THE UNIVERSITY OF HULL

Capital Structure and Market Timing in the UK: Empirical Evidence from UK Firms

being a Thesis submitted for the Doctor of Philosophy in Finance in the University of Hull

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Abstract

This thesis studies capital structure of non-financial firm in the UK. It specifically examines the market timing theory of capital structure in the three different empirical chapters. Given that the market timing theory is new relative to the trade-off and pecking order explanations of firms' capital structure decisions; it provides an interesting discourse for the wider finance community. The thesis empirically tests the theory and provides evidence as well as theoretical implications for practising managers.

The first empirical chapter looks at the timing of IPOs and SEOs in the UK as well as the reversal and persistence of timing attempts. Consistent with the findings in Barker and Wurgler (2002) we find that firms do time IPOs as well as SEOs. However, similar to Alti (2006), we do not find that the effect is persistent. In addition to that, we find that the motive for timing SEOs are distinctively different from the motive for IPO managers. Although timers in both markets are inferior (they are less profitable and have a smaller growth frontier), SEO firms appear to be over-levered and their timing attempts appear to be motivated by reaching a target level. The findings in this chapter lay out an interesting avenue that provides opportunities for future research work.

The second empirical chapter studies the timing of issues as well as repurchases. Similar to Elliot et al. (2007) we use a direct measure of equity mispricing to measure how firms adjust security issues to reflect equity mispricing. Consistent with their findings in the US market, we find that firms increase debt issues during periods of undervaluation and equity issues during period of overvaluation to finance their deficit. We further investigate the impact of equity mispricing on repurchasing activities. The findings confirm those of Oswald and Young (2004) where firms repurchase activities are driven by equity mispricing and contradict Rau and Vermaelan (2002) where repurchases in the UK are tax driven. I further find that financial constraints play a critical role in timing of issues and repurchases. Constrained firms are more sensitive to equity mispricing and thus time the market more evidently. In addition to that, building from the work in Warr et al (2011) I find that firms are inclined to time security issues and repurchases to reach their target leverage levels.

The third empirical chapter studies the probabilities of firms issuing and repurchasing securities to time periods of equity mispricing. I find that firms time issues and thus rely on debt issues during periods of undervaluation (and vice versa). This action leads them to deviate further from target levels. This is an intuitive finding and supports conclusions derived in Hovakimian (2006) where firms that set target leverage levels also engage in market timing. Similar to Huang and Ritter (2009) I find that equity mispricing drive the issue decision as well as the issue choice. Building on the work of Hovakimian et al. (2001) I also find that issue size is also driven by market timing considerations. Further to that I also find that equity mispricing similarly influences on the repurchasing decision, size and choice of repurchases. Contributing further, I find that firms decision to issue equity accompanied by reducing debt (or issue debt accompanied by repurchasing equity) are more likely to be driven by equity mispricing than pure issue or repurchase decisions, suggesting that managers do try to lower overall cost of capital by switching to a relatively cheaper source of financing.

In brief this thesis provides empirical evidence that equity market timing influences capital structure decisions. In support of the market timing theory, I find that managers do indeed time security issues and repurchase securities to reflect equity mispricing. Their timing motivations seem to be driven by targeting behaviour and also financial capacity. I further find that managers substitute one form of financing with another due to market timing considerations. Further research into debt market timing such as Doukas et al. (2011) might shed further light into managerial timing decisions and its impact on capital structure of firms. Comparing both views simultaneously would also provide a more complete and insightful understanding of capital structure.

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Chapter 1 : Introduction

1.1 Introduction

This document is a PhD thesis entitled "Capital Structure and Market Timing in the UK: Empirical Evidence from UK Firms". It sets forth the parameters of the study, and encompasses the background and context of the study; problem statements that explain the rationale and justification for the study; the purposes of the study based on the research questions; the scope and limitation of the study; a review of relevant literature; an account of the research methodology; and, finally the outcome of the study.

1.2 Background of the Study

The capital structure of a company comprises a mixture of different forms of financing. The ultimate goal of the policy adopted when raising capital by combining different sets of securities would be to maximise firm value. Several theories have been put forth to explain observed capital structure such as the trade-off theory, the pecking order and the managerial entrenchment theory. Recently a new theory of capital structure has developed and received much attention from researchers known as market timing. All these theories attempt to explain the motivations behind managers' choice of a given capital structure.

The market timing theory of capital structure stems from the work of Baker and Wurgler (2002). The theory that they present states that capital structure evolves as the cumulative outcome of past attempts to time the market. The authors find a negative relationship between market-to-book in year t-1 and leverage in year t. High values of market-to-book are associated with less leverage, and low market-to-book values are associated with higher ratios of debt-to-total assets. A new variable that summarizes the historical variation in market valuations is added to the other determinants of capital structure which is the "external finance weighted-average" market-to-book ratio. The external finance weighted-average is economically and statistically significant when used in a multivariate regression

with leverage as the dependent variable. It is so, even when the one period lagged market-to-book is included in the regression. The historical value is stronger and more consistent. A test of persistence shows that the historical influence of market-to-book lasts for up to ten years.

1.3 Problem Statements

There are three main areas of interest in this study that serve to expand the literature in the area of capital structure. They are:

1.3.1 Market Timing in the IPO and SEO Market

This area of research has drawn a lot of attention even before the proposed theory by Baker and Wurgler (2002). The idea of market conditions having an impact on capital structure was investigated by Marsh (1982) where past history of security prices are seen to influence the choice of debt and equity issuance. Asquith and Mullins (1986) show that companies tend to issue equity after large increases in their stock prices and abstain from issuing equity when prices are falling. In their survey, Graham and Harvey (2001) found that managers admit that recent stock price increase was an important factor affecting the decision to issue equity. This indicates that managers attempt to time the market.

Managers attempt to time the market because they perceive or belief that there is a window of opportunity to issue securities. Due to market imperfections as well irrationality of different agents, there are arbitrage opportunities that the managers attempt to exploit. Much of the literature has focused on the US market and thus to fill in the gap, this study will look at UK firms. This study isolates the IPO and SEO event and identifies timers as firms that issue during hot markets. If managers are able to identify periods of favourable equity market conditions and issue during these periods, they would be lowering cost of equity capital and thus increasing firms' value as well as delivering value to the shareholders. The study will look at firms that issue in the hot and cold markets, the firms specific characteristics of timers versus non-timers, the impact of timing attempts on capital structure in the short and long run.

1.3.2 Market Timing, Financial Constraints and Targeting Behaviour

The market timing literature received a lot of attention since Baker and Wurgler (2002). Many studies have provided support as well as contention for their findings. Baker and Wurgler (2002) find that market timing has an economical and statistically significant effect. Hovakimian (2006) contests their findings and shows that although firms do time the equity market, their effects are economically small and short lived. In another recent study, Elliot et al. (2007) find that firms do indeed time the equity market and the effects are economically and statistically significant.

This study will look at the timing of issuing as well repurchasing behaviour. If managers are timing issues, they would also be inclined to time repurchases of securities. Further to that, financial flexibility may also limit or drive timing behaviour. Thus, this thesis will question the assumption in the initial model of issuing and repurchasing that firms do not face any constraints when timing issues as well as repurchases. In addition the study will also examine whether managers are timing security issues and repurchases to coincide with a pre-determined target leverage level.

1.3.3 Deviation from Target Levels and Security Choice

This part of the thesis looks at timing and targeting behaviour in a contextual framework where managers time security issues as well as consider targeting behaviour simultaneously. Hovakimian (2004) looks at this issue and finds that firms that have a target ratio can engage in timing the equity market. Warr et al (2011) further show that firms adjust their issues to reflect equity mispricing which in turn influences speed of adjustment to target levels. Their results reveal that firms that are over-levered (under-levered) and whose equities are over-valued (under-valued) adjust faster to target levels.

Given the developments in the literature, this study proposes an alternative view where firms increase (decrease) debt levels during periods of undervaluation (overvaluation) of equity. This results from managers timing the equity markets and leads them to temporarily deviate from their target leverage levels. Thus timing activities would be a significant determinant of deviation from target levels. Previous studies assumes that the issuing and repurchasing decision in exogenous to the type of security issue. This thesis further considers issues and repurchases by endogenizing the issue and repurchases decision and

proposes a two step issue (repurchase) decision based on Huang and Ritter (2009). Building on the work of Baker and Wurgler (2002) I further propose that managers not only actively time equity issues to finance their deficit, but they also swap one form of capital for another (i.e. retiring debt and issuing equity during periods of overvaluation and vice-versa). Given the nature of this empirical tests, conditions in the debt market are assumed to be constant (cost of debt is assumed to be constant throughout the sample period).

1.4 Research Questions

The following three main groups of questions form the basis and core of this research:

1) Do firms time the IPO and SEO market?
   Are there any quality differences between hot and cold market issuers?
   Do firms undo timing attempts in subsequent years?
2) Do firms increase equity (debt) issues during periods of equity overvaluation (undervaluation) to finance their deficit?
   Do firms also time security repurchases?
   Does financial flexibility (financial constraints) influence timing behaviour?
   Is timing behaviour guided (limited) by aims of reaching a target leverage level?
3) Does timing behaviour cause firm to deviate from target levels?
   Does equity mispricing drive the issue versus repurchase choice?
   Do firms actively swap one form of financing for another to reflect equity mispricing?

1.5 Overview of sample selection, data and research method

This thesis employs quantitative research methods. It examines three different issues in the market timing area of capital structure. Data for all the empirical chapters are obtained from Datastream. In addition to that the analysis for the first empirical chapter is also enriched with additional IPO and SEO data from the London Stock Exchange. Data obtained from the London Stock Exchange is then matched to the dataset of UK firms available in

Datastream. Consistent with the literature of capital structure, all financial firms are excluded from the sample as the balance sheets of these firms are often highly leverage causing the sample to be skewed and biased. Further eliminations of outliers are as detailed in each chapter.

The first empirical chapter is mainly studying two main events (the IPO and SEO event) and thus the analysis is mainly cross-sectional in nature. This is to investigate and understand the nature of these two events. It utilises regular OLS with industry dummies in the regressions. The significance levels of the coefficients are measured using White (1980) standard errors. The second empirical chapter mainly uses unbalanced panel data and the regressions are done using fixed effects with clustering at firm level. The significance levels are measured using Rogers (1993) standard errors. The third empirical chapter also uses unbalanced panel data and regressions are using fixed effects, sequential and multinomial logit. The regressions are also done with clustering at firm level and significance levels are measured using Rogers (1993) standard errors. Analysis was done using Stata and PcGive.

1.6 Major Findings and Contributions of the Thesis

The examination of the three different research questions as detailed above provides some interesting answers and implications for the market timing theory of capital structure. It provides insights into the timing of the IPO and SEO phenomenon, questions firms' capacity to time the equity market and looks at timing attempts in a framework where firms operate within a reasonable distance from target leverage levels.

Firstly, the third chapter looks at the timing of IPOs and SEOs in the UK. Prior studies (Baker and Wurgler, 2002 and Alti, 2006) were mainly focused on the US market. My empirical investigations show that managers attempt to time both the IPO and SEO market in the UK. A clear trend of hot and cold markets can be observed for both events. Looking at the IPO event I find that managers raise more proceeds during hot markets than their cold market counterparts. Firms in the SEO market exhibit a similar trend. I find that managers do increase debt issues after the IPO event but do not record a similar behaviour for SEO

firms. Interestingly, by examining SEO firms, I am able to detect that timing in the SEO market and IPO market seems to be motivated by different purposes. IPO firms are motivated by pure market timing purposes but SEO firms are motivated by rebalancing or reducing leverage levels. In both instances, hot market issuers are inferior in quality i.e. have lower growth opportunities, lower levels of investments and also are less profitable.

Secondly, the fourth chapter looks at equity mispricing and the impact of financing the deficit on issuing behaviour. Confirming the results of Elliot et al. (2007) I find that firms increase equity financing during periods equity of overvaluation and debt financing during periods of undervaluation. Furthermore, I find that managers also time repurchases. The results also indicate that constrained firms are more sensitive to equity mispricing and adjust their issues and repurchasing behaviour to a larger extent to reflect mis-valuations. These results are counter intuitive and suggest that they gain the most by timing the equity market and the benefits of market timing becomes of strategic importance to firms that are less flexible. I further look at timing behaviour in a targeting context and find that firms are reluctant to time the market if said timing attempts cause them to deviate further from target levels. This implies that managers are trading off the costs of deviating from target levels with benefits gained from market timing and would only be inclined to time the market if these actions are in-line with their target levels.

Thirdly, in the last empirical chapter I provide an alternative view of timing behaviour in a target leverage framework compared to Warr et al (2011). I conjecture that timing attempts cause firms to temporarily deviate away from target leverage levels. Thus I model the distance from target levels and find that equity mispricing plays an important role in firms' willingness to deviate from target levels. Thus managers adjust security issues to reflect equity mispricing and this actions cause them to deviate from target levels. I further examine the issue decision and issue choice in a two stage framework to control for endogeneity issues and find that firms are more likely to issue debt (equity) during periods of equity undervaluation (overvaluation). I also find that managers are more likely to repurchase debt (equity) during periods of overvaluation (undervaluation). Building on the work of Baker and Wurgler (2002) I find that managers go beyond issuing to finance the

deficit and actively swap one form of security for another to lower overall cost of capital and thus provide strong evidence for the market timing theory of capital structure.

1.7 Outline of the Thesis

Chapter Two reviews the relevant literature that relates to important concepts in the study of capital structure as well as the market timing theory of capital structure. Chapter Three provides empirical evidence on the market timing in the IPO and SEO market in the UK. Chapter Four examines the effect of equity mispricing, financial constraints and targeting behaviour on financing decisions. Chapter Five looks at the deviation from target leverage and the security issue choice as well as repurchasing. Chapter Six presents the conclusions, limitations of the thesis and makes suggestions for future research.

Chapter 2 : Literature Review

2.1 Introduction

Every company will try to ensure that its business activities run a smooth manner. In order to grow and invest in projects that are planned, the company would need to raise capital. This can be done from several different possibilities ranging from internal sources or from external sources. The availability of internal funds would depend on the profitability of the company to generate earnings and also the payout policy that is practised by the management. This would allow the company to draw the needed funds from what is known as the retained earnings. Another possible option is to acquire the funds from outside the company. When going for this option, the company would be confronted with the choice of raising capital through the issue of debt or equity.

The decision making would be based on many different factors such as the cost of capital and other financial considerations and also non financial considerations such as corporate governance and agency problems. Once this is decided, the firm can then implement its new projects based on the return and risk (discount factor) relationship, which is derived from the choice of capital that is used to finance the project. In the long run, the decision made would affect the value of the company as project viability is based on the cost of capital. Ownership structure also is dependent on the choice of capital structure. Equity and retained earnings reflect ownership by shareholders. Debt on the other hand is owned by the debtholders. Shareholders are rewarded for providing financing via the possibilities of dividends mostly capital gains through appreciation of the value of the shares which may be due to share repurchases, and debtholders on the other hand receive obligatory interest payments.

2.2 The Basic Concept of Capital Structure and Firm Value

The massive interest in research in this area can be said to have started to develop since the memorable papers by MM (Franco Modigliani and Merton Miller) in 1958 and 1963. In

their first paper, MM argued that the value of the firm did not depend on its capital structure. Firm value was irrelevant to the composition of financing used to raise capital to fund projects. MM believed the value of the firm was determined purely by its cash flows from projects or in other words real assets and not the way it chooses to finance these assets.

In stating their arguments, MM relied on the perfect market assumptions which are that there are no transaction costs, there is no information asymmetry, there are no taxes and capital markets are perfectly competitive, where there are many buyers and sellers. The objective set out by the authors was to build an investment function which would allow the decision to accept an investment opportunity or not, depending on precisely who happens to be the owners of the firm at the moment. This brought about the development of their first proposition which states that the market value of a firm at any given time is independent of its capital structure. This value is given by discounting future cash flows at the expected rate of return. Thus the average cost of capital of a firm would be completely independent of its capital structure. Therefore in equilibrium:

$$\mathbf{V \equiv (E + D) = } \overline{X} \mathbf{\ / p_k} \qquad \textbf{(2-1)}$$

The market value of the firm (V) which is given by the left hand side of the formula in equation (1) is equals to the market value of the equity (E) and the market value of the debt (D). This is given by capitalizing the expected return ($\overline{X}$) at the appropriate rate which is given by p_k. When the equation is reshuffled to solve for the cost of capital:

$$\overline{X} \mathbf{\ / (E + D) \equiv } \overline{X} \mathbf{\ / V = p_k} \qquad \textbf{(2-2)}$$

It can be seen from (2-2) MM's Proposition I that the average cost of capital ($p_{k)}$ of any firm is independent of its capital structure and the value of a firm is unaffected by the composition of the capital structure. In other words, $V_L = V_U$, the value of a levered firm is the same as the value of an unlevered firm. This clearly shows that what matters for the value of a firm is its cash flows, not how the cash flows are distributed in between its claimants. In perfect capital markets, leverage just redistributes the cash flows between the interest holders of the firm without affecting the cash flow per se.

MM state that if there were inequalities in the values of two firms in the same equivalent risk class, investors would buy and sell shares and bonds in the these two firms to in such a

way to exchange the earning potentials of the firms until equilibrium is reached and erode all the differences in the values of such firms. This arbitrage process would ensure that the proposition holds no matter what the choice of financing used by the firm. Investors would be offsetting any gains firms made by using leverage by making use of personal home made leverage.

Based on this first proposition, MM derive what is come to be known as Proposition II in the study of corporate finance which concerns the rate of return of equity (i_j) in a company which has a certain amount of debt in its books. This proposition states that the expected return is a linear function of leverage, where the required return increases in line with the debt-to-equity ratio. This can be expressed as:

$$\mathbf{k_e = k_u + (k_u - k_d)\,(D / E)} \qquad \textbf{(2-3)}$$

The above expression shows that the expected return of a shareholder (k_e) of a levered company has a premium over the expected return of a shareholder for a company financed purely by equity. This premium is given by the difference between k_u and k_d (which is the difference between the cost of capital for an unlevered firm and the cost of debt) multiplied by the debt to total value ratio. Thus, any gain accrued from the usage of leverage (due to debt being a cheaper source of financing) is lost in exact proportion due to the increase in cost of equity. The rationale for this is quite simple in the sense that the shareholders would now require a higher level of return due to the increase in the level of risk borne by the shareholder as compared to a shareholder of a company with pure equity financing. This risk adjustment which is required by the shareholders increases in proportion of debt.

Another important contribution made in this paper is through the development of their third proposition known as Proposition III. This proposition states that a company must only invest in projects if the rate of return exceeds the cost of capital. This means that the investment function would be unaffected by the mixture of financing used. Thus a company which uses leverage has the same weighted average cost of capital as a firm which does not use leverage (given that they are in the same equivalent risk class). Whatever gains made from the use of cheap borrowed funds is more than offset by the increase in cost of raising equity capital. This argument can be expressed as below:

$$\mathbf{k_{UL} = k_L} \qquad \textbf{(2-4)}$$

where k_{UL} is the weighted average cost of capital for an unlevered firm and k_L is the weighted average cost of capital of a levered firm.

The relation between cost of equity, cost of debt and the total cost of capital for a firm can be expressed in the following graph based on Proposition I & II of MM[1]:

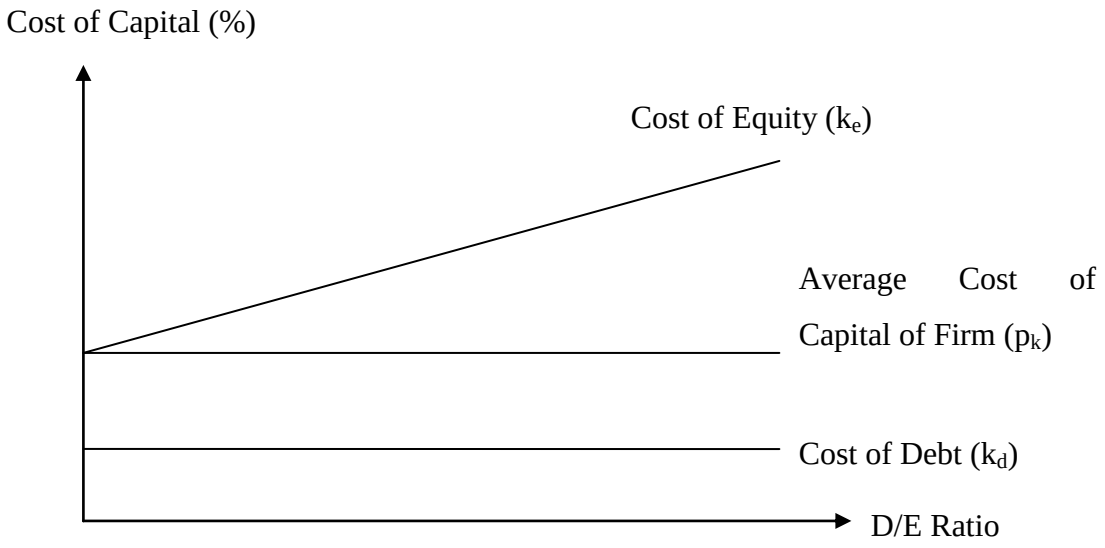


Figure 2.1: Relation between Cost of Debt, Cost of Equity and WACC according to MM 1958

These propositions are different from the traditional in two distinctive ways. The first is that the value of the firm and the cost of capital are independent of its capital structure. Under the traditional view, debt is seen as a cheaper source of financing. Thus a firm is able to lower its average cost of capital by introducing debt. Secondly, MM iterate that there is no definite optimal point of firm value. This is clearly against the traditional view where a company's value is maximised at a certain level where the benefit of debt as a cheaper source of financing is greater than the cost of bankruptcy. According to MM, one debt-to-

[1] Cost of debt is constant as perfect market assumptions apply where firms are able to increase leverage without incurring additional costs.

equity ratio is as good as another. There is no optimal point in maximising firm value. Firm value is purely dependent on the future cash flows to its assets.

The distinction of the traditionalist view and that of MM can be expressed graphically as follows[2]:

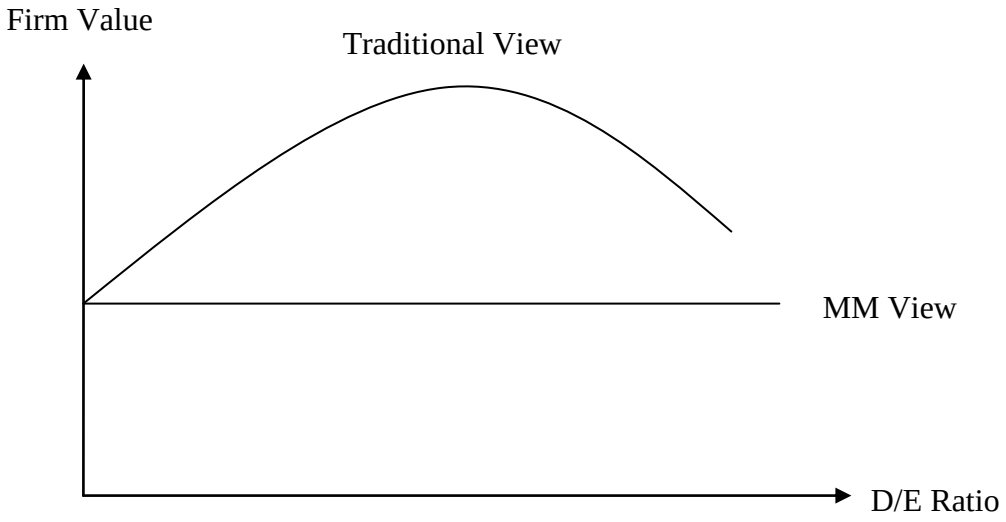


Figure 2.2: Difference between MM View and Traditional View

2.3 Relevance of Capital Structure to the Firm Value

In 1963, MM relaxed one of the main assumptions in their earlier model. They investigated causality relationship between corporate tax and choice of capital structure. When including the impact of corporate tax and the deductibility of interest from profits before tax, the difference in the MM view and the traditionalist one is narrowed. However, MM firmly state that the tax advantage of debt is the only permanent one giving effect to the choice of

[2] The concave curve expressed shows that as leverage increases, firms value increases as managers are able to exploit debt as a cheaper source of financing. This however is only valid up to a certain point where optimal capital structure which maximizes value is reached. After this level, firm value decreases due to additional debt will lead to an increase in weighted cost ofcapital.

capital structure. The reason for this argument was the tax code where interests are paid to debtholders from profits before computing for taxation and dividends are paid to shareholders from profit after taking into account the tax payable.

