concurrently with changes in macroeconomic states), we lead this variable by one period (1 year) in when defining states in order to better assess the true macroeconomic state in the given, or current period (time *t*). The logic behind this is that, as it lags changes in the business cycle, the value for a given period would reflect the prior period's macroeconomic state. Figure 1 shows the various constituent indicators used to construct the lagging indicator, which was last revised in 1994.

ii) Coincident Indicator

Changes the coincident indicator are deemed to move approximately in time with actual changes in the business cycle. Figure 2 shows a breakdown of the various components used to construct the revised composite coincident indicator. As changes in the coincident indicator occur concurrently with changes in macroeconomic conditions, this variable was used as is when assessing the macroeconomic state in a given year.

iii) Leading Indicator

Figure 3 shows the components of the revised composite leading indicator – which consists largely of real rather than financial indicators. According to the SARB Quarterly Bulletin, the revised leading indicator precedes actual turning points in the business cycle by at least 4 months at most 31 months (as noted by Botha, 2004). Thus this variable was lagged by one period (1 year) when assessing macroeconomic states in order to obtain the true macroeconomic state in the current period.

As mentioned in the model specification, a set of dummy variables was created to represent macroeconomic upturns and downturns (favourable and unfavourable states). An "upturn" dummy was set to 1 in the event of an upturn and 0 otherwise. In addition, another "downturn" dummy was set to 1 in the event of a downturn, and 0 otherwise. An interaction term was then created by multiplying the target leverage variable with each macroeconomic state dummy variable. The coefficient of this variable indicates the speed of adjustment, or SOA. This signifies the percentage of the gap between a firm's actual and target leverage ratio that the firm closes in a single year.

To summarise, upturns (favourable states) and downturns (unfavourable states) were defined according to the annual observations of the macroeconomic variables. In the case of GDP, a firm-year observation was thus classified as a "downturn" if it fell in a year where the overall change in real GDP for the year was negative. A firm-year observation was therefore classified as an "upturn" if the overall change in GDP for that year was positive. Similarly, in terms of the coincident indicator, a firm-year observation was classified as a downturn if it fell in a year where the overall change in the coincident indicator for the year was negative. A firm-year observation was therefore classified as an upturn if it fell in a year where the overall change in the coincident indicator for that year was positive. In terms of the leading indicator and equity index (ALSI), a firm-year observation was classified as a downturn if it fell in a year where the overall change in the leading indicator or equity index for the year (bearing in mind the indicator values were first lagged) was negative. A firm-year observation was therefore classified as an upturn if it fell in a year where the overall change in the leading indicator or equity index for that year was positive. In terms of the lagging indicator, a firm-year observation was classified as a downturn if it fell in a year where the overall change in the indicator for that year was negative (bearing in mind that a lead was first put on the indicator values) and an upturn otherwise. In terms of CPI, a firm-year observation was classified as an upturn (downturn) if it fell in a year where the CPI observation for the year was higher (lower) than the median CPI for the sample period (bearing in mind that a lead was first put on the CPI values. Lastly, a year was classified as an upturn (downturn) if it fell in a year where the term spread observation for the given year was positive (negative) – bearing in mind that the term spread values were first lagged.

Figure 1: Constituents of the composite lagging business cycle indicator

Previous components	New components
Value of non-residential buildings completed at constant prices	Value of non-residential buildings completed at constant prices
Value of fixed investment in machinery and equipment	Ratio of gross fixed capital formation in machinery and equipment to final consumption expenditure on goods by households
Value of industrial and commercial inventories at constant prices	Ratio of inventories to sales in the manufacturing and trade sectors
Nominal labour cost per unit of production in the manufacturing sector	Nominal labour cost per unit of production in the manufacturing sector (percentage change over four quarters)
Physical volume of building materials produced by the mining sector	Cement sales in tons
Value of unfilled orders as percentage of sales in manufacturing	Ratio of households' use of instalment sale credit to their disposable income
Employment in non-agricultural sectors	Predominant prime overdraft rate of banks
Total number of hours worked by production workers in the construction sector	

Source: South African Reserve Bank Quarterly Bulletin – "Note on the revision and significance of the composite lagging business cycle indicator", December 2004

Figure 2: Constituents of the composite coincident business cycle indicator

Previous components	New components
Gross value added at constant prices, excluding agriculture, forestry and fishing	Gross value added at constant prices, excluding agriculture, forestry and fishing
Value of wholesale, retail and new vehicle sales at constant prices	Value of wholesale, retail and new vehicle sales at constant prices
Utilisation of production capacity in manufacturing	Utilisation of production capacity in manufacturing
Employment in the manufacturing, mining and construction sectors	Total formal non-agricultural employment
Physical volume of manufacturing production: durable goods	Industrial production index
Physical volume of manufacturing production: non-durable goods	
Value of imports at constant prices, excluding minerals	

Source: South African Reserve Bank Quarterly Bulletin – "Note on the revision of composite leading and coincident business cycle indicators", March 2004

Figure 3: Constituents of the composite leading business cycle indicator

Previous components	New components
Opinion survey of volume of orders in manufacturing	Opinion survey of volume of orders in manufacturing
Opinion survey of stocks in relation to demand: Manufacturing and trade	Opinion survey of stocks in relation to demand: Manufacturing and trade
Opinion survey of business confidence: Manufacturing, construction and trade	Opinion survey of business confidence: Manufacturing, construction and trade
International business cycle indicator: Industrial production	Composite leading business cycle indicator of major trading-partner countries: Percentage change over twelve months
Commodity prices in US dollars for a basket of South Africa's export commodities: Percentage change over twelve months	Commodity prices in US dollars for a basket of South Africa's export commodities: Six-month smoothed growth rate
Real M1 money supply (deflated with the CPI): Percentage change over twelve months	Real M1 money supply (deflated with the CPI): Six-month smoothed growth rate
Prices of all classes of shares	Prices of all classes of shares: Six-month smoothed growth rate
Number of residential building plans passed	Number of residential building plans passed for flats, townhouses and houses larger than 80m²
Tender Treasury bill discount rate	Interest rate spread: 10-year bonds less 91-day Treasury bills
Ratio of output prices to unit labour costs in manufacturing	Gross operating surplus as a percentage of gross domestic product
Number of new motor vehicles sold	Labour productivity in manufacturing: Six-month smoothed growth rate
Physical volume of mining production, excluding gold	Job advertisements in the *Sunday Times* newspaper: Six-month smoothed growth rate
Value of merchandise exports, excluding gold and agriculture	Opinion survey of the average hours worked per factory worker in the manufacturing sector
Overtime hours as percentage of ordinary hours worked in manufacturing	
Company profits, after tax	
Physical volume of gold ore milled	
Net number of new companies registered	
Number of real-estate transactions	
Net gold and other foreign exchange reserves	
Consumer credit at constant prices	
London gold price in rand	

Source: South African Reserve Bank Quarterly Bulletin – "Note on the revision of composite leading and coincident business cycle indicators", March 2004

3.2.5.2 Determinants of target leverage

Target leverage can be specified either endogenously or exogenously. Shyam-Sunder and Myers (1999) and Fama and French (2002) use a firm's mean historical debt ratio as an exogenous measure of the target ratio. However, Drobetz et al. (2007) note that if adjustment costs prevent firms from fully adjusting toward their targets (which is what is assumed in this study), this would be an inaccurate proxy.

Many studies model target leverage endogenously as a function of lagged firm-characteristic variables such as tangibility, profitability, size, growth opportunities, etc. Drobetz et al. (2007) define target leverage as "the extent of leverage, a firm would choose in the absence of information asymmetries, transaction costs and other adjustment costs" (p.6).

Typically, target leverage is assumed to be a function of firm-characteristic and macroeconomic variables. The choice of variables that were used to determine target leverage for this study are explained below:

a) ***Firm-characteristic determinants of target leverage***

Market to book ratio: The market to book or price-to-book ratio (ratio of the market price of an ordinary share of the firm divided by the book value of the share) is often used to signify a firm's future investment (growth) opportunities – seen as measure of the firm's growth opportunities. Firms may thus choose not to take out more debt in order to preserve funds for these potential future investments (Flannery & Rangan, 2006). Thus investment opportunities may influence the choice of target. In addition, according to pecking order concepts, firms will increase leverage if investments amount to more than retained earnings (Drobetz & Wanzenried, 2006; Cook & Tang, 2010). Firms with higher market-to-book ratios are expected to have less debt in their capital structures as this indicates higher growth opportunities for the firm.

Tangibility: Tangible assets are viewed as potential collateral. Increasing collateral results in reduced bankruptcy costs and consequently increased debt capacity (Titman & Wessels, 1988). In this paper, the ratio of fixed assets (gross property, plant and equipment) to total assets is used as a measure of tangibility.

Profitability: Profitability affects a firm's retained earnings. According to pecking order concepts, firms with higher earnings are likely to have less debt in their capital structures as they would finance out of retained earnings, reducing the need for debt financing.

Firm size: Fama and French (2002) maintain that larger, diversified firms have less cash flow volatility - which increases the likelihood that such firms will take advantage of interest tax shields and thus reduces expected bankruptcy costs and the probability of becoming financially distressed. In addition, larger firms tend to have better access to financial markets (Rajan & Zingales; 1995). The log of total sales (as employed by previous studies) is used as a proxy for size in this paper.

Industry median debt ratio: In their survey, Graham and Harvey (2001) note that managers perceive debt levels of firms in the same industry to be a significant determinant of their debt policy. In addition, adjustment costs may be similar between firms in the same industry and heterogeneous across firms in different industries (Elsas & Florysiak, 2011), making firms in the same industry better benchmarks for comparison when setting a target. It also acts as a control to capture industry characteristics that are not captured by other determinants (Flannery & Rangan, 2006). Firms in industries with a high median debt ratio are inclined to have more debt in their capital structures. Thus the industry median ratio is included as a potential variable affecting firms' target leverage. The JSE industry classifications were used to categorise firms in this paper.

These variables were also used in the second stage of the model as control variables. Table 2 lists the definitions of these variables. These particular variables were included simply to control for potential firm-level influences on leverage; thus they are included primarily on the basis that they have been found to be the most prominent determinants of leverage in previous studies. Therefore, other potential determinants such as factors that control for firm uniqueness and non-debt tax shields are excluded. While it is recognised that these factors could potentially affect target leverage, including too many variables could also result in existing variables becoming redundant. Furthermore, these variables will not be commented on in the analysis as they are not the focus of the study.

Table 2: Definition of firm-level variables

Variable	***Definition***
Sales	Logarithm of sales
Growth opportunities	Firm's price-to-book ratio
Profitability	EBITDA* to total assets
Tangibility	Fixed assets to total assets ratio
Industry median	Median leverage ratio of firms in the same industry as classified according to the relevant JSE sector

***** Earnings before interest and taxes

b) Macroeconomic determinants of target leverage

Macroeconomic factors can influence target leverage as both tax benefits and bankruptcy costs are dependent on the state of the economy. If one assumes that the trade-off hypothesis holds, then target leverage should be a function of the tax benefits of debt and bankruptcy costs (Korajczyk & Levy, 2003). Korajczyk and Levy (2003), report that target leverage is pro-cyclical for constrained firms and countercyclical for unconstrained firms – evidence that firms take macroeconomic conditions into account when deciding on their target leverage.

Kiyotaki and Moore (1997) and Levy (2001) find further empirical evidence to support that macroeconomic conditions influence the choice of target leverage. Specifically, they maintain that the aggregate distribution of wealth between managers and outside shareholders affects the severity of potential agency problems, which affects target leverage. Korajczyk and Levy (2003) maintain that corporate profits and equity performance affect manager compensation through bonuses and options. Thus, they utilise the two-year corporate profit growth, the commercial paper spread, and the two-year return on the equity market to proxy for macroeconomic conditions.

As there is a lack of consensus regarding what factors firms use when determining their target leverage ratio - particularly in the context of South African firms – this study does not utilise the above macroeconomic determinants of target leverage, as there is no evidence of the managerial sentiment hypothesis regarding South African firms, and the relevant data were not available. Instead, a set of lagged macroeconomic determinants (representing the potential macroeconomic factors firms may take into account when determining their target debt ratios) – were incorporated merely to control for any effect they could potentially have on target leverage. These determinants are based on the variables that were used to indicate macroeconomic states in this study (growth in real GDP, inflation, term spread, the change in value of a stock market index). While there are many other macroeconomic factors that could potentially affect the target debt level, it is argued that they all essentially capture underlying changes in the business cycle (or economy at large) which may affect a firm's choice of target – thus controlling for these specific factors should essentially suffice.

The macroeconomic control variables used are the prior-period annual change in value of the All-Share Index (representing changes in the equity market), the prior-period annual change in the Consumer Price Index (representing inflation), as well as the prior-period annual change in the prime rate. The prime rate is hypothetically defined as the interest rate that commercial banks charge on loans to their "most creditworthy" customers. Although the prime rate was not included in the set of indicator variables, it was opted to control for this: Assuming firms take the prime rate into account when deciding what rate to charge on their issued debt, or how much debt they could borrow from corporations who base their interest rates on the prime rate; this could potentially be a determinant of firms' target debt ratios. Lastly, the term spread and annual growth in real Gross Domestic Product (which managers could also potentially take into account when targeting a certain debt level) were excluded due to their high collinearity with the other macroeconomic variables.

3.2.5.3 Definition of leverage

Previous literature has typically used a variety of leverage definitions in the analysis of capital structure.

Certain capital structure theories have distinct implications for different types of debt (Titman & Wessels, 1988). For example, Booth et al. (2001) observe that firms in developing countries are more reliant on short-term debt – the determinants of which differ from those of long-term debt. Shleifer and Vishny (1992) infer that a firm's debt capacity is subject to current economic conditions. Following this thought, Hackbarth et al. (2006) note that the debt capacity of a firm in an expansion could potentially be 40 percent larger than the same firm in a contraction. This would clearly have implications for the type of debt (short/long-term) that a firm would be able to take on in various macroeconomic conditions. Halling et al. (2011) propose that informational asymmetries may cause firms to opt for debt with shorter maturities. They assume that if a recession exacerbates informational asymmetries, a firm would be likely to take on more short term debt. On the contrary, they add that if transactions costs associated with rolling over short-term debt are higher in recession periods, firms would be expected to have more long-term debt in their capital structures. In addition, Huang and Ritter (2009) mention that a low term spread may lead to increased use of long-term debt by firms.

Thus it would be pertinent to examine both long-term and short term debt in this study.

Numerous studies also distinguish between market and book leverage as the implications for both are assumed to differ. Certain studies characterise market values of debt as more accurate measures than book values, although market value data is less readily available. Such studies argue that the market value is a more accurate measure of the real value of a firm (Banerjee, Heshmati & Wihlborg, 2001). However, it has been suggested that market leverage ratios may be distorted as they capture future expectations, resulting in potential bias (Getzmann et al., 2010). Moreover, it has been noted that debt-holders' liability in the event of a bankruptcy is measured in terms of book value rather than market value (Banerjee et al., 2001) – suggesting firms regard it as a more accurate measure. Regardless, Bowman (1980, cited in Titman & Wessels (1988)) shows that the book value and market value of debt possess large cross sectional correlation, thus using book values as opposed to market values should still lead to fairly accurate (and similar) results. Thus this paper focuses solely on book leverage in South African firms.