MM modified their earlier two propositions to include the effect of corporate tax. Proposition I would now state that a firm with leverage has higher value compared to a firm without leverage. The increase in value is given by the tax shield provided by the tax deductibility of debt. This shows the tax advantage of debt and makes leverage beneficial to corporations. The first Proposition is modified to take the tax shield into account and thus can be expressed as follows:

$$\mathbf{V_L = V_U + T_C\,(D)} \qquad \textbf{(2-5)}$$

This is shown in (2-4) that the value of the levered firm (V_L) is greater than the value of an unlevered (V_U) firm in the exact amount given by the tax savings generated from interest payments (the equation is derived by assuming the perpetuity of debt).

The second proposition after taking into consideration of corporate tax, states that the cost of equity increases in a linear fashion in relation to leverage but by smaller factor given by 1-T (one minus the corporate tax rate). According to MM, this is still fundamentally different from the traditional view in the sense that the traditional view states that cost of equity capital is completely independent of leverage. Proposition II can be stated in the below equation:

$$\mathbf{k_e = k_u + (1 - T_C)(k_u - k_d)\,(D / E)} \qquad \textbf{(2-6)}$$

The advantage of the firm value of a levered firm that makes use of debt capital over an unlevered firm is given in the graphical form as below:

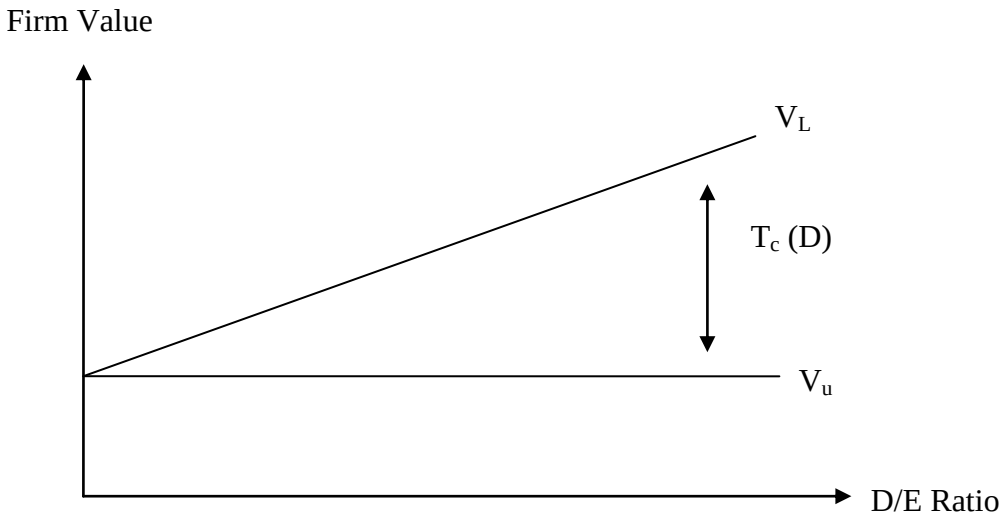


Figure 2.3: Advantage of a Firm with Debt over a firm without Debt

Based on the second Proposition, the relationship between cost of capital, cost of equity and cost of debt can be best seen in the following graphical form[3]:

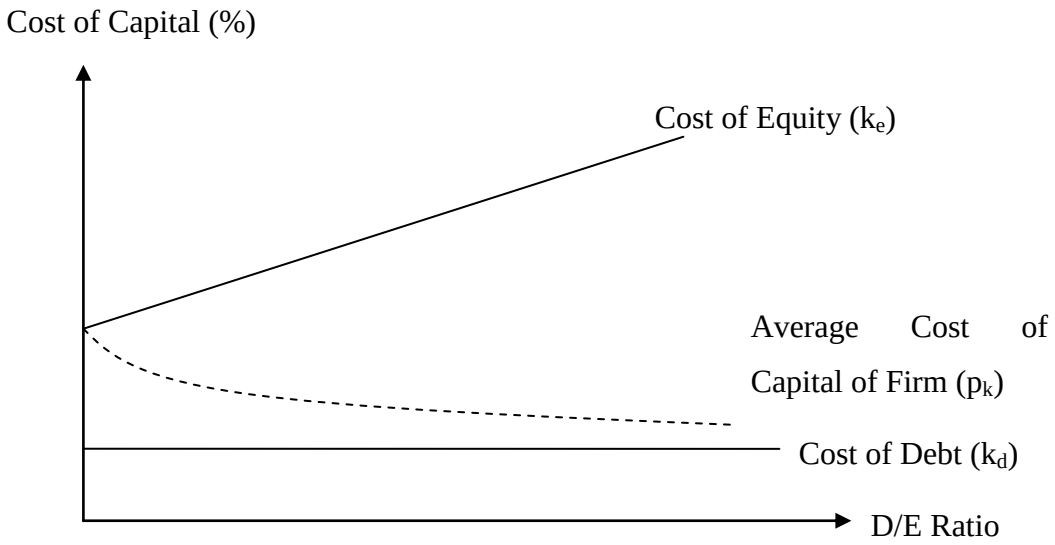


Figure 2.4: WACC after Considering Advantage of Debt

[3] Cost of debt is assumed to be constant.

2.4 Trade-off View of Capital Structure

An interesting implication from MM's propositions after taking into account for corporate taxes was that firms should target a capital structure consisting of almost 100% debt since it gives earnings a shield from income taxes. This would create a linear function for the firm to maximise profits. In the absence of transaction costs, this is entirely possible and can be proven given costless financial intermediaries (Stiglitz, 1969). However, in reality, where markets are imperfect, this is not possible. No firm would be able to borrow beyond a certain limit. This is due to the cost of debt such as staff leaving, suppliers demanding disadvantageous payment terms and conflict of interests between debtholders and shareholders. One of the most significant costs of issuing debt capital would definitely be the cost of bankruptcy. Debts are issued based on obligatory and binding contracts. Thus if the firm is unable to generate enough earnings to meet the obligatory payments, it would be facing the possibility of financial distress and liquidation of its assets to meet the payments.

In practice, where markets are imperfect, managers do fully realize the perils of bankruptcy and financial distress. When a firm issues debt, it increases the probability of bankruptcy, thus it incurs the cost of debt. If the firm is unable to meet the demanded payment from debt capital, debtholders would lose their investments in the firm, thus such investors would require a higher rate of return as more and more debt is introduced into the financing mix. Thus no firm can be observed having purely debt capital. However, based on the findings from MM's work, a firm would want to exploit the tax benefit of debt. This can only be done to a certain extent where the marginal benefit of debt is not offset by the marginal cost of debt, namely bankruptcy costs such as transfer of ownership and also liquidation costs. It can be said from this point of view that the firm's value is maximised when an optimal capital structure is reached, where the present value of the tax rebate from the marginal increase in leverage is equal to the present value of marginal costs of disadvantages of leverage (Robichek and Myers, 1965).

The inclusion of tax benefits of debt and the bankruptcy penalties would allow the determination of an optimal capital structure (Hirshleifer, 1966). Based on this benefit versus cost argument, comes the trade-off theory of capital structure. The trade-off between

the tax benefit of debt and the deadweight costs of bankruptcy is shown in Kraus and Litzenberger (1973). According to the trade-off theory a balance is reached and the value of the firm is optimised when the marginal benefit of debt is equal to the marginal cost of issuing debt. The theory is built on the foundations laid by the seminal papers by MM. The theory states that the benefits of debt at first outweigh the decline in value of the firm due to the loss of valuable future investment opportunities. After a certain point, the two effects just balance to reach equilibrium, where further borrowing would decrease the value of the firm (Myers, 1977). Thus, a firm with pure equity would have less value than a firm which utilises the availability of debt financing as a cheaper source of financing.

Based on this argument, the value of a firm which uses debt financing as well as equity financing is now reduced. However, it is still greater than a firm which relies on just equity financing. The tax advantage offered by debt is reduced by the bankruptcy costs (direct and indirect). The value of the levered firm is now given by the below equation which takes into account the bankruptcy costs (BC):

$$\mathbf{V_L = V_U + T_C\,(D) - BC} \qquad \textbf{(2-7)}$$

Interestingly, it is not only the costs of bankruptcy *per se*, but the deadweight losses in and around financial distress that creates this situation. It also involves indirect costs of bankruptcy besides the transfer of ownership that causes the value of the firm to be reduced. This includes situations where staff are leaving due to concerns over the future of the company as a going concern, suppliers demanding unfavourable terms causing the firm to lose out in terms of competitive advantages and creating a problem in their cash cycle as well as stockholders panic selling and infighting in the board rooms of corporations. In order to maintain this delicate balance, a firm will set a target debt ratio and gradually move towards this ratio (Myers, 1984). This target is based on the trade-off theory and is determined by balancing the debt tax shields against costs of bankruptcy. However, empirical studies such as by Warner (1977) show that bankruptcy costs alone are not sufficient to offset the benefit afforded by debt. Further costs of debt such as the underinvestment problem and the agency conflict are discussed in the following few sections.

2.4.1 Impact of Bankruptcy Costs on Capital Structure

Three different costs of bankruptcy that are studied in the literature are the administrative expenses paid to various third parties involved in the bankruptcy proceedings, the indirect costs of reorganization and the loss of tax credits when the firm goes bankrupt. Warner (1977) shows that these costs are about 5% of the firm value. Ang et. al. (1982) estimates these costs to be about 2%. The magnitude of such costs cannot be larger than costs of restructuring as pointed out by Haugen and Senbet (1988). More importantly, a recent empirical study suggests that such costs may have dropped in the 1990s by half due to the reduction in the length of time spent in bankruptcy and report them to be about 1.5% (LoPucki and Doherty, 2004).

Indirect costs of bankruptcy however are found to be quite significant and large in as compared to the firm value as a whole. Altman (1984) explores these indirect costs and quantifies them based on forgone sales and profits which are measured by the difference between the actual and estimated profits. According to this study, the average indirect bankruptcy costs were 8.1% of the firm value three years prior to bankruptcy and 10.5% in year of bankruptcy. Opler and Titman (1994) find that firms with higher levels of leverage in R&D-intensive industries have lower sales during economic slowdowns. Any firm that is in the danger of financial distress would have difficulty in raising additional capital to finance any new projects that might become available. This situation is included in a study that shows that average annual loss of value per firm is 10.3% per annum (Chen and Merville, 1999).

Companies facing financial distress would be forced to liquidate and their assets would be sold at a value that is less than its optimal value (fire sale). In certain circumstances these assets are sold at 15% to 40% of the value the firm would have received otherwise (see Pulvino, 1998, Pulvino, 1999 and Kruse, 2002). Thus there would be a loss in the amount of money that debtholders would be able to recover in such situations. Realising this, debtholders would put a discount on the amount of money they would be willing to pay for the equivalent amount of debt. Thus, this amount would have to be factored into the initial share price and is therefore borne by the shareholder.

2.4.2 Impact of Taxation on Capital Structure

The seminal work by Modigliani and Miller (1963) recognised the importance of tax on capital structure decisions. When firms issue debt, they are given a tax shield because interest is deducted before tax is calculated. Thus in the presence of corporate taxes, MM showed that the value of the firm would rise with higher leverage ratios. However, investors in the firm are also subject to tax on their income from their investments. In most countries debt interest is a deductible expense for the firm but is taxed as income when the debtholders receive them. Dividends on the other hand receive a different treatment where they are taxed twice. The dividends are taxed from the investors' perspective maybe different from the corporate tax rate or even the interest tax rate. The rate may also differ among different investor groups. Miller (1977) argues that a firm will issue debt until the corporate tax savings are equal to the personal tax loss. This would create an equilibrium where both rates are not controlled by the firm and thus the tax rate determines the level of debts. Miller proposed the value of the levered firm to be as follows:

$$\mathbf{V_L = V_U + [\ 1 - \{(1-T_c)\ (1-T_e)\ /\ (1-T_p)\}]\ (D)} \qquad \textbf{(2-8)}$$

where T_c is the corporate tax rate, T_e is the equity tax rate and T_p is the personal tax rate of the investor. The value of the interest payments received by the debt investor is given by $(1-T_p)$ and the value of the dividends received by the equity holders would be subject to tax twice, which is given by $(1-T_c)\ (1-T_e)$. The above shows that if there are no personal taxes or $T_p = T_e$ than the value of the levered firm is once again as specified by the earlier prediction by MM in 1963. The implication from the inclusion of personal taxation into the effect of firm value to the investors is that if the tax on the interest income (T_p) is larger than the corporate tax rate (T_c) and equity tax rate (T_e), there is no net advantage of debt and in certain circumstances can even be negative. The net tax advantage (NTA) the firm would be able to capture in every dollar paid out as interest compared to dividends based on Miller's equilibrium is as below:

$$\mathbf{NTA = (1-T_p) - (1-T_c)\ (1-T_e)} \qquad \textbf{(2-9)}$$

As long as NTA > 0, then investors would favour interest income over dividends. Thus to maximise firm value, the company would have the incentive to issue debt over equity.

The firm however has many other deductibles in practice besides the interest expenses which lead to lower effective tax rate. DeAngelo and Masulis (1980) incorporate the non-debt-tax-shields (NDTS) such as depreciation and investment tax credits into the initial analysis and argue that T_c is not a constant rate given by the statutory rate. They show that T_c decreases because the NDTS reduce the tax benefit of interest payments. Based on this argument, firms with large NDTS would have less incentive to issue debt capital. Hence, there is a direct negative relationship between the marginal rate of corporate tax savings and the amount of debt is issued because additional debt would cause the marginal benefit from debt to decrease or even be totally lost. Given this, the optimal level of debt is reached when the marginal benefit is equals to the marginal personal tax disadvantage as firm value is optimized.

Increasing firm value by issuing debt also causes the firms to face several others costs namely the financial distress costs. Brennan and Shwarz (1978) show how bankruptcy and corporate taxes interact to impact the relationship between capital structure and valuation. Issuing debt is found to have two simultaneous effects on the firm. The first being it increases the tax savings as long as the firm survives, but ironically the second it reduces the probability of the firm to survive. The analysis shows that if the tax savings is greater than the increase in probability of failing, then it is beneficial for the firm to issue debt and is thus considered as a positive NPV action. The opposite also holds true which leads to debt issuance being detrimental to firm value. This trade-off implies that debt issuance increases value the most for firms with the lowest business risk, debt with longer maturity causes a decrease in the optimal leverage point and also if the firm becomes riskier, then the optimal leverage point is also reduced. Mayer (1986) further shows that firms exhaust the tax benefit of debt before they approach the point of bankruptcy. This happens because firms are allowed to carry forward losses in form of tax credits but are not able to claim refunds immediately and thus would not have the incentive to issue additional .

2.4.2.1 Empirical Studies on the Impact of Taxation on Capital Structure

The analysis above shows that adding debt to an underleveraged firm adds value to the firm. Masulis (1980) examines the exchange offers made by the firm where one security is offered and another is immediately retired to evaluate the change of capital structure to firm value assuming that the investments are constant. The prediction that debt increasing exchange offers increase firm value due to increase in tax deductions is found to be true. An increase in leverage increases equity value by 7.6% and a decrease in leverage leads to a reduction in equity value by 5.4%. It is further found that when common stock and preferred stock is substituted with debt which would result in an increase in tax deductions, there are large stock price increases. Masulis (1983) further shows the relationship between debt issues and stock returns by regressing stock returns with the change of debt levels in exchange offers. The coefficient is found to be 0.40 showing that tax savings arising from debt has a significant impact of firm value and the personal taxes are lower compared to corporate tax rates. This also implies that the costs of issuing debt to be quite low.

The exchange offer of traditional preferred stock for monthly income preferred stock (MIPS) also is an indicator of the tax benefit to firms when issuing leverage. The MIPS payments are tax deductible similar to interest payments on regular debt and the dividends on preferred stock are taxed twice similar to the dividends on common stock. Thus, when corporations issue MIPS to retire preferred stock, firms gain from the tax deductibility of the interest payments from MIPS. Engel et al (1999) compare MIPS yield to the traditional preferred stock yield and find that the tax benefit of MIPS is $0.28 per dollar of the total value of the issue. Irvine and Rosenfeld (2000) use abnormal announcement returns to estimate the returns of MIPS at $0.26. Since MIPS and preferred stock are similar in legal context and should theoretically have the same information content, these studies are able to conclusively show the positive effects of tax on firm value.

Fama and French (1998) test the impact of tax savings from debt on firm value directly by regressing V_L directly on debt interest, dividends and a proxy of V_U where a positive coefficient on interest shows the tax benefit of debt. They find that the coefficient to be either negative or insignificant showing that debt tax benefits do not have an effect on firm

value. They argue that interest provides information about earnings that is not otherwise captured by their controls for V_U. Thus, V_U is measured with error and the negative value is due to some other costs of debt. Kemsley and Nissim (2002) switch the variables by moving the earnings variable (which is a proxy for V_U) to the left hand side and V_L to the right hand side. They model EBIT on V_L and debt to find a debt coefficient that is negative. This shows that debt contributes value to the firm. The coefficient is also found to change through time to reflect changes in statutory tax rates. To evaluate the marginal benefit gained from issuing debt, Graham (2000) simulates interest deduction benefit functions and uses them to estimate the tax-reducing value of each incremental dollar of interest expense. This simulation is done based on the understanding that the marginal benefit of adding more debt declines as more debt is added. This study estimates the tax benefit of debt to be about 10% during 1980-1994. If personal taxes are taken into account, this estimate drops to about 8%. This implies that large tax benefits of debt appear to remain unexploited by the firm as intuitively the benefits would be expected to be higher, suggesting more profitable firms are cautious against using debt as a financing option.

Given that personal tax cost of interest income are large compared to tax on dividend income, Miller (1977) proposes an equilibrium that explains why companies appear to be underleveraged and do not fully exploit the tax benefit of debt. Graham (1999) finds that firms for which the net advantage is the largest use the most debt and identifies a negative relation between debt and personal tax. Campello (2001) finds that firms that do not pay dividend (and are assumed to have investors with high tax rates) increased debt ratios in response to personal tax reduction relative to corporate tax rates. Firms paying high levels of dividends (which are assumed to have investors with low or zero tax rates) are found to reduce debt usage relative to other firms in such situations.

A firm that has non-debt tax shields would rely less on debt as a tax shield which adds value to the firm. Thus NDTS should be a substitute for interest deductions implying a negative relationship to debt use. Bradley et al (1984) regressed firm specific debt-to-value ratios on NDTS and surprisingly find that debt is positively related to NDTS. NDTS however only affect debt decisions to the extent that they affect the marginal tax rate of a firm. If the firm is modestly profitable then the NDTS will have a sufficient impact to affect

the marginal tax rate and thus have a positive impact on the debt policy. MacKie and Mason (1990) find that tax-exhausted firms substitute away from debt when non-debt tax shields are high by interacting NDTS with a variable that identifies firms which are nearing a point where the trade-off between interest and NDTS are important.

2.5 Separation of Ownership and Management

The literature in this area can be traced back to times of Adam Smith who noted that when 'joint-stock' companies were managed by people, who did not own them, there would be a conflict of interest between managers and owners. This conflict is often referred to as the agency theory and describes the agent-principal relationship. In the modern corporation, the agent (the management) works on behalf of the principal (the shareholders) who does not have the capacity or means to scrutinise the actions of the agent, even if they had the incentive to do it. The problem that arises here is that there may be a conflict in the objectives of the managers and the owners. The owners would like to see the value of the firm maximised. Meanwhile, the management would be making decisions to fulfil their own set of objectives that may include a guarantee of their current job and position, reducing the workload by investing in projects that are less complicated or require less attention and also favouring projects that have lower payback period which could mean a more secure alternative.

Managers have every incentive to consume corporate wealth since the costs of such consumption is not borne by themselves. Seminal work in this area that relates to corporate financing behaviour indicates that the principal can limit the divergences from his interests by providing appropriate incentives (Jensen and Meckling 1976). The principal would also have to incur monitoring costs to ensure that the agent does not redirect valuable resources from the company to his own benefit. In today's world, the shareholders are dependent on the accounting reports to know what exactly the value of the firm is worth. However, these reports are subject to manipulation by the agents (management) as observed in the accounting scandals around the globe. Jensen and Meckling (1976) also state that it would be impossible to get this done at zero costs and fittingly define agency costs to be inclusive

of monitoring expenditures by the principal, the bonding expenditures and the residual loss that is a result from the excessive perks enjoyed by the management of the company[4].

Taking into consideration the expected behaviour of managers based on their incentive to transfer wealth from the company to themselves, the price of new equity would be discounted to take into consideration the costs of monitoring such behaviour. Given this scenario, managers would be motivated to issue debt. However, issuing debt to finance investment would also incur agency costs. The conflict that arises from this sort of financing would now be due to the conflict between the debtholders and the shareholders. When a company issues more debt, the managers are given the incentive to invest in riskier projects. If these projects were successful, the shareholders would reap the benefits of such projects. On the other hand, if the project were to fail, the shareholders' downside of the losses incurred would be limited given that they are protected by the limited liability whereby a firm is an entity of its own and separated from the owners.

Debtholders on the other hand would not be enjoying the benefits of a success since their returns would be constant but would be exposed to the full downside of the situation if the risky project were to fail and cause the firm to go bankrupt. Assuming that debtholders are rational, they would incorporate a premium into the necessary compensation they would expect to receive given the probability of bankruptcy would increase if the firm were to issue more debt. In practice this is translated to higher interest payments, thus increasing the costs of debts. Given this scenario, Hunsaker (1999) includes the opportunity costs caused by the impact of debt in the investment decisions of the firm; the monitoring and contractual expenditures by the debtholders and the managers as well as the costs associated with bankruptcy and reorganisation as the agency costs of debt.

The duration of the debt contract serves as a tool that can be used to mitigate the agency costs of debt financing. This is because the extent of this problem depends largely on the length of the agreement. In other words, debt maturity plays an important role reducing the problem. The longer the duration of the loan, the more opportunities the shareholders have to profit at the expense of debtholders. Johnson (2003) shows that agency costs are smallest

[4] Bonding expenditures are basically agreements that penalise agents for acting in ways that violate the interests of principals or reward them for achieving principals goals.

for short-term debt. Another possible step that debtholders can take to protect themselves would be to include debt covenants (Smith and Warner, 1977). This can be in the form of a specific set of instructions that will be laid out in the contract and is a condition of giving out the funds to the company. The covenants may range from the type of investment that the firm is allowed to make to the amount of dividend that is paid out to the shareholders. However, Smith and Warner (1977) also argue that these covenants also limit the power of management's decision and may be counter-productive to the overall value of the firm. The authors highlight examples of debt covenants that restrict the disposition of assets limit the ability of the firm to divest assets whose value to others is greater than itself raises the cost to shareholders. In addition the authors also highlight that the issue of secured debt involves out of pocket costs (such as reporting to debtholders, filling fees and other administrative expenses) as well as opportunity costs by restricting the firm from profitable disposition of collateral.

2.5.1 Conflicting Interests of Shareholders and Managers

There are quite a number of possible scenarios or situations in today's business world that would give rise to the conflict of interests between shareholders and managers. The first happens when managers put in lower levels of efforts since the cost of this inefficiency will not be borne by themselves but by the shareholders. This is of course given that the levels of wages do not reduce as well as pointed out in Jensen and Meckling (1976). Another scenario is when managers are reluctant to accept projects that are risky and opt for less risky options as well as lower levels of debts (Hunsaker 1999). In cases where there are inefficiencies, management will tend to resist takeovers even if it is in the best interest of the shareholders. This is because managers will try their best to minimise the likelihood of employment termination (Garvey and Hanka, 1999). In Harris and Raviv (1990) managers are said to always want to continue with the firm's current operations even if liquidation of the firm is preferred by either shoreholders or debtholders. Managers may also be keen to reinvest all available funds to increase firm size further even if paying out cash serves the interest of the shareholder better (Stulz, 1990).

Given these different possible conflicts that arise in the agent-principal relationship that reduces shareholders value, it is important to be able to discipline the actions of managers via different governance mechanisms. These mechanisms could at the very least minimise

these problems and in turn reduce the associated agency costs. Jensen (1986) proposes that to reduce inefficient behaviour on the side of managers, the free cash flow that is made available to them be reduced. This is argued because management would be interested in increasing firm size whereas shareholders ultimate motive is to maximise the value of their shares. Managers would tend to finance less profitable projects with internal funds, which is subject to less scrutiny and monitoring as compared to external funding. Thus, shareholders can opt for two possible actions to prevent this behaviour. The first would be to demand the increase in the levels of dividends. The second possibility would be to increase the levels of leverage in the firm. This would in turn reduce the free cash flow that is available to managers to invest in unprofitable expansions which is often referred to as discipline of debt. Hunsaker (1999) also notes that an increase in leverage would increase the possibility of bankruptcy, thus give managers the incentive to consume fewer perks and increase effort levels.

The use of debt as a disciplining tool is also proposed in Harris and Raviv (1990). In this model, debt reduces the agency costs by giving the debtholders the option to force liquidation if cash flows are poor. However, in this model, the introduction of debt also causes another form of cost, which is the cost of information in the process of liquidation. A firm will then reach an optimal capital structure based on the trade off between the benefit of debt which allows for liquidation versus the cost of investigation. In Stulz (1990), on the other hand, debt works to as a disciplining tool in a different way. In this model, as in Jensen (1986), debt reduces the free cash flows available to managers. This model also proposes an optimal capital structure that is obtained by trading off the benefits of debt with the costs of debt. The cost of debt is that debt payment may more than exhaust free cash. This would lead to a scenario of underinvestment where the necessary cash required for profitable investments would not be available to managers. This differs to the underinvestment problem that exists due to conflicts between shareholders and managers.

Several studies also propose the use of convertible debts to control the behaviour of managers (see Jensen and Meckling, 1976, Green, 1984 and Smith and Warner, 1979). The logic behind this argument comes because this tool allows for the use of debt to control managerial behaviour and at the same time allowing investors to participate in the

possibility of increased profits via conversion and thus enjoying the upside of the payoff in terms of capital gains. It is possible that overinvestment may restrict growth potential. Thus to reduce the problem of overinvestment, it is better to introduce convertible debt since ordinary debt would limit the growth potential. Thus, firms with growth opportunities should have a positive relationship with convertible debt and a negative relationship with ordinary debt.

A concentrated level of debtholders would also have the incentive and the ability to monitor managerial behaviour to the extent of reducing the agency costs. The free rider problem that arises from one individual bearing the costs and all of the other investors sharing the benefits of the monitoring and controlling managerial behaviour can be resolved if the debtholders were concentrated (Stiglitz, 1985) According to this view, these costs can be borne by lenders, especially banks in order to effectively exert control over managerial behaviour. Banks have the incentive to monitor the possibility of default and managers are motivated to avoid situations of default. Thus, Berglof (1990) argues that lower levels of debt should be observed in firms with dispersed creditor structure as opposed to concentrated creditor structure as concentrared level of creditors would have the incentive to monitor managerial behaviour. Agency costs can also be reduced through the increase of managerial ownership. Kim and Sorensen (1986) suggest that lenders would be able to have a clearer view of managerial actions that reduce the value of debt if management ownership were higher and also be more willing to negotiate to increase the levels of equity to balance out the risks of increase levels of leverage.

2.5.2 Conflicting Interests between Shareholders and Debtholders

Any firm that has leverage in its balance sheet would be confronted with this type of agency problem. This conflict exists if the investment decision has different consequences on the value of equity and the value of debt. According to Jensen and Meckling (1976), managers who are working for the interests of shareholders, will tend to over-invest. The over-investment problem is especially true when the firm is facing financial distress. There will be some amount of information asymmetry whereby managers will have the advantage of knowing whether the firm will be facing financial distress in the future or not. In such cases, the managers would have lost opportunities to invest in risky projects that they would not have accepted otherwise. The downside of this scenario is borne by the

debtholders but the upside is enjoyed by both the shareholder as well as the debtholders. This is also commonly referred to as asset substitution where shareholders will have the incentive to substitute risky investments for safe ones after issuance of debt.

Another possible form of conflict is when the exact opposite behaviour occurs when the firm is facing financial distress. During such circumstances, shareholders would again be having a conflict of interest with debtholders. However, instead of accepting risky projects, they will decline to finance new, positive NPV projects. In such a situation, there would be an under-investment problem. The project would increase the value of the debt but would not increase the value of the equity. This situation is known as debt overhang (Myers, 1977). The reluctance to accept the project would be costly for debtholders and be detrimental to the value of the firm. According to Myers (1977), this cost is higher for firms that are likely to have profitable future growth opportunities requiring large investments.

There is also a possibility of conflict when managers would sell the assets of the company and use the proceeds to pay out dividends to the shareholders. This would leave the bondholders with valueless assets if the company were to be liquidated and thus their claims would be worthless (Smith and Warner, 1979). Smith and Warner (1979) also identify another source of conflict between debtholders and shareholders which is the claim dilution. When bonds are issued, they are normally priced assuming that the firm will stick to a particular level of leverage. Thus, in the event where managers decide to increase their leverage levels and issue more debt, the value of the bonds would have decreased since their claim to the assets of the company would have decreased. Galai and Masulis (1976) in their model show that the transfer of wealth from the shareholder to the bondholder can result from an increase in the level of risks in the firm, an increase in the leverage levels and a payout to the shareholder. However, Jensen and Meckling (1976) argue that debt investors are well aware of these conflicts and the costs associated with them and thus will discount any bonds issued. Thus shareholders would not benefit from such actions.

Debtholders are aware of this conflict and thus the use of convertible debt (as with the case of conflict between shareholder and managers) reduces the costs of conflict between shareholders and debtholders. This is because the option that is given to bondholders to

convert their bonds to shares would allow them to share in any possible wealth transfer that might occur. Thus shareholders have less incentive to act in such ways (Green,1984 and Masulis, 1983). Based on this logic, the discount applied by the investors on bonds issued by the company would be reduced. Thatcher (1985) supports this notion and shows that the issue of convertible debt reduces this sort of agency problem.

Managerial reputation also plays a role when analysing the conflict of interests (Diamond, 1991). According to Diamond (1991), managerial reputation is an important aspect that investors look at when determining the borrowing rate. Firms can be classified into safe and risky categories based on their choice of investments. Firms that invest in safe assets will have a lower risk of default. On the other hand, firms that invest in risky projects would have a higher risk of default. Investors, being outsiders to the firm, are only able to observe default. Thus, the longer the firm is able to remain default free, the better its reputation. This leads to a lower borrowing rate. Based on this, it can be suggested that older and more established firms will opt for safer and less risky options because they would be trying to maintain their reputation. Younger and relatively unknown firms would be inclined to choose risky projects with higher returns in the short run. In the long run, once these firms become profitable and reputable, they would then switch to less risky projects. Based on this, Diamond argues that older firms tend to have lower levels of debts.

Rational managers would try to enhance their personal reputation in managing the firms. Their reputation is closely tied to the perceived human capital value that they add to the company. Thus, a manager would opt for investment decisions that would build their reputation (Hirshleifer and Thakor, 1992). Their compensation packages would be tied to the successes and failures of the projects that they choose to invest in. Therefore, managers would have the incentive to go for projects that have the highest possibility of success even though they may have poor cash flows or may not be the best (optimal) choice as their compensation packages would be tied to projects implemented. Hirshleifer and Thakor (1992) term this moral hazard as an excessive level of managerial conservatism and can cause the firm value to be lowered. However, this behaviour that results in sub-optimal value of the firm does have a plus side. This is because managers that would be interested in protecting their reputation would not choose the risky projects. The result from this

would be a reduced level of expropriation of debtholders by shareholders, causing a reduction in the cost of borrowing. Given this, the company would be able to have higher levels of leverage than otherwise, resulting in greater tax savings due to the tax deductibility of interest payments.

2.5.3 Empirical Studies on Agency Costs

Managers as agents of shareholders act on their behalf to make decisions in the day to day running of the company. However, to evaluate the effectiveness of this decision making is extremely difficult. This is due to the complexity in measuring the agency costs involved in the dynamics of today's modern corporate. Ang et. al. (2000) provides a measure of agency costs for equity for companies under different ownership structures. This is done by comparing the performance of such firms with a base firm which is hypothetical in nature as a benchmark. This firm is 100% manager owned and compared to firms that have less than 100% managerial ownership. The analysis is done for small firms and shows that agency costs are higher for firms with higher levels of non-managerial ownership. Agency costs can be lowered by via greater monitoring, mainly by banks and increasing manager's ownership share. Habib and Ljungqvist (2005) further compare this benchmark to provide a direct estimate of agency costs in publicly held corporations using the Tobin's Q as a measure. The results show that due to agency costs, the firm is about 12% below its benchmark value which translates into $751 million in 'lost' market value. Thus the reduction of this significant amount of costs would see the firm performance improve in comparison to its peers in the same industry or class.

Increased levels of managerial ownership should lead to lower levels of agency costs. Thus, it can be argued that leverage ratios can be explained by the agency costs reasoning. Kim and Sorensen (1986) test this notion by dividing firms into groups of 'insider' and 'outsider'. The authors define insiders as a corporate officer or director or individual who is actively involeved in the decisions of the firm. Insider refers to firms where insiders own more than 25% of the firm, whereas outsiders are defined as firms where insiders own less than 25% of the firm. Debt was measured as the ratio of long term debt to total market capitalisation. The results show that insider firms on the average have significantly higher levels of debt ratios than outsider firms. Insider firms are observed to have about 6-7% higher debt levels than outsider firms in the same industry. The results also suggest that

large firms with high levels of insider ownership tend to rely more on long term debt. This could be due to insiders opting to issue more debt to maintain control over ownership as relying on equity financing dilutes ownership. Debt is also preferred as a financing option since it does not carry the high agency costs of equity. Another reason for this observation is that firms with higher levels of insider ownership by itself would have lower levels of agency costs due to more control in observing covenants and provisions that are part and parcel of debt as well as sub-optimal levels of investment reducing the expropriation of debtholders. Chen and Steiner (2000) also find a strong positive relationship between managerial ownership and leverage levels thus lending support to the argument of lowering agency costs of debt due to sub-optimal levels of investment reducing the asset substitution effect.

Shareholders would also be interested in reducing the agency conflict that gives rise to the under-investment problem. This can be done by including some form of equity as a compensation package to the management. Datta et. al. (2001) show that managers that have some form of ownership or options to increase ownership tend to be involved in risk-increasing acquisitions that would benefit shareholders as the increased risks would usually be accompanied by an increase in returns. Ryan and Wiggins (2002) show that firms where managers compensation packages include equity ownership (or options) tend to have higher levels of R&D investment. The findings also observe the opposite where the R&D investment levels are lower for firms which do not have equity ownership as a part of the management compensation packages. This shows that the firms would have lower levels of growth potential. Overall, the empirical papers suggest that agency costs can be lowered via managerial ownership, which causes the firm value to be maximised.

Agency costs also can be reduced by increased levels of ownership concentration. Ownership concentration can also be observed via institutional ownership. Firth (1995) studies the effect of institutional ownership and managerial ownership on capital structure decisions. The variables used to reflect the composition of ownership in this study are the year end market value of the management's shares, percentage of ownership by management and percentage of ownership by institutional investors. The market value of management's shares is found to be negatively and significantly related to the debt-equity

ratio. The percentage of ownership by management is also negative but insignificant. The authors argue that this lends support to the notion that mangers would try to enhance their reputation to influence the perceived value they add to the company as the human capital. The percentage of ownership by institutional investors on the other hand is found to be positive and significant to the debt-equity ratio. This shows that there is a reduction in the agency costs and thus leads to a higher level of gearing by the firm. Agrawal and Mendelker (1992) also find that institutional ownership leads to better monitoring and thus reduces agency costs that affect firms.

The reduction of agency costs of debt via concentrated ownership is further supported by the work of Amihud et. al. (1990). This is due to the reduction in monitoring costs thus reducing the agency costs associated with debt. Shleifer and Vishny (1986) also find that large shareholders play an active role in monitoring management. The voting power that comes along with significant levels of ownership also influence the ability of large shareholders to reduce agency costs. The existence of such a strong voting power would tend to motivate managers to perform optimally as the threat of losing their jobs would be perceived to be real. Denis and Sarin (1997) show that firms with high levels of concentration or large shareholders have a higher level of executive turnover. Denis and Serrano (1996) also show that firms with large shareholders tend to outperform firms with dispersed ownership. Overall, the effective role of large-block shareholders of monitoring and exerting a perceived threat to manager's job safety, reduces the agency costs and is enjoyed by all shareholders.

Empirical studies however are unable to conclusively establish the effect of concentrated shareholders on agency costs. Large shareholders should reduce agency costs and thus firms with a higher level of large shareholders should have higher levels of leverages. Zeckhauser and Pound (1990) assess the impact of large shareholders on corporate performance. Large shareholders should be able to gather information for monitoring purposes more efficiently than smaller shareholders. Thus, the leverage levels of firms with at least one large shareholder should be higher than that of firms without any large shareholders. The reason for this expected observation is that the firms would be able to exploit the benefits of debt more extensively due to the reduction in agency costs related to

debt. The results show that there is no significant difference in leverage ratios of these 2 groups of firms. This shows that large shareholders conduct the monitoring function only for equity owners and do not have an impact on debtholders.

The notion of large shareholders reducing agency costs arising from conflicts between managers and shareholders however has an agency conflict of its own. Large shareholders may vest personal interests in their holdings and choose to pursue actions that wouldn't coincide or be aligned to the interest of minority shareholders (La Porta et. al. 1998). They would be able to utilise the assets of the companies for their own personal purpose which would then be done at the expense of the minority or smaller and dispersed shareholders. In these cases, the levels of agency costs may in fact be higher with large shareholders rather than without them. Classens et. al. (2002) show that a greater concentration of voting rights has a negative effect on the firm value. These studies show that large shareholders may enjoy a private benefit that would in turn increase the agency costs instead of minimising the costs of the conflict as they may pursue agendas that favour themselves.

Studies also focus on the impact of concentrated shareholders on the R&D investment, which is generally seen as a growth potential and in turn influences the value of the firm. The literature however has mixed results regarding to the relationship between large block holders and the R&D activities. The first strand of literature has found that concentrated ownership encourages R&D investments (such as Wahal and McConnell, 2000 and Hosono et. al., 2004). There are also studies such as Yafeh and Yosha (2000) which find that this relationship is negative. On the other hand, some empirical studies find that concentrated shareholders have no impact on R&D activities at all (see Holderness and Sheehan, 1988 and Francis and Smith, 1995). Recent studies have started focusing on the type of block shareholders that influence the R&D expenditure policies of the firm. Hosskisson et. al. (2002) found that the type of concentrated ownership influences the R&D investment policy that the firm decides to pursue. The results show a significant difference between the firms that had pension funds and professional investment funds as the main shareholders. Firms in the latter category pursued a more aggressive and thus highly intensive R&D expenditure given professional investment funds may be seeking growth firms and pension funds may be seeking to invest in firms that are stable and pay dividends regularly.

2.6 Pecking Order View of Capital Structure

The differences in information between insiders and outsiders of the firm play an important role in shaping capital structure decisions. The insiders are the managers of the firms who are privy to information which the investors (outsiders) are not. The nature of such information can be ranging from future prospects of projects currently in place, the true nature of risks the company is exposed to and thus the true value of the firm. These differences in information lead to the adverse selection and moral hazard problem which were identified by Akerlof (1970). If such asymmetries were to exist, then investors would be willing to pay less for the equity of a firm rather than the true value. This would cause the prices of such equity to be issued at a discount. The firm must issue these shares at a discount to ensure that uninformed investors will purchase them (Rock, 1986). Thus management would be deterred from issuing equity. Given this, managers would be more inclined to rely on funds from inside the company rather than issuing new securities to raise capital.

Parallel to the argument of informational asymmetry leading to new shares being issued at a discount, Myers and Majluf (1984) put forth a hierarchy of financing often referred to as the Pecking Order Hypothesis. This hierarchy of financing options would allow managers to avoid inefficiencies or sub-optimal decisions where positive NPV projects would have to be passed upotherwise. Thus this hierarchy proposes that managers would prefer internal resources to external and debt to equity when resorting to external equity. The preferences for debt over equity would be due to the fact that debt issuers are generally in a better position to have access to information than equity investors and thus the tendency for debt to be undervalued would be less than the case for equity due to the nature of debt and equity markets. This view of importance of debt to the company which stems from avoiding inefficiencies contradicts the trade-off model where debt is issued to make use of the tax shield. The hierarchy however doesn't directly look at control considerations.

The pecking order theory of capital structure states that firms would prefer internal to external financing. Given that dividend policies are sticky, managers would be reluctant to

increase retention ratios because they would risk sending out the wrong signals to investors. Thus, increases in capital requirements would cause firms to resort to external financing. When managers are faced with this situation, they would opt for debt. This is because debts have a priority of claim over assets in situations of financial distress. Issuers of debt are thus subject to less error in valuing the true value of the firm in addition to legal venues available as collateral and covenants. Thus debts are deemed less risky than equity. The managers would move from less risky debt to more risky debt to further accommodate capital deficiencies until the point just before the firm faces financial distress. The firm would only resort to equity as a final resort. In cases where firms have excess retained earnings, the firm would first retire debt before opting for share repurchases. This is to allow the firm to have more financial slack to manoeuvre in times of growth to accommodate more capital requirements as managers follow the hierarchy when raising capital in the future.

2.6.1 Adverse Selection Leading to a Pecking Order.

Managers adapt their decision making in financing to mitigate problems created by the differences in information. The adverse selection problem leads to managers preferring retained earnings to debt and debt is preferred to equity (Myers, 1984). Potential investors of the firm are unable to gauge the true value of the firms. They will treat announcements made by the managers for issuance of new shares with optimism if they believe that managers require additional capital to invest in positive NPV projects. However, if they believe that managers are trying to issue the shares because managers think that the shares are overvalued, the investors would perceive it as bad news. Thus they are unable to give new shares a fair valuation.

Given this scenario, it is possible that some firms will have undervalued stocks. If the managers were to proceed to issue new shares, then some form of wealth transfer would take place between existing and new shareholders. Assuming that managers are working in the interest of existing shareholders, they would be reluctant to take such actions at the perils of the firm owners even if it meant passing up positive NPV projects. The only possible situation where managers would be willing to issue new shares would be that the growth opportunity offered by the new project would be greater than the transfer of such

wealth. Firms which have overvalued stocks on the other hand would be willing to issue new shares and transfer wealth to existing shareholders.

Potential new investors would be aware of managers' intention and thus would demand the shares to be issued at a discount to reflect the situation. This would lead to managers being deterred from issuing shares. Cadsby et al (1990) show that only firms with low true value would be inclined to issue shares under such situations. High value firms would prefer to forgo opportunities rather than issue new shares as investors are unable to differentiate between high value and low value firms would demand the same discount for compensating their perceived losses due to information asymmetry. Managers would then judge the potential of the new project. If the new project's NPV is greater than the existing assets in place in the company, managers would be willing to issue new shares as they would be willing to issue new shares at a discount at the expense of existing shareholders. Existing shareholders would be compensated with the difference between current asset values and the new value added by the new project undertaken from the capital raised.

In this model, managers will tend to rely on retained earnings first. This is because they would be able to avoid all the adverse selection problems associated with information asymmetry. If risk-free debt were available, it would work as well as retained earnings. Debt however would be associated with the risk of default due to market imperfections (information asymmetry). Myers (1984) argues that intuitively, such risky debt ought to fall between the retained earnings and equity, leading to a pecking order. This can be iterated by assuming a firm has no assets in the beginning. In this case, the investors and the entrepreneur would split the proceeds of the new project without having to pay out a certain portion to debtholders. This would lead them to prefer internal financing rather than external financing and also debt to equity when resorting to external financing as they would be reluctant to liquidate their interests in the company and risk their proceeds being diluted (Ravid and Spiegel, 1997). Adverse selection can also cause a reverse effect on the standard pecking order. If the adverse selection problem leads to an information asymmetry about the firm value than the standard pecking order is observed. However, if adverse selection causes information asymmetry in regards to the risk of the firm, then managers would prefer to issue equity over debt (Halov and Heider, 2005). Hogan and Hutson (2005)

also show that firms that faced such circumstances would prefer to issue equity over debt. Thus adverse selection can cause a pecking order with preference to debt over equity as well as the other way round, depending on the nature of the information asymmetry.

2.6.2 Moral Hazard Leading to a Pecking Order

Moral hazard is defined as a situation in which managers who are insulated from risks would behave differently from those who are fully exposed to the risks. Given that managers have more information than investors and debt holders, it would give them the incentive to behave in ways which are not always in the best interests of shareholders and debtholders. Managerial preference for internal financing could also stem from moral hazard behaviour amongst managers. This is because they would have to provide detailed exposure on the conditions of the firms to outsiders and thus open themselves to monitoring activities by interest holders. Generally managers would prefer internal to external funding as they would be less exposed to this outside monitoring. This situation however does not exactly lead to a pecking order as it does not distinguish between debt and equity preference when resorting to external financing. Myers (2003) points out that agency conflicts may lead to a pecking order. This is because managers would have no incentive to consume excessive perks when using internal funding.

The simple understanding of the Jensen and Meckling (1976) would show the financing hierarchy that result from the moral hazard problem. Assuming that an entrepreneur starts a firm with X dollars, the available amount of financing to the firm would be X. If the person decides to invest all the money, then the amount that is available from the profits is R with R' (the first order differentiation) > 0 and R" < 0. The consumption of desirable perks is the difference between X and the amount invested, I. Without any outside financing, the situation is given as:

$$\textbf{MAX UTILITY } [\, R(I) + (X-I) \,]$$

$$\textbf{with} \quad I \leq X. \qquad \textbf{(2-10)}$$

The first order differentiation gives R' = I, which shows that the return (R) to the entrepreneur is directly related to the amount invested. This holds true in situations where there are no financial constraints and the entrepreneur can finance the operations of the company 100%. However, if the firm has further growth opportunity then, the rational manager would seek out external financing. The total required capital amount is now higher

than the initial requirement and is denoted by I* and I* is always > X. The owner manager would now be seeking for an additional amount given by I* - X in exchange to share the returns and pay a portion of profits denoted by D. Assuming the external financing is via risk-less debt and D is the interest amount paid from the profits. The manager would invest optimally and adhere strictly to the repayments of D. In this case, the risk-less debt does not cause any sub-optimal behaviour on part of the managers.

External equity would only be introduced in to the company if the company has exhausted its borrowing capacity. The entrepreneur would now have to raise equity capital denoted by E and outsiders would have a claim to the firm denoted by S. The total amount of equity the managers would be able to raise would be E = (1-S) R (I). Thus the situation is now as follows:

$$\textbf{MAX UTILITY } [S\,R(I) + R + E - I]$$

$$\textbf{with} \quad I \leq R + E \qquad \textbf{(2-11)}$$

The first order differentiation gives S R'(I) = 1. In this case, the investment required is denoted as I**. Thus, as long as S < 1, I** will also be < I*. This means that the managers are underinvesting. In this case, the entrepreneur would bear the full cost of any perks not consumed whilst on the other hand be forced to share the benefits. The rational manager would be aware of this sub-optimal underinvestment problem. The use of internal financing would lead to a higher level of utility for the managers. In situations where internal financing is not sufficient, the rational thing to do would be to resort to equity as a last resort as it gives the least amount of utility to the managers (Myers, 1977). Thus the moral hazard here would lead to a pecking order. The moral hazard problem can also cause financing behaviour which contradicts with the pecking order. Morellec (2004) proposes a dynamic agency model where entrenched managers issue less debt than optimal to accommodate their empire building desires. However, when the choices reduce firm value beyond a certain extent, managers would face control challenges. They would then be inclined to issue debt and thus move towards an optimal capital structure that maximises firm value.

2.6.3 Reducing Information Asymmetry

Every rational manager would try to reduce the information asymmetry that exists between the insider and the outsiders of the firm through signalling mechanisms. Ross (1977) proposes a model where equilibrium is reached when managers are able to truly reflect the opportunities available to the firm to outsiders. In this model, if a particular firm has superior investment opportunities relative to another firm, the managers would be inclined to issue more debt than otherwise as commitment to interest payments act as a signal. The market would then perceive these particular types of firms positively and the opposite if they are reluctant to issue debt would cause them to be viewed negatively by the market. If the firm signals itself to be a good type then it must not issue more debt than the NPV of the investment opportunities available to them, otherwise it would go bankrupt. Similarly if the firm considers itself to be inferior in terms of investment opportunities, then it must not issue more debt than the NPV of projects available to it. This would cause equilibrium to be reached where no firms would have the incentive to signal incorrectly.

If firms from the good type issue less debt than necessary, they would not be able to raise sufficient capital to fully finance the investment opportunities and thus reduce their compensation by not maximising value. On the other hand, if managers from the firms with an inferior set of investment opportunities were to issue more debt, then bankruptcy would occur. They would have the incentive to signal truthfully if the benefit from issuing false signals were less than the cost of bankruptcy. In this equilibrium, both types of firms would signal truthfully and thus outsiders would be able to infer the true value of the firms based on the signals sent by issuing debt (Hunsaker, 1999). This situation would lead to a similar situation as described in MM's irrelevance hypothesis where the cost of capital would be independent of the financing decision in spite of each firm having different levels of debt as debt issues act as a signal and not to lower overall cost of capital. It can also be deduced that higher levels of debt would mean that the firm is of a superior quality. Another possible way of inferring quality of the firm is through the desired stake of the management in the firm. Leland and Pyle (1977) show that managerial stake in the firm also constitutes a signalling equilibrium. This is because managers are risk averse and would only have a high stake in the firm if they were confident of the success of the projects that the company invests in. Thus the market would treat higher managerial ownership as a positive signal.