Three leverage ratios established are used as the dependent variable in the empirical analysis: they will be defined as shown in table 3. In addition, only interest bearing debt is included as the primary concern of this paper is on financial liabilities. The short-term debt ratio is defined as all short-term interest-bearing debt as reported in the balance sheet (debt due to be repaid within a year as well as the current portion of long-term loans) divided by the value of total book assets (defined as total assets reported in the balance-sheet, excluding intangible assets). The long-term debt ratio is defined as the value of all long-term interest-bearing debt as reported in the balance sheet, divided by total book assets. Lastly, the total debt ratio is defined as total interest-bearing debt as reported in the balance sheet, divided by total assets. Annual ratios are utilised as accounting data for most firms are only available annually.

Table 3: Definition of leverage ratios

Ratio	***Definition***
Book total leverage	total interest-bearing debt to total assets
Book long-term leverage	long-term interest-bearing debt to total assets
Book short term leverage	short-term interest-bearing debt to total assets

3.2.5.4 Definition of financially constrained and unconstrained firms

As mentioned, as a secondary concern, adjustment speed dynamics will be examined for financially constrained and unconstrained sub-samples.

There has been much debate as to what criteria should be used to define a financially constrained firm. Fazzari, Hubbard and Petersen (1988) suggest that financially constrained firms can be characterized by their “investment to cash flow sensitivity”. Specifically, if external financing carries higher costs than internal financing, financially constrained firms would rely more on internal funds, thus cash flow changes would be a key determinant of investment expenditure for these firms. A higher degree of financial constraints would thus be associated with investment being more sensitive to cash flow changes. After ranking firms according to various ratios that traditionally proxy for financial constraints, they find results in support of their theory.

However, the accuracy of their measure of financial constraints has been criticised on various grounds: Empirically, Kaplan and Zingales (1997) similarly ranked firms according to various proxies for financial constrains and found that firms that were *less* financially constrained displayed a *greater* sensitivity of investment to cash flow. Theoretically, Erickson and Whited (2000) and Alti (2003) (cited in Denis & Sibilkov, 2010) maintain that if cash flow possesses information regarding investment opportunities and the profitability of assets in place, less constrained firms should exhibit a higher investment to cash flow sensitivity as they would be more likely to adjust investment in the event of an investment opportunity shock.

Almeido, Campello and Weisbach (2004) propose an alternative and define financially constrained firms as those exhibiting a positive cash flow sensitivity of cash. They associate financial constraints with a firm's liquidity demand and argue that firms that foresee financial constraints in the future will take action by storing cash. They argue that financial constraints should therefore depend on a firm's propensity to save cash out of their cash inflows, which they term the "cash flow sensitivity of cash". In particular, financially unconstrained firms should not exhibit a systematic tendency to save cash, and thus should not possess a significant cash to cash flow relationship. They test whether their hypothesis holds on a sample of manufacturing firms divided into subsamples according to criteria which traditionally proxy for financial constraints. Their findings support their theory.

Korajkczyk and Levy (2003) define financially constrained firms as "the set of firms that do not have sufficient cash to undertake investment opportunities and that face severe agency costs when accessing financial markets," (p.76). According to the authors, this constitutes firms which simultaneously have sufficient investment opportunities and high retention rates. They contend that dividends and repurchases compete with investment for the use of funds, and that firms that have investment opportunities and simultaneously encounter relatively high costs of external financing are more likely to retain net income for investment (p. 82). Thus, firms can empirically be defined as financially constrained if the following criteria are met:

1) Do not have a net repurchase of debt or equity and do not pay dividends within the event window under consideration.
2) The firm has a Tobin's Q at the end of the event quarter that is greater than 1, where Tobin's Q is the sum of the market value of equity and book value of debt, divided by the book value of assets (p. 82).

A financially unconstrained firm is then defined as a firm that does not meet these criteria. They reason that, as dividend issuance and stock repurchases are alternatives to investment in terms of funding choices, firms with available investment opportunities that face substantially high external financing costs would likely elect to retain net income for investment purposes.

This definition is used by numerous other papers (Cook & Tang, 2010; Halling et al., 2011). However, the current paper contends that a firm cannot be defined as financially constrained merely because it does not pay dividends, as (especially in the context of South African firms) many financially unconstrained firms opt not to pay dividends merely out of choice. Furthermore, Tobin's Q has been found to be an inadequate measure of firm performance as the relationship between firm performance and Tobin's Q may be confounded by underinvestment (Dybvig & Warachka, 2010). Thus an alternative definition will be employed.

Conventional definitions for financially constraints involve sorting firms based on criteria such as bond ratings, commercial paper ratings, payout policy, and the size of a firm's assets (Almeida, Campello & Weisbach, 2004). For example, Almeida, Campello and Weisbach (2004) consider a firm to be financially constrained if the firm does not have a bond rating and reports positive debt for a particular firm-year observation. Naturally, if a firm does not meet these criteria it would be classified as financially unconstrained. However, bond ratings are not readily available for South African firms.

Therefore, as most financial constraint definitions fall under criticism, this paper utilises cash flow ratios to classify firms as financially constrained. Credit rating agencies are known to make use of cash flow ratios when deciding on ratings (Mills & Yamamura, 1998). As credit ratings (commonly used to determine whether or not a firm is financially constrained) are largely unavailable for South African firms, ratios could perhaps serve somewhat as a substitute. In addition, cash flow ratios enable one to assess the ability of a firm to repay or refinance its long-term debt obligations, sustain or increase its dividend to shareholders, or raise additional capital (Mills & Yamamura, 1998). The failure to meet such criteria could signal financial distress.

Also, this paper looks at cash flow ratios rather than liquidity ratios (such as the traditional acid test and quick ratios) for numerous reasons: First, cash flow ratios are computed from the income statement of a firm and thus document the financial state of the firm over the entire financial year - as opposed to liquidity ratios which are computed from the balance sheet, and thus only document the state of the firm at a particular point in the financial year. This makes cash flow ratios a more accurate judge of a firm's financial state.

This study thus utilises two cash flow ratios to determine financial distress – the first being the debt coverage ratio. This is defined as:

Operating cash flow/Total interest-bearing debt *(4)*

This generally assesses the length of time a firm will take to repay its debt obligations if all operating cash flow was used to repay debt. A higher ratio is associated with an unconstrained firm, while a low ratio suggests less financial flexibility and potential difficulty in meeting debt obligations – suggestive of financial distress. Thus a firm-year observation for a given year was classified as financially constrained (in this case) if it had a debt coverage ratio of less than 1 (indicating it was not generating sufficient operating cash flows to cover its debt), and unconstrained otherwise.

The second ratio utilised is the capital expenditure coverage ratio, which is computed as:

Operating cash flow/Capital Expenditures *(5)*

This assesses the amount of capital available for reinvestment in the firm and for existing debt repayments (Mills & Yamamura, 1998). Generally, a ratio larger than 1 suggests that the firm possesses sufficient funds to cover its capital investment, with any excess being available to cover debt obligations. The higher the ratio value, the more likely that the firm will have excess cash to repay its debt. Thus a firm-year observation was classified as financially constrained if it had a capital expenditure coverage ratio of less than 1, and unconstrained otherwise.

The interpretation of the value does, however, differ according to industry. Mills and Yamamura (1998) maintain that cyclical industries, such as (e.g. housing and autos) potentially exhibit more variation in capital coverage ratios than noncyclical industries (e.g. pharmaceuticals and beverages). Moreover, a low ratio is more typical in firms from growth industries (e.g. technology) relative to those in mature industries (e.g. textiles).

Each of these ratios was used in turn (but not concurrently – as this resulted in sample sizes too small for the regressions to run) to separate the sample into financially constrained and unconstrained sub-samples.

This concludes the model specifications and definition of variables to be used in the model. The following section outlines the procedure for sample selection, as well as the properties of the chosen dataset.

3.3 SAMPLE SELECTION AND DATASET

The final sample includes firms listed on the main board of the Johannesburg Securities Exchange from 2000 to 2010. The total time period spans 10 years in order to incorporate a sufficient number of data points for each firm. The said time period was also chosen to allow for an adequate number of upturns and downturns. Due to the lack of available data, a longer time period could not be examined. However, this is not necessarily a disadvantage as Generalised Method of Moments regressions generally improve the efficiency of results when there are not a large number of time-series observations in the panel (Getzmann et al., 2010). Regardless, the ten-year sample period still encompasses a sufficient number of firm-year observations. GMM estimates converge to their true value in large samples, and are thus more effective the more firm-year observations are included in the dataset (Hill, Griffiths & Lim, 2008 – cited in Getzmann et al., 2010). The selected period also has the advantage of allowing the results of the study to be comparable to similar studies.

The sample chosen includes only listed firms were listed on the JSE for the entire sample period. Listed firms were chosen as in order to allow for more data points per firm such that leverage dynamics for the firms could be better observed over time. Also, financial statement information on delisted firms is less readily available. Firm characteristic data was obtained from the McGregor BFA database, while macroeconomic data was obtained from the South African Reserve Bank website as well as the McGregor BFA database.

In accordance with previous research, financial firms and regulated utilities are excluded from the dataset as their capital structure choices are subject to regulatory requirements (Lemmon et al., 2008). Moreover, because lagged variables are incorporated in the regression, each firm must have had at least two consecutive years of data in order to be included in the sample. Annual observations are defined according to fiscal year-ends as opposed to calendar year-ends as firms report accounting data based on different fiscal year-ends.

In line with previous authors, such as Flannery and Rangan (2006), all firm-characteristic control variables are winsorized at the 1st and 99th percentiles in order to mitigate the effect of extreme observations. Also, as most of the variables used are expressed as ratios, inflationary effects should not distort the results; however, where variables are not expressed as ratios, the natural log of the variable will instead be used.

Firm-year observations were also excluded in the event that

(i) The value of total assets was zero (this would result in an undefined value as total assets constitutes the denominator of most variables).

(ii) There was not a complete set of firm-characteristic data for the firm-year observation.

In addition, the samples were split into financially constrained and unconstrained sub-samples according to the debt coverage and capital expenditure coverage ratios in turn. Again, a firm-year observation was classified as constrained if it the capital expenditure coverage ratio for the observation was less than 1 and unconstrained otherwise. Similarly, a firm-year observation was classified as financially constrained if the debt coverage ratio for the observation was less than one and unconstrained otherwise. For both measures of financial constraints, the number of firms in the unconstrained and constrained samples ranged from 71 to 157 firms, depending on data availability for the firm-year observation.

Table 4 presents a summary of the leverage variables (panel A), macroeconomic variables (panel B) and firm-characteristic variables (panel C) for the overall 2000-2010 sample. This includes the total number of observations in the sample, the mean, median, standard deviation and minimum and maximum observations for the period. The final sample consists of an unbalanced panel comprising 1447 firm-year observations. The final panel is presented in the compact disc found at the back of this report.

Table 4: Summary statistics of leverage variables, macroeconomic variables and firm-characteristic variables

Variable	No. Of Obs	Mean	Median	Standard deviation	Minimum	Maximum
Panel A: Leverage variables						
Total leverage	1447	0.2121432	0.1753668	0.1880401	<0.00010617	1.73602
Long-term leverage	1447	0.1188437	0.0716859	0.153117	- <0.00018311	1.661814
Short-term leverage	1447	0.0932995	0.0647705	0.1065129	0	1.547945
Panel B: Macroeconomic variables						
Prime rate	1447	0.1252108	0.125	0.0234294	0.09	0.17
Equity index	1447	0.1459415	0.2105274	0.1878016	-0.1367065	0.436293
Term spread	1447	0.0035992	0.0108	0.0209279	-0.0304	0.028
GDP	1447	0.0340238	0.0361856	0.0209001	-0.0153731	0.0560372
CPI	1447	0.0613351	0.0597	0.025862	0.0139	0.1095
Leading indicator	1447	0.0303773	0.001	0.0753491	-0.068	0.173
Coincident indicator	1447	0.0319419	0.046	0.0623445	-0.117	0.096
Lagging indicator	1447	-0.0050366	0.013	0.0740079	-0.148	0.091
Panel C: Firm-characteristic variables						
Tangibility	1447	0.280573	0.2217141	0.2327795	0	0.8935927
Profitability	1447	0.1861206	0.1811871	0.1537941	-0.4038142	0.7594915
Size	1447	14.59643	14.61443	1.991782	9.244549	18.96891
Growth opportunities	1447	2.293849	1.66	2.343768	0.12	16.01
Industry median leverage	1447	0.1540739	0.1540326	0.0719191	0.0070894	0.4731213

Panels A to C present the number of observations, mean, median, standard deviation, minimum and maximum observations for the leverage ratios, macroeconomic variables and firm-characteristic variables from 2000 to 2010. The sample includes all listed firms (besides financials and utilities) with a complete set of data for at least two consecutive years. All leverage ratios are book values. Short-term leverage is computed as (total short-term interest-bearing liabilities/total book assets), long-term leverage as (total long-term interest-bearing liabilities/total book assets) and total leverage as ((short-term + long-term interest-bearing liabilities)/total book assets).

Table 4 indicates that the average total leverage held by South African listed firms from 2000 to 2010 according to the sample is 21.24%. This is far lower than the debt ratios noted in capital structure research on developed countries. Debt ratios observed in developed markets generally amount to between 54% and 73% (Rajan & Zingales, 1995, cited in Yan, 2010). This is consistent with the findings of Correia and Cramer (2008), who find that South African firms have considerably low target debt-equity ratios, resulting in sufficiently low use of debt.

Table 5 presents a summary of the leverage variables per year from 2000 to 2010. This includes the number of observations in each year as well as the annual mean, median and standard deviation of each variable. From the table it is evident that the sample size ranges from 100 firms in 2000 to 169 firms in 2010. In addition, the annual mean leverage ratios for the sample appear to be relatively stable over time.

Figure 4 shows the evolution per year of each macroeconomic indicator variable over the ten-year sample period. The equity index shows the most extreme changes: a sharp drop in economic activity is seen to occur between 2002 and 2003, which is also evidenced by a downturn in most other indicators. Alternatively, a clear rise in economic activity is evident from 2003 to 2006 (signalling a future rise in economic activity). In addition, the downturn due to the global financial crisis is evident from the drop in the index from 2007 to 2009. Although not as extreme, this is echoed by the leading indicator (dropping from 2006 to 2008), coincident indicator, GDP (both dropping from 2007 to 2009), lagging indicator and CPI (both falling slightly later from 2008 onwards). Most indicators depict a considerable rise in activity after 2009.

Figure 5 shows how the mean leverage ratios for the full sample change per year over the entire sample period. The aggregate mean leverage ratios do not seem to convey a clear pattern in relation to changes in macroeconomic conditions. Thus, from a general observation, one cannot discern how firms adjust their leverage ratios in response to macroeconomic changes. In 2001, when most indicators reach a trough, leverage ratios appear to peak. This suggests firms may increase their leverage during market downturns. However, the aggregate amount of leverage appears to be relatively stable from the period 2002 to 2005, when economic conditions were somewhat volatile. In 2007, when (according to most indicators) there was a considerable downturn, leverage levels appear to reach a low.