2.6.4 Empirical Studies on Information Asymmetry

Assuming that managers would try to reduce the cost of capital to allow the firm to maximise its value, information asymmetry costs would lead the manager to prefer to use retained earnings followed by debt and finally rely on equity as a last result. This suggests that profitability of the company is an important factor when considering the choice of capital. Logically, profitability should have a negative dependence on the firm's leverage levels for a given level of dividends as more profitable firms would have higher levels of retained earnigns. This shows that managers would prefer to use retained earnings and thus follow the financing hierarchy predicted by the pecking order hypothesis. Testing this empirically however does not isolate the impact of information asymmetry on the financing behaviour. Klein and Belt (1994) apply a logit regression analysis that is able to discriminate the preference of internal over external financing and also model the probability of choosing between debt and equity. It was found that faster growing firms exhaust internal financing before resorting to external financing and firms with the least amount of information asymmetry tend to opt for external financing and debt is preferred over equity in such situations. In cases where managers have favourable information about future prospects of the firm but are operating under greater information asymmetry tend to rely on debt rather than equity financing as they tend to use debt issues as a signal to reduce such asymmetry (Krishnaswami et al 1999).

Companies tend to use returns to build up their retained earnings. Thus past returns have a significant impact on the ability of the company to use their retained earnings based on the growth opportunities that the firm has. Allen (1993) investigates the effect of information asymmetry on capital structure which leads to a pecking order via the impact of past returns and growth on the firm leverage based on the following regression:

$$\mathbf{NDAR_{jt} = \alpha_1 + \alpha_2 ROA_{j,t} + \alpha_3 ROA_{j,t-1} + \alpha_4 ROA_{j,t-2} + \alpha_5 ROA_{j,t-3} + \alpha_6 GROWTH_j + e_{j,t}} \quad \mathbf{(2\text{-}12)}$$

where $NDAR_{jt}$ is the leverage ratio; GROWTH is the growth in the firm's assets and defined as the ratio of the firm's total assets at the beginning of the sample period to total assets at the end of the sample period. The ROA and the subsequent lags are intended to capture the firm's past profitability. The findings of this study show that there is a significant negative relationship between past profitability and debt ratios. Chua and Woodward (1993) argue that costs of information asymmetry would cause the management

to be reluctant to issue equity and thus debt would be negatively related to liquidity and internally generated cash flows. The results lend support to a pecking order hypothesis where there is negative dependence between liquidity and the need to raise external funds. Shyam-Sunder and Myers (1999) use the following regression to show that the pecking order hypothesis has a higher explanatory power over the trade-off model to explain financing behaviour:

$$\Delta D = \beta_0 + \beta_1 (D^*_t - D_{t-1}) + \mu_t \text{ and } \Delta D = \alpha_0 + \alpha_1 DEF_t + v_t \quad \textbf{(2-13)}$$

In these regressions ΔD is the change in a firm's debt ratio, D^*_t is the optimal debt ratio and D_{t-1} is the actual ratio. DEF_t is the firm's financing requirement for the current period. The argument is that if the trade-off model is true, then $0 < \beta_1 < 1$ and $\alpha_0 = 0$ and $\alpha_1 = 1$ if the pecking order is true. The results show that $0 < \beta_1 < 1$, α_1 is positive but less than unity. However the pecking order model has more explanatory power over the trade-off model and thus information asymmetry costs are significant and lead to a financing hierarchy.

The issuance of equity at a discount is an important empirical issue that concerns the information asymmetry between insiders and outsiders of the firm. This is based on the equilibrium in Myers and Majluf (1984) where firms would only issue equity at marked-down prices. Asquith and Mullins (1986) confirm the prediction that the announcement of stock issue will cause a drop in stock prices. The average fall is found to be about 3% of the pre-issue market capitalization of the firm as stock issues are seen as s signal of equities being overvalued. The price drop is found to be much larger than the fraction of amount to be issued which confirms the argument that companies that decide to issue equity are seen to be worth less than companies that issue debt. Investors interpret the signal negatively and thus downgrade the prospects of the firm. Based on this finding, it should also mean that the greater the information asymmetry, the bigger the price drop. This is confirmed by Dierkens (1991) where firms with a larger information aysmmetry record a sharper drop in prices of equity. Thus firms are seen to issue equity when the information asymmetry is relatively low as information asymmetry is found to fluctuate throughout the observed period. This argument is further iterated in D'Mello and Ferris (2000) where the price drop is more significant for firms followed by fewer analysts and firms where there is a greater dispersion of earnings forecasts by analysts. In practise, this is one of the major reason large established firms rarely issue equity (Marsh, 1982).

The value of growth opportunities that the new project has compared to the assets in place also plays a role in the price drop due to equity issue announcements. According to the model proposed by Myers and Majluf (1984), firms with better growth prospects are seen to be more credible issuers. So the investors would then perceive them to be more valuable than firms with less growth opportunities. Thus, the under-pricing of the stocks upon issue would be lower than for firms with less growth opportunities. Investors would be less concerned about misjudging the values of assets in place. Equity offerings for mature firms are found to decline more than growth firms (Pilotte, 1992). This shows that if the management of the company were pursuing a growth strategy which is the in the interest of the shareholders, then the investors would react positively as they would perceive management as acting in the best interest of the shareholders. Jung et al (1996) shows that firms with the most valuable investment opportunities do not have an adverse stock returns when issuing equity and firms with poor investment opportunities that issue equity even though the pecking order suggests they should issue debt and register extremely significant drop in their share price when issuing equity.

When seeking external financing, the managers would make a choice between debt and equity. When the firm faces financial distress, debt holders would have a priority of claim over the assets relative to the equity holders. Thus, debt holders would be less exposed to the information asymmetry problem which causes the valuation of the firm to be incorrect. Based on this, the announcement of debt issues should have a smaller downward impact on the stock price than the announcement of equity issues. If the investors presume this debt to have a small risk of default, then the impact on the stock price is negligible (Shyam-Sunder, 1991). Eckbo (1986) however finds that there is no evidence that the issuance of debt conveys positive information to the market.

2.7 Market Timing and Capital Structure

Managers try to maximise the value that is delivered to the current shareholders of the firm. Thus when managers perceive a mispricing, where stock prices are irrationally high, they will tend to issue equity. In this way, they are transferring wealth from new shareholders to existing shareholders. On the other hand, if managers think that stock prices are irrationally low, they will refrain from issuing equity. Movements in the market values of long-term debt and equity are seen to have a strong impact on capital structure decisions (Taggart, 1977). The impact of market conditions is investigated by Marsh (1982) where past history of security prices is seen to influence the choice of debt and equity issuance. The author finds that a company's historical share price plays a significant role in composition of the capital structure. In the study it is found that managers prefer to issue equity after strong stock market performances and issue debt when interest rates are low or expected to rise. This is due to the behavioural aspect where managers interpret past performance as an indicator of future performance and time their issues accordingly.

Asquith and Mullins (1986) show that companies tend to issue equity after large increases in their stock prices and abstain from issuing equity when prices are falling. The authors find that there is a price run up preceding an equity issue. Korajczyk et al (1991) also find the same trend among companies and managers are deemed to be acting in favour of existing shareholders. Hovakimian et al (2001) find a significant relationship between stock prices and seasoned equity issuances. Although the authors find that firms do revert to a target leverage ratio, they show that this ratio tends to change over time in tandem with profitability and also the firm's stock price. This shows that firms do exhibit timing patterns even though they might have set a target leverage ratio.

High stock prices would tempt manager to issue equity as they perceive the cost of issuing equity to be low. Ritter (1991) found that IPOs generally underperformed compared to the market and companies that went public in high volume years fared the worst. The author shows that these high volume years present a window of opportunity to issuers and they take advantage of such opportunities to time their issues. Loughran and Ritter (1995) further investigate this phenomenon among seasoned equity offers and find the same

pattern. The authors however are unable to find the reason for such patterns and left another puzzle in the study of capital structure. Baker and Wurgler (2002) attempt to solve this puzzle by looking at the behavioural elements of corporate finance. The authors find a negative relationship between the amount of equity issues as a portion of total capital issues and the average value weighted market returns. They argue that the results prove that there is market inefficiency and managers attempt to time equity issues to take advantage of such situations.

Baker and Wurgler (2002) explain how current capital structure is the cumulative outcome of past attempts to time the equity market. The authors find a negative relation between market-to-book in year t-1 and leverage in year t. This means that high values of market-to-book are associated with less leverage. The authors also find that the external finance weighted-average market-to-book has a stronger relationship with leverage compared to the market-to-book[5]. This variable shows the historical variation in market valuations of the firm. The impacts of past market values on leverage ratios have a half life that is well over 10 years. Managers are seen to systematically time equity issues when market-to-book levels are high. This is documented in the results which show that high market valuations reduce leverage in the short run and historically high market valuations are associated with lower levels of leverage in the cross section. This confirms Graham and Harvey (2001) where CFOs admit that recent stock price increase is an important factor affecting equity decisions suggesting quite a rational response from managers.

The assumption of rationality becomes a central issue which is questioned thoroughly when looking at the market timing explanation of capital structure. Baker et al (2004) looked at two different aspects of irrationality to understand the behavioural aspect of financing behaviour. The first approach looks at investor irrationality. In this approach the managers attempt to time the market because they are aware of the mispricing which occurs due to investor irrationality. They are able to judge the true value of the firm due to their superior information advantage. Thus managers would follow a market timing financing policy where they would supply securities that are overvalued and purchase securities that are undervalued. The second approach looks at irrational managers operating in efficient

[5] The external finance weighted-average market-to-book is constructed by multiplying the current portion of the external finance divided by cumulative total external weighted with the market-to-book ratio.

markets. This approach suggests that managers may be overconfident on their ability to time the market. The implementation of financial policies may be affected by other company issues as well as managers may follow active market activities.

Chazi and Tripathy (2007) test for two alternative reasons for the mispricing. They find that real mispricing rather than dynamic adverse selection explains market timing. This shows that when managers who have a greater level of insider information will be tempted to issue equity when they believe the prices to be overvalued. This assumes that the benefits of such timing attempts by managers outweigh the negative signal that accompanies equity issues. The market timing explanation is further expanded by Ditmar and Thakor (2007) who show that managers will opt for equity when stock prices are high because the likelihood of disagreement between shareholders and management concerning project choice is lower. Managers would only issue equity when they believe that investors views about project payoffs are likely to be aligned with theirs, thus maximizing the likelihood of agreement with investors. In situations where the opposite is true, the authors suggest that managers would prefer to issue debt.

One of the possible ways of aligning managers' objectives with that of the shareholders is to allow them to hold a certain percentage of ownership in the firm. Given this scenario, Jenter (2005) shows that managers time their own portfolios as well as firms' financing decisions. The findings show that managers purchase equity on their own and repurchase at firm level when market-to-book values are low. Managers are also seen to sell their own stake when market-to-book values are high and also issue new equity when this ratio is high. Jenter (2005) further states that managers may even issue equity only to benefit from the perceived mispricing where they are overconfident of their ability to judge the fair value of the firm. This would occur even when there are no real growth opportunities. They may choose to accept negative NPV projects if they believe the price for equity is cheap[6]. On the other hand, managers may choose to forgo value adding projects if the price of equity is expensive. The ability of managers to time the market is further studied in Kahle (2000). This is done by studying the patterns of insider trading before equity and convertible debt issues. The author shows that insider trading is positively related to stock price run up and

[6] Managers would perceive the cost of equity to be lower when equities are overvalued.

market-to-book ratios. Kahle (2000) also finds a negative relationship between abnormal insiders selling and long-run performance for equity issues and a positive relationship between abnormal purchases and long-run performance for straight debt issues[7]. These findings suggest that managers attempt to time equity issuance for firms as well as their own holdings.

Managers may also attempt to time debt issuance as well as equity issuance. The duration of debt maturity could be an indication of managers attempting to time the market. Brick and Ravid (1985) found that when there is an increase in term structure of interest rates, long-term debt is considered optimal and short-term debt is optimal when the opposite happens. Other studies such as Barclay and Smith (1995) and Stohs and Mauer (1996) also found the similar pattern where the maturity of debt is negatively related to the term structure of interest rates. However, these studies were not able to link the maturity of debt to managers' attempts to time the market. Later studies however have started linking debt maturity choices to market timing attempts by managers. Datta et al (2000) show that debt IPOs underperforms over the 3 and 5 year period. The results are similar for equity IPOs and debt issues are timed to be issued when the market has highest expectations concerning the firms' prospects. The post underperformance is found to be more pronounced for debt with longer maturity durations. Baker et al (2003) further augment the argument of debt market timing by indicating that firms use debt market conditions to determine the lowest cost maturity at which they borrow. This is seen because firms tend to borrow long when excess bond returns are predictably low. The total of long-term debt as a share of total debt is also found to be a good predictor of excess bond returns where the values are high when excess bond returns are low.

The choices of debt yields could also show that managers attempt to time debt issues. Faulkender (2005) shows that managers attempt to time the market on debt issues due to speculative beliefs rather than hedging purposes. The analysis uses interest rate exposure of new debt issued by combining the current rate of exposure with the swap arrangement for that particular issue. The results confirm managers' beliefs on the movement of future

[7] Kahle (2000) defines abnormal insider selling as actual activity minus expected activity, divided by standard deviation of expected activity where expected activity is the mean activity in the 36-month period beginning 48 months prior to announcement and ending 13 months prior to the announcement.

interest rates influences financing choices and thus their attempts to time issues. Baker et al (2006) further analyse the impact of stock prices on equity issues and show that it has a significant explanatory power on new equity issues. The authors further show that correlation between debt maturity and excess bond return to be slightly positive rejecting Butler et al (2006)'s argument that such a correlation is observed due to pseudo market timing. Butler et al (2006) on the other hand show that managers are unable to time the maturity of debt issues. The authors prove that there are structural breaks causing spurious correlation and all this leads to a nonsense regression. The findings on firm level data also confirm that managers are unable to time maturity of debt issues. The results also show that maturity of new debt issues cannot predict excess bond returns, thus corporate managers cannot successfully time the maturity of their debt issues given that they are unable to predict the movements in the yield curve better than other market participants. The authors argue that if this wasn't the case they would observe such a correlation indicating managerial market timing in the debt market.

Further argument on the issues of timing the market is put forth by Welch (2004) by showing that when equity is measured in market value terms, firms do not use their issuing activities to counteract the mechanistic influences of stock valuation on leverage. The author argues that leverage changes do not occur due to market timing by managers but due to the unwillingness of firms to take actions to counter the effect of stock prices on capital structure which is based on the 'inertia' theory where firms face implicit costs to reacting or adjusting, either actual or perceived.

2.7.1 Empirical Papers on Market Timing

The impact of market timing on capital structure decisions as showed by Baker and Wurgler (2002) is persistent. Huang and Ritter (2009) show that US firms resort to equity issues when the risk premium associated to such issues is lower. They also find that firms resort to debt financing when the risk is higher leading to a higher level of cost of equity. The results also reveal that small growth firms rely on debt financing and turn to equity issues when cost of equity is relatively lower. Later work shows that the impact is only significant on the short run. Alti (2006) isolates IPOs in hot markets to evaluate the impact of market timing in the long run. The findings show that firms that go public in hot markets

tend to increase leverage ratios in the periods that follow and firms that go public in cold markets tend to have high levels of leverage during the IPO event. The author also finds that the impact of market timing impact completely vanishes two years after the IPO. Firms are also found to rebalance their optimal capital structure to stay within an optimal range (Leary and Roberts, 2005). The effect of shocks on leverage ratios are negated in the long run and are only temporary due to adjustment costs. In the long run, the effects are reduced due to active rebalancing.

The impact of market timing on the long run is further examined by Frank and Goyal (2004) using a VAR framework to evaluate the impact of market conditions on capital structure. The findings show that there a capital structure ratio which firms seem to revert to in the long run and high market-to-book ratios have a short-run impact on leverage levels where debt is reduced. The authors find no clear relationship between market valuations and equity issue activity. This would suggest that firms follow the trade-off explanation of capital structure. Hovakimian (2004) looks at the importance of historical average market-to-book on leverage regressions and find that equity issues may be timed but they have no significant long-lasting effects on capital structure. The author argues that other transactions that have an impact on capital structure such as equity repurchases, debt issues and debt reductions that may exhibit timing patterns are unable to cause a negative relation between market-to-book and leverage. Antoniou et al (2006) on the other hand study the determinants of corporate debt maturity structure. The authors look at firms in the UK, France and Germany. The results show that changes in stock prices have a positive relationship with debt maturity for firms operating the UK. This suggests that firms issue long-term debt when there is an increase in their share price.

Kayhan and Titman (2007) further split the market timing analysis into two different categories which are the short-term and long-term measure. They find that historical stock prices affect capital structure changes in the short run. However, in the long run, the effects are partially reversed and firms tend to move toward target debt ratios which lend support to the trade-off theory. Elliot et al (2008) uses an earnings based valuation to separate market timing caused by the effects of irrational pricing on growth prospects and adverse selection due to asymmetric information. The authors decompose the market-to-book ratio

into a growth component and a mispricing component. The authors find that mispricing has a significant effect on capital structure choice even after controlling for growth options. This supports the market timing explanation and also suggests investor irrationality. The impact of market timing on a wider range of firms globally is shown by Henderson et al (2006). They find that firms globally issue equity when stock prices appear to be overvalued and also time their long-term debt issues where such debt is issued prior to increases in interest rates. Mahajan and Tartaroglu (2008) also investigate the impact of market timing on an international scale by looking at the G7 countries specifically. The authors find that leverage is negatively related to the historical market-to-book ratio in all the G7 countries. They however argue that this relationship cannot be attributed to equity market timing as current market-to-book is negatively related to leverage and is a control factor for growth opportunities. Thus the negative coefficient is consistent with the trade-off explanation of capital structure. Their analysis also reveals that firms in all G7 countries except Japan rebalance the leverage levels following pure equity issues at different speeds.

Managers attempt to time security issues based on their anticipation of market conditions. The ability of managers to time the market is questioned in Schultz (2003) who introduces the pseudo market timing hypothesis which suggests that even though markets are efficient and managers had no superior ability to time the market, there could still be a probability of long-run underperformance post issue. The author shows that market timing is indeed the result of a spurious post issue relationship between security issuance and market returns. This implies that benefits received by equity issuers at market peaks trigger further equity issuances. Brown et al (2006) further studied the influence of managers' view on hedging practices. The results show that firms tend to adjust hedging based on managers' views on the market. However the ability of managers to successfully time the market is found to be doubtful in this study. Another empirical study by Adam and Fernando (2006) also shows that managers attempt to use hedging and speculative instruments to time debt issues to reflect their believes. The outcome of such timing activities however appears to be of no significance to the overall performance of the firms. Barry et al (2007) further split their analysis into forward-looking and backward-looking market timing. Forward-looking would suggest that managers issued securities based on how they think the markets would move and backward-looking indicates that managers merely react to market movements.

The study finds strong evidence for backward market timing and no evidence that managers are successful in forward timing strategies.

Surprisingly managers attempt to time debt issues as well as equity issues. They admit that their maturity choices based on the level of interest rates in the survey by Graham and Harvey (2001). Guedes and Opler (1996) examined the debt maturity decisions of debt issues. The results show that maturities were significantly negatively related to the term spread. This timing attempts by managers however is surprising given that the opportunity for mispricing is quite remote in cases of debt issues as in most cases the issues of debts do not involve a significant amount of information asymmetry as debt markets are generally more transparent and debt investors are generally more informed[8]. Antoniou et al (2006) show that in the UK, firms' debt maturity and risk exposure are driven by market conditions rather than firm-specific interest rate risk exposure. According to this study, when the long-term rates are relatively low, firms tend to issue fixed rate debt to lock in the interest rate risk exposure. This shows that managers attempt to time debt maturity as well as yield types to lower the cost of capital when issuing debt.

Debt market timing research has also been linked with equity markets. Debt issues have been followed by low equity returns as showed by Richardson and Sloan (2003) as managers shift reliance to debt issues. Speiss and Affleck-Graves (1999) document the substantial equity long-run underperformance of firms issuing straight and convertible debt. They find that the underperformance is limited to those that issue in times of heavy volume. The market appears to under react at the point of debt offering and the full impact is only realized over the longer horizon. Antoniou et al (2006) further iterate this link by showing that firms in the UK and Germany opt to issue long-term debt when the equity premium is high. This reflects managers' attempts to minimise the cost of capital by making choices between the sources of funding. This is further outlined in Baker and Wurgler (2003) where equity overvaluation relaxes the binding leverage constraint and creates debt capacity which shows that equity market timing also leads to debt market timing as managers utilise the debt capacity that is created by high levels of equity premium.

[8] Corporations mainly issue bonds and borrow through banks. In the cases of bonds, rating agencies reduce the extend of information asymmetry and in cases of bank debt, borrowers are subject to a more extensive scrutiny by investors.

Chapter 3 : Capital structure and equity market timing: empirical evidence from IPOs and SEOs in the UK[9]

3.1 Introduction

There are three main competing theories of capital structure. The trade-off theory stipulates that observed capital structures are the result of firms trading off the benefits of leverage against the cost of introducing debt in the capital mix. This theory implies that in order to maximize firm value, each firm adjusts towards an optimal debt ratio. However, firms' financing needs varies over time and they may not always be at the optimal levels. The managers will then weigh the benefits of being on target versus the cost of being off target. As a result, a firm's capital structure is formed by gradual movement towards its optimal debt ratio. The pecking order theory implies that firms do not have a target capital structure, but instead follow a pecking order of incremental financing choices that gives priority to retained earnings, followed by debt issues and then equity financing. This happens when firms have reached their debt capacity and it is no longer viable to raise more capital via debt issues. Finally, the equity market timing theory suggests that mangers are able to identify certain windows of opportunity during which equity issuance is less costly due to mispricing. In theory, if managers are able to time the equity issues, the cost of equity would be relatively lower. Thus, managers would be increasing the value of the firm by lowering the overall cost of capital of the firm. However, managers would be doing this at the expense of new shareholders and the benefit would be transferred to existing shareholders.

Starting from Shyam-Sunder and Myers (1999), there is a whole strand of literature that focuses on empirically testing the different theories that attempt to explain capital structure

[9] Earlier version of this chapter has been presented at the Behavioural Finance Working Group Conference at Cass Business School, London in July 2010 and the current version was presented Eastern Finance Association 2011 Annual Meeting in Georgia, USA in March 2011 and the CEFB and CAA PhD Workshop, Hull University Business School, University of Hull in May 2011.

decisions.[10] The trade-off theory is found to be able to explain how taxes, bankruptcy costs, security issuance costs, and the investment opportunity set of a firm influence financing decisions. The pecking order theory seems to provide a superior explanation for observed capital structure changes. This theory offers a plausible explanation as to why debt ratios and profitability are negatively related and why markets react negatively to al new equity issues. It also sheds light on to the question why firms have higher levels of cash than common sense or the trade-off theory suggest.

Many previous studies before Baker and Wurgler (2002) have also indirectly tested the market timing theory.[11] They have found that certain factors influence security decisions such as past stock prices, interest rate conditions and time-varying adverse selection costs of equity issuance. Overall, these studies have shown that there is evidence of equity market timing by managers. The market timing theory put forth by Baker and Wurgler (2002) argues that managers time the securities they issue. Given this argument, when the market values of equities are high, relative to book and past market valuations, managers tend to prefer equity over debt and vice versa. This also indirectly implies that managers would repurchase equity when their valuations are low.

This theory also predicts that the market timing of equity issues has a long-lasting effect on capital structure. Baker and Wurgler (2002) find that firms with lower (higher) levels of leverage are those that issued equity capital when their market valuations are high (low). Several different empirical studies using different approaches have tested this theory and generally found support for the market timing predictions.[12] They have found that managers issue equity when market valuations of firms are high and turn to debt otherwise. However, these studies are unable to reach a consensus on the long-term impact of market timing on capital structure. They find that market timing does not have a long-term impact as opposed to Baker and Wurgler (2002) who find that the impact can last up to 10 years.

[10] See Marsh (1982), Chrinko and Singha (2000), Fama and French (2002), Baker and Wurgler (2002), Frank and Goyal (2003), Loof (2003), Lemmon and Zender (2004), Autore and Kovacs (2006), Alti (2006).
[11] See Taggart (1977), Marsh (1982), Jalilvand and Harris (1984), Asquith and Mullins (1986), Korajczyk et al (1991), Choe et al (1993), Rajan and Zingales (1995), Bayless and Chaplinsky (1996), Pagano et al(1998), Hovakimian et al (2001).
[12] Korajczyk and Levy (2003), Alti (2006), Hovakimian (2006), Kayhan and Titman (2007), Elliot et al (2007), Elliot et al (2008), Huang and Ritter (2009).

This chapter makes two separate contributions to the literature of market timing. The first one is to examine equity market timing in the UK. Most of the literature is focused on the US market. This would provide a basis for comparison for this relatively new field of study with respect to capital structure and corporate finance as a whole. Although both markets are similar in their structure, previous comparative studies have found that debt levels in these two countries to be significantly different. Antoniou et al (2008) report that mean values for debt in US to be about 27% and the UK to be about 18%. Alti and Sulaeman (2011) further show that firms only exhibit timing behaviour during periods of high stock returns if there are high levels of demands from institutional investors. Studies have shown that in the 1990s, about 50% of shares in the US are owned by individuals, double the percentage in the UK (The Economist, 1995). Table 3.1 shows the trend of institutional ownership for the US and UK. This would prompt a study on the impact of market timing on firms operating in the UK. This study also looks at the interaction of growth prospects and firms size with hot markets. This will capture the effect market timing has on firms with differing growth potential and also various sizes. Table 3.1 further compares the institutional factors of the US and UK market.

The second main contribution of this study is that it looks at SEO issues as well as IPOs. This aims to examine whether the same phenomenon is present in prevailing market or market timing is just restricted to the timing of the decision to go public. According to the market timing theory, firms issue securities depending on the relative costs. Thus, this would imply that managers would time SEOs as well as IPOs. This study examines the SEO market from four different aspects, namely the comparison of hot market issuers (timers), the short term impact of SEO market timing, the persistence of SEO market timing and also the reversal of the SEO market timing impact on the capital structure of firms.

There are several main findings and implications that can be drawn from this study. Firstly, firms evidently time equity issues in hot markets. This is found in the IPO sample as well as in the SEO sample. The pre-issue leverage levels for IPO firms are similar for hot and cold firms. Hot market IPO firms raise more equity than cold market firms. This is robust to growth opportunities as evidenced by significantly lower levels of investments and profitability. The decline in retained earnings and relatively similar level of dividends

further support this notion. Secondly, in the SEO case, pre-issue leverage for hot market firms are significantly higher than their cold market counterparts. SEO firms that issue in the hot market issue similar levels of equity compared to cold market firms. Their behaviour, however, appear to be more motivated by reaching a target leverage and hot markets are seen as a temporary window of opportunity to reach this target. Our regression results confirm this notion as hot market SEO firms are found to be about 3.08% above their leverage target and the change in leverage during SEO year is about 3.80%. These effects are also statistically significant suggesting that managers are acutely aware of being over-levered and the reductions in leverage levels are intentionally timed to coincide with favourable equity market conditions.

Thirdly, in line with the ongoing debate in the literature our findings shed some light on the issue of cash stockpiling of equity timers. We document that firms going public during hot markets do increase cash levels significantly. The effect is present in the SEO market as well although statistically insignificant.[13]. Hot market firms in both the SEO and IPO event have lower levels of profitability and investments suggesting there is a significant difference in the quality of hot market firms compared to cold market issuers. Lastly, consistent with results in Alti (2006), hot market IPO firms undo timing attempts by increasing their leverage levels in the immediate two periods after going public. This effect is, however, less severe and cold market firms do reduce their leverage levels, suggesting they may in fact have been timing the debt market. These further suggest that both hot and cold market firms converge around a similar level of target leverage.[14] Given that SEO firms see hot markets as an opportunity to raise external funds without deviating from their target leverage, we document that hot market firms have lower levels of equity issues in subsequent years. In the SEO market, firms that issue in hot markets are clearly inferior in quality with fewer investments opportunities. DeAngelo et al. (2010) find that firms approaching or close to bankruptcy are the ones most likely to issue during favourable market conditions suggesting that these firms would not have been able to raise similar levels of capital otherwise. Thus hot market firms would be inclined to raise more capital

[13] These findings are in line with findings documented and discussed in detail in DeAngelo et al (2010).
[14] Binsbergen et al (2010) document that the cost of being over-levered is higher than that of being under-levered, which implies that market timing should be more attractive for managers whose firms are above their target leverage. Our analysis highlights this finding.

from these issues than their cold market counterparts to fully benefit from hot markets when the equity market is more favourable. This view is further supported by issuing behaviour after the SEO event. Thus, the evidence implies that market timing effects are temporary in nature in both IPO and SEO markets. Although the results do not strongly discriminate the market timing view of irrational manager and rational investors, the evidence suggests that rational managers may be able to identify windows of opportunities in the equity market due to irrational investors.

The remainder of this chapter is organized as follows. Section 3.2 reviews the relevant literature. Section 3.3 provides a description of the data, variable definitions and the construct of the hot market dummy. Section 3.4 empirically tests how hot markets affect equity issuance. Sections 3.5 and 3.6 examine how market timing attempts impact capital structure in the short (long)-run, respectively. Section 3.7 tests whether companies reverse their timing attempts in subsequent years. Section 3.8 concludes the paper.

Table 3.1: Institutional ownership trends of firms and stock markets in the UK and US

Panel A. Institutional ownership	US				UK			
Year	2003	2002	1990	1981	2004	2003	1989	1963
Percentage of Institutional Ownership	60.0%	58.0%	39.1%	35.0%	84.7%	80.0%	60.0%	42.4%

Panel B. Stock markets	US					UK				
Year	1990	1995	2000	2005	2008	1990	1995	2000	2005	2008
Market Capitalization ($ Billions)	3060	6857	15104	16971	11738	849	1408	2577	3058	1852
Market Capitalization (% of GDP)	53.2	93.4	154.7	137.3	83.3	83.8	121.7	174.4	134.1	69.3
No. of Listed Companies	6599	7671	7561	5143	5603	1701	2078	1945	2759	2415

Market capitalization is the share price times the number of outstanding shares. Listed companies are the number of domestically incorporated companies listed on the stock exchanges at the year end. All indicators do not include investment companies, mutual funds, or other collective investment vehicles. Source: World Development Indicators, World Bank; Binay (2005); Moerland (1995); Aguilera et al (2006); Mallin et al (2005).

3.2 Review of the literature

Market timing mechanisms are pivotal in forming capital structure as they drive issuance decisions. This section reviews the literature from several different aspects. Firstly, the practice of raising equity in patterns leads to hot capital markets. These patterns may be caused by mispricing arising from irrational expectations from either managers or investors as irrational expectations may cause overly bullish expectations and thus lead to hot and cold markets. Empirical studies have shown that hot capital markets affect firms in different ways which include deviation from optimal leverage and also post-issue stock returns. Pagano et al (1998) focus on private firms in Italy and investigate why firms decide to go for IPOs. They find that the likelihood of an IPO is increasing in the firm's size and the industry's market-to-book ratio. According to the authors, companies appear to go public not to finance future investment and growth but to rebalance their accounts after high investment and growth as bulk of the investment and growth was financed by borrowing. Secondly, according to Baker and Wurgler (2002), capital structure is the aggregate outcome of firm's historical attempts at timing the market where the current capital structure is a result of previous timing attampts by managers. This approach looks at capital structure from a market-oriented pecking order where firms would raise capital based on cost of capital as dictated by prevailing market conditions. The authors find that market timing has a long-term and persistent effect on capital structure. On the other hand, contradictory evidence as found by Alti (2006) shows that market timing behaviour has only a short-term impact on firms' capital structures. Thirdly, although attractive market conditions may cause firms to deviate from their original leverage ratios, the effect tends to be reversed and firms tend to rebalance their capital structure sooner or later. In this sense, the market timing approach is similar to a modified version of the trade-off theory which incorporates a timing factor. The market timing theory attempts to address the behavioural aspect of corporate finance and shed more light than the traditional approach. However, much remains to be explored in this area.

3.2.1 The hot issue market

The literature that looks at hot equity markets have generally focused on both IPOs and SEOs. The notion of 'hot market' was first discussed by Ibbotson and Jaffe (1975). The

authors show the existence of hot markets where offering prices were higher than the average premium in the aftermarket. Further empirical evidence is provided by Ibbotson et al (1994) where stock prices of firms that went public in hot markets underperformed for five years following the offerings. They also show that the earnings per share grow rapidly in years preceding the IPO but surprisingly decline during IPO period and for the subsequent years. This underperformance was mainly from firms that went public during periods of heavy volume i.e. in hot markets. Firms that went public in the lower volume years did not exhibit such levels of underperformance.

Choe et al (1993) look at the time-varying adverse selection costs of issuing equity. The authors state that during the expansionary phase of the business cycle, a larger number of firms issue shares. During these periods, equities make up a substantially larger proportion of external financing. They argue that firms sell seasoned equity when they are faced with lower adverse selection costs due to more promising investments opportunities and there is less uncertainty about assets in place. Thus, they predict that firm announcements about equity issues convey less adverse information about the values of equity and proposed that the negative price reaction associated equity offering announcement to be smaller during such periods. In addition to that the authors also predict that during periods of uncertainty, firms prefer debt issues and the negative price reaction to equity offering announcement to be greater. Their results support these predictions. It is also found that business cycle variables have significant explanatory power and interest rate variables are generally insignificant.

Bayless and Chaplinsky (1996) examine whether there are windows of opportunity for seasoned equity issues. They directly link the decision to issue equity and the cost of issuing due to information asymmetry by comparing the cumulative announcement date prediction errors (CAPE (-1,0)) for equity issues during hot and cold periods. In their model, the authors build on the work of Myers (1984) and Myers and Majluf (1984) by argue that if information costs are a significant deterrent to equity issue, periods of reduced information costs should be periods of relatively high issue volume. Hot periods are defined as high equity issue volume periods, and cold periods as the low volume periods. Based on this, they are able to show that the average price reaction in hot markets is

significantly less negative while the price reaction in cold is significantly more negative than at other times. Their findings also show that lower price reaction in hot markets is economically important and is independent of the macroeconomic characteristics of hot and cold markets. Thus, their findings support the notion of windows of opportunity for equity issues that result at least partially from reduced levels of asymmetric information.

Further supporting the notion of market timing, Loughran et al (1994) found that IPO volumes were significantly correlated to stock market valuations in major markets across the world. Hovakimian et al (2001) found that SEO issues in the US were also highly correlated with stock prices. In the UK, Marsh (1982) documented a similar pattern where firms tend to issue equity when prices are high. Ritter (1984) found that timing of IPOs does matter for specific industries. Therefore, based on these studies it can be argued that hot markets emerge because firms can go public at certain periods where there are higher price-earnings and market-to-book ratios, leading to periods of high volume of equity issues. Given the findings from the above literature, rather than economic business cycles, this large increase in volumes may indeed be a result of firms attempting to time their equity issues. If indeed managers are able to take advantage of these situations, lower subsequent performance should be observed as inferior firms would have larger incentives by timing the market during hot periods.

The literature has several different explanations for the reason behind this hot market occurrence and also how the hot and cold market firms may differ. Empirical studies look at the long-term performance of IPOs and models of decisions to go public or remain private and theoretical models look at under-pricing as a signalling mechanism. According to long-term performance studies, hot market firms are lower quality and have lower stock returns than cold market firm (e.g., Loughran and Ritter, 1995; Field, 1997). Hot markets are viewed as a result of irrational investors who are overly bullish. This provides a "window of opportunity" for manager to issue equity. Contrastingly, the signalling mechanism view of hot markets is when a greater number of high quality of firms choose to go public (e.g., Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989). These studies show that firms opt for hot markets because offer prices are less affected by

adverse selection costs where investors would be demanding a lower discount on issue price.

Several other studies focus on how hot markets are caused by shocks in productivity or advancements of technology (e.g., Maksimovic and Pichler, 2001; Stoughton et al 2001; Benviste et al 2002). Their results show that hot markets consist mainly of small and risky issuers from particular industries. These particular firms have growth potential although they may not be profitable in the subsequent years. Helwege and Liang (2004), on the other hand, found that hot market firms did not differ in terms of quality such as profitability, size and sales. They did, however, show that cold market IPO firms generally had higher levels of capital expenditures. The authors also found no difference in terms of long-run underperformance of hot and cold market firms. This indicates that hot markets occur because of greater investor optimism and are not driven by managerial behavioural aspect given that cold market firms have higher levels of growth opportunities

3.2.2 Capital structure rebalancing

There is a strong debate with regards to firms having a target capital structure and rebalance their leverage ratios after timing their equity issues and in subsequent years moving towards their original targets. Market timing theory provides two different implications of capital structure. Baker and Wurgler (2002) argue that firms issue securities when they perceive them to be overvalued. Based on this framework, firms issue securities based on managers attempting to time the market, while the current security issue choice is not influenced by previous issue activities. This study found that equity issuance in times of high market valuations has a persistent impact on capital structure as the weighted average external financing market-to-book ratio has significant correlation between debt levels up to 10 years after the IPO event. Thus, they argue, capital structure is the cumulate outcome of previous timing attempts by firms[15]. Welch (2004) found that equity price shocks also have a long-lasting effect on capital structure. Welch iterates that firms do not rebalance their capital structure in response to shocks in market value in spite of active net issuing

[15] This differs from previous views on capital structure which suggest that current issuing activity is influenced by the existing capital structure. The trade-off view suggests that managers would make decisions to reach a particular optimal level of leverage and the pecking order view indicates that managers would only resort to external financing if internal financing was exhausted. Subsequently, managers would favour debt over equity, where equity is a last resort of financing.

activity, suggesting that stock returns are the primary driver of capital structure changes. However, the author states that net issuing activity remains a mystery. These studies conclude that market timing attempts have a persistent effect on leverage ratios and firms do not rebalance towards and optimal capital structure.

The second view of market timing contradicts the above studies. Flannery and Rangan (2006) estimate a partial-adjustment model of firm leverage decisions and conclude that firms do have a target capital structure. They observe "targeting" behaviour, as opposed to timing or pecking order considerations, explain a significant change in leverage ratios. Leary and Roberts (2005) argue that the persistence observed by Baker and Wurgler (2002) is attributed to adjustment costs. Further evidence is provided by Alti (2006) who finds that after timing the decision to go public in hot markets, firms tend to issue more debt in subsequent two to three years. This results in a reversal of leverage ratios during the post-IPO period. Kayhan and Titman (2007) look at stock prices and financing deficits and find that these two elements have strong influences on capital structure changes. However, their effects are at least partially reversed. The authors show that although firms' history strongly influences their capital structure, firms tend to move towards a target debt ratio over a period of time. Hovakimian (2006) tests the persistence effect and finds that firms time equity issues to periods of high market-to-book ratios but the effects of timing behaviour are economically small and short-lived. This study also proves that the effect of timing of equity repurchases on leverage ratios is even weaker. However, the author finds that debt issues have a significant long-lasting effect on capital structure, but their timing is unlikely to induce a negative relation between market-to-book and leverage.

3.3. Data

3.3.1 Data description and descriptive statistics

This study has two different data sets as it examines market timing from two separate events, namely the IPOs and SEOs in the UK. The first set of data comprises all firms that went public during 1st January 1979 to 31st December 2008, available in the Datastream database including dead firms. Like several previous studies, IPO dates are assumed as the

first month the share price becomes available in Datastream[16]. The initial sample for IPO firms contained 3,487 firms. The sample for SEOs are initially selected by matching the further equity issues data from London Stock Exchange from 1st January 1998 to 31st December 2008[17]. This includes dead firms. Based on Barnes & Walker (2006), we include issues for cash, subscriptions for cash, rights and open offers for cash as well as placing for cash[18]. The initial sample consisted of 1890 issues during the period for this study. The inclusion of data from the current credit crunch related crisis may allow a better examination of market timing.

Variable definitions follow the standard approach All variables variables are measured at the financial year end of the firm obtained from Datastream. Construction of the market-to-book ratio is done using the market value of equity on the date of the financial year end of each firm year. Definitions of all dependent variables used in this chapter are defined in table 3.2 and all explanatory and control variables are defined in table 3.3. The financial firms are dropped from the sample. To minimize the influence of outliers, M/B greater than 10, D/A greater than 100% and EBITDA/A greater than 100% are dropped. Firm-year observations for which d/A, e/A, ΔRE/A, EBTIDA/A, INV/A and DIV/E exceeding 100% in absolute value are also dropped from the sample. Firms where data from the pre-IPO year is not available are removed from the IPO sample. For the SEO sample we are left with 540 issues. A furhter140 issues which result in proceeds of less than 5% of issued share capital are dropped[19]. Hillier, Linn and McColgan (2005) also exclude such issues in their study of UK firms. In the rare case where a firm issues more than once in a particular financial year, the issues are merged into one. In our sample this only occurs once. To reduce dependence for statistical tests SEOs by the same firm during the three years after an SEO is excluded from the sample. A further 119 issues are thus excluded from the sample. This is done because the study focuses on multiyear issuer behaviour. Therefore, if a firm conducts an SEO, it cannot re-enter the sample until 3 years have passed since the

[16] We are unable to ascertain the IPO month more precisely due to lack of access to new issues databases.
[17] Our access to a larger and richer dataset is restricted as HUBS does not subscribe to the new issues database available from Thomson Reuters.
[18] Open offers and rights issues constitute about 18% of total issues during our sample period. Alti and Sulaeman (2011) find that institutional ownership influences share prices of firms when announcement of a further issue is made. Thus we include placing for cash.
[19] We exclude smaller issues to ensure an economically significant level of financing. The inclusion of smaller or exclusion of rights and open offers do not affect our results.

year of issue.[20] The final sample for IPOs consists of 580 firms and the SEOs sample consists of 280 issues.

The statistics of firm specific characteristics and financing activities for IPO and SEO firms are summarized in Table 3.4. The number of observations decreases due to probable bankruptcies, delisting, or mergers and acquisitions. The analysis is done in IPO time where IPO year is the fiscal year the firm goes public and IPO + *k* is the k^{th} fiscal year after the IPO. The same method is used for the SEOs. Clearly, debt ratios decline during IPO year to levels lower than pre-IPO and increase to higher levels about 2 years after the IPO year. A different pattern is observed for SEOs where debt increases slightly during SEO year and fluctuates around that level. Size increases with age for IPO and SEO firms. Market-to-book ratio also decreases for both IPO and SEO firms after equity issuance. Investment levels also display a decreasing trend for both samples. R&D expenses are higher during equity issues and decline in subsequent years.[21] Profitability is lower during IPO year and increases in the following years.[22] A similar trend can be detected for SEO firms.

IPO firms appear to be far more profitable than SEO firms. Cash balances reduce over time for the IPO samples. Tangibility and dividends increase over time for IPO firms. An opposite pattern is observed for SEO firms. Relative to their size, IPO firms issue more equity than SEO firms. For both samples, the amount of net equity issued reduces over time. Net debt issued increases for the first two years after IPO and stabilizes subsequently. This ratio however peaks during SEO year and reduces subsequently.

[20] This is similar to the method used in Healy and Palepu (1990) and Loughran and Ritter (1997).
[21] Kim and Weisbach (2008) find evidence that incremental dollar from equity issues across 38 different countries are spent on capital expenditure and R&D.
[22] Jain and Kini (1994), Mikkelson et al (1997) and Alti (2006) document similar trends among IPO firms.

Table 3.2 Definition of Dependent Variables

Variable	Definition	Source
Book Leverage (D/A)	Total book debt divided by total assets	Datastream
Pre issue Leverage (D/A pre-IPO or D/A pre-SEO)	Total book debt divided by total assets in the financial year before the issue	Datastream
Capital Expenditure (INV/A)	Net capital expenditure divided by total assets	Datastream
Change in Leverage (D/A_t - D/A_{t-1})	Total debt divided by total assets in year t minus total debt divided by total assets in year t-1	Datastream
Proceeds (Proceeds/A_t or Proceeds /A_{t-1})	Net proceeds from offerings (both IPOs and SEOs) divided by total assets in year t or t-1	London Stock Exchange
Dividends (DIV/E)	Cash dividends paid divided by the book equity.	Datastream
Cash (CASH/A)	Cash and short term investments scaled by total assets	Datastream
Net debt issued (d/A)	Changes in book debt over total assets	Datastream
Net equity issued (e/A)	Changes in book equity minus the changes in retained earnings divided by total assets	Datastream
Newly retained earnings (RE/A)	Changes in retained earnings scaled by total assets	Datastream

Table 3.3 Definition of Explanatory and Control Variables

Variable	Definition	Source
HOT	Dummy variable which takes the value of one if number of issues are larger than median value during the particular month (for IPOs) or year (for SEOs)	Datastream for the IPO dates and London Stock Exchange for SEO dates
Market-to-book ratio (M/B)	Book value of total assets less book value of equity plus market value on the date of the financial year end to book value of total assets	Datastream
Profitability (EBITDA/A)	Earnings before interest, taxes and depreciation over total assets	Datastream
Size (SIZE)	Natural logarithm of net sales in million of 1979 pounds for the IPO data and in millions of 1998 pounds for the SEO data	Datastream
Tangibility (PPE/A)	Net plant, property and equipment over total assets	Datastream
Research and Development (R&D/A)	Research and development expenses scaled by total assets	Datastream
RDD	Dummy variable that takes the value of one if R&D data is missing from Datastream	Datastream

Table 3.4: Summary statistics of firm-specific factors and financing activities of IPO and SEO firms

Panel A: IPO sample

	N	D/A	M/B	d/A	e/A	ΔRE/A	EBITDA/A	SIZE	PPE/A	R&D/A	INV/A	DIV/E	CASH/A
Pre-IPO	580	15.45(17.30)	-	-	-	-	9.48(20.66)	8.99(2.36)	29.43(26.17)	1.88(7.24)	8.99(10.44)	4.30(10.01)	19.76(22.42)
IPO	580	13.35(14.13)	2.27(1.55)	1.46(13.6)	17.14(25.9)	0.02(11.2)	8.63(17.46)	9.38(2.16)	29.87(26.25)	1.82(5.72)	8.96(10.04)	4.49(8.79)	19.31(21.06)
IPO+1	554	14.74(14.39)	1.87(1.23)	3.06(10.15)	6.93(17.74)	-1.27(13)	7.44(18.86)	9.68(2.07)	31.13(26.57)	2.20(7.47)	8.31(9.46)	5.27(8.03)	16.05(18.61)
IPO+2	519	16.39(15.34)	1.75(1.21)	2.64(10.16)	4.30(19.22)	0.08(14.84)	7.56(18.19)	9.87(2.04)	30.95(26.63)	1.97(5.46)	7.01(7.68)	5.06(7.39)	14.75(17.65)
IPO+3	391	16.20(14.85)	1.71(1.19)	0.70(10.17)	4.49(19.54)	1.02(12.90)	9.39(14.71)	10.18(2.02)	33.0(26.77)	1.82(5.26)	6.76(7.16)	4.92(6.89)	13.34(15.14)
IPO+4	327	16.25(14.25)	1.63(0.95)	1.13(9.09)	3.46(13.94)	-0.36(10.9)	8.66(14.85)	10.38(2.05)	34.18(26.05)	1.81(5.09)	6.64(7.31)	5.65(7.05)	12.93(15.29)
IPO+5	276	16.08(14.51)	1.55(0.82)	1.57(9.62)	1.25(14.71)	1.12(10.90)	9.53(13.41)	10.44(2.03)	34.09(25.76)	1.67(4.98)	6.49(6.21)	6.60(10.25)	12.78(14.29)
IPO+7	198	15.45(12.74)	1.58(0.85)	1.75(8.10)	4.50(12.51)	0.93(9.08)	10.76(11.8)	10.73(2.03)	33.69(25.67)	1.75(4.89)	5.97(5.13)	6.39(8.09)	12.69(14.4)

Panel B: SEO sample

	N	D/A	M/B	d/A	e/A	ΔRE/A	EBITDA/A	SIZE	PPE/A	R&D/A	INV/A	DIV/E	CASH/A
Pre-SEO	280	20.54(17.90)	-	-	-	-	-1.82(24.32)	10.34(2.64)	31.01(27.39)	4.30(13.26)	7.72(9.21)	6.20(20.01)	15.32(20.59)
SEO	280	21.28(17.66)	1.91(1.41)	4.02(14.46)	11.19(26.87)	-1.81(22.02)	-2.63(26.08)	10.63(2.41)	29.87(27.00)	4.52(13.22)	6.36(8.22)	4.27(12.55)	13.83(18.99)
SEO+1	255	21.27(17.05)	2.05(1.64)	2.20(11.56)	4.52(22.31)	0.83(22.78)	-2.76(29.54)	10.82(2.45)	29.49(27.09)	4.70(13.08)	6.43(7.82)	3.41(10.37)	14.36(19.80)
SEO+2	222	20.71(16.62)	1.79(1.24)	0.63(12.48)	6.69(26.86)	-1.80(28.66)	-1.85(29.25)	11.01(2.48)	28.07(26.27)	3.72(9.54)	5.86(7.26)	4.38(12.70)	14.92(20.02)
SEO+3	195	21.25(17.29)	1.69(1.04)	2.17(11.18)	1.49(19.87)	-1.07(21.29)	-2.30(27.53)	11.06(2.49)	27.69(26.57)	4.00(9.90)	5.38(7.44)	3.11(4.86)	15.63(20.22)

This table records means and standard deviations in brackets of firm specific variables for IPO and SEO firms in the sample. All variables except *M/B* and *SIZE* are scaled by year end assets and are reported in percentage terms. Book leverage, *D/A*, is the ratio of book debt to total assets. Market-to-book ratio, *M/B*, is defined as the ratio of book value of total assets less book value of equity plus market value of equity to book value of total assets. Net debt issued, d/A is the change in book debt. Net equity issued, e/A is the change in book equity minus the change in retained earnings. Newly retained earnings, ΔRE/A, is the change in retained earnings. Profitability is measured by EBITDA/A which is earnings before interest, taxes and depreciation. SIZE is the logarithm of net sales in 1979 pounds. Asset tangibility, PPE/A, is defined as net plant, property and equipment. R&D/A is the research and development expenses. INV/A is capital expenditure. DIV/E is cash dividends paid divided by book equity. CASH/A is cash and short-term investments.