Table 5: Summary statistics of leverage variables per year

	Total leverage				Long-term leverage				Short-term leverage			
Year	Obs.	Mean	Median	Std	Obs.	Mean	Median	Std	Obs.	Mean	Median	Std
2000	100	0.194442	0.188435	0.1418804	100	0.092307	0.061387	0.1086429	100	0.102135	0.083207	0.0911236
2001	108	0.212224	0.198595	0.1539713	108	0.099299	0.077286	0.1110247	108	0.112925	0.077133	0.1075171
2002	108	0.199351	0.177566	0.1648416	108	0.102518	0.068725	0.1359032	108	0.096834	0.068921	0.1006733
2003	110	0.203549	0.18627	0.168518	110	0.102462	0.06472	0.129889	110	0.101087	0.068826	0.1043902
2004	112	0.198336	0.160295	0.1744656	112	0.105643	0.058684	0.1404269	112	0.092693	0.063247	0.1032694
2005	118	0.196729	0.137792	0.2188644	118	0.103695	0.052356	0.1486362	118	0.093033	0.058769	0.162123
2006	116	0.220551	0.166723	0.2339769	116	0.123473	0.064218	0.2018274	116	0.097078	0.065809	0.1211467
2007	154	0.205058	0.153062	0.1917542	154	0.117712	0.061689	0.1589986	154	0.087346	0.0563	0.1009338
2008	176	0.22953	0.184198	0.2050211	176	0.139262	0.083439	0.1718435	176	0.090268	0.063395	0.1010347
2009	176	0.240539	0.210691	0.19588	176	0.146473	0.094057	0.1647095	176	0.094066	0.067936	0.0974952
2010	169	0.209253	0.166019	0.1776629	169	0.135273	0.085708	0.152058	169	0.07398	0.059911	0.0767238

This table reports summary statistics for the various leverage variables per year for the ten-year sample period from 2000 to 2010. This includes the number of observations per year (obs), mean and median leverage ratios per year, as well as the annual standard deviation (std). All leverage ratios are in book value terms.

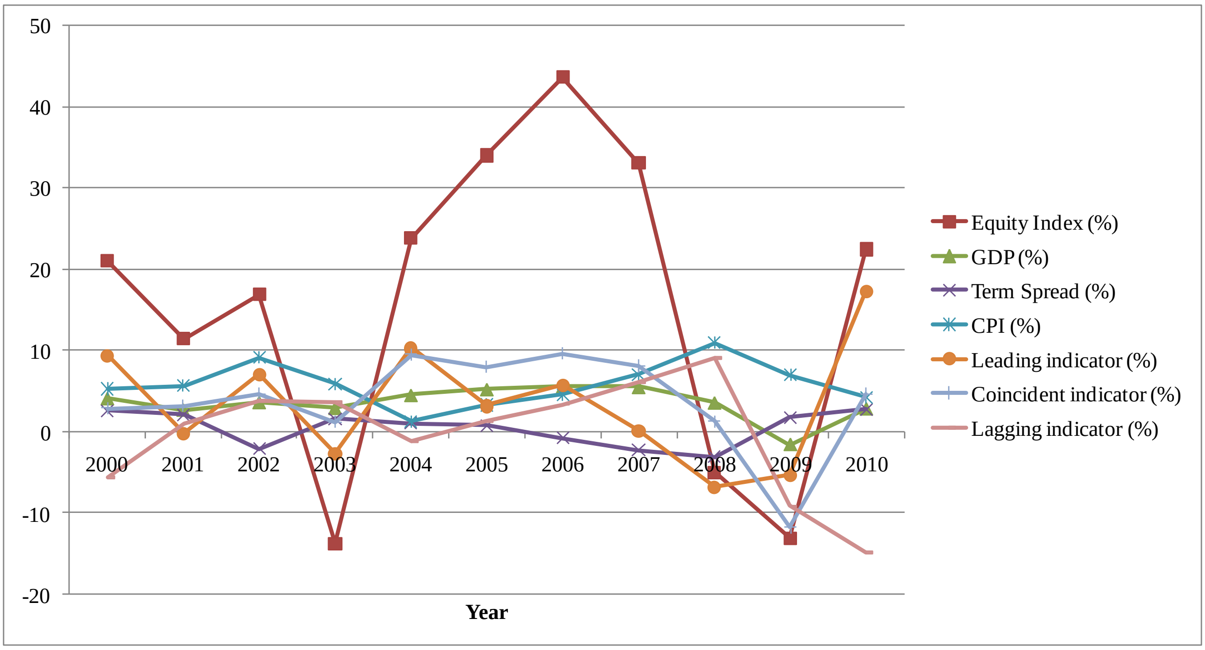

Figure 4: Macroeconomic variables over time

The figure shows how the various macroeconomic indicator variables change over the ten-year sample period from 2000 to 2010.

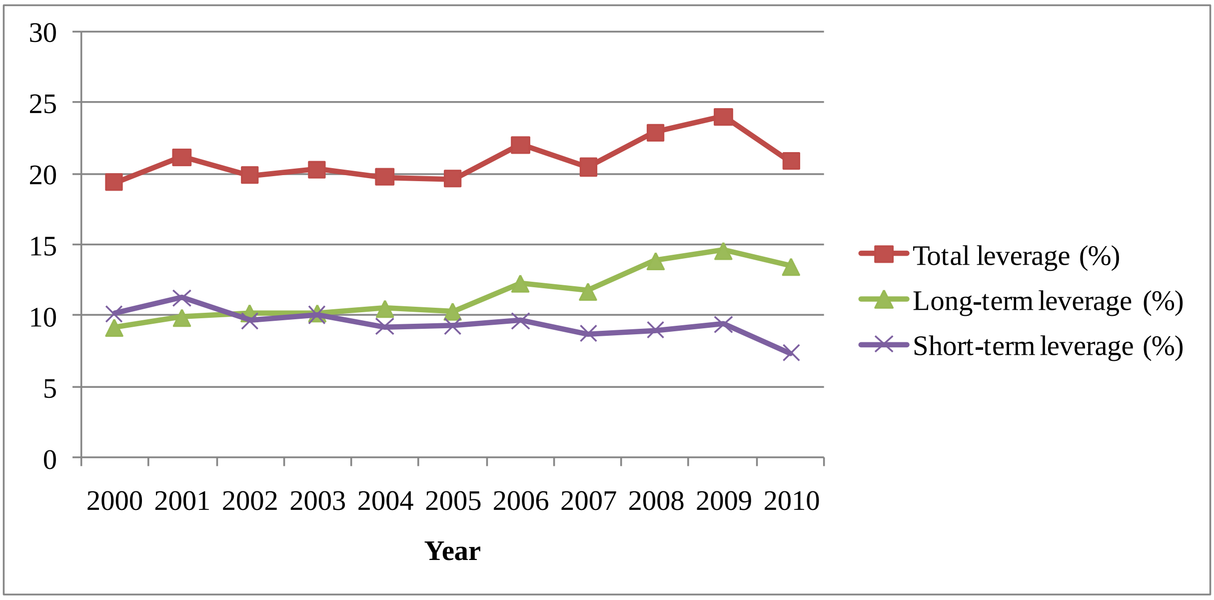

Figure 5: Mean leverage ratios over time

This figure shows how the aggregate mean leverage ratios for the entire sample change over the ten-year sample period from 2000 to 2010. The ratios are expressed as percentages for comparison purposes.

This suggests that firms may decrease their debt in the event of a downturn. In contrast, when most indicators suggest a considerable economic low in 2009, leverage ratios seem to reach a peak.

Lastly, Table 6 shows the correlation between all of the variables used in the analysis. A relatively high correlation is evident between GDP and the ALSI. The term spread and CPI exhibit a high correlation, as do the prime rate and the term spread. The SARB leading indicator exhibits a relatively high positive correlation with the equity index, which is expected as they are both leading indicators.

Having outlined the sample selection procedure and the sample statistics, it would now be pertinent to mention the research hypotheses to be addressed. This is explained in the following section.

Table 6: Correlation matrix of variables

	TL	LT	ST	Prime	Mkt	Term	GDP	CPI	Lead	Lag	Coin	Tan	Prof	Size	Growth	Ind
TL	1.0000	0.8242	0.5806	-0.0089	-0.0456	-0.0110	-0.0536	0.0390	-0.0496	-0.0064	-0.0613	0.2414	-0.0923	0.0151	0.1000	0.2664
LT		1.0000	0.0175	-0.0338	-0.0439	-0.0175	-0.0630	0.0446	-0.0337	-0.0320	-0.0666	0.3326	-0.0226	0.0403	0.1050	0.2253
ST			1.0000	0.0328	-0.0174	0.0058	-0.0040	0.0048	-0.0391	0.0348	-0.0126	-0.0520	-0.1305	-0.0313	0.0256	0.1464
Prime				1.0000	0.0200	-0.7387	0.3468	0.6759	-0.3206	0.7188	0.1739	-0.0206	-0.0035	-0.0692	0.0757	0.0062
Mkt					1.0000	-0.0888	0.7688	-0.5150	0.6142	0.0438	0.8225	-0.0151	0.0437	-0.0309	0.1404	-0.1294
Term						1.0000	-0.4204	-0.6626	0.4329	-0.8131	-0.2575	0.0224	-0.0714	-0.0294	-0.1556	0.0719
GDP							1.0000	-0.2144	0.3271	0.5320	0.9502	-0.0139	0.0537	-0.0611	0.1420	-0.1208
CPI								1.0000	-0.6309	0.4655	-0.3942	-0.0063	0.0208	0.0398	0.0357	0.0331
Lead									1.0000	-0.5596	0.5206	<0.00019	-0.0215	-0.0156	-0.0106	-0.0687
Lag										1.0000	0.3589	-0.0184	0.0389	-0.0543	0.0958	-0.0124
Coin											1.0000	-0.0135	0.0364	-0.0598	0.1102	-0.1143
Tan												1.0000	0.0761	0.0651	0.0114	0.1938
Prof													1.0000	0.1913	0.1632	0.0241
Size														1.0000	0.0939	0.0192
Growth															1.0000	-0.0368
Ind																1.0000

This table presents the correlation between all of the variables employed in the study. The variables are labelled as follows: "TL" denotes total leverage, "LT" long-term leverage, "ST" short-term leverage, "Prime" the prime rate, "Mkt" the return on the equity market index (ALSI), "Term" the term spread, "GDP" the real GDP growth rate, "CPI" the inflation rate, "Lead" the change in the SARB leading indicator, "Lag" the change in the SARB lagging indicator, "Coin" the change in the SARB coincident indicator, "Tan" firm tangibility, "Prof" firm profitability, "Size" firm size as denoted by the log of sales, "Growth" firm growth opportunities as indicated by the firm price-to-book ratio, and "Ind" the industry median debt ratio.

3.4 RESEARCH HYPOTHESES

As discussed previously, evidence from previous research indicates that adjustment speeds vary with changes in macroeconomic conditions. The typical finding is that firms adjust faster in good macroeconomic states than bad states. In addition, the manner in which leverage ratios evolve with respect to changes in the macroeconomic conditions differs depending on whether or not a firm is financially constrained. Certain studies have suggested that unconstrained firms should adjust faster toward their targets than constrained firms (Korajczyk and Levy, 2003; Cook and Tang, 2010). In addition, some studies suggest that constrained firms should be more sensitive to changes in macroeconomic conditions than constrained firms (Halling et al., 2011), while others suggest the opposite (Korajczyk and Levy, 2003).

Taking the above into account, the overall research hypothesis to be investigated is:

H_0: Macroeconomic conditions affect the speed at which South African firms adjust toward their target debt ratios.
H_A: Macroeconomic conditions do not affect the speed at which South African firms adjust toward their target debt ratios.

Essentially, this main question can be expressed in terms of three sub-hypotheses[7] based on the findings of previous literature:

H-A: The speed at which firms adjust toward the target ratio is higher in macroeconomic upturns and lower in macroeconomic downturns.

H-B: The difference between the speed of adjustment towards the target ratio in upturns and downturns is lower for financially unconstrained firms than unconstrained firms.

H-C: The speed at which financially unconstrained firms adjust towards the target ratio is higher than that of constrained firms.

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[7]These are termed “hypotheses” for ease of reference, but they are essentially more specific research objectives.

This paper follows the approach of previous studies (e.g. Cook & Tang, 2010; Drobetz et al., 2007; Halling et al., 2011) and will investigate these hypotheses by means of a regression analysis.

Hypothesis H-A addresses the main issue of whether macroeconomic conditions affect the speed at which firms adjust toward their target ratios. To test whether firms adjust faster in good macroeconomic states (upturns), a one-sample difference in means test was used to assess whether the adjustment speed estimates (coefficients on the interaction terms between the macroeconomic indicator dummy variable and target leverage term) for macroeconomic upturns were significantly different from that of downturns. This follows the approach of Halling et al. (2011). In addition, it is assessed whether this hypothesis holds for the financially constrained and unconstrained sub-samples, as evidenced by Cook and Tang (2010).

The following two hypotheses address the secondary concern of whether adjustment dynamics differ between constrained and unconstrained firms. These are tested informally, by examining the differences across the regression results for the two samples.

Specifically, Hypothesis H-B serves to assess whether constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms, as proposed in previous literature (Halling et al., 2011). Halling et al. (2011) propose that if the latter holds true, the difference in adjustment speed estimates between market upturns and downturns (as evidenced by the difference in the coefficient estimates for both interaction terms) should be larger for constrained firms than unconstrained firms (the logic being that greater sensitivity to macroeconomic conditions would mean that the adjustment speed across states for a firm would differ more). Naturally the differences across states would have to be significant for each sub-sample for the findings to be significant.

Lastly, hypothesis H-C investigates whether financially unconstrained firms adjust faster than constrained firms, as indicated in previous studies (Korajczyk et al., (2003), Cook and Tang, 2010). This will be assessed informally by examining whether visibly larger (and significant) adjustment speeds (coefficient estimates) are obtained in both states for unconstrained firms in comparison to constrained firms.

3.5 CHAPTER CONCLUSION

Thus far the specification of the dynamic partial adjustment model to be used has been established. To summarize, three leverage definitions will be utilised; namely short-term debt, long-term debt and total debt. In addition macroeconomic conditions will be defined according to seven variables – the annual change in real GDP, the annual inflation rate, the annual term spread, the annual change in the JSE All-Share Index, as well as the SARB leading, lagging and coincident indicators. Firm-characteristic variables – namely profitability, tangibility, size, growth opportunities and the industry median debt ratio for the firm - will be controlled for in the estimation procedure. Also, the Arellano-Bover/Blundell-Bond GMM estimation technique will be used to derive annual speed-of-adjustment estimates.

The sample period to be examined will be from 2000 to 2010, and the said sample includes all non-financial and non-utility firms that were listed on the JSE for the entire sample period. In addition to examining the effects of macroeconomic conditions on the adjustment speed of the entire sample, the sample will be split into a sub-sample of financially constrained and unconstrained firms as defined according to the debt coverage ratio and capital expenditure coverage ratios respectively.

Lastly, specific research questions were established to essentially investigate whether macroeconomic conditions affect adjustment speed, and if these effects differ according to the financial status of the firm.

The following section presents the results and analysis of the regressions. This will lead to the conclusion of the study.

CHAPTER 4: ANALYSIS OF RESULTS

4.1 INTRODUCTION

This chapter reviews the findings of the empirical analysis. As mentioned previously, adjustment speed estimates were computed for the full sample as well as after splitting the firms into constrained and unconstrained sub-samples (as defined by the debt coverage and capital expenditure coverage ratios respectively). Regressions were re-run using each macroeconomic indicator in turn to define macroeconomic states. The regressions were also re-estimated separately using each leverage definition as a dependent variable in turn. In addition, robustness test were also conducted. Specifically, the results were re-estimated after extreme leverage observations were removed (as mentioned previously) and after changing the lags on certain macroeconomic variables to re-define states – as will be explained in the sections that follow. The initial results are reported and discussed in the next section.

4.2 RESULTS AND DISCUSSION

4.2.1 RESULTS FOR FULL SAMPLE

As mentioned earlier, as most firm-level data is only available on an annual basis, the frequency of the data - including macroeconomic data - is on a yearly basis. This may affect the results in terms of defining macroeconomic states. Thus the results must be interpreted with caution.

Table 7 shows the initial speed-of-adjustment estimates for the full sample in market upturns and downturns as defined by the various macroeconomic indicators. Again, the adjustment speed estimates are computed as the coefficients (λ_1 and λ_2) on the interaction terms between the target leverage ratio and the macroeconomic state dummy variable for upturns and downturns. Panels A, B and C report results using total leverage, long-term leverage and short-term leverage in turn as the dependent variables. For brevity, only the adjustment speed coefficient estimates, associated p-values and GMM standard errors are reported. More comprehensive results are shown in table I of appendix A. Also included are the magnitudes of the differences in adjustment speeds between upturns and downturns, as well as p-values from significance tests of the difference in means of the two coefficients (the coefficients on the interaction term between the relevant macroeconomic state dummy variable and the relevant target leverage ratio). This tests the null hypothesis that the adjustment speed in an upturn is not significantly different from that in a downturn.

As mentioned previously, VIF tests for multicollinearity were conducted between the explanatory variables. These statistics are reported in tables IV and V of Appendix A. A VIF statistic of 10 or greater would indicate severe multicollinearity which may affect the feasibility of the estimates. Tests reveal that there were no problems in this regard (as reported in Appendix A). The Sargan test for over-identifying restrictions was also conducted, as well as tests for first and second-order autocorrelation. The results of these tests are included in Appendix A. The statistics reveal that the over-identifying restrictions for the regressions were valid in all cases, and second-order autocorrelation was not present. (The null hypotheses were not rejected in these cases – p-values were insignificant as required). Lastly, Wald test statistics to test for the joint significance of the explanatory variables, as well as the number of observations from each regression are reported beneath the adjustment speed estimates.

In general, when using the equity index to define macroeconomic conditions, it is evident that firms close about 48.81% of the gap between actual total leverage and their target total leverage in one year in macroeconomic upturns. In downturns, they only close about 42.89% of the gap. These are within the range of speeds found by Cook and Tang (2010). Similar speeds are observed for conditions defined according to the leading indicator (about 48.81% in upturns and 43.97% in downturns), while speeds of almost half the magnitude are observed for the term spread (about 21.18% in upturns and 25.60% in downturns) and CPI (around 25.44% in upturns and 22.62% in downturns). In addition, apart from observations regarding the term spread and CPI (for which estimates are significant at the 10% level), all SOA estimates are significant at the 5% level.

Furthermore, the results for total leverage indicate that adjustment speeds are higher in market upturns relative to downturns when conditions are defined by the equity index, CPI, leading indicator and lagging indicator. These differences vary from 2.10% (lagging indicator) to 5.92% (equity index). This provides some support for hypothesis H-A. It is also in accordance with the theoretical model proposed by Hackbarth et al. (2006) and the findings of Drobetz et al. (2007), Cook and Tang (2010), Huang (2010) and Mahakud and Mukherjee (2011) - that firms should adjust faster in good macroeconomic states. However, the differences are only significant at the 5% level[8] for the equity index and leading indicator observations. In contrast, when states are defined by term spread, GDP and the coincident indicator, higher SOA estimates are observed for market downturns – contradicting hypothesis H-A. In addition, these differences are relatively larger; ranging from 4.41% (term spread) to 6.46% (coincident indicator) and are significant for all three indicator observations at a 5% level of significance. (However, the actual SOA estimates for term spread are insignificant). This corroborates the findings of Rubio and Sogorb (2011) – firms adjust faster in macroeconomic contractions. In addition, this supports the implications of Hess and Immenkötter's (2011) model: firms will adjust toward their targets faster in bad states if the cost of not being at the optimal level of debt is higher in these states.

When using long-term leverage as the dependent variable, the overall adjustment speed estimates observed are dramatically reduced (roughly half in some cases) in relation to total leverage. This suggests that firms take longer to adjust toward their long-term leverage targets. These estimates range from 19.19% to 26.14% per year in market upturns (for conditions defined by CPI and the term spread respectively) and 14.62% to 35.83% per year in market downturns (for conditions defined by CPI and GDP respectively). In addition, the adjustment speeds remain significant at the 5% level for most observations (apart from the case of upturns defined by CPI – which is still significant at the 10% level). In contrast to the previous results however, the overall results in panel B indicate that firms adjust toward their long-term leverage targets faster in macroeconomic downturns relative to upturns (the reverse only holds true for conditions defined according to CPI) – once again refuting hypothesis H-A, and corroborating the findings of Rubio and Sogorb (2011) and Hess and Immenkötter (2011). Moreover, these differences vary greatly, from 1.42% when using the equity index as an indicator, to as much as 12.85% and 13.17% when using GDP and the coincident indicators, respectively. In addition, although these differences are insignificant for the equity index, term spread and leading indicator observations they are highly significant for the GDP, coincident and lagging indicator observations.

[8] A p-value of less than 0.1, 0.05 and 0.01 indicate significance at the 10%, 5% and 1% levels respectively.

The results vary even more so when using short-term leverage as a dependent variable: adjustment towards short-term leverage targets are dramatically faster relative to the previous leverage definitions. For example, the lowest speeds documented are 76.84% in a year for upturns and 73.3% in one year for downturns in the case of using CPI as an indicator. These are similar in magnitude to speeds reported by Huang (2010). Interestingly, when using the term spread and lagging indicator to define states[9], results indicate that firms take less than a year to adjust toward their short-term leverage targets. The speeds of adjustment observed amount to as high as 133.75% and 110.95% in upturns and around 124.85% and 110.3% in downturns when states are defined by the term spread and lagging indicator respectively. Although this may actually be an indication that the firms are over-adjusting relative to their targets, and therefore do not regard targeting as a priority, speeds above 100% only occur in two cases.

Moreover, all the estimates are highly significant at all levels. In addition - once again contradicting hypothesis H-A - in most cases (although insignificant) adjustment speeds are higher in macroeconomic downturns for short-term leverage than in upturns. Furthermore, the only significant difference observed in adjustment speeds across upturns and downturns is considerably high (8.90%). This occurs in the case where conditions are defined by the term spread. Again, this corroborates Hess and Immenkötter's (2011) model, and Rubio and Sogorb's findings.

Overall, the findings show weak support for the notion that firms adjust toward their targets faster in good macroeconomic states than bad macroeconomic states (as expressed by hypothesis H-A). In contrast, most observations indicate that firms adjust faster in bad macroeconomic states than good states. This is in line with the notion that firms will adjust faster toward their targets if the costs of deviating from the target are higher (Hess & Immenkötter, 2011) – which occurs during bad states. In addition, it is evident that firms adjust faster toward their short-term debt targets than long-term debt targets, suggesting perhaps that the transaction costs associated with such debt is low, or alternatively that the benefits of reducing such debt are high (Halling et al., 2011).

[9] As the SOA estimates measure the percentage of the distance firms close between their actual and target ratios in one year, and a speed of 100% indicates perfect adjustment, speeds of greater than 100% suggests firms adjust beyond their target ratios, implying that they would reach their targets (reach a 100% SOA) in less than a year.

After assessing these findings, the sample was then divided into subsamples of financially constrained and unconstrained firms (the findings of which address hypothesis H-B and H-C in addition to H-A) - first according to the capital expenditure ratio, and then according to the debt coverage ratio. The findings are reported in the following sub-section.

Table 7: Adjustment speed estimates for the full sample

Macroeconomic Indicator	SOA in upturn	SOA in downturn	Difference
Panel A: Total leverage			
Equity Index	0.4881*** (0.1230)	0.4289*** (0.1324)	0.0592 p=(0.0007)
		Obs. 1239	Wald 1026.15***
Term spread	0.2118 (0.1842)	0.2560 (0.1697)	-0.0442 p=(0.0328)
		Obs. 1239	Wald 997.12***
GDP	0.3662*** (0.1333)	0.4240*** (0.1264)	-0.0618 p=(0.0035)
		Obs. 1239	Wald 933.23***
CPI	0.2544* (0.1516)	0.2262 (0.1574)	0.0282 p=(0.1078)
		Obs. 1031	Wald 758.37***
Leading Indicator	0.4881*** (0.1374)	0.4397*** (0.1322)	0.0489 p=(0.0188)
		Obs. 1239	Wald 957.56***
Coincident Indicator	0.3281** (0.1336)	0.3927*** (0.1267)	-0.0646 p=(0.0010)
		Obs. 1239	Wald 936.36***
Lagging Indicator	0.4030** (0.1859)	0.3820** (0.1716)	0.0210 p=(0.3627)
		Obs. 1031	Wald 679.5***
Panel B: Long-term leverage			
Equity Index	0.2287*** (0.0771)	0.2429*** (0.0802)	-0.0142 p=(0.4000)
		Obs. 1239	Wald 4240.06***
Term spread	0.2614*** (0.0842)	0.2812*** (0.0793)	-0.0198 p=(0.2513)
		Obs. 1239	Wald 4418.05***
GDP	0.2298*** (0.0815)	0.3583*** (0.0859)	-0.1285 p=(<0.0001)
		Obs. 1239	Wald 4066.52***
CPI	0.1919* (0.1014)	0.1462 (0.1113)	0.0457 p=(0.0246)
		Obs. 1031	Wald 3847.22***
Leading Indicator	0.2486*** (0.0780)	0.2592*** (0.0798)	-0.0106 p=(0.4908)
		Obs. 1239	Wald 4204.06***
Coincident Indicator	0.2237*** (0.0815)	0.3554*** (0.0859)	-0.1317 p=(<0.0001)
		Obs. 1239	Wald 4038.41***
Lagging Indicator	0.2009** (0.0894)	0.2577*** (0.0846)	-0.0568 p=(0.0220)
		Obs. 1031	Wald 3960.45***

Table 7 continued: Adjustment speed estimates for the full sample

Macroeconomic Indicator	SOA in upturn	SOA in downturn	Difference
Panel C: Short-term leverage			
Equity Index	0.9218*** (0.1906)	0.9309*** (0.2120)	-0.0091 p=(0.8058)
		Obs. 1239	Wald 518.74***
Term spread	1.3375*** (0.2504)	1.2485*** (0.2227)	0.0890 p=(0.0156)
		Obs. 1239	Wald 503.31***
GDP	0.8536*** (0.1681)	0.8927*** (0.1636)	-0.0391 p=(0.2328)
		Obs. 1239	Wald 539.59***
CPI	0.7684*** (0.2013)	0.7330*** (0.1915)	0.0354 p=(0.2615)
		Obs. 1031	Wald 493.49***
Leading Indicator	0.9351*** (0.1937)	0.9772*** (0.2116)	-0.0421 p=(0.1698)
		Obs. 1239	Wald 486.68***
Coincident Indicator	0.8567*** (0.1678)	0.9010*** (0.1634)	-0.0443 p=(0.1771)
		Obs. 1239	Wald 544.41 ***
Lagging Indicator	1.1095*** (0.3124)	1.1030*** (0.2766)	0.0065 p=(0.0905)
		Obs. 1031	Wald 359.98***

The table shows speed of adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for the total sample from 2000-2010. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. In addition, the number of observations (Obs.) and Wald test statistics are reported for each regression. Significance of the statistics and estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. In addition, the differences in speeds-of-adjustment between upturns and downturns are reported, along with p-values to test for the significance of the differences. A significant p-value results in the rejection of the null hypothesis of no difference in adjustment speed between upturns and downturns.

4.2.2 RESULTS FOR CONSTRAINED VERSUS UNCONSTRAINED FIRMS

As financially constrained firms may experience difficulties in adjusting toward their targets, the sample was divided into firm-year observations that were financially constrained and those that were not. Two measures of financial constraints were employed: the capital expenditure coverage ratio and the debt coverage ratio. A firm-year observation was considered financially constrained if the relevant ratio (capital expenditure coverage or debt coverage ratio) was less than one, and unconstrained otherwise. The regressions were re-estimated in turn according to each measure of financial constraints and an adjustment speed estimate was obtained for both samples in macroeconomic upturns and downturns. The adjustment speeds were again re-estimated for each leverage measure. In addition, the significance of the differences in adjustment speed across states was also obtained.

Once again, to address hypothesis H-A, the adjustment speed estimates and differences across states were compared for both samples (in order to examine whether constrained and unconstrained firms adjust faster in upturns). To assess whether hypothesis H-B (that constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms) holds true, the differences in adjustment speed estimates across states were compared for both samples. If constrained firms are indeed more sensitive than unconstrained firms to these changes, higher differences across states would be observed for constrained firms. To address hypothesis H-C, it was assessed whether adjustment speed estimates for unconstrained firms were higher than that of constrained firms, and if both sample estimates were significant. The results are reported (in the same manner as previously) in tables 8 and 9. More comprehensive results are found in tables II and III of Appendix A.

4.2.2.1 Financially constrained observations defined according to the capital expenditure coverage ratio

Before interpreting these results, a caveat must be mentioned in this regard: splitting the sample in terms of financial constraints resulted in considerably small sample sizes. This is evidenced by extremely high Wald test statistics for many of the regressions (a consequence of small sample size). This may lead to standard errors that are too large to consider the coefficient estimates to be significant with certainty. Thus the results must be interpreted with caution.

In general, when defining financially constrained firm-year observations according to the capital expenditure coverage ratio, it is evident as per table 8 that the adjustment speed estimates obtained are highly significant (even at a 1% level of significance) in most cases. Morover, most of the total leverage estimates found for unconstrained firms are in the 30 to 45% range – similar to the findings of Halling et al. (2011).

Regarding hypothesis H-A: Unconstrained firms appear to adjust toward their total and short-term leverage targets significantly faster in macroeconomic downturns than upturns – lending further support to Hess and Immenkötter's (2011) model. These results again refute hypothesis H-A. However, when using long-term leverage as a dependent variable, unconstrained firms appear to adjust significantly slower in downturns than upturns – lending support to Hackbarth et al.'s (2006) model, as well as the findings of Mahakud and Mukherjee (2011), Cook and Tang (2010), and Drobetz et al (2007). Similar to the results for the full sample, adjustment speeds are relatively faster when using short term leverage as a dependant variable, and slower when using long term leverage in comparison to using total leverage. Thus it is evident that unconstrained firms adjust faster to their short-term leverage targets (in some-cases, even over-adjusting). Again, this indicates that the costs associated with short-term debt may be lower, or the benefits thereof, higher.

The results regarding constrained firms are also mixed in this regard. When short-term leverage is considered, constrained firms appear to adjust significantly faster towards their targets in macroeconomic upturns than downturns, in support of hypothesis H-A. However, many of the adjustment speeds are above 100% (sometimes as high as 166.79%) - indicating that these firms over-adjust relative to their short-term leverage targets. Moreover, when total leverage and long-term leverage are considered, majority of the adjustment speeds documented are negative in both upturns and downturns (ranging from as low as -10.34% in downturns to -65.89% in upturns for total leverage observations). This is in line with the findings of Iliev and Welch (2010), who also find negative adjustment speed estimates. These estimates, however, are far greater in magnitude than those found by them. While extremely low adjustment speed estimates would suggest that firms are perhaps not adjusting towards their targets at all, negative estimates leads one to believe that these firms seem to be actively adjusting away from their total and long-term leverage targets. It is also somewhat in line with Halling et al. (2011) who find speeds as low as 9.1% and 4% for constrained firms – suggesting that they do not explicitly target an optimal debt ratio. Overall, these results suggest that adjusting towards a target does not appear to be a priority for constrained firms. Furthermore, the high speeds at which these firms appear to be adjusting away from their targets in many cases indicates that this may be due to choice rather than adjustment costs or difficulty in obtaining financing.