3.3.2 Defining hot markets

Hot markets are defined based on the number of issues for the total market in the given period. This is done to examine timing behaviour in equity markets. This study follows Alti (2006) and constructs a dummy variable based on the volume to define timing attempts by firms. For the IPO sample, monthly number of IPO volume is used. The period used for IPO firms is 1st January 1979 to 31st December 2008. The number of issues is smoothened using a 3 month moving average to iron out seasonal variations.[23] The UK economy grew by about 2.4% per annum over the period, thus the moving average is further detrended at 0.2% per month[24]. Hot (cold) months are then defined as the months where the IPO volume is above (below) the median across the given period. Figure 3.1 shows the detrended volume of IPO for the observed period and the horizontal line cutting across the figure is the median, which is 7.19. The figure illustrates that there is a significant difference in terms of volume in hot and cold periods. In this study, the sample constitutes of 394 hot and 186 cold firms.

A similar method is used to define the hot dummy variable for SEOs. The period for the sample is limited to 1998 to 2008 because of data availability from London Stock Exchange[25]. The volume is detrended using a 3-year moving average and divided by 4.6% since the economy grew at that rate per annum during the corresponding period. This study looks at 161 SEOs issued during hot periods and 199 SEOs issued during cold periods.

[23] This is done following previous studies, e.g., Helwege and Liang (2004) and Alti (2006).
[24] Growth is corrected using the GDP deflator. GDP growth and deflator data are obtained from the Office for National Statistics.
[25] Our sample period and size is limited due to lack of access to new issues database at HUBS currently.

Figure 3.1: Detrended monthly moving average of IPO volume.

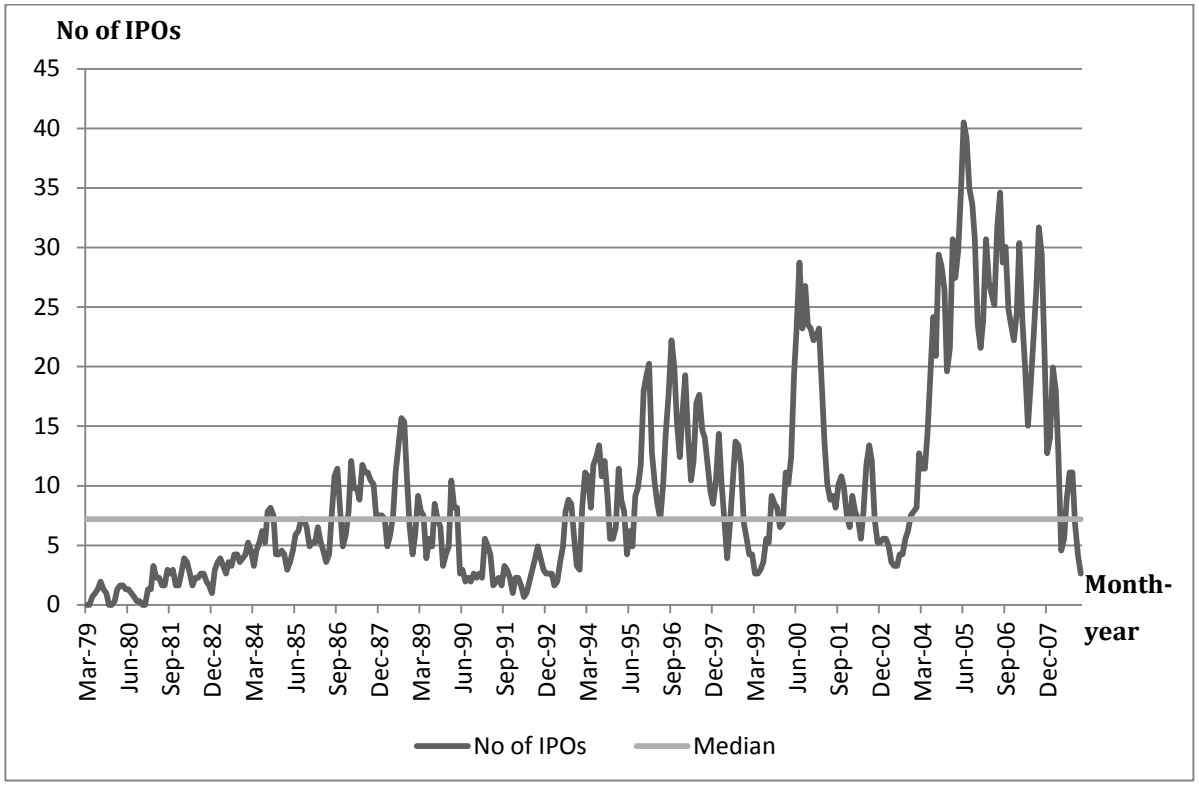
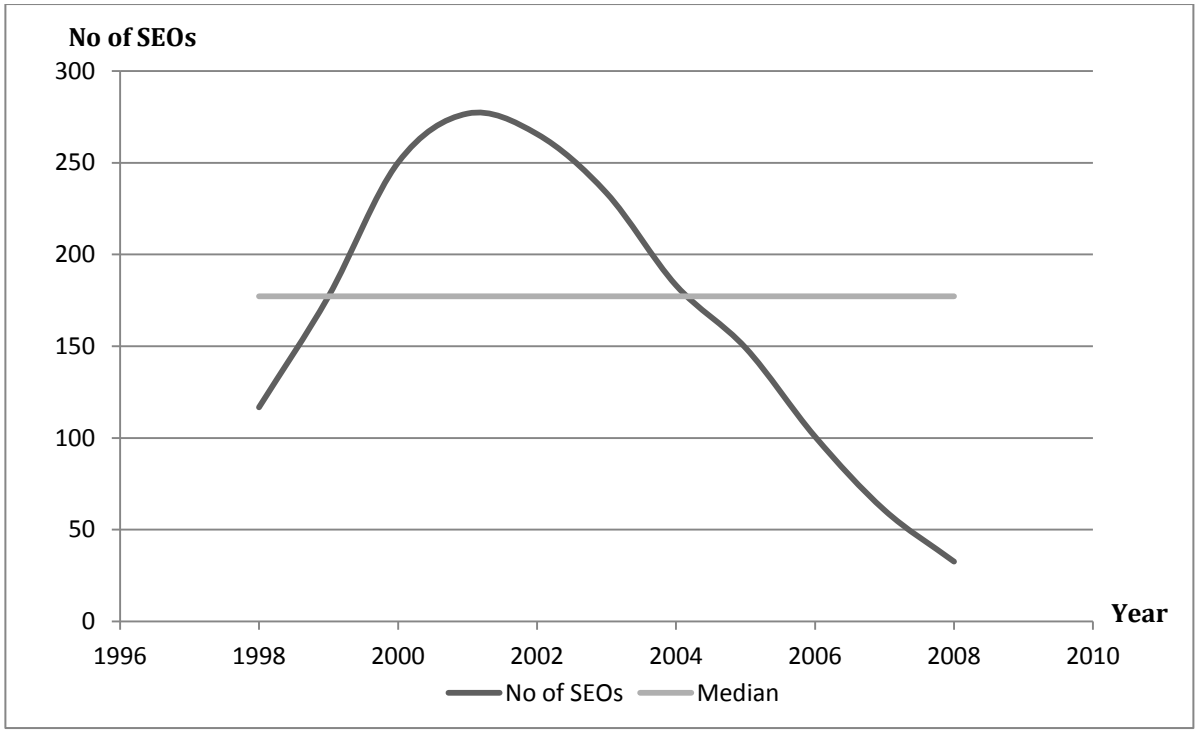


Figure 3.2: Detrended moving average of SEO volume.



3.4 How Market Timing Affects Equity Issuance

3.4.1 Hot market and timing attempts

Ibbotson and Jaffe (1975) found that there were hot and cold issue markets for IPO markets. The authors argue that such durations are usually accompanied by high number of offerings, severe under-pricing or oversubscription of offerings. Several subsequent studies documented the occurrence of hot and cold equity market.[26] Empirical studies have shown that there are different plausible explanations for the hot and cold IPO market, namely the changing business conditions (Pastor and Veronesi, 2005) and investor sentiments (Ritter, 1991). Ivanov and Lewis (2008) consider several different explanations and provide empirical evidence that time variation in business conditions and investor sentiments are important determinants of monthly issue activity. The authors also show that time variation in adverse selection costs does not significantly affect IPO volume. Henderson et al (2006) investigate world markets for raising new capital and provide empirical evidence that market timing considerations are also important in SEO markets. Kim and Weisbach (2008) further argue that firms with a higher market-to-book ratio offer a higher fraction of secondary shares in SEOs than low market-to-book firms. Thus, market timing plays a critical role in equity issues.

The market timing theory implies that firms would issue equity when managers believe when market conditions are favourable. Alti (2006) argues that the hot dummy captures this implication of the theory. Market timing would also imply that firms that issue equity when the market is more favourable would sell more equity and thus be able to raise more capital relative to when markets are unfavourable. This section examines this notion of market timing. We follow Alti (2006) and identify hot market firms as timers to avoid the concerns surrounding the use of market-to-book ratio (or M/B_{efwa}) as an indicator for market timers as interpreting results from the market-to-book ratio is often mixed.[27]

The amount of capital that is raised during equity issue is measured as $Proceeds/A_t$ and is defined as net proceeds from the sale of equities scaled by year-end total assets. The data is

[26] See Ibbotson et al (1988), Loughran et al (1994) and Alti (2006).

[27] See Hennesy and Whited (2004), Leary and Roberts (2005) and Kayhan and Titman (2007) for criticism on the use of market-to-book ratio as an indicator for market timing.

obtained from the London Stock Exchange and is matched with the earlier selected sample. The construction of the HOT dummy as in Alti (2006) is intended to capture instances when managers perceive markets to be favourable. Proceeds on the other hand are a reflection of firms being able to sell more equity during hot markets rather than cold markets. Thus it is an indicator of whether the markets are favourable. For the IPO sample, the number of observations is reduced because of data availability. Panel A, Table 3.5 shows the mean values of proceeds raised by hot and cold market firms for the IPO sample relative to their assets. Surprisingly, hot market firms raise relatively the same amount of capital as their cold market counterparts suggesting that firms are not able to raise more proceeds during hot markets The difference is not statistically significant. However, this estimate may be distorted since the amount is normalized by IPO year-end assets. This could be due to the additional capital raised mainly adds to assets. To examine this effect, the proceeds are then divided by total assets at the beginning of the IPO year (Proceeds/A_{t-1}). The market timing effect is evident in this measure where hot market firms raise more capital (114.54%) than cold market firms (86.86%). Although the results may be statistically insignificant, a 30% increase in proceeds raised does suggest economic significance.

Panel A, Table 3.6 shows the mean values for SEO firms. The amount of capital raised (Proceeds/A_t) for hot market firms is 2.63 points higher on average than cold market firms (22.65% vs. 20.02%) but the difference is statistically insignificant. In order to investigate whether the additional capital raised mainly adds to assets the proceeds are scaled by total assets at the beginning of the SEO year (Proceeds/A_{t-1}). The results are similar to the IPO sample where hot market firms raised more capital relative to beginning of year assets but again the difference is statistically insignificant. The results seem to suggest that the additional capital raised by cold market firms result in a relatively higher increase in additions of assets than hot market firms.

The difference in amount of capital raised by hot and cold market firms may result from their different characteristics. To examine this difference the following models are adopted to control for firm-specific determinants of equity issues (*t* is the event year):

$$Y_t = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD_{t-1} + \beta_8 \frac{D}{A_{t-1}} + \varepsilon_t \quad \textbf{(3-1)}$$

$$Y_t = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD_{t-1} + \beta_8 \frac{D}{A_{t-1}} + \beta_9 HOT * \frac{M}{B_t} + \beta_{10} HOT * Size_{t-1} + \varepsilon_t \quad \textbf{(3-2)}$$

As in Alti (2006), the HOT dummy is intended to capture the equity market timing effect. The control variables used to identify the differences in between hot and cold market issuers are the market-to-book ratio, profitability, size, tangibility, research and development expenses, and lagged book leverage.[28] RDD is a dummy variable which takes the value 1 if no research and development is reported in Datastream.[29] Given that empirical priors have identified these variables are important determinants of capital structure and the issue decision, they serve as a control for our purpose which is to isolate the effect of market timing. Net proceeds from equity issues is a measure of how much equity can be sold, thus the explanatory variable and control variables are intended to explain the amount of equity capital raised. These regressions and all subsequent results reported in this study are done using OLS with industry dummies to control for heterogeneity in industry characteristics. All the explanatory variables are also lagged one period, except the market-to-book ratio which is observed in the IPO year for the first time to control for endogeneity.

[28] This is based on Rajan and Zingales (1995), Titman and Wessels (1988) and Alti (2006) where these variables are identified as the main determinants of debt-equity choice.
[29] This is similar to Baker and Wurgler (2002) and Alti (2006).

Table 3.5: Market Timing Effects on IPO Firms

	$Proceeds/A_t$	$Proceeds/A_{t-1}$	d/A_t	d/A_t
Panel A: Mean Values				
Hot	61.38	114.54	1.39	1.39
Cold	61.94	86.86	1.60	1.60
t -value (difference)	(0.05)	(1.32)	(0.17)	(0.17)
Panel B: Regression Analysis				
HOT	-5.15	31.57*	0.13	-0.98
	(11.16)	(17.58)	(1.13)	(5.22)
M/B_t	21.04***	28.12***	-1.23***	-1.27**
	(4.78)	(7.34)	(0.31)	(0.52)
$EBITDA/A_{t-1}$	-0.49*	0.51	-0.01	-0.01
	(0.26)	(0.56)	(0.02)	(0.02)
$SIZE_{t-1}$	5.40**	-2.13	-0.15	-0.21
	(2.69)	(4.67)	(0.24)	(0.41)
PPE/A_{t-1}	-0.17	-0.34	0.11***	0.11***
	(0.12)	(0.26)	(0.03)	(0.03)
$R\&D/A_{t-1}$	-0.39	1.56	0	0
	(0.43)	(1.80)	(0.05)	(0.05)
RDD_{t-1}	-4.02	42.28	2.29*	2.28
	(12.26)	(25.91)	(1.36)	(1.36)
D/A_{t-1}	-0.32	-0.76	-0.40***	-0.40***
	(0.22)	(0.40)	(0.05)	(0.05)
$HOT*M/B_t$	-	-	-	0.07
	-	-	-	(0.62)
$HOT*SIZE_{t-1}$	-	-	-	0.1
	-	-	-	(0.48)
R^2	0.31	0.2	0.25	0.25
Adjusted R^2	0.26	0.14	0.23	0.22
F-Test	5.86***	3.22***	10.36***	9.29***
N	238	238	580	580

Panel A reports the mean values of hot and cold market firms for each dependent variable.. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dummy variable RDD takes the value of 1 when R&D data is not available in Datastream. The dependent variable is the proceeds from IPO divided by year-end total assets, proceeds divided by beginning of year total assets and net debt issued divided by year-end total assets for IPO year for the three different sets of regressions. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 3.6: Market Timing Effect on SEO Firms

	Proceeds/A_t	Proceeds/A_{t-1}	d/A_t	d/A_t
Panel A: Mean Values				
Hot	22.65	98.37	1.75	1.75
Cold	20.02	30.47	7.09	7.09
t-value (difference)	(0.55)	(0.85)	(3.10)	(3.10)
Panel B: Regression Analysis				
HOT	1.15	15.39	-4.42**	10.17
	(3.52)	(34.20)	(1.75)	(6.99)
M/B_t	2.67*	-13.40	-0.44	-0.06
	(1.46)	(24.83)	(0.48)	(0.75)
$EBITDA/A_{t-1}$	-0.27***	-11.36	0.04	0.03
	(0.10)	(9.94)	(0.04)	(0.04)
$Size_{t-1}$	-3.44***	-20.04	0.91**	1.70***
	(1.24)	(18.49)	(0.38)	(0.48)
PPE/A_{t-1}	-0.06	0.94	-0.01	-0.02
	(0.06)	(0.98)	(0.04)	(0.05)
$R\&D/A_{t-1}$	-0.29	-11.23	0.00	-0.03
	(0.31)	(10.40)	(0.06)	(0.06)
RDD_{t-1}	-5.05	34.93	1.02	1.28
	(8.29)	(51.46)	(2.18)	(2.19)
D/A_{t-1}	-0.03	-0.97	-0.20**	-0.20**
	(0.07)	(1.22)	(0.08)	(0.08)
$HOT*MTB_t$	-	-	-	-0.49
	-	-	-	(0.98)
$HOT*Size_{t-1}$	-	-	-	-1.31**
	-	-	-	(0.59)
R^2	0.15	0.16	0.14	0.15
Adjusted R^2	0.10	0.10	0.08	0.09
F-test	2.81***	2.88***	2.46***	2.40***
N	280	280	280	280

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dummy variable RDD takes the value of 1 when R&D data is not available in Datastream. The dependent variable is the proceeds from SEO divided by year-end total assets, proceeds divided by beginning of year total assets and net debt issued divided by year-end total assets for SEO year for the three different sets of regressions. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

The interaction terms HOT*$(M/B)_t$ and HOT*$Size_{t-1}$ are also included in the analysis. This is due to the notion that firms with different growth opportunities and size would behave differently regarding market timing attempts.[30] Larger firms may be able to benefit more from timing the hot market and firms with higher growth opportunities may have more incentives to time the market as well. Alti (2006) finds that the 'HOT' dummy is significantly and positively correlated with the amount of proceeds from IPOs scaled by asset size of issuing firms and concludes that hot-market firms tend to issue more equity and hence raise more capital. Thus, a positive link is expected between the 'HOT' dummy and the dependent variables (Proceeds/A_t and Proceeds/A_{t-1}). The coefficient for market-to-book is also expected to be positive. The coefficient of the lagged leverage, on the other hand, is expected to be negative. Panel B, Tables 3.5 and 3.6 report the regressions results.

For IPO firms, although being insignificant, the hot dummy in Table 3.5 has a surprisingly negative correlation with proceeds divided by year-end total assets. The impact of market timing is evident when proceeds are divided by total assets from the beginning of the year. The hot market coefficient is 31.57, which is statistically and economically significant. Therefore, firms that go public in a hot market (firms that time the market) would be able to raise 31.57% more capital than cold market firms. The market-to-book ratio in the first four columns of Table 3.3 have strongly positive coefficients, indicating that firms with more growth opportunities tend to raise more capital. Firm size has also a positive and significant coefficient implying larger firms raise more capital during the IPO event. Profitability, on the other hand, has a negative and significant relationship with proceeds. Thus, profitable firms tend to raise less capital from the IPO event. This would suggest that they face less demand for external form of financing or may choose an alternative choice of financing.

For SEO firms, the hot dummy is positively linked to the proceeds divided by year-end total assets, as expected. The market-to-book ratio for SEO firms also has a positive and marginally significant coefficient with proceeds. Thus, firms with higher potential for growth would raise more capital from SEO issues. In contrast to IPO firms, size has a negative impact on proceeds. The coefficient is 3.44 and significant at 1%. This would suggest that larger firms raise less capital through SEOs and may rely more on debt as a

[30] The regressions results are robust to multicollinearity problem.

source of financing. However, larger firms may be subject to less transaction costs and monitoring, and thus be able to opt for multiple issues. Larger firms would therefore be less inclined to raise bigger amounts of capital in a single issue. The coefficient of profitability is 0.27 (similarly negative as IPO firms) and significant.

The last two columns in tables 3.5 and 3.6 report the net debt issued for hot and cold market firms. For IPO firms, Panel A shows that on average hot market firms issue less net debt than cold market firms, the difference being insignificant. Looking at SEO firms highlights the significant difference in net debt issues for hot market and cold market firms (1.75% versus 7.09%, respectively). The difference in mean values provide support for the market timing theory that hot market firms find the equity market more favourable than the debt market. Panel B shows the results for the multiple regressions. We do not find a significant value for the HOT dummy, suggesting that UK firms do not decrease net debt issues in the hot market as opposed to findings in Alti (2006). A possible explanation for this difference could be due to pre-issue leverage in the US IPO market being more than 4 times that of the UK (15.45% in our sample vs. 66.54% in Alti's sample).

The results for SEO firms are as expected. The coefficient is negative and economically and statistically significant. The interaction term in the last column between growth and the hot dummy is also negative. This would lend further support to the result in the first and second column where hot market firms with greater growth opportunities would be have larger proceeds when issuing SEOs. The market-to-book ratio for IPO firms has a negative correlation with net debt issued, which is significant at 1%. This would be in line with the results in the first column where firms with more growth potential would raise more capital during the IPO. Size has a negative coefficient which further validates the result in the first column. Tangibility and lagged leverage are both statistically significant and have the expected signs. For SEO firms, the market-to-book ratio is also negative. This result validates the result in the first column. In contrast to the IPO results, size has a positive coefficient which is significant at 5%. This indicates that larger firms issue more debt during SEO year. This result is also consistent with the first two columns. Comparing both results would suggest that SEO firms time the equity market more evidently than IPO firms.

3.4.2 Difference in quality of hot market and cold market firms

The literature suggests that the reasons firms issue more equity (either in the IPO or SEO case) could be due to other than market timing considerations. The first possibility would be that firms are attempting to lower their leverage ratios as their prior ratios may be too high. This is examined in the first column in Panel A, Table 3.7, which shows that the mean levels of leverage of hot market firms in the IPO are lower than than their cold market counterparts. Panel B shows the regression results of book leverage at the beginning of the year of IPO firms with the hot market dummy and similar control variables with an exception of the market-to-book ratio. The coefficient is surprisingly positive but is insignificant. The next column shows the expanded model. Panel A, Table 3.8 shows that hot market and cold market firms in the SEO sample have a relatively similar level of mean leverage in pre-issue year. However, the regression results in Panel B reveal a surprising result. The coefficient of the hot dummy is 3.08 and statistically significant at 5% level. This suggests that hot market firms indeed may have deviated further from their target leverage compared to cold market firms. The next column with the interaction term shows that firm size doesn't dampen this effect.

The second possibility is that firms would issue equity to finance growth.[31] Thus, hot market firms may raise more capital through equity as they may have more growth options relative to cold market firms. To resolve the question whether firms are really raising more equity during hot markets to finance growth we next model growth in this section. Panel A of the third column in Table 3.7 shows that the mean investment levels for hot market firms are lower than cold market firms by 1.85% (t-value = 2.07). The significantly lower levels of investment persist throughout the subsequent two years from IPO year. The results in the third column of Panel B show that the hot dummy is negatively but insignificantly correlated to investment levels on IPO year. The next column shows that the negative correlation is offset by an increase in growth options and size for hot market firms.

[31] Kim and Weisbach (2008) show firms spend substantial amounts of proceeds from equity issues on R&D and capital expenditure.

Table 3.7: Differentiating Hot and Cold Market IPO Firms

			INV/A_t						$EBITDA/A_t$			
	$D/A_{Pre-IPO}$	$D/A_{Pre-IPO}$	IPO	IPO	IPO+1	IPO+1	IPO+2	IPO+2	IPO	IPO	IPO+1	IPO+1
Panel A: Mean Values												
Hot	14.60	14.60	8.37	8.37	7.58	7.58	6.18	6.18	6.33	6.33	5.04	5.04
Cold	17.25	17.25	10.22	10.22	9.84	9.84	8.69	8.69	13.48	13.48	12.51	12.51
t -value (difference)	(1.72)	(1.72)	(2.07)	(2.07)	(2.63)	(2.63)	(3.54)	(3.54)	(5.37)	(5.37)	(5.13)	(5.13)
Panel B: Regression Analysis												
HOT	0.68	-2.29	-0.14	-4.91	-0.60	1.12	-0.49	-0.54	-3.46**	-12.85**	-3.84***	-8.12
	(1.49)	(6.50)	(0.86)	(4.69)	(0.85)	(5.17)	(0.72)	(3.99)	(1.29)	(5.64)	(1.46)	(7.99)
M/B_{IPO}	-	-	0.54**	0.17	0.48*	0.98*	0.38	0.83*	0.57	1.64*	0.55	1.67*
	-	-	(0.23)	(0.38)	(0.25)	(0.52)	(0.30)	(0.69)	(0.63)	(0.91)	(0.72)	(0.81)
M/B_{t-1}	-	-	-	-	-	-	0.56*	0.77	-	-	-	-
	-	-	-	-	-	-	(0.28)	(0.66)	-	-	-	-
$EBITDA/A_{t-1}$	-0.10***	-0.10***	-0.02	-0.01	-0.00	-0.00	0.00	0.00	-	-	-	-
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	-	-	-	-
$SIZE_{t-1}$	0.47	0.28	-0.58***	-0.81***	-0.52**	-0.52*	0.12	-0.02	2.17***	1.33***	1.95***	1.46**
	(0.38)	(0.50)	(0.19)	(0.35)	(0.22)	(0.34)	(0.14)	(0.28)	(0.27)	(0.39)	(0.33)	(0.47)
PPE/A_{t-1}	0.25***	0.25***	0.17***	0.17***	0.17***	0.17***	0.14***	0.14***	0.08***	0.09***	0.11***	0.11***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
$R\&D/A_{t-1}$	-0.16**	-0.16**	-0.07*	-0.07	-0.09*	-0.07*	-0.03	-0.02	-0.16	-0.14	-0.33*	-0.31*
	(0.07)	(0.07)	(0.03)	(0.03)	(0.05)	(0.05)	(0.03)	(0.03)	(0.12)	(0.11)	(0.17)	(0.18)
RDD_{t-1}	-0.94	-0.94	1.45	1.39	0.68	0.77	1.15	1.14	3.13	3.25*	1.55	1.68
	(1.97)	(1.96)	(1.96)	(1.13)	(1.08)	(1.06)	(0.55)	(0.55)	(2.03)	(1.96)	(2.29)	(2.28)
$HOT*M/B_{IPO}$	-	-	-	0.57	-	-0.72	-	-0.66	-	-1.55	-	-1.52
	-	-	-	(0.47)	-	(0.58)	-	(0.72)	-	(1.20)	-	(1.19)
$HOT*M/B_{t-1}$	-	-	-	-	-	-	-	-0.33	-	-	-	-
	-	-	-	-	-	-	-	(0.72)	-	-	-	-
$HOT*SIZE_{t-1}$	-	0.32	-	0.38	-	-0.02	-	0.20	-	1.36**	-	0.76
	-	(0.69)	-	(0.39)	-	(0.43)	-	(0.31)	-	(0.52)	-	0.72)
R^2	0.16	0.16	0.22	0.22	0.26	0.26	0.30	0.30	0.19	0.20	0.15	0.16
Adjusted R^2	0.14	0.14	0.20	0.20	0.24	0.24	0.27	0.27	0.17	0.18	0.13	0.13
F-Test	6.87***	6.47***	9.29***	8.41***	11.151***	10.07***	11.7***	10.31***	8.28***	8.00***	5.97***	5.51***
N	580	580	580	580	554	554	519	519	580	580	554	554

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the pre-IPO,IPO, IPO+1 and IPO+2 year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the pre-IPO book leverage divided by total assets, investments rates scaled by total assets and profitability scaled by total assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.7 (continued)

	EBITDA/A_t						Div/E_t					
	IPO+2	IPO+2	IPO+3	IPO+3	IPO+4	IPO+4	IPO	IPO	IPO+1	IPO+1	IPO+2	IPO+2
Panel A: Mean Values												
Hot	5.24	5.24	7.69	7.69	6.71	6.71	4.52	4.52	5.10	5.10	4.58	4.58
Cold	12.23	12.23	12.21	12.21	11.50	11.50	4.43	4.43	5.62	5.62	6.03	6.03
t -value (difference)	(4.49)	(4.49)	(2.97)	(2.97)	(2.90)	(2.90)	(0.14)	(0.14)	(0.72)	(0.72)	(2.11)	(2.11)
Panel B: Regression Analysis												
HOT	-3.66**	-10.79	-1.44	4.33	-1.89	-2.58	0.57	-7.77**	0.36	-10.74***	-0.26	-4.36
	(1.58)	(9.38)	(1.57)	(10.42)	(1.55)	(11.32)	(0.71)	(2.93)	(0.77)	(3.54)	(0.73)	(4.05)
M/B_{IPO}	-0.52	0.94	-0.29	-0.38	-0.47	-0.96	0.80***	0.22	0.92***	0.51	-0.08	-0.63
	(0.97)	(1.28)	(0.74)	(0.93)	(0.88)	(1.46)	(0.32)	(0.25)	(0.28)	(0.44)	(0.26)	(0.48)
M/B_{t-1}	1.83	1.52	3.29***	5.97***	1.76*	4.12**	-	-	-	-	1.61***	1.83***
	(1.58)	(1.78)	(0.91)	(1.57)	(1.00)	(1.56)	-	-	-	-	(0.40)	(0.87)
$EBITDA/A_{t-1}$	-	-	-	-	-	-	0.01	0.01	-0.00	-0.00	0.01	0.01
	-	-	-	-	-	-	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
$SIZE_{t-1}$	2.17***	1.49**	1.76***	1.75***	1.45***	1.16*	0.90***	0.48***	1.11***	0.51*	1.07***	0.90***
	(0.36)	(0.54)	(0.37)	(0.65)	(0.43)	(0.65)	(0.16)	(0.17)	(0.20)	(0.20)	(0.17)	(0.32)
PPE/A_{t-1}	0.07**	0.07**	0.10***	0.10***	0.15***	0.15***	-0.03*	-0.03*	-0.01	-0.01	0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$R\&D/A_{t-1}$	-0.23	-0.22	-0.39*	-0.39**	-0.65**	-0.72**	-0.02	-0.03	-0.14**	-0.16**	-0.11***	-0.12**
	(0.18)	(0.18)	(0.22)	(0.21)	(0.29)	(0.27)	(0.05)	(0.05)	(0.06)	(0.06)	(0.04)	(0.04)
RDD_{t-1}	3.21	3.12	1.79	1.67	-1.72	-1.94	0.74	0.65	-0.25	-0.43	0.74	0.67
	(2.03)	(2.03)	(2.18)	(2.14)	(1.90)	(1.78)	(1.11)	(1.10)	(1.20)	(1.20)	(0.72)	(0.73)
$HOT*M/B_{IPO}$	-	-2.06	-	-0.06	-	1.02	-	0.86*	-	0.65	-	0.80
	-	(1.80)	-	(1.37)	-	(1.61)	-	(0.49)	-	(0.56)	-	(0.56)
$HOT*M/B_{t-1}$	-	0.40	-	-3.48**	-	-3.56*	-	-	-	-	-	-0.29
	-	(2.68)	-	(1.87)	-	(2.00)	-	-	-	-	-	(0.94)
$HOT*SIZE_{t-1}$	-	1.05	-	0.05	-	0.44	-	0.69**	-	1.00***	-	0.30
	-	(0.76)	-	(0.87)	-	(0.93)	-	(0.30)	-	(0.35)	-	(0.38)
R^2	0.14	0.15	0.20	0.22	0.20	0.22	0.09	0.10	0.11	0.12	0.15	0.15
Adjusted R^2	0.11	0.12	0.17	0.18	0.16	0.17	0.06	0.07	0.08	0.09	0.12	0.12
F-Test	4.95***	4.51***	5.57***	5.17***	4.67***	4.35***	3.22***	3.22***	3.83***	3.95***	4.90***	4.33***
N	519	519	391	391	327	327	579	579	553	553	518	518

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO, IPO+1, IPO+2, IPO+3 and IPO+4 year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is profitability divided by total assets and dividends divided by total equity. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 3.8: Differentiating Hot and Cold Market SEO Firms

			INV/A_t						$EBITDA/A_t$			
	$D/A_{Pre\text{-}SEO}$	$D/A_{Pre\text{-}SEO}$	SEO	SEO	SEO+1	SEO+1	SEO+2	SEO+2	SEO	SEO	SEO+1	SEO+1
Panel A: Mean Values												
HOT	21.39	21.39	5.02	5.02	5.03	5.03	5.60	5.60	-5.21	-5.21	-3.99	-3.99
COLD	19.38	19.38	9.79	9.79	8.01	8.01	6.23	6.23	0.86	0.86	-1.12	-1.12
t-value (difference)	(0.93)	(0.39)	(5.02)	(5.02)	(2.62)	(2.62)	(0.64)	(0.64)	(2.04)	(2.04)	(0.75)	(0.75)
Panel B: Regression Analysis												
HOT	3.08**	4.03	-2.02***	-3.55	-1.78**	1.15	-0.09	2.65	-3.57**	1.99	-2.48	23.21*
	(1.46)	(6.12)	(0.91)	(3.65)	(0.87)	(3.88)	(0.85)	(3.58)	(1.71)	(9.83)	(2.21)	(12.77)
M/B_{SEO}	-	-	1.07***	1.13***	0.94***	1.40***	0.23	0.23	-0.12	0.87	-0.36	2.72**
	-	-	(0.26)	(0.39)	(0.29)	(0.57)	(0.35)	(0.79)	(0.84)	(1.28)	(1.18)	(0.90)
M/B_{t-1}	-	-	-	-	-	-	0.20	0.42	-	-	-	-
	-	-	-	-	-	-	(0.38)	(0.71)	-	-	-	-
$EBITDA/A_{t-1}$	-0.13***	-0.13***	0.01	0.02	-0.02*	0.05**	0.01*	0.04**	-	-	-	-
	(0.04)	(0.04)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	-	-	-	-
$Size_{t-1}$	3.08***	3.13***	-0.06	-0.25	0.12	-0.00	0.23	0.25	1.44***	1.57**	2.19***	2.90***
	(0.38)	(0.56)	(0.15)	(0.28)	(0.18)	(0.26)	(0.15)	(0.23)	(0.43)	(0.73)	(0.51)	(0.74)
PPE/A_{t-1}	0.21***	0.21***	0.15***	0.15***	0.12***	0.12***	0.13***	0.13***	0.01	0.02	0.01	0.00
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.05)
$R\&D/A_{t-1}$	-0.05	-0.05	-0.00	0.01	0.00	0.03	0.02	0.07**	-0.30**	-0.30**	-0.32**	-0.34**
	(0.06)	(0.06)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.14)	(0.14)	(0.16)	(0.16)
RDD_{t-1}	6.36***	6.38***	1.31*	1.23	0.41	0.21	0.76	0.83	2.18	1.88	-0.05	-0.64
	(1.97)	(2.00)	(0.72)	(0.73)	(1.01)	(0.98)	(1.04)	(1.08)	(2.44)	(2.41)	(2.86)	(2.92)
$HOT*M/B_{SEO}$	-	-	-	-0.13	-	-0.88	-	0.14	-	-1.77	-	-5.19***
	-	-	-	(0.50)	-	(0.68)	-	(0.86)	-	(1.63)	-	(1.90)
$HOT*M/B_{t-1}$	-	-	-	-	-	-	-	-0.67	-	-	-	-
	-	-	-	-	-	-	-	(0.76)	-	-	-	-
$HOT*Size_{t-1}$	-	-0.09	-	0.19	-	-0.09	-	-0.14	-	-0.20	-	-1.48
	-	(0.61)	-	(0.28)	-	(0.32)	-	(0.28)	-	(0.86)	-	(1.08)
R^2	0.36	0.36	0.35	0.35	0.30	0.32	0.32	0.33	0.23	0.24	0.31	0.34
Adjusted R^2	0.32	0.32	0.31	0.31	0.25	0.27	0.27	0.27	0.19	0.19	0.26	0.29
F-Test	9.76***	9.12***	8.87***	7.92***	6.38***	6.09***	5.70***	5.02***	5.26***	4.74***	7.01***	7.05***
N	280	280	280	280	255	255	222	222	280	280	255	255

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the pre-SEO, SEO, SEO+1 and SEO+2 year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the pre-SEO book leverage divided by total assets, investments rates scaled by total assets and profitability scaled by total assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 3.8 (continued)

	EBITDA/A_t				Div/E_t					
	SEO+2	SEO+2	SEO+3	SEO+3	SEO	SEO	SEO+1	SEO+1	SEO+2	SEO+2
Panel A: Mean Values										
HOT	-4.25	-4.25	-1.38	-1.38	4.33	4.33	3.36	3.36	5.38	
COLD	1.67	1.67	-3.87	-3.87	4.19	4.19	3.50	3.50	2.93	
t-value (difference)	(1.65)	(1.65)	(0.61)	(0.61)	(0.09)	(0.09)	(0.45)	0.45	(1.68)	
Panel B: Regression Analysis										
HOT	-6.13**	17.92	-0.41	29.53	0.65	18.36	-0.09	-5.47*	2.90	-7.89
	(2.89)	(18.48)	(3.30)	(24.29)	(1.65)	(18.39)	(1.30)	(2.84)	(1.87)	(6.29)
M/B_{SEO}	0.12	3.17	-2.76	-4.09	0.19	0.58	0.66	0.18	0.78	0.38
	(2.14)	(2.50)	(1.84)	(3.45)	(0.62)	(0.49)	(0.55)	(0.34)	(0.61)	(0.45)
M/B_{t-1}	-0.13	-1.13	-2.91	-3.16	-	-	-	-	0.10	0.10
	(1.94)	(2.37)	(4.16)	(6.31)	-	-	-	-	(0.34)	(0.42)
$EBITDA/A_{t-1}$	-	-	-	-	-0.01	0.08	-0.00	0.00	-0.00	0.00
	-	-	-	-	(0.02)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)
$Size_{t-1}$	1.69**	2.81**	4.05***	6.33***	-0.36	0.31	0.70***	0.49***	1.21***	0.63**
	(0.71)	(1.17)	(1.15)	(2.23)	(1.03)	(0.31)	(0.15)	(0.16)	(0.35)	(0.24)
PPE/A_{t-1}	0.08	0.09	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
	(0.06)	(0.06)	(0.06)	(0.07)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
$R\&D/A_{t-1}$	-0.10	-0.04	0.52	0.41	-0.08	-0.06	-0.00	0.00	-0.00	-0.03
	(0.22)	(0.24)	(0.47)	(0.33)	(0.08)	(0.08)	(0.02)	(0.02)	(0.05)	(0.05)
RDD_{t-1}	4.36	4.25	5.54	4.69	2.21*	2.66	2.47*	2.49*	1.10	0.94
	(5.27)	(5.48)	(4.56)	(4.01)	(1.22)	(1.43)	(1.37)	(1.49)	(1.83)	(1.94)
$HOT*M/B_{SEO}$	-	-4.45	-	2.04	-	-0.69	-	0.82	-	0.55
	-	(3.78)	-	(3.77)	-	(0.97)	-	(0.88)	-	(1.25)
$HOT*M/B_{t-1}$	-	1.02	-	0.78	-	-	-	-	-	0.24
	-	(3.73)	-	(6.82)	-	-	-	-	-	(0.60)
$HOT*Size_{t-1}$	-	-1.61	-	-3.27	-	-1.53	-	0.36	-	0.85
	-	(1.35)	-	(2.20)	-	(1.50)	-	(0.22)	-	(0.51)
R^2	0.13	0.13	0.26	0.29	0.04	0.08	0.08	0.08	0.11	0.12
Adjusted R^2	0.06	0.05	0.19	0.21	0.00	0.02	0.02	0.01	0.04	0.03
F-Test	1.84**	1.65**	3.92***	3.69***	0.73	1.24	1.24	1.15	1.50	1.32
N	222	222	195	195	280	280	255	255	222	222

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO, SEO+1, SEO+2 and SEO+4 year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is profitability divided by total assets and dividends divided by total equity. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

A similar pattern of lower levels of investment is observed for SEO firms in column three of Panel A, Table 3.8. The mean investment levels of hot market firms are significantly lower than cold market firms during the SEO year. This effect also persists for the subsequent year. The results in Panel B confirm the pattern even after controlling for firm and industry specific characteristics. In SEO year, hot market firms invest 2.02% less than cold market firms. This effect is statistically significant at 5%. The next column shows that the negative correlation is robust even after taking into account hot market firms with growth opportunities. The interaction of the hot dummy with size is positive and similar to IPO firms. This would mean that an increase in size for hot market firms would lead to a reduced negative correlation with investment levels. The negative correlation of the hot dummy with investment levels is evident for the first year after the equity issue. The results in tables 3.7 and 3.8 also show that there is a strong and significant relationship between the market-to-book ratio and investments opportunities. Alti (2006) also obtains similar results and suggests that this may highlight the weakness in using the market-to-book ratio as a measure for market timing. The relationship obtained between the market-to-book ratio and equity issues may in fact be due to growth opportunities that trigger higher levels of equity issues.

Market timing considerations may prompt less profitable firms to issue equity when the market is more favourable as they may find it difficult to raise capital in the equity market in less favourable conditions. To examine this issue we further model profitability as less profitable firms would be deemed as lower quality and thus would have difficulty issuing equity. Thus they would be more inclined to issue during hot markets. The next ten columns in Table 3.7 validate this notion. Panel A shows that the average profitability of hot market firms is less than half of cold market firms. The difference is statistically significant well beyond the IPO year. The results show that the hot dummy is negatively and significantly correlated to profitability.[32] The next column shows that the negative correlation is even more evident for hot market firms with high levels of growth opportunities. The interaction with size is positive and suggests that an increase in size reduces the negative correlation. The negative correlation between the hot dummy and profitability persists for the subsequent years.

[32] Alti (2006) highlights that the lower levels of profitability for hot market firms are due in part to their larger asset base at the end of IPO year.

SEO firms also exhibit similar trends. Panel A, Table 3.8 shows that the mean value of profitability during SEO year is significantly lower for hot market firms. The average for hot market firms continues to be lower the subsequent two years after the issue. The results in Panel B provide further evidence. Hot market firms are 3.57% less profitable than cold market firms after controlling for industry and firm specific characteristics. The negative correlation even holds when the hot dummy is interacted with the market-to-book ratio. The second interaction term shows that size reduces the negative correlation. The negative correlation persists for the subsequent years.

Given that we find that firms raise more proceeds during hot markets, we question whether these proceeds are used to issue higher levels of dividends. Thus we further model dividends to investigate whether payout policies differ for hot versus cold market firms.The amount of dividends that firms pay out during IPO year is relatively similar for hot and cold market firms. However, IPO year is the only year where mean levels of dividends paid is higher for hot market firms. In the subsequent two years, cold market firms issue more dividend than hot market firms. This difference of mean values is significant in the second year after IPO year. The hot market dummy has a positive but insignificant coefficient during IPO year. The coefficient remains positive for the first year after IPO but is negative for the second year after IPO. The interaction of the hot dummy with market-to-book term also has a significantly positive coefficient. Thus, hot market firms with higher growth opportunities pay higher levels of dividends during IPO year. This interaction term remains positive for the subsequent two years. The second interaction term also has a significantly positive coefficient. Larger hot market firms would therefore issue higher levels of dividend. The coefficient for this term increases in the first year after the IPO year and remains statistically significant.

Panel A, Table 3.8 shows the mean levels of dividends for SEO firms. Hot market firms have similar levels of dividends during the SEO year and also in the subsequent year. The difference is statistically insignificant in the SEO year and the first year subsequently. Panel B shows that the hot dummy is positively correlated with dividend levels during SEO year but turns negative in the following period. Dividend levels for hot market firms peak in the

second year after the SEO event. The coefficient of the hot dummy is also positive and is economically significant. Both interaction terms are positive for the SEO+2 period suggesting that the hot market effect would be larger for larger and firms with higher growth opportunities.

To sum up this section, issuance volume does indicate market timing attempts by firms. Firms that go public in hot markets tend to raise more proceeds than their counterparts. Prior levels of leverage do not seem to cause this hot market effect in the IPO market. The additional amount of equity issued is also not accounted for by an increased amount of external amount of financing needed by hot market firms in subsequent years. In the SEO sample, hot market firms do, however, have higher leverage prior to the issue, suggesting that firms are attempting to lower leverage during hot markets. Hot market firms tend to have inferior levels of performance and also lower levels of need for external financing as justified by their lower levels of investments. This suggests that inferior firms are exploiting windows of opportunities to raise equity capital. Thus, market timing considerations rather than financing or investing needs seem to drive equity issues among IPO and SEO firms. Targeting behaviour also significantly affects financing decisions for SEO firms.

3.5 The impact of market timing on capital structure in the short-run

The previous section showed that hot market influences firm's decision making with regards to equity issues. Thus, market timing theory would predict that leverage ratios would be lower for hot market firms during IPO and SEO events. This section examines the impact of such timing attempts on capital structure and further dissects the impact with regards to changes in the balance sheet. The first aspect is the change in leverage levels from pre-issue year to issue year. The mean values of the change are reported in the first column of Panel A, Table 3.9. Clearly, both hot and cold market firms have reduced leverage levels in the IPO year. However, the reduction is 0.88% greater for hot market firms but the difference is statistically insignificant. To probe further into this change, the change in leverage is modelled with the hot dummy and other determinants that control for change in leverage in the following forms:

$$\frac{D}{A_t} - \frac{D}{A_{t-1}} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A_{t-1}} + \varepsilon_t \quad \textbf{(3-3)}$$

$$\frac{D}{A_t} - \frac{D}{A_{t-1}} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A_{t-1}} + \beta_9 HOT * \frac{M}{B_t} + \beta_{10} HOT * Size_{t-1} + \varepsilon_t \quad \textbf{(3-4)}$$

Panel B, Table 3.9 reports the results. The hot dummy has a negative correlation with the change in leverage. Although the result is not statistically significant, it may be economically significant as the reduction in leverage is 1.08%. The next column shows results for the expanded model. Both interaction terms yield in positive coefficients. This suggests that increases in size and growth opportunities alleviate the reduction in leverage for hot market firms.

Panel A, Table 3.10 sheds more light into the reduction of leverage. Hot market firms for the SEO sample reduce their leverage similarly to IPO firms, but cold market firms increase their leverage ratios. The difference is also highly significant (t-value = 2.52). Panel B shows that the significant difference in reduction holds even after controlling for various determinants and also industry characteristics. Hot market firms reduce their leverage ratios by 3.80% and the result is significant at 1% level. The coefficient is also very similar to the one documented in table 3.6 further suggesting that hot markets provide managers with the opportunity to reach their target leverage[33]. The interaction terms reveal that growth opportunities and size cause hot market firms to reduce leverage even further.

The change in leverage can be further decomposed as follows:[34]

$$\frac{D}{A_t} - \frac{D}{A_{t-1}} = -\frac{e}{A_t} + \frac{E}{A_{t-1}} \times \frac{(\Delta Cash + \Delta Other\ Assets)}{A}_t - \frac{\Delta RE}{A}_t \quad \textbf{(3-5)}$$

The four components in the decomposition are used as dependent variable in the models as expressed in equation 3.3 and 3.4. The first term is the negative net equity issued in year *t*. This differs from Proceeds/A_t as it includes other forms of equity issues and repurchases

[33] The extent of deviation from target capital structure quite accurately coincides with the level of reduction leverage levels indicating equity issues are intentionally timed during favourable equity markets to lower leverage levels.

[34] This decomposition is similar to Baker and Wurgler (2002) and Alti (2006).

(including through mergers and employee stock options). If firms were issuing equity to retire debt, then the change would be unity. However, if firms utilize equity issues to add to assets than this would lead to a relationship that is less than one. The second term is intended to capture the increase in assets. The increase in assets is split into change in cash as well as change in other assets. Alti (2006) argues that proceeds from market timers are more likely to be added to cash reserves and short term investments rather than longer term investments. Several other studies have found similar findings and suggest that firms issue equity to finance projects and also build up cash reserves that could utilized in later years.[35] The last term is the change in retained earnings. Newly obtained retained earnings would add to equity and in turn lead to a reduction in debt ratios and thus we further model change in retained earnings to isolate the market timing effect.

Panel A, Table 3.9 shows that on average, hot market firms issued 4.18% more (i.e., 18.48-14.30) equity than cold market firms in the IPO year. Panel B shows the regression results after controlling for other determinants. The coefficient on hot dummy is positive (1.23). The interaction between hot dummy and market-to-book ratio yields a negative coefficient and suggests that growth options reduce this positive effect. The third column in Panel A, Table 3.10 shows that the average net equity issued for hot market firms is insignificantly lower than cold market firms in the SEO sample. Panel B, Table 3.10 shows that hot market firms did indeed issue 1.39% less equity than cold market firms. This result is economically significant despite statistical insignificance. The next column shows that growth opportunities reduce this positive correlation significantly. Size on the other hand further increases the negative correlation.

Both hot and cold market firms have an average increase in cash during IPO year, as shown in Panel A, Table 3.9. However, the increase for hot market firms is more than double that of cold market firms. The results in Panel B, Table 3.9 show that the hot market effect on the change in cash is 2.36% and the coefficient is significant. The next column shows that the increase in cash is lower for hot market firms with higher growth opportunities. Firm size also has a similar coefficient. SEO firms also increase their cash levels during issue year, as shown in Panel A, Table 3.10. Hot market firms have a higher increase but the

[35] Following Alti (2006), the dependent variables $\Delta Cash/A_t$ and $\Delta Other\ Assets/A_t$ are not multiplied by$(E/A)t-1$.

difference is not significantly different as documented in the IPO market. The coefficient of the hot market is positive but not statistically different from zero, as the effect observed for IPO firms suggesting that hot market firms are not stockpiling cash. The next column reveals that increase in growth opportunities leads to an increase in cash stockpiling for hot market firms.[36]. Firm size however dampens the hot market effect.