Regarding hypothesis H_0-B: There is some – though not overwhelming support for the notion that constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms. In the case of total and long-term leverage, the difference in adjustment speed estimates across upturns and downturns for constrained firms appears to be more extreme than that of unconstrained firms in most cases[10]. Furthermore, the observed differences across states appear to be highly significant in most cases. In some cases, the differences across states for constrained firms surpass that of unconstrained firms by more than 10% - indicating greater sensitivity. Thus there appears to be support for Halling et al.'s (2011) theory that constrained firms are more sensitive to business cycle variation and therefore macroeconomic changes. In the case of short-term leverage, however, the differences are substantially larger for unconstrained firms in most cases (where the differences across states for both samples are significant) – supporting Korajczyk and Levy's (2003) hypothesis that constrained firms should be relatively less sensitive to macroeconomic changes. Thus the results are sensitive to the leverage definition used.

Regarding hypothesis H-C: When considering total and long-term leverage observations,

[10] It is important to note that, when assessing which firms are more sensitive to changes in macroeconomic states, one is concerned with the absolute value of the differences in adjustment speed across states - not whether the differences are negative or positive.

there is some support for the notion that unconstrained firms adjust faster toward their targets than constrained firms, as the speed-of-adjustment estimates for these observations are mostly positive and significant for unconstrained firms, but negative and significant (in most cases) for constrained firms. This supports the propositions of Korajczyk and Levy (2003), Halling et al. (2011) and the findings of Cook and Tang (2010) in the sense that it implies that unconstrained firms would reach their targets sooner than constrained firms. More importantly, however, the findings suggest that constrained firms are not likely to reach their targets as they appear not to adjust toward a target at all (as evidenced by negative SOA estimates). The results pertaining to short-term leverage are inconclusive, as they yield no clear pattern.

Overall, the results are largely mixed: when separating financially constrained firms and unconstrained firms according to the capital expenditure coverage ratio, there is no consensus as to whether firms adjust faster in macroeconomic upturns than downturns – as per hypothesis H-A. In addition – although not overwhelming – there is some support for the notion that constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms (for two out of three debt definitions). This is somewhat in accordance with hypotheses H-B. However, the results appear to be sensitive to the definition of leverage used. Lastly, the results in relation to hypothesis H-C are inconclusive.

4.2.2.1 Financially constrained observations defined according to the debt coverage ratio

When defining financial constraints according to the debt coverage ratio, highly significant adjustment speed estimates are observed again in most cases (across all definitions of macroeconomic conditions and leverage definitions). However, the results pertaining to the various hypotheses are somewhat in contrast to those relating to the capital expenditure coverage ratio.

Regarding hypothesis H-A: There is no clear evidence as to whether firms adjust faster towards their target ratios in macroeconomic upturns relative to downturns. In the case of unconstrained firms, significantly (at all levels in most cases) negative adjustment speed estimates are obtained in most cases in both upturns and downturns, across all leverage definitions. This suggests – in contrast to the previous results – that *unconstrained* firms adjust away from their targets, and do not appear to consider targeting a priority. This deviates from findings found in most previous studies, which only find positive SOA estimates (Cook and Tang, 2010; Halling et al., 2011). Similarly, there is no clear evidence that constrained firms adjust faster toward their targets in upturns: in the case of total leverage, although highly positive adjustment speeds are obtained, the results are mixed. In the case of long term leverage, the only significant estimates obtained for the constrained sample are those pertaining to the term spread and lagging indicator cases. All other estimates, although insignificant, are negative. Regarding short-term leverage, most SOA estimates obtained are above 100% (in some cases by more than 10%), indicating that these firms are either adjusting very rapidly towards their short-term leverage targets (reaching these targets in less than a year), or are perhaps over-adjusting to their targets as they do not consider targeting a priority.

In terms of hypothesis H-B: the results do not show clear support for this hypothesis (and Halling et al.'s theory that constrained firms should be more sensitive to changes in macroeconomic conditions than unconstrained firms). Using the total leverage and short-term leverage ratios, there are mixed results; the findings differ according to the indicator used to define macroeconomic states. In the case of long-term leverage, there is evidence against this hypothesis: five out of seven cases exhibit larger differences for unconstrained firms – indicating greater sensitivity to macroeconomic conditions for unconstrained firms. This is, as before, somewhat in support of Korajczyk and Levy's (2003) proposition that constrained firms should be less sensitive to changes in macroeconomic conditions – and similarly in contrast to Halling et al.'s suggestion that the opposite should occur. However, the actual differences across states for constrained firms are insignificant in most cases, thus one cannot conclude for certain that there is greater sensitivity on the part of constrained firms. In addition, the magnitude of the differences across states for unconstrained firms exceed that of constrained firms by less than 5% in most cases; thus they do not differ drastically in comparison.

Regarding hypothesis H-C: When total debt is used to define leverage, the adjustment speed estimates for constrained firms are highly significant and positive at all levels (speeds as high as 96.66%) are observed, while unconstrained firms exhibit significantly negative adjustment speeds in most cases – suggesting that they actively adjust away from their targets. This is somewhat in contrast to the findings of Korajczyk and Levy (2003) and Cook and Tang (2010), as it implies that constrained firms adjust more quickly toward their target ratios than unconstrained firms (which do not seem to consider targeting a priority – completely in contrast to the results concerning the capital expenditure coverage ratio). However, there is no support for this hypothesis in the case of long-term debt as most of the adjustment speed estimates are negative (and even insignificant in most cases for constrained firms) for both samples – again, indicating both types of firms adjust away from their targets. Moreover, the results pertaining to short-term debt yield mixed results, as the estimates for unconstrained firms are significantly negative in most cases and those for constrained firms are significantly above 100% in most cases – indicating over-adjustment.

Overall, when separating financially constrained firms and unconstrained firms according to the debt coverage ratio, there is still no consensus as to whether firms adjust faster in macroeconomic upturns than downturns – as per hypothesis H-A. In addition, the results are less conclusive than previously: there is no support for the notion that constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms (or vice versa) as per hypothesis H-B. Lastly, the results in relation to hypothesis H-C are again inconclusive.

In summary, the results pertaining to unconstrained and constrained firms using both coverage ratios are mixed. Upon separating the samples, it is no longer evident that firms adjust faster in downturns than upturns – as indicated previously. Although there is evidence that adjustment speed estimates and leverage dynamics differ according to whether or not a firm is financially constrained, there is no clear evidence as to *how* these dynamics differ. There is no confirmation that constrained firms are more sensitive to changes in macroeconomic conditions than unconstrained firms. Also, there is no confirmation that unconstrained firms adjust faster than constrained firms, as the results are highly sensitive to the measure of financial constraints being used.

The regressions were then re-estimated after removing extreme leverage observations from the sample, to assess whether these were affecting the results. The re-estimated results are presented in the following section.

Table 8: Adjustment speed estimates for constrained and unconstrained samples using the capital expenditure coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	**Constrained**	**Unconstrained**	**Constrained**	**Unconstrained**	**Constrained**
Panel A: Total leverage						
Equity Index	0.4652*** (0.0384)	-0.0287 (0.0378)	0.4927*** (0.0391)	-0.1034*** (0.0390)	-0.0275 p=(<0.0001)	0.0747 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 3.87e+07*** Wald 29752.05***	
Term spread	0.0621 (0.1075)	-0.6589*** (0.0599)	0.1129 (0.0975)	-0.5882*** (0.0547)	-0.0508 p=(<0.0001)	-0.0707 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 84890.67*** Wald 33407.64***	
GDP	0.2733*** (0.0323)	0.0979*** (0.0365)	0.3507*** (0.0312)	0.0495 (0.0337)	-0.0774 p=(<0.0001)	0.0484 p=(0.0002)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 35403.94*** Wald 15743.36***	
CPI	0.3853*** (0.0671)	-0.4642*** (0.0400)	0.4179*** (0.0750)	-0.5011*** (0.0443)	-0.0326 p=(0.0025)	0.0369 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 41476.04*** Wald 185243.67***	
Leading Indicator	0.3796*** (0.0420)	-0.0941* (0.0540)	0.3562*** (0.0424)	-0.2518*** (0.0585)	0.0234 p=(0.0005)	0.1577 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 73277.96 *** Wald 47396.10***	
Coincident Indicator	0.2358*** (0.0296)	0.0979*** (0.0365)	0.3352*** (0.0283)	0.0495 (0.0337)	-0.0994 p=(<0.0001)	0.0484 p=(0.0002)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 41745.66*** Wald 15743.36***	
Lagging Indicator	0.3435*** (0.0346)	-0.5501*** (0.0468)	0.3504*** (0.0373)	-0.5239*** (0.0434)	-0.0069 p=(0.0110)	-0.0262 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 48004.33*** Wald 761444.78***	

Table 8 continued: Adjustment speed estimates for constrained and unconstrained samples using the capital expenditure coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel B: Long-term leverage						
Equity Index	0.2130*** (0.0165)	-0.3272*** (0.0245)	0.1930*** (0.0152)	-0.3224*** (0.0242)	0.0200 p=(<0.0001)	-0.0048 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 5.97e+06*** Wald 4.44e+06 ***	
Term spread	0.3249*** (0.0182)	-0.4941*** (0.0175)	0.2564*** (0.0176)	-0.4058*** (0.0163)	0.0685 p=(<0.0001)	-0.0083 p=(0.6855)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 9.91e+06*** Wald 292061.04***	
GDP	0.2271*** (0.0162)	-0.5520*** (0.0342)	0.1794*** (0.0163)	-0.3883*** (0.0365)	0.0477 p=(<0.0001)	-0.1337 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 2.00e+07*** Wald 55877.07***	
CPI	-0.0267 (0.0270)	0.0839*** (0.0230)	-0.1549*** (0.0274)	0.1723*** (0.0234)	0.1282 p=(<0.0001)	-0.0884 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 1.54e+06*** Wald 176985.77***	
Leading Indicator	0.2212*** (0.0192)	-0.4259*** (0.0239)	0.2189*** (0.0182)	-0.3737*** (0.0238)	0.0023 p=(0.2529)	0.7996 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 2.10e+07*** Wald 5.58e+06***	
Coincident Indicator	0.2076*** (0.0168)	-0.5520*** (0.0342)	0.1835*** (0.0167)	-0.3883*** (0.0365)	0.0241 p=(<0.0001)	0.3331 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 1.09e+06*** Wald 55877.07***	
Lagging Indicator	0.1574*** (0.0232)	-0.2431*** (0.0357)	0.0373** (0.0168)	-0.067291** (0.0330)	0.1201 p=(<0.0001)	-0.1758 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 361640.52*** Wald 1.22e+07***	

Table 8 continued: Adjustment speed estimates for constrained and unconstrained samples using the capital expenditure coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel C: Short-term leverage						
Equity Index	1.9152*** (0.0299)	1.2739*** (0.0736)	2.2787*** (0.0338)	1.1801*** (0.0778)	-0.3635 p=(<0.0001)	0.0938 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 169280.98*** Wald 1.19e+06***	
Term spread	0.3542*** (0.0469)	0.2958*** (0.1029)	0.4727*** (0.0413)	0.5190*** (0.1021)	-0.1185 p=(<0.0001)	-0.2232 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 1.72e+06*** Wald 674150.61***	
GDP	0.6825*** (0.0593)	1.6079*** (0.0923)	1.0237*** (0.0481)	1.5518*** (0.0790)	-0.3412 p=(<0.0001)	0.0561 p=(0.0075)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 7.14e+07*** Wald 677008.29***	
CPI	0.1676* (0.0938)	0.6531*** (0.0821)	0.3167*** (0.0918)	0.5796*** (0.0765)	-0.1491 p=(<0.0001)	0.0735 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 9112.04*** Wald 151705.67***	
Leading Indicator	1.5917*** (0.0854)	1.1319*** (0.0939)	1.7760*** (0.0992)	0.9995*** (0.1062)	-0.1843 p=(<0.0001)	0.1324 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 43014.58*** Wald 2.82e+06***	
Coincident Indicator	0.6802*** (0.0608)	1.6079*** (0.0923)	1.0343*** (0.0492)	1.5518*** (0.0790)	-0.3541 p=(<0.0001)	0.0561 p=(0.0075)
	Unconst.-: Const.-:		Obs. 417 Obs. 342		Wald 6.99e+06*** Wald 677008.29***	
Lagging Indicator	0.5356*** (0.0889)	0.8005*** (0.1687)	0.5470*** (0.0805)	0.7741*** (0.1590)	-0.0114 p=(0.3803)	0.0264 p=(0.0170)
	Unconst.-: Const.-:		Obs. 345 Obs. 290		Wald 9068.12*** Wald 775040.20 ***	

The table shows speed-of-adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for unconstrained and constrained firms. These results pertain to the case where constrained and unconstrained firms are classified according to the capital expenditure coverage ratio. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. In addition, the number of observations (Obs.) and Wald test statistics are reported for each regression. Significance of the statistics and estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. The differences between speeds-of-adjustment across upturns and downturns are reported for both samples, along with p-values to test for the significance of the differences. A significant p-value results in the rejection of the null hypothesis of no difference in adjustment speed between upturns and downturns. "Unconst." denotes unconstrained firm-related observations, while "Const." denotes constrained firm-related observations.

Table 9: Adjustment speed estimates for constrained and unconstrained samples using the debt coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	**Constrained**	**Unconstrained**	**Constrained**	**Unconstrained**	**Constrained**
Panel A: Total leverage						
Equity Index	-0.1992*** (0.0220)	0.8772*** (0.1416)	-0.1883*** (0.0208)	0.8305*** (0.1439)	-0.0109 p=(0.0095)	0.0467 p=(0.0149)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 38850.51*** Wald 947.17***	
Term spread	0.0713** (0.0332)	0.9111*** (0.2045)	0.0254 (0.0304)	0.9115*** (0.1895)	0.0459 p=(<0.0001)	-0.0004 p=(0.9843)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 256769.05*** Wald 964.95***	
GDP	-0.1511*** (0.0370)	0.8748*** (0.1736)	-0.1760*** (0.0325)	0.8800*** (0.1629)	0.0249 p=(0.0002)	-0.0052 p=(0.7834)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 80898.67*** Wald 905.79***	
CPI	-0.2796*** (0.0580)	0.7755*** (0.1096)	-0.3039*** (0.0633)	0.7195*** (0.1971)	0.0243 p=(<0.0001)	0.0560 p=(0.0059)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 74665.84*** Wald 793.28***	
Leading Indicator	-0.1458*** (0.0349)	0.8586*** (0.1412)	-0.1393*** (0.0312)	0.8203*** (0.1417)	-0.0065 p=(0.1506)	0.0383 p=(0.0474)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 6577.42*** Wald 911.52***	
Coincident Indicator	-0.2522*** (0.0336)	0.8748*** (0.1736)	-0.2316*** (0.0295)	0.8800*** (0.1629)	-0.0206 p=(0.0004)	-0.0052 p=(0.7834)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 64659.66*** Wald 905.79***	
Lagging Indicator	-0.1756*** (0.0277)	0.9666*** (0.2053)	-0.1886*** (0.0278)	0.9439*** (0.1956)	0.0130 p=(0.1124)	0.0227 p=(0.3129)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 165284.88*** Wald 827.61***	

Table 9 continued: Adjustment speed estimates for constrained and unconstrained samples using the debt coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	**Constrained**	**Unconstrained**	**Constrained**	**Unconstrained**	**Constrained**
Panel B: Long-term leverage						
Equity Index	-0.0825*** (0.0078)	-0.0217 (0.0867)	-0.1016*** (0.0072)	-0.0592 (0.0833)	0.0191 p=(<0.0001)	0.0375 p=(0.0071)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 1.60e+07*** Wald 13157.81***	
Term spread	-0.0508*** (0.0164)	-0.0036 (0.0799)	-0.1174*** (0.0162)	0.0268 (0.0825)	0.0666 p=(<0.0001)	-0.0304 p=(0.1201)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 5.90e+06*** Wald 11951.35***	
GDP	-0.0840*** (0.0174)	-0.0775 (0.0864)	-0.1628*** (0.0174)	-0.0166 (0.0816)	0.0788 p=(<0.0001)	-0.0609 p=(0.0002)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 6.86e+06*** Wald 12836.07***	
CPI	-0.1580*** (0.0185)	0.4209*** (0.1172)	-0.1781*** (0.0218)	0.4119*** (0.1259)	0.0201 p=(<0.0001)	0.0090 p=(0.6016)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 1.05e+07*** Wald 8180.21***	
Leading Indicator	-0.0282*** (0.0040)	-0.0137 (0.0818)	-0.0825*** (0.0036)	-0.0273 (0.0798)	0.0543 p=(<0.0001)	0.0136 p=(0.3845)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 8.83e+06*** Wald 12978.17***	
Coincident Indicator	-0.1135*** (0.0119)	-0.0775 (0.0864)	-0.1397*** (0.0124)	-0.0166 (0.0816)	0.0262 p=(<0.0001)	-0.0609 p=(0.0002)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 1.51e+07*** Wald 12836.07***	
Lagging Indicator	-0.0983*** (0.0084)	0.3242*** (0.1036)	-0.1256*** (0.0114)	0.3389*** (0.0979)	0.0273 p=(<0.0001)	-0.0147 p=(0.6046)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 2.96e+06*** Wald 8413.45***	

Table 9 continued: Adjustment speed estimates for constrained and unconstrained samples using the debt coverage ratio

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Unconstrained	**Constrained**	**Unconstrained**	**Constrained**	**Unconstrained**	**Constrained**
Panel C: Short-term leverage						
Equity Index	0.0666*** (0.0186)	1.1243*** (0.1619)	0.1922*** (0.0231)	1.1332*** (0.1815)	-0.1256 p=(<0.0001)	-0.0089 p=(0.8086)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 66442.56*** Wald 739.71***	
Term spread	-0.1292*** (0.0482)	0.9320*** (0.2399)	-0.1551*** (0.0408)	0.9770*** (0.2114)	0.0259 p=(0.0006)	-0.9770 p=(0.2331)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 203097.40*** Wald 684.28***	
GDP	-0.3183*** (0.0219)	1.0500*** (0.1447)	-0.2721*** (0.0263)	1.1021*** (0.1444)	-0.0460 p=(0.0003)	-0.0521 p=(0.1339)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 318746.54*** Wald 733.91***	
CPI	-0.5357*** (0.0514)	0.9215*** (0.2020)	-0.5382*** (0.0491)	0.7836*** (0.1887)	0.0025 p=(0.4943)	0.1379 p=(<0.0001)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 352780.26*** Wald 454.20***	
Leading Indicator	0.2249*** (0.0386)	1.0761*** (0.1844)	0.3858*** (0.0504)	1.0745*** (0.2054)	-0.1609 p=(<0.0001)	0.0016 p=(0.9572)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 593865.95*** Wald 722.98***	
Coincident Indicator	-0.3283*** (0.0216)	1.0500*** (0.1447)	-0.2405*** (0.0273)	1.1021*** (0.1444)	-0.0878 p=(<0.0001)	-0.0521 p=(0.1339)
	Unconst.-: Const.-:		Obs. 226 Obs. 737		Wald 307870.45*** Wald 733.91***	
Lagging Indicator	-0.7766*** (0.0448)	1.0165*** (0.3012)	-0.7217*** (0.0414)	0.9576*** (0.2666)	-0.0549 p=(<0.0001)	0.0589 p=(0.1795)
	Unconst.-: Const.-:		Obs. 189 Obs. 615		Wald 1.50e+06*** Wald 557.16***	

The table shows speed-of-adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for unconstrained and constrained firms. These results pertain to the case where constrained and unconstrained firms are classified according to the debt coverage ratio. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. In addition, the number of observations (Obs.) and Wald test statistics are reported for each regression. Significance of the statistics and estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. The differences between speeds-of-adjustment across upturns and downturns are reported for both samples, along with p-values to test for the significance of the differences. A significant p-value results in the rejection of the null hypothesis of no difference in adjustment speed between upturns and downturns. "Unconst." denotes unconstrained firm-related observations, while "Const." denotes constrained firm-related observations.

4.2.3 RESULTS AFTER DELETING EXTREME OBSERVATIONS

As certain authors suggest that extreme leverage observations may bias results (Hovakimian and Li, 2009), the regressions were re-estimated for each leverage specification after removing leverage observations above 0.8. A comparison of the results is presented in tables 10, 11, 12 and 13. Table 13 reports differences in SOA estimates across states for the constrained and unconstrained sub-samples according to the various definitions. In addition, p-values to test for the significance of the differences in adjustment speeds across states are reported below the coefficients. More comprehensive results can be found in tables I, II, and III of Appendix B. The observed changes will be discussed in the following subsections.

4.2.3.1 Results for the full sample

While certain changes are evident with the sample, the overall conclusion remains the same.

Regarding hypothesis H-A: There is still no undisputed evidence that firms adjust faster in macroeconomic upturns than downturns – the results appear even less conclusive than previously. When using total leverage as a specification, the speed-of-adjustment estimates remain highly significant and positive at all levels. While most differences across states still remain significant at the 5% level, there is again no clear evidence of firms adjusting faster in upturns than in downturns. A noticeable difference, however, is that all adjustment speed estimates – regardless of which indicator is used to describe macroeconomic conditions – are substantially larger (in some cases almost double) than the case where extreme leverage observations were included. For example, when looking at the coincident indicator observations: the prior speed of adjustment estimates obtained were about 32.81% for upturns and 39.27% in downturns. After excluding extreme observations these speeds almost double to 60.18% in upturns and 67.68% in downturns.

When considering long-term leverage, it is still evident (as before) that firms tend to adjust faster in macroeconomic downturns than in upturns – although only four of these differences are significant at the 5% level (as before). What is more evident is that, while most adjustment speed estimates were significant at the 5% level previously, only one estimate is significant in this sample. In addition, all the speeds have decreased visibly in comparison to the prior estimates. For example, when looking at the observations concerning term spread: a speed of approximately 26.14% was noted in upturns and 28.12% in downturns. After removing extreme observations, these estimates have decreased to around 5.71% in upturns and 9.09% in downturns.

Similarly, decreases in adjustment speed are also evident when short-term leverage is considered. While these decreases are not as dramatic as those documented from long-term leverage observations, some are still relatively substantial. When considering term spread as an indicator, for instance: the speed of adjustment decreases from about 133.75% to 60.05% in upturns and from 124.85% to 66.24% in downturns. All observations are still significant at the 5% level. Once again, however, there is no clear evidence of firms adjusting faster in upturns than in downturns. Moreover, most of the differences across states remain insignificant at the 5% level.

4.2.3.2 Financially constrained observations defined according to the capital expenditure coverage ratio

The results from these observations appear to be less conclusive than before. After removing extreme leverage observations, it is evident that the results pertaining to the total leverage observations have changed considerably. However, the observations pertaining to long-term leverage do not differ much from the initial results – largely remaining within the same range of adjustment speeds found before. Moreover, there were no short-term leverage observations less than 0.8 in the constrained sample and therefore no comparison to make. In addition, the SOA estimates (for short-term leverage) relating to the unconstrained sample (and significance thereof) have remained almost identical to the prior results. Thus the observations pertaining to long- and short-term leverage will not be discussed.

Upon examining the results when total leverage is used as the leverage definition, it is apparent that the negative adjustment speed estimates obtained earlier for constrained firms are no longer observed. Significantly positive estimates are evident in most cases for both constrained and unconstrained firms. In addition - in comparison to the results when extreme observations were included - an overall increase in adjustment speed estimates is evident for constrained firms, while unconstrained firm adjustment speed estimates have generally decreased slightly.

Regarding hypothesis H-A: There is still no clear evidence that firms adjust faster in macroeconomic upturns than downturns when splitting the sample. As previously, evidence somewhat in contradiction to this is found once again in the case of total leverage – from which it is evident that both unconstrained and constrained firms adjust faster in macroeconomic downturns (and significantly so in most cases at the 5% level, according to the differences across states listed in table 13). Yet in certain cases, speeds of up to 126.50% are observed for constrained firms – which may again be an indication that adjusting toward a target may not be a concern for such firms. There is evidence that unconstrained firms adjust slightly faster in upturns than in downturns – with these differences being highly significant at the 5% level. However, most of the estimates regarding constrained firms remain significantly negative.

Concerning hypothesis H-B, the results are somewhat in accordance with those reported previously. It is again apparent that unconstrained firms are slightly (though perhaps not overwhelmingly) more sensitive to changes in states. This is evident from significant and slightly larger differences in adjustment speeds across states for these firms (as indicated in table 13). The most pronounced evidence is found when the leading indicator is used to define states: the difference in adjustment speeds across states is only 2.34% for unconstrained firms, but 15.77% for constrained firms.

Moreover, with respect to hypothesis H-C, considerably higher adjustment speeds are now observed for constrained firms relative to unconstrained firms, refuting the findings of Cook and Tang (2010) and Halling et al. (2011). This is also somewhat in support of Drobetz et al. (2007) who do not find evidence in favour of unconstrained firms adjusting faster than constrained firms. However, in some cases, adjustment speeds of more than 100% are observed for constrained firms – which may indicate, as before, that (rather than adjusting extremely fast to their target ratios), targeting an optimal debt ratio may not be a priority for such firms.

Thus, apart from the findings relating to hypothesis H-C: whether unconstrained firms adjust faster toward their targets than constrained firms across both states (which the results now do not seem to support), the overall findings regarding the capital expenditure coverage observations appear to remain the same as before.

4.2.3.3 Financially constrained observations defined according to the debt coverage ratio

When employing the debt coverage ratio as an indicator of financial constraints, the overall conclusions resulting from these observations remain the same as for the original sample. Regardless of the leverage specification used, there were no observations greater than 0.8 in the unconstrained sample. In addition, while adjustment speed estimates did change in certain cases for constrained and unconstrained samples (indicating that removing extreme leverage observations does affect adjustment speed estimates - in accordance with Hovakimian & Li, 2009) - the significance of the speed-of-adjustment estimates for the samples did not differ so much so that they yield clearer results.

The only noticeable difference in findings are those pertaining to hypothesis H-B: where there is some indication that constrained firms appear to be more sensitive in the case of total leverage than unconstrained firms – in support of Halling et al.'s (2011) proposition. (The differences in adjustment speeds across states are slightly (again, not overwhelmingly) higher for constrained firms – although these differences are not significant in some cases.) However, these results do not hold for the long-term leverage and short-term leverage observations, leading to the same overall conclusion as before – no conclusive results.

Overall, the results still present no clear evidence regarding whether firms adjust faster in upturns in relation to downturns. There is still mixed evidence as to whether unconstrained firms are more or less sensitive to changes in macroeconomic conditions relative to constrained firms. In addition, there is no confirmation of the notion that unconstrained firms adjust toward their targets faster in upturns and downturns relative to constrained firms. Thus the overall conclusions remain the same as those for the original sample.

Thus, while it is evident that adjustment speed estimates are sensitive to the inclusion of extreme leverage observations, the results in this particular case are not drastically affected by these observations.

Table 10: Adjustment speed estimates for the full sample before and after removing extreme leverage observations

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Initial sample	Excluding observations >0.8	Initial sample	Excluding observations >0.8	Initial sample	Excluding observations >0.8
Panel A: Total leverage						
Equity Index	0.4881*** (0.1230)	0.8218*** (0.1221)	0.4289*** (0.1324)	0.7647*** (0.1262)	0.0592 p=(0.0007)	0.0571 p=(0.0070)
Term spread	0.2118 (0.1842)	0.4985*** (0.1728)	0.2560 (0.1697)	0.5604*** (0.1584)	-0.0442 p=(0.0328)	-0.0619 p=(0.0037)
GDP	0.3662*** (0.1333)	0.6139*** (0.1398)	0.4240*** (0.1264)	0.6866*** (0.1298)	-0.0618 p=(0.0035)	-0.0727 p=(0.0015)
CPI	0.2544* (0.1516)	0.5502*** (0.1423)	0.2262 (0.1574)	0.5035*** (0.1533)	0.0282 p=(0.1078)	0.0467 p=(0.0224)
Leading Indicator	0.4881*** (0.1374)	0.8240*** (0.1216)	0.4397*** (0.1322)	0.7658*** (0.1254)	0.0489 p=(0.0188)	0.0582 p=(0.0136)
Coincident Indicator	0.3281** (0.1336)	0.6018*** (0.1402)	0.3927*** (0.1267)	0.6768*** (0.1304)	-0.0646 p=(0.0010)	-0.0750 p=(0.0009)
Lagging Indicator	0.4030** (0.1859)	0.7222*** (0.1545)	0.3820** (0.1716)	0.7172*** (0.1420)	0.0210 p=(0.3627)	0.0050 p=(0.8312)
Panel B: Long-term leverage						
Equity Index	0.2287*** (0.0771)	0.0650 (0.0736)	0.2429*** (0.0802)	0.0710 (0.0783)	-0.0142 p=(0.4000)	-0.0060 p=(0.7534)
Term spread	0.2614*** (0.0842)	0.0571 (0.0810)	0.2812*** (0.0793)	0.0909 (0.0768)	-0.0198 p=(0.2513)	-0.0388 p=(0.0642)
GDP	0.2298*** (0.0815)	0.0541 (0.0798)	0.3583*** (0.0859)	0.1690* (0.0866)	-0.1285 p=(<0.0001)	-0.1149 p=(<0.0001)
CPI	0.1919* (0.1014)	0.1609* (0.0923)	0.1462 (0.1113)	0.1135 (0.1034)	0.0457 p=(0.0246)	0.0474 p=(0.0258)
Leading Indicator	0.2486*** (0.0780)	0.0920 (0.0736)	0.2592*** (0.0798)	0.0895 (0.0756)	-0.0106 p=(0.4908)	0.0025 p=(0.8911)
Coincident Indicator	0.2237*** (0.0815)	0.0478 (0.0799)	0.3554*** (0.0859)	0.1666* (0.0868)	-0.1317 p=(<0.0001)	-0.1188 p=(<0.0001)
Lagging Indicator	0.2009** (0.0894)	0.1147 (0.0853)	0.2577*** (0.0846)	0.1864** (0.0809)	-0.0568 p=(0.0220)	-0.0717 p=(0.0029)

Table 10 continued: Adjustment speed estimates for the full sample before and after removing extreme leverage observations

Macroeconomic Indicator	SOA in upturn		SOA in downturn		Difference	
	Initial sample	Excluding observations >0.8	Initial sample	Excluding observations >0.8	Initial sample	Excluding observations >0.8
Panel C: Short-term leverage						
Equity Index	0.9218*** (0.1906)	0.9251*** (0.1882)	0.9309*** (0.2120)	0.9200*** (0.2089)	-0.0091 p=(0.8058)	0.0051 p=(0.8930)
Term spread	1.3375*** (0.2504)	0.6005** (0.2539)	1.2485*** (0.2227)	0.6624*** (0.2285)	0.0890 p=(0.0156)	-0.0619 p=(0.0767)
GDP	0.8536*** (0.1681)	0.8461*** (0.1721)	0.8927*** (0.1636)	0.9067*** (0.1677)	-0.0391 p=(0.2328)	-0.0606 p=(0.1035)
CPI	0.7684*** (0.2013)	0.6509*** (0.1935)	0.7330*** (0.1915)	0.5458*** (0.1895)	0.0354 p=(0.2615)	0.1051 p=(0.0002)
Leading Indicator	0.9351*** (0.1937)	0.8120*** (0.1991)	0.9772*** (0.2116)	0.7859*** (0.2181)	-0.0421 p=(0.1698)	0.0261 p=(0.4136)
Coincident Indicator	0.8567*** (0.1678)	0.8478*** (0.1720)	0.9010*** (0.1634)	0.9141*** (0.1676)	-0.0443 p=(0.1771)	-0.0663 p=(0.0745)
Lagging Indicator	1.1095*** (0.3124)	0.7649*** (0.2775)	1.1030*** (0.2766)	0.7127*** (0.2523)	0.0065 p=(0.0905)	0.0522 p=(0.1457)

The table shows speed-of-adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for the full sample of firms. The reported results are a comparison of adjustment speed estimates before and after extreme leverage ratios (ratios above 0.8) are removed from the sample. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. Significance of the estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. In addition, the differences in speeds-of-adjustment between upturns and downturns are reported, along with p-values to test for the significance of the differences. A significant p-value results in the rejection of the null hypothesis of no difference in adjustment speed between upturns and downturns.

Table 11: Adjustment speed estimates for financially constrained and unconstrained firms before and after removing extreme leverage observations (capital expenditure coverage ratio)

Macroeconomic Indicator	SOA in upturn				SOA in downturn			
	Initial sample		Without leverage observations >0.8		Initial sample		Without leverage observations >0.8	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel A: Total leverage								
Equity Index	0.4652*** (0.0384)	-0.0287 (0.0378)	0.3754*** (0.0381)	1.2511*** (0.0277)	0.4927*** (0.0391)	-0.1034*** (0.0390)	0.4027*** (0.0391)	1.2650*** (0.0250)
Term spread	0.0621 (0.1075)	-0.6589*** (0.0599)	0.0466 (0.0887)	0.5884*** (0.0672)	0.1129 (0.0975)	-0.5882*** (0.0547)	0.0878 (0.0811)	0.6557*** (0.0628)
GDP	0.2733*** (0.0323)	0.0979*** (0.0365)	0.2155*** (0.0322)	0.9827*** (0.0402)	0.3507*** (0.0312)	0.0495 (0.0337)	0.2811*** (0.0313)	1.0518*** (0.0355)
CPI	0.3853*** (0.0671)	-0.4642*** (0.0400)	0.3862*** (0.0663)	1.0496*** (0.0414)	0.4179*** (0.0750)	-0.5011*** (0.0443)	0.4209*** (0.0742)	1.1120*** (0.0409)
Leading Indicator	0.3796*** (0.0420)	-0.0941* (0.0540)	0.2921*** (0.0307)	1.1219*** (0.0507)	0.3562*** (0.0424)	-0.2518*** (0.0585)	0.2660*** (0.0337)	1.0992*** (0.0506)
Coincident Indicator	0.2358*** (0.0296)	0.0979*** (0.0365)	0.1777*** (0.0276)	0.9827*** (0.0402)	0.3352*** (0.0283)	0.0495 (0.0337)	0.2677*** (0.0262)	1.0518*** (0.0355)
Lagging Indicator	0.3435*** (0.0346)	-0.5501*** (0.0468)	0.3320*** (0.0412)	0.2640*** (0.0546)	0.3504*** (0.0373)	-0.5239*** (0.0434)	0.3396*** (0.0416)	0.3842*** (0.0510)
Panel B: Long-term leverage								
Equity Index	0.2130*** (0.0165)	-0.3272*** (0.0245)	0.1476*** (0.0112)	-0.3272*** (0.0237)	0.1930*** (0.0152)	-0.3224*** (0.0242)	0.1180*** (0.0101)	-0.3224*** (0.0233)
Term spread	0.3249*** (0.0182)	-0.4941*** (0.0175)	0.2731*** (0.0152)	-0.4941*** (0.0314)	0.2564*** (0.0176)	-0.4058*** (0.0163)	0.1998*** (0.0147)	-0.4058*** (0.0284)
GDP	0.2271*** (0.0162)	-0.5520*** (0.0342)	0.2746*** (0.0122)	-0.5520*** (0.0364)	0.1794*** (0.0163)	-0.3883*** (0.0365)	0.2341*** (0.0118)	-0.3883*** (0.0368)
CPI	-0.0267 (0.0270)	0.0839*** (0.0230)	-0.0270 (0.0271)	0.0839*** (0.0252)	-0.1549*** (0.0274)	0.1723*** (0.0234)	-0.1598*** (0.0269)	0.1724*** (0.0272)
Leading Indicator	0.2212*** (0.0192)	-0.4259*** (0.0239)	0.1369*** (0.0184)	-0.4259*** (0.0246)	0.2189*** (0.0182)	-0.3737*** (0.0238)	0.1341*** (0.0172)	-0.3737*** (0.0256)
Coincident Indicator	0.2076*** (0.0168)	-0.5520*** (0.0342)	0.1438*** (0.0134)	-0.5520*** (0.0364)	0.1835*** (0.0167)	-0.3883*** (0.0365)	0.1217*** (0.0135)	-0.3883*** (0.0368)
Lagging Indicator	0.1574*** (0.0232)	-0.2431*** (0.0357)	0.1579*** (0.0232)	-0.2431*** (0.0276)	0.0373** (0.0168)	-0.067291** (0.0330)	0.0372** (0.0163)	-0.0673** (0.0260)

Table 11 continued: Adjustment speed estimates for financially constrained and unconstrained firms before and after removing extreme leverage observations (capital expenditure coverage ratio)

Macroeconomic Indicator	SOA in upturn				SOA in downturn			
	Initial sample		Without leverage observations >0.8		Initial sample		Without leverage observations >0.8	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel C: Short-term leverage								
Equity Index	1.9152*** (0.0299)	1.2739*** (0.0736)	1.9152*** (0.0299)	-	2.2787*** (0.0338)	1.1801*** (0.0778)	2.2787*** (0.0338)	-
Term spread	0.3542*** (0.0469)	0.2958*** (0.1029)	0.3542*** (0.0470)	-	0.4727*** (0.0413)	0.5190*** (0.1021)	0.4727*** (0.0413)	-
GDP	0.6825*** (0.0593)	1.6079*** (0.0923)	0.6825*** (0.0593)	-	1.0237*** (0.0481)	1.5518*** (0.0790)	1.0237*** (0.0481)	-
CPI	0.1676* (0.0938)	0.6531*** (0.0821)	0.1676* (0.0938)	-	0.3167*** (0.0918)	0.5796*** (0.0765)	0.3167*** (0.0918)	-
Leading Indicator	1.5917*** (0.0854)	1.1319*** (0.0939)	1.5917*** (0.0854)	-	1.7760*** (0.0992)	0.9995*** (0.1062)	1.7796*** (0.0992)	-
Coincident Indicator	0.6802*** (0.0608)	1.6079*** (0.0923)	0.6802*** (0.0608)	-	1.0343*** (0.0492)	1.5518*** (0.0790)	1.0343*** (0.0492)	-
Lagging Indicator	0.5356*** (0.0889)	0.8005*** (0.1687)	0.5356*** (0.0889)	-	0.5470*** (0.0805)	0.7741*** (0.1590)	0.5470*** (0.0805)	-

The table shows speed-of-adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for unconstrained and constrained firms. The reported results are a comparison of adjustment speed estimates before and after extreme leverage ratios (ratios above 0.8) are removed from the sample. These results pertain to the case where constrained and unconstrained firms are classified according to the capital expenditure coverage ratio. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. Significance of the estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. A value of "-" indicates that the regressions were not re-estimated as there were no leverage observations above 0.8 in that particular case.

Table 12: Adjustment speed estimates for financially constrained and unconstrained firms before and after removing extreme leverage observations (debt coverage ratio)

Macroeconomic Indicator	SOA in upturn				SOA in downturn			
	Initial sample		Without leverage observations >0.8		Initial sample		Without leverage observations >0.8	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel A: Total leverage								
Equity Index	-0.1992*** (0.0220)	0.8772*** (0.1416)	-	1.1046*** (0.1360)	-0.1883*** (0.0208)	0.8305*** (0.1439)	-	1.0810*** (0.1420)
Term spread	0.0713** (0.0332)	0.9111*** (0.2045)	-	0.6206*** (0.1939)	0.0254 (0.0304)	0.9115*** (0.1895)	-	0.6880*** (0.1782)
GDP	-0.1511*** (0.0370)	0.8748*** (0.1736)	-	0.8374*** (0.1650)	-0.1760*** (0.0325)	0.8800*** (0.1629)	-	0.9083*** (0.1533)
CPI	-0.2796*** (0.0580)	0.7755*** (0.1096)	-	0.7609*** (0.1997)	-0.3039*** (0.0633)	0.7195*** (0.1971)	-	0.7144*** (0.2076)
Leading Indicator	-0.1458*** (0.0349)	0.8586*** (0.1412)	-	1.0781*** (0.1406)	-0.1393*** (0.0312)	0.8203*** (0.1417)	-	1.0591*** (0.1430)
Coincident Indicator	-0.2522*** (0.0336)	0.8748*** (0.1736)	-	0.8374*** (0.1650)	-0.2316*** (0.0295)	0.8800*** (0.1629)	-	0.9083*** (0.1533)
Lagging Indicator	-0.1756*** (0.0277)	0.9666*** (0.2053)	-	0.7737*** (0.2049)	-0.1886*** (0.0278)	0.9439*** (0.1956)	-	0.7988*** (0.1980)
Panel B: Long-term leverage								
Equity Index	-0.0825*** (0.0078)	-0.0217 (0.0867)	-	-0.0777 (0.1064)	-0.1016*** (0.0072)	-0.0592 (0.0833)	-	-0.0752 (0.1021)
Term spread	-0.0508*** (0.0164)	-0.0036 (0.0799)	-	-0.1061 (0.0993)	-0.1174*** (0.0162)	0.02684 (0.0825)	-	-0.0636 (0.1025)
GDP	-0.0840*** (0.0174)	-0.0775 (0.0864)	-	-0.1353 (0.1011)	-0.1628*** (0.0174)	-0.0166 (0.0816)	-	-0.0260 (0.0993)
CPI	-0.1580*** (0.0185)	0.4209*** (0.1172)	-	0.3516*** (0.1240)	-0.1781*** (0.0218)	0.4119*** (0.1259)	-	0.3697*** (0.1290)
Leading Indicator	-0.0282*** (0.0040)	-0.0137 (0.0818)	-	-0.0680 (0.1070)	-0.0825*** (0.0036)	-0.0273 (0.0798)	-	-0.0639 (0.1016)
Coincident Indicator	-0.1135*** (0.0119)	-0.0775 (0.0864)	-	-0.1353 (0.1011)	-0.1397*** (0.0124)	-0.0166 (0.0816)	-	-0.0260 (0.0993)
Lagging Indicator	-0.0983*** (0.0084)	0.3242*** (0.1036)	-	0.1254 (0.1198)	-0.1256*** (0.0114)	0.3389*** (0.0979)	-	0.2197* (0.1223)

Table 12 continued: Adjustment speed estimates for financially constrained and unconstrained firms before and after removing extreme leverage observations (debt coverage ratio)

Macroeconomic Indicator	SOA in upturn				SOA in downturn			
	Initial sample		Without leverage observations >0.8		Initial sample		Without leverage observations >0.8	
	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained	Constrained
Panel C: Short-term leverage								
Equity Index	0.0666*** (0.0186)	1.1243*** (0.1619)	-	1.0169*** (0.1565)	0.1922*** (0.0231)	1.1332*** (0.1815)	-	0.9368*** (0.1757)
Term spread	-0.1292*** (0.0482)	0.9320*** (0.2399)	-	1.0044*** (0.2391)	-0.1551*** (0.0408)	0.9770*** (0.2114)	-	1.0559*** (0.2108)
GDP	-0.3183*** (0.0219)	1.050*** (0.1447)	-	1.1851*** (0.1438)	-0.2721*** (0.0263)	1.1021*** (0.1444)	-	1.1834*** (0.1438)
CPI	-0.5357*** (0.0514)	0.9215*** (0.2020)	-	0.9511*** (0.1934)	-0.5382*** (0.0491)	0.7836*** (0.1887)	-	0.8093*** (0.1796)
Leading Indicator	0.2249*** (0.0386)	1.0761*** (0.1844)	-	0.9237*** (0.1835)	0.3858*** (0.0504)	1.0745*** (0.2054)	-	0.8447*** (0.2059)
Coincident Indicator	-0.3283*** (0.0216)	1.050*** (0.1447)	-	1.1851*** (0.1438)	-0.2405*** (0.0273)	1.1021*** (0.1444)	-	1.1834*** (0.1438)
Lagging Indicator	-0.7766*** (0.0448)	1.0165*** (0.3012)	-	1.1044*** (0.2974)	-0.7217*** (0.0414)	0.9576*** (0.2666)	-	1.0295*** (0.2608)

The table shows speed-of-adjustment (SOA) estimates (coefficients on the interaction terms of macroeconomic variable dummies with the target leverage term) for market upturns and downturns as defined by various macroeconomic indicators/variables for unconstrained and constrained firms. The reported results are a comparison of adjustment speed estimates before and after extreme leverage ratios (ratios above 0.8) are removed from the sample. These results pertain to the case where constrained and unconstrained firms are classified according to the debt coverage ratio. Regression results are reported separately for each regression. Panels A, B and C report regression results from using the total, short-term and long-term leverage ratios respectively as a dependent variable. GMM standard errors are reported in brackets below these figures. Significance of the estimates at the 1%, 5% and 10% levels are denoted by ***, ** and * respectively. A value of "-" indicates that the regressions were not re-estimated as there were no leverage observations above 0.8 in that particular case.

Table 13: Differences in adjustment speeds across upturns and downturns before and after removing extreme leverage observations

Total leverage observations							
	Mkt	**Term**	**GDP**	**Coin**	**Lead**	**Lag**	**CPI**
Panel A: Financial constraints defined according to capital expenditure coverage ratio							
Unconstrained	-0.0275 p=(<0.0001)	-0.0508 p=(<0.0001)	-0.0774 p=(<0.0001)	-0.0994 p=(<0.0001)	0.0234 p=(0.0005)	-0.0069 p=(0.0110)	-0.0326 p=(0.0025)
Unconstrained excluding obs. >0.8	-0.0273 p=(<0.0001)	-0.0412 p=(<0.0001)	-0.0656 p=(<0.0001)	-0.0900 p=(<0.0001)	0.0261 p=(0.0010)	-0.0076 p=(0.0062)	-0.0347 p=(0.0013)
Constrained	0.0747 p=(<0.0001)	-0.0707 p=(<0.0001)	0.0484 p=(0.0002)	0.0484 p=(0.0002)	0.1577 p=(<0.0001)	-0.0262 p=(<0.0001)	0.0369 p=(<0.0001)
Constrained excluding obs. >0.8	-0.0139 p=(0.0228)	-0.0673 p=(<0.0001)	-0.0691 p=(<0.0001)	-0.0691 p=(<0.0001)	0.0227 p=(<0.0001)	-0.1202 p=(<0.0001)	-0.0624 p=(<0.0001)
Panel B: Financial constraints defined according to debt coverage ratio							
Unconstrained	-0.0109 p=(0.0095)	0.0459 p=(<0.0001)	0.0249 p=(0.0002)	-0.0206 p=(0.0004)	-0.0065 p=(0.1506)	0.0130 p=(0.1124)	0.0243 p=(<0.0001)
Unconstrained excluding obs. >0.8	-	-	-	-	-	-	-
Constrained	0.0467 p=(0.0149)	-0.0004 p=(0.9843)	-0.0052 p=(0.7834)	-0.0052 p=(0.7834)	0.0383 p=(0.0474)	0.0227 p=(0.3129)	0.0560 p=(0.0059)
Constrained excluding obs. less >0.8	0.0236 p=(0.2904)	-0.0674 p=(0.0034)	-0.0709 p=(0.0018)	-0.0709 p=(0.0018)	0.0190 p=(0.3942)	-0.0251 p=(0.2540)	0.0465 p=(0.0262)

Table 13 continued: Differences in adjustment speeds across upturns and downturns before and after removing extreme leverage observations

Long term leverage observations							
	Mkt	**Term**	**GDP**	**Coin**	**Lead**	**Lag**	**CPI**
Panel C: Financial constraints defined according to capital expenditure coverage ratio							
Unconstrained	0.0200 p=(<0.0001)	0.0685 p=(<0.0001)	0.0477 p=(<0.0001)	0.0241 p=(<0.0001)	0.0023 p=(0.2529)	0.1201 p=(<0.0001)	0.1282 p=(<0.0001)
Unconstrained excluding obs. >0.8	0.0296 p=(<0.0001)	0.0733 p=(<0.0001)	0.0405 p=(<0.0001)	0.0221 p=(<0.0001)	0.0028 p=(0.1927)	0.1207 p=(<0.0001)	0.1328 p=(<0.0001)
Constrained	-0.0048 p=(<0.0001)	-0.0083 p=(0.6855)	-0.1337 p=(<0.0001)	0.3331 p=(<0.0001)	0.7996 p=(<0.0001)	-0.1758 p=(0.0001)	-0.0884 p=(0.0001)
Constrained excluding obs. >0.8	-0.0048 p=(0.0190)	-0.0883 p=(<0.0001)	-0.1637 p=(0.0001)	-0.1637 p=(0.0001)	-0.0522 p=(0.0001)	-0.1758 p=(0.0001)	-0.0885 p=(<0.0001)
Panel D: Financial constraints defined according to debt coverage ratio							
Unconstrained	0.0191 p=(<0.0001)	0.0666 p=(<0.0001)	0.0788 p=(<0.0001)	0.0262 p=(<0.0001)	0.0543 p=(<0.0001)	0.0273 p=(<0.0001)	0.0201 p=(<0.0001)
Unconstrained excluding obs. >0.8	-	-	-	-	-	-	-
Constrained	0.0375 p=(0.0071)	-0.0304 p=(0.1201)	-0.0609 p=(0.0002)	-0.0609 p=(0.0002)	0.0136 p=(0.3845)	-0.0147 p=(0.6046)	0.0090 p=(0.6016)
Constrained excluding obs. less >0.8	-0.0025 p=(0.8726)	-0.0425 p=(0.0123)	-0.1093 p=(<0.0001)	-0.1093 p=(<0.0001)	-0.0041 p=(0.8141)	-0.0943 p=(0.0003)	-0.0181 p=(0.2912)

Table 13 continued: Differences in adjustment speeds across upturns and downturns before and after removing extreme leverage observations

Short term leverage observations							
	Mkt	**Term**	**GDP**	**Coin**	**Lead**	**Lag**	**CPI**
Panel E: Financial constraints defined according to the capital expenditure coverage ratio							
Unconstrained	-0.3635 p=(<0.0001)	-0.1185 p=(<0.0001)	-0.3412 p=(<0.0001)	-0.3541 p=(<0.0001)	-0.1843 p=(<0.0001)	-0.0114 p=(0.3803)	-0.1491 p=(<0.0001)
Unconstrained excluding obs. >0.8	-0.3635 p=(<0.0001)	-0.1185 p=(<0.0001)	-0.3412 p=(<0.0001)	-0.3541 p=(<0.0001)	-0.1879 p=(<0.0001)	-0.0114 p=(0.3803)	-0.1491 p=(<0.0001)
Constrained	0.0938 p=(<0.0001)	-0.2232 p=(<0.0001)	0.0561 p=(0.0075)	0.0561 p=(0.0075)	0.1324 p=(<0.0001)	0.0264 p=(0.0170)	0.0735 p=(<0.0001)
Constrained excluding obs. >0.8	-	-	-	-	-	-	-
Panel F: Financial constraints defined according to the debt coverage ratio							
Unconstrained	-0.1256 p=(<0.0001)	0.0259 p=(0.0006)	-0.0460 p=(0.0003)	-0.0878 p=(<0.0001)	-0.1609 p=(<0.0001)	-0.0549 p=(<0.0001)	0.0025 p=(0.4943)
Unconstrained excluding obs. >0.8	-	-	-	-	-	-	-
Constrained	-0.0089 p=(0.8086)	-0.9770 p=(0.2331)	-0.0521 p=(0.1339)	-0.0521 p=(0.1339)	0.0016 p=(0.9572)	0.0589 p=(0.1795)	0.1379 p=(<0.0001)
Constrained excluding obs. less >0.8	0.0801 p=(0.0391)	-0.0515 p=(0.1773)	0.0017 p=(0.9653)	0.0017 p=(0.9653)	0.0790 p=(0.0171)	0.0749 p=(0.1070)	0.1418 p=(<0.0001)

The table reports a comparison of the differences in adjustment speeds (differences in coefficient estimates) across market upturns and downturns for financially constrained and constrained firms. The results show a comparison of differences before and after extreme leverage observations (leverage ratios above 0.8) are removed from the sample. P-values are reported beneath the differences. This determines whether or not the null hypothesis of no difference between the speeds of adjustment (difference in the means of the coefficients) in upturns and downturns should be rejected.

4.2.4 RESULTS AFTER CHANGING LAGS

According to the SARB, the lagging and leading indicators may follow or precede changes in economic conditions by far more than a year in certain cases. Thus, for robustness, the relevant regressions were re-estimated using a lead of 2 years for the lagging indicator and a lag of 2 years for the leading indicator to define the macroeconomic state at time t (the current period). Similarly, the term spread may sometimes forecast economic conditions for more than a year ahead (Estrella & Mishkin, 1996). Thus the regressions were re-estimated using a lag of 2 periods for the term spread in order to assess whether clearer results were obtained (in the event that the conditions were not correctly identified previously).

The initial results were re-examined using the re-estimated results for the lagging indicator, leading indicator and term spread in place of the previous estimates obtained for these indicators. The re-estimated results are shown in tables I, II and III of Appendix C. (The observations relating to the other indicators are not reported again.) When analysing these results it is evident that the adjustment speed estimates are (as expected) considerably sensitive to the definition of macroeconomic states. The adjustment speed estimates reported in this case are substantially lower for the full sample than previously estimated. However, although the estimates and their significance have changed in most cases, their changes do not affect the overall conclusions found previously.

This concludes the analysis of the results. A summary and conclusion of the findings as well as limitations and suggestions for future research are presented in the following chapter.

CHAPTER 5: CONCLUSIONS OF THE RESEARCH

5.1 SUMMARY AND CONCLUSIONS

This paper set out to assess whether macroeconomic conditions affect the speed at which South African firms adjust toward their target leverage ratios. In addition, it was assessed whether these adjustment dynamics differ depending on whether a firm is financially constrained or not, and whether the findings differed based on the definition of debt used.

Three hypotheses (or rather, research questions) were posed, based on the findings of prior research, in order to examine this: these hypotheses were established to address the following issues:

- Whether firms adjust faster in favourable macroeconomic conditions, or upturns relative to unfavourable macroeconomic conditions, or downturns (irrespective of whether they are financially constrained or not).
- Whether financially constrained firms tend to be more sensitive to changes in macroeconomic conditions than financially unconstrained firms.
- Whether financially unconstrained firms tend to adjust toward their target leverage ratios faster than unconstrained firms.

These issues were addressed using the Arellano-Bover GMM estimation technique. In addition, the dynamic panel adjustment model used was adapted (as per Hovakimian and Li, 2009) to avoid the potential effects of mean reversion due to the fractional nature of leverage ratios.

Judging by the initial results, the findings of the study shows some indication that the speed at which firms adjust toward their targets does change in relation to changes in macroeconomic conditions: most adjustment speed estimates found were highly significant, and most economic indicators suggest that firms adjust at a significantly higher or lower speed in certain states than others. However, the manner in which adjustment speeds change is highly sensitive to the definition of macroeconomic conditions used. The full sample results are somewhat more in favour of the implications of Hess and Immenkötter's (2006) model, and the findings of Rubio and Sogorb (2011): there is evidence to suggest that firms generally appear to adjust faster in macroeconomic downturns than upturns. This suggests that firms are possibly aware that the costs of deviating from optimal leverage are higher in such conditions, and thus adjust faster in order to avoid such costs.

However, the results do not support the findings of Cook and Tang (2010) who find that firms adjust faster towards their targets in good macroeconomic states, regardless of whether or not a firm is financially constrained. There is evidence to suggest that the adjustment dynamics of unconstrained firms differ from that of constrained firms, as results in certain cases clearly differ for both samples. Indeed, in certain cases negative adjustment speeds of well over 100% are observed, possibly indicating active adjustment away from the target and contradicting trade-off theory. However, the results are sensitive to the definition of financial constraints used. Thus there is inconclusive evidence regarding Halling et al.'s conjecture that financially constrained firms are more sensitive to changes in macroeconomic states relative to constrained firms. In addition, somewhat in accordance with Drobetz et al. (2007) (2011), this paper finds no conclusive evidence to support Korajczyk and Levy's (2003) hypothesis and findings of Cook and Tang (2010) - that constrained firms adjust towards their targets more slowly than unconstrained firms.

Lastly, adjustment speed estimates appear to differ based on the definition of debt used. The general pattern observed is that firms appear to adjust considerably faster toward short-term leverage targets in comparison to total or long-term debt targets. This suggests that firms perhaps perceive the costs associated with short-term debt to be lower relative to the benefits. Alternatively, it suggests the costs of deviating from these targets may be high. In addition, this may be due to the fact that South African firms possess relatively low levels of debt (Correia and Cramer, 2008) – making their target debt levels lower - thus enabling them to adjust faster to their optimal short-term debt levels. Alternatively, as Booth et al. (2001) observe (as mentioned previously): firms in developing countries (such as South Africa) are more reliant on short-term debt. Thus adjustment for short-term debt could perhaps be more prevalent than long-term debt – which could explain the increased adjustment speeds for short-term debt

These conclusions were largely robust to deleting extreme leverage observations, as well as re-defining macroeconomic states to account for nature of certain macroeconomic indicators.

However, the findings do seem to highlight the sensitivity of dynamic partial adjustment models to changes in specifications – as mentioned by Hovakimian and Li, (2009), and Iliev and Welch, (2010), Elsas and Fliorysiak, (2011) – among others.

The observed results could be due to various reasons. Firstly, as mentioned previously, Halling et al. (2011) conjecture that the decrease in adjustment speeds during recessions is less extreme in countries where public markets are well developed. They add that this is due to the fact that developed markets are less subject to freezes in the event of a recession – meaning firms can adjust to target levels more readily. As the South African economy - including the stock exchange – has become more developed in recent years, it could mean that the effects of macroeconomic conditions on firms' adjustment dynamics have become less pronounced over time. Thus, although firms may be adjusting in response to macroeconomic changes, the transition may be less severe and therefore less apparent.

Secondly - as noted by Rubio and Sogorb (2011) - the observed patterns in adjustment speeds found in previous studies may not be a response to macroeconomic conditions, but simply the fact that firms which are further away from their targets are adjusting faster in order to meet these targets. This may merely happen to coincide with unfavourable macroeconomic conditions. Alternatively it could be argued that, as the distance away from target for firms has not been explicitly incorporated into this study, the potential effects of this could be confounding the possible relationship between macroeconomic conditions and firms' adjustment speed.

Thirdly, the largely negative and significant adjustment speeds observed suggest that perhaps certain firms do not regard targeting a strict debt ratio a priority at all. Rather, the capital structure choice of such firms may be driven largely by pecking-order and market timing-related concerns.

Lastly, many prior studies (Drobetz et al., 2007; Cook and Tang, 2010; Halling et al., 2011) utilise the coefficient on lagged leverage ratios to discern the speed of adjustment – which may simply be reflecting mean reversion rather than true adjustment speed estimates. This calls into question the clarity of the results found by these authors. Similarly, it may explain the lack of clarity in the results of the current study.

5.2 LIMITATIONS OF THE STUDY

Due to the lack of available data (both firm-level accounting data and macroeconomic data) the sample size examined was small. Also, it has been acknowledged that, for various reasons, only firms that have been listed throughout the period of study have been included in the dataset – thus it may suffer from survival bias. In addition, due to data availability, annual data was chosen for the macroeconomic variables examined. As annual data is relatively smoothed, it may neglect to pick up significant changes in macroeconomic conditions that occur during a given year. In contrast, however, more frequent observations could introduce noise in the dataset; this would lead to the inclusion of small, insignificant changes in macroeconomic conditions – also leading to inaccurate results.

In additions, studies have previously reported that classifying financially constrained firms on the basis of cash flow ratios alone may not be an entirely accurate measure of financial constraints. However, as financially constrained firms were not the primary focus of this paper, a more simplistic measure was chosen. In addition, more complex measures could restrict the sample size to the extent that the results would not be statistically interpretable. Lastly, as accounting standards have changed over the years, leverage classifications may have been affected. Thus the results must be interpreted with caution. These are suggestions for future research to improve upon.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

A study encompassing a longer time-period may yield different results. In addition, there are a variety of macroeconomic factors known to affect leverage in capital structure (which could not be included due to lack of data). A study incorporating the effect of these alternative macroeconomic factors on leverage ratios in South Africa would perhaps be insightful.

Furthermore, certain studies have suggested that macroeconomic factors may indirectly affect leverage through their effect on firm-characteristic variables. Thus more insight on adjustment speeds may be gained through examining the interactive effects of firm-characteristic variables and macroeconomic variables on leverage.

Also, research suggests that any relation between adjustment speeds and macroeconomic conditions is merely a consequence of the fact that firms that are farther away from their targets adjust faster (Cook & Tang; 2010, Rubio & Sogorb; 2011). Indeed, various authors also suggest that speed of adjustment is directly influenced by whether a firm is under- or over-leveraged relative to its target (Hovakimian, Opler and Titman, 2001; Byoun, 2008; Faulkender et al., 2011). Thus, a study examining adjustment speed in relation to both a firm's distance from target, whether or not the firm is under- or over leveraged relative to its target and macroeconomic conditions would be of interest.

In addition, recent research suggests that using standard estimators – including GMM estimators - to estimate speed of adjustment may result in biases as these models fail to account for the observed heterogeneity in speeds of adjustment across firms – they assume that all firms adjust toward their target at the same pace (Elsas and Florysiak, 2011). The issue of heterogeneity may also have implications for financially constrained firms; Elsas and Florysiak (2011) find that speed of adjustment is highest for firms with high default risk or expected bankruptcy costs. This may explain the lack of clear findings in the current study. Thus a model that corrects for this may yield clearer results.

5.4 OVERALL CONCLUSION

This paper set out to assess whether macroeconomic conditions affect the speed at which South African firms adjust towards their target leverage ratios. The secondary concern was whether these findings differed according to the financial status of a firm. It was also assessed whether these findings were robust to various leverage definitions. The results show some indication that macroeconomic conditions have an effect on the adjustment behaviour of firms. In addition, although not overwhelmingly, there is evidence to suggest that firms adjust faster in unfavourable macroeconomic states. There is also some indication that financial constraints affect adjustment behaviour. Lastly, higher adjustment speeds were generally found for short-term debt relative to other debt types. However, the results are highly sensitive to the definition of financial constraints employed and the inclusion of extreme leverage observations.

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