The average increase in long-term assets for hot market IPO firms is lower in Table 3.9. Panel B, Table 3.9 shows that the hot market effect coefficient is - 3.10. The next column shows that the negative correlation is higher for firms with higher market-to-book ratios. An increase in size, on the other hand, reduces the negative effect. The average change in long-term assets for hot market firms in the SEO sample is about half of cold market firms as recorder in Panel A, Table 3.10. The regression analysis further confirms this difference as that the hot market coefficient is -11.09 and very significant. The interaction terms show that this negative effect decreases for firms with growth opportunities and for larger firms.

The last term in the decomposition is the change in retained earnings. Panel A, Table 3.9 shows that hot market IPO firms had a reduction in retained earnings and cold market firms had a slight increase. The results in Panel B indicate that newly added retained earnings are 1.14% lower for hot market firms. The next column shows that an increase in growth options for hot market firms' further lowers their retained earnings. This effect is statistically significant at 10%. An increase in firm size mitigates the reduction in retained earnings for hot market firms. The mean values for hot and cold market SEO firms, on the other hand, are similarly negative. Panel B, Table 3.10 shows that the hot market effect reduces retained earnings by 1.51%. The next column shows that this reduction is further compounded for hot market firms with higher growth options but slightly alleviated for larger firms.

The results reveal that during hot markets, IPO and SEO firms issue more equity and less debt. The reduction in leverage is larger and more significant for SEO firms. This is indeed a result from their pre-issue leverage levels being significantly higher than their cold market counterparts. Alti (2006) argues that part of the hot market effect on leverage is

[36] DeAngelo et al (2010) also document a lack of significant cash stockpiling for firms that issue equity in favourable equity markets.

further masked by higher retained earning that cold market firms generate. In the IPO market, hot and cold market firms differ in the increase of long-term assets. Cold market firms tend to invest more in long-term assets but difference is statistically insignificant. In the SEO market, the same pattern is observed. The additional equity that hot market firms issue generally results in a build-up of cash levels in the IPO market. Such a scenario is not observed in the SEO market. Thus, it is evident that hot market firms are timing the equity market to tap windows of opportunities and raise more capital than their financing needs would dictate in the IPO market. In the SEO market however, the primary objective of issuing during hot markets are to offset pre-issue leverage levels.

The last two columns in tables 3.9 and 3.10 examine the book leverage during the issue year. This is intended to capture the capital structure at the end of the issue year to examine the impact of market timing. For IPO firms, hot market firms have 3.33% lower levels of leverage than cold market firms. This difference is statistically significant. Hot market firms in the SEO market also have similarly lower levels of leverage than cold market firms (lower by 1.67%). However, it is important to evaluate whether firms have deviated from their target ratios at this point. This is considered by adopting the below models:

$$\frac{D}{A_t} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A_{t-1}} + \varepsilon_t \quad \textbf{(3-6)}$$

$$\frac{D}{A_t} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B_t} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A_{t-1}} + \beta_8 HOT * \frac{M}{B_t} + \beta_9 HOT * Size_{t-1} + \varepsilon_t \quad \textbf{(3-7)}$$

Alti (2006) iterates that the coefficient for the hot dummy would be zero if hot and cold market firms did not differ in the levels they deviated from their target leverage. The final two columns in Panel B, Table 3.7 present the results. The coefficient is negative but insignificant. The next column shows that increase in growth opportunities would result in a larger negative coefficient. Size, however, reduces the negative correlation. Table 3.8 shows that as expected, the coefficient for SEO firms is also negative but slightly larger than IPO firms. The interaction terms show that firm size and growth opportunities strengthen the negative coefficient.

Table 3.9: The Impact of Market Timing on Capital Structure for IPO Firms in the Short-Run

	D/A_t-D/A_{t-1}	D/A_t-D/A_{t-1}	e/A_t	e/A_t	$\Delta Cash/A_t$	$\Delta Cash/A_t$	ΔOther Assets/A_t	ΔOther Assets/A_t	$\Delta RE/A_t$	$\Delta RE/A_t$	D/A_t	D/A_t
Panel A: Mean Values												
Hot	-2.38	-2.38	18.48	18.48	5.35	5.35	20.83	20.83	-0.38	-0.38	12.22	12.22
Cold	-1.50	-1.50	14.30	14.30	2.16	2.16	21.61	21.61	0.89	0.89	15.75	15.75
t- value (difference)	(0.69)	(0.69)	(1.97)	(1.97)	(2.16)	(2.16)	(0.36)	(0.36)	(1.55)	(1.55)	(2.82)	(2.82)
Panel B: Regression Analysis												
HOT	-1.08	-5.02	1.23	3.62	2.36*	16.09**	-3.10	-8.22	-1.14	-1.32	-0.50	-3.87
	(1.32)	(6.67)	(2.06)	(12.20)	(1.40)	(7.41)	(2.08)	(11.01)	(0.80)	(4.73)	(1.19)	(5.62)
M/B_t	-1.19**	-1.66**	1.35*	2.25*	1.46**	2.23**	-1.79**	-1.36	-0.26	0.56*	-1.52***	-1.33**
	(0.48)	(0.79)	(0.90)	(1.25)	(0.67)	(0.63)	(0.69)	(0.84)	(0.43)	(0.34)	(0.30)	(0.49)
$EBITDA/A_{t-1}$	0.03	0.03	0.23***	0.22***	0.08	0.09	0.15***	0.16***	-0.07*	-0.08**	-0.07**	-0.07**
	(0.03)	(0.03)	(0.09)	(0.09)	(0.07)	(0.07)	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
$SIZE_{t-1}$	0.18	0.03	-3.06***	-3.09***	-0.48	0.22	-2.92***	-3.38***	0.28	0.11	0.60**	0.35
	(0.32)	(0.49)	(0.54)	(0.83)	(0.36)	(0.43)	(0.49)	(0.81)	(0.19)	(0.28)	(0.29)	(0.42)
PPE/A_{t-1}	-0.07**	-0.07**	0.02	0.02	0.04	0.04	0.02	-0.02	0.01	0.01	0.18***	0.18***
	(0.03)	(0.03)	(0.05)	(0.05)	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)
$R\&D/A_{t-1}$	0.04	0.03	0.62***	0.63***	0.78***	0.79***	0.14	0.17	-0.00	0.01	-0.12*	-0.11
	(0.07)	(0.07)	(0.19)	(0.19)	(0.15)	(0.15)	(0.16)	(0.16)	(0.07)	(0.07)	(0.06)	(0.06)
RDD_{t-1}	1.47	1.39	7.60**	7.75**	7.36***	7.51***	5.17*	5.36*	-1.67	-1.54	0.38	0.41
	(1.71)	(1.70)	(3.18)	(3.18)	(2.56)	(2.57)	(2.70)	(2.72)	(1.38)	(1.37)	(1.53)	(1.53)
D/A_{t-1}	0.03	0.03	-0.05	-0.06	-0.01	-0.01	-0.16*	-0.03	0.02	0.02	-	-
	(0.04)	(0.04)	(0.06)	(0.06)	(0.05)	(0.05)	(0.07)	(0.07)	(0.03)	(0.03)	-	-
$HOT*MTB_t$	-	0.71	-	-1.35	-	-1.23	-	-0.63	-	-1.22*	-	-0.27
		(0.96)	-	(1.62)	-	(1.04)	-	(1.21)	-	(0.70)	-	(0.61)
$HOT*Size_{t-1}$	-	0.26	-	0.05	-	-1.19	-	0.66	-	0.30	-	0.42
		(0.62)	-	(1.12)	-	(0.67)	-	(1.00)	-	(0.40)	-	(0.52)
R^2	0.04	0.04	0.14	0.14	0.10	0.10	0.12	0.11	0.04	0.04	0.22	0.22
Adjusted R^2	0.01	0.01	0.11	0.11	0.07	0.07	0.08	0.08	0.00	0.01	0.19	0.19
F-Test	1.41	1.31	4.98***	4.52***	3.38***	3.20***	3.84***	3.50***	1.15	1.27	9.07***	8.16***
N	580	580	580	580	580	580	580	580	580	580	580	580

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage, net equity issued, the change in cash, the change in other assets, the change in retained earnings and book leverage scaled by year end assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.10: The Impact of Market Timing on Capital Structure for SEO Firms in the Short-Run

	D/A_t- D/A_{t-1}	D/A_t- D/A_{t-1}	e/A_t	e/A_t	$\Delta Cash/A_t$	$\Delta Cash/A_t$	ΔOther Assets/A_t	ΔOther Assets/A_t	$\Delta RE/A_t$	$\Delta RE/A_t$	D/A_t	D/A_t
Panel A: Mean Values												
HOT	-0.82	-0.82	9.79	9.79	19.97	19.97	11.24	11.24	-1.71	-1.71	20.57	20.57
COLD	2.87	2.87	13.08	13.08	16.23	16.23	22.83	22.83	-1.93	-1.93	22.24	22.24
t-value (difference)	(2.52)	(2.52)	(1.05)	(1.05)	(0.34)	(0.34)	(2.98)	(2.98)	(0.08)	(0.08)	(0.78)	(0.78)
Panel B: Regression Analysis												
HOT	-3.80***	6.34	-1.39	-10.77	0.71	-1.96	-11.09***	-20.32	-1.51	-4.34	-0.97	6.89
	(1.45)	(5.64)	(3.11)	(22.66)	(2.09)	(13.87)	(3.96)	(26.31)	(2.75)	(14.56)	(1.88)	(7.24)
M/B_t	0.05	1.02	2.06	-2.32	0.94	-1.76	0.71	-0.02	-0.24	0.86	-1.14**	-0.85
	(0.52)	(0.82)	(1.87)	(2.32)	(1.76)	(2.06)	(1.13)	(1.56)	(0.75)	(1.04)	(0.51)	(0.84)
$EBITDA/A_{t-1}$	0.03	0.02	0.25	0.28*	-0.11	-0.09	0.18	0.19	-0.23***	-0.24***	-0.10**	-0.10**
	(0.03)	(0.03)	(0.15)	(0.15)	(0.09)	(0.08)	(0.12)	(0.13)	(0.09)	(0.09)	(0.04)	(0.04)
$Size_{t-1}$	-0.08	0.33	-1.73**	-1.44	0.40	0.76	0.76	0.35	1.49***	1.09	2.89***	3.31***
	(0.28)	(0.34)	(0.81)	(1.38)	(0.55)	(0.85)	(1.35)	(0.91)	(0.55)	(0.87)	(0.35)	(0.58)
PPE/A_{t-1}	-0.07	-0.07*	-0.01	-0.03	0.09***	0.07**	-0.21**	-0.21**	-0.02	-0.01	0.14***	0.14***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.03)	(0.03)	(0.08)	(0.08)	(0.06)	(0.06)	(0.04)	(0.04)
$R\&D/A_{t-1}$	-0.03	-0.04	0.26	0.21	0.13	0.09	0.16	0.17	-0.08	-0.05	-0.06	-0.08
	(0.05)	(0.05)	(0.26)	(0.28)	(0.19)	(0.21)	(0.17)	(0.21)	(0.14)	(0.14)	(0.07)	(0.07)
RDD_{t-1}	1.68	-1.78	2.04	3.54	2.06	3.07	0.81	0.85	-0.47	-1.02	4.37**	4.48**
	(1.70)	(1.67)	(4.28)	(4.15)	(3.00)	(2.94)	(4.62)	(4.69)	(3.51)	(3.57)	(2.05)	(2.09)
D/A_{t-1}	0.08**	0.08*	-0.03	-0.04	-0.03	-0.03	0.22**	0.22	0.03	0.04	-	-
	(0.04)	(0.04)	(0.09)	(0.09)	(0.06)	(0.06)	(0.10)	(0.11)	(0.08)	(0.08)	-	-
$HOT*M/B_t$	-	-1.64	-	8.02**	-	5.00*	-	1.23	-	-2.07	-	-0.43
	-	(0.99)	-	(3.19)	-	(2.96)	-	(2.07)	-	(1.48)	-	(1.05)
$HOT*Size_{t-1}$	-	-0.67	-	-0.56	-	-0.66	-	0.66	-	0.65	-	-0.68
	-	(0.45)	-	(1.80)	-	(1.07)	-	(2.11)	-	(1.11)	-	(0.61)
R^2	0.10	0.11	0.08	0.12	0.08	0.12	0.11	0.11	0.06	0.06	0.33	0.33
Adjusted R^2	0.05	0.05	0.02	0.06	0.02	0.06	0.05	0.05	0.00	0.00	0.29	0.29
F-Test	1.79**	1.76**	1.33	1.93**	1.38	1.89**	1.89**	1.70**	0.93	0.93	8.17***	7.28***
N	280	280	280	280	280	280	280	280	280	280	280	280

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO year. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage, net equity issued, the change in cash, the change in other assets, the change in retained earnings and book leverage divided by year end assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level,, respectively.

3.6 The impact of market timing in the long-run

The earlier section examined how market timing attempts shape the capital structure of firms. The results show that hot market IPO firms reduced leverage levels to a greater extent than cold market firms even though their pre-issue levels were similar. This resulted in hot market IPO firms having lower levels of leverage at the end of issue year. However, the level they deviated from their target leverage was not significantly affected. For SEO firms, hot market firms also reduced leverage levels. This difference was also statistically significant. Their larger reductions may have been motivated from the extent of deviation from their target leverage in the pre-issue period. This notion is further supported from the debt levels at the end of the SEO year. Hot market firms did not significantly deviate from their target leverage at this point. Cold market firms on the other hand have higher levels of leverage at the end of the SEO year.

Thus, the next question this paper examines is whether the difference is evident in subsequent years. To analyze this difference the change in leverage with regards to pre-issue levels are examined as follows:

$$\frac{D}{A_t} - \frac{D}{A_{PRE-IPO/PRE-SEO}} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B}_{t-1} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A}_{t-1} + \varepsilon_t \quad \textbf{(3-8)}$$

$$\frac{D}{A_t} - \frac{D}{A_{PRE-IPO/PRE-SEO}} = \alpha + \beta_1 HOT + \beta_2 \frac{M}{B}_{t-1} + \beta_3 \frac{EBITDA}{A}_{t-1} + \beta_4 Size_{t-1} + \beta_5 \frac{PPE}{A}_{t-1} + \beta_6 \frac{R\&D}{A}_{t-1} + \beta_7 RDD + \beta_8 \frac{D}{A}_{Pre-IPO/SEO} + \beta_9 HOT * \frac{M}{B}_t + \beta_{10} HOT * Size_{t-1} + \varepsilon_t \quad \textbf{(3-9)}$$

The theory of market timing implies that timing attempts have a long-term effect on capital structure. The models (equations 3.8 and 3.9) are intended to question whether the effect of market timing is persistent as documented in Baker and Wurgler (2002). Alti (2006) on the other hand finds that the effect is reversed in subsequent years. If the effect is persistent, the difference in current leverage levels and pre-issue levels should be reflected in the hot dummy in subsequent years. Tables 3.11 and 3.12 show the regressions results of equations 3.8 and 3.9. Panel A, Table 3.11 reveals that the average levels for hot market firms are negative during the IPO+1 period. This difference gradually reduces and becomes positive

by the IPO+4 period. The hot market dummy coefficient for IPO firms in Panel B, Table 3.11 is -0.37 in the IPO+1 period, which was -1.08 during the IPO year. The next column shows that the negative value is higher for firms with higher growth opportunities. Contrastingly, for larger firms the reduction of the coefficient is less and the effect is significant at 5% level.

The next two columns show the regressions without the market-to-book ratio. The results are similar. The hot market dummy has been reduced to -0.43. The interaction with firm size also has a similar effect. The effect remains negative in the second year after the IPO. In the third year after IPO, the effect has totally disappeared. The hot dummy coefficient has turned positive. In the fourth year, the positive coefficient gets significant at 10%. The interaction terms show that growth opportunities and firm size increase further this effect. If market-to-book ratio is excluded from the regressions, the results are still similar. The coefficient remains positive until the seventh year after the IPO.

The regressions are repeated for book leverage at the current year. The results show the hot dummy is positive in the first year after the IPO. The next column shows that this effect is reduced for hot market firms with increases in growth opportunities. Firm size, however, significantly increases the effect. The regressions are repeated without the market-to-book ratio in the next two columns. The results are similar. The coefficient remains positive until the seventh year after the IPO. The coefficient increases throughout the observation period. This suggests a reversal in the hot market effect for IPO firms beginning immediately after the IPO event. This is further evidenced by the average levels of book debt that are almost similar for hot market and cold market firms.

Table 3.12 shows the results for SEO firms for a similar analysis. In Panel A, the average difference in leverage is negative for the first and second year after the SEO event for hot market firms and significantly different to cold market firms. In the third year, the difference is positive but lower than cold market firms. The first column of Panel B shows the hot market coefficient is -1.79. This is sharply contrasting to the difference in the SEO year where the coefficient is -3.24 and significant at 1% level. This clearly shows the effect

has disappeared. The regressions are repeated without the market-to-book ratio. The coefficient remains negative for the second and third year after the SEO event.

The analysis is repeated for book leverage. Panel A, Table 3.12 shows that book leverage of hot market firms continues to be lower for two years after the SEO. The difference only disappears in the third year after the SEO. Panel B reveals that the coefficient for the hot market dummy becomes positive in the first year after the SEO. The next column shows that this positive effect is increased for firms with higher growth options. Firm size has a similar effect. The exclusion of the market-to-book ratio reveals a similar result. The coefficient is negative for the second year after the SEO. The coefficient then becomes positive for the third year after the SEO. Thus, it can be concluded that the hot market effect is largely transitory in nature and does not persist throughout the periods after the equity issuance event. These conclusions do not concur with the findings in Baker and Wurgler (2002).

Table 3.11: The Impact of Market Timing in the Long-Run for IPO Firms

	$D/A_t - D/A_{Pre\text{-}IPO}$											
	IPO+1	IPO+1	IPO+1	IPO+1	IPO+2	IPO+2	IPO+2	IPO+2	IPO+3	IPO+3	IPO+3	IPO+3
Panel A: Mean Values												
Hot	-1.34	-1.34	-1.34	-1.34	-0.5	-0.5	-0.5	-0.5	-0.28	-0.28	-0.28	-0.28
Cold	-0.06	-0.06	-0.06	-0.06	1.32	1.32	1.32	1.32	-0.54	-0.54	-0.54	-0.54
t -value (difference)	(0.93)	(0.93)	(0.93)	(0.93)	(1.16)	(1.16)	(1.16)	(1.16)	(0.14)	(0.14)	(0.14)	(0.14)
Panel B: Regression Analysis												
HOT	-0.37	-9.81*	-0.43	-12.99***	-0.53	-14.41**	-0.42	-13.87**	1.75	-13.31	1.75	-11.30
	(1.08)	(5.55)	(1.08)	(4.60)	(1.35)	(6.86)	(1.35)	(6.24)	(1.45)	(8.09)	(1.45)	(7.28)
M/B_{t-1}	-1.09***	-0.61	-	-	-1.07**	-1.22	-	-	-0.76	-1.41	-	-
	(0.33)	(0.77)	-	-	(0.45)	(0.98)	-	-	(0.40)	(0.87)	-	-
$EBITDA/A_{t-1}$	-0.04	-0.06*	-0.05	-0.06**	-0.03	-0.03	-0.04	-0.04	-0.06	-0.06	-0.07	-0.08*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
$SIZE_{t-1}$	0.76***	0.12	0.96***	0.19	0.79***	-0.03	0.92***	0.10	0.90***	0.18	0.94***	0.26
	(0.24)	(0.38)	(0.23)	(0.36)	(0.28)	(0.48)	(0.28)	(0.48)	(0.33)	(0.49)	(0.32)	(0.47)
PPE/A_{t-1}	0.10***	0.10***	0.11***	0.11***	0.11***	0.11***	0.12***	0.12***	0.13***	0.13***	0.14***	0.14***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$R\&D/A_{t-1}$	0.01	0.00	-0.01	-0.03	-0.06	-0.07	-0.09	-0.10	0.07	0.08	0.04	0.05
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.13)	(0.13)	(0.14)	(0.14)
RDD_{t-1}	1.91	1.87	2.52*	2.33	1.59	1.40	1.85	1.65	2.30	2.43	2.46	2.55
	(1.42)	(1.42)	(1.42)	(1.41)	(1.51)	(1.50)	(1.48)	(1.48)	(1.74)	(1.70)	(1.74)	(1.71)
$D/A_{Pre\text{-}IPO}$	-0.61***	-0.61***	-0.61***	-0.61***	-0.66***	-0.66***	-0.65***	-0.65***	-0.72***	-0.72***	-0.72***	-0.72***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
$HOT*MTB_{t-1}$	-	-0.59	-	-	-	0.25	-	-	-	0.85	-	-
	-	(0.83)	-	-	-	(1.020)	-	-	-	(0.96)	-	-
$HOT*Size_{t-1}$	-	1.08**	-	1.28***	-	1.33**	-	1.34**	-	1.32*	-	1.27*
	-	(0.48)	-	(0.46)	-	(0.61)	-	(0.59)	-	(0.69)	-	(0.68)
R^2	0.47	0.47	0.46	0.46	0.46	0.47	0.46	0.46	0.52	0.52	0.52	0.52
Adjusted R^2	0.45	0.45	0.44	0.44	0.44	0.45	0.44	0.44	0.50	0.50	0.49	0.50
F-Test	25.84***	23.76***	26.38***	25.56***	23.92***	21.91***	24.89***	24.00***	22.25***	20.36***	23.39***	22.47***
N	554	554	554	554	519	519	519	519	391	391	391	391

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+1, IPO+2 and IPO+3. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage from the pre-IPO year. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.11 (continued)

	$D/A_t - D/A_{Pre\text{-}IPO}$											
	IPO+4	IPO+4	IPO+4	IPO+4	IPO+5	IPO+5	IPO+5	IPO+5	IPO+7	IPO+7	IPO+7	IPO+7
Panel A: Mean Values												
Hot	1.20	1.20	1.20	1.20	0.82	0.82	0.82	0.82	0.01	0.01	0.01	0.01
Cold	-1.13	-1.13	-1.13	-1.13	0.32	0.32	0.32	0.32	-0.05	-0.05	-0.05	-0.05
t -value (difference)	(1.29)	(1.29)	(1.29)	(1.29)	(0.23)	(0.23)	(0.23)	(0.23)	(0.26)	(0.26)	(0.26)	(0.26)
Panel B: Regression Analysis												
HOT	2.38*	-13.70*	2.42*	-9.17	2.09	-10.02	2.08	-5.21	2.40	0.68	2.40	-1.22
	(1.42)	(7.43)	(1.42)	(6.68)	(1.61)	(9.78)	(1.61)	(8.83)	(1.62)	(11.11)	(1.62)	(10.41)
M/B_{t-1}	-0.47	-1.91*	-	-	-0.85	-2.73**	-	-	-0.30	0.71	-	-
	(0.66)	(0.80)	-	-	(0.81)	(1.29)	-	-	(1.09)	(2.05)	-	-
$EBITDA/A_{t-1}$	-0.06	-0.06	-0.07	-0.06	-0.10*	-0.10*	-0.11**	-0.12**	-0.21***	-0.21***	-0.22***	-0.22***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.08)	(0.07)	(0.07)
$SIZE_{t-1}$	0.98***	0.36	0.99***	0.38	0.82**	0.38	0.81**	0.40	1.06**	0.84	1.06**	0.88
	(0.32)	(0.44)	(0.32)	(0.45)	(0.39)	(0.57)	(0.39)	(0.59)	(0.47)	(0.56)	(0.47)	(0.55)
PPE/A_{t-1}	0.13***	0.14***	0.14***	0.14***	0.21***	0.20***	0.21***	0.21***	0.14***	0.14***	0.14***	0.14***
	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$R\&D/A_{t-1}$	-0.11	-0.07	-0.15	-0.15	-0.33**	-0.31**	-0.38**	-0.38***	-0.37**	-0.39**	-0.38**	-0.38*
	(0.115)	(0.16)	(0.18)	(0.18)	(0.15)	(0.15)	(0.15)	(0.15)	(0.17)	(0.18)	(0.16)	(0.16)
RDD_{t-1}	0.33	0.61	0.28	0.31	-0.80	-0.72	-0.82	-0.84	0.23	0.04	0.19	0.17
	(1.70)	(1.68)	(1.70)	(1.68)	(1.96)	(1.96)	(1.92)	(1.93)	(2.08)	(2.16)	(2.04)	(2.04)
$D/A_{Pre\text{-}IPO}$	-0.70***	-0.69***	-0.70***	-0.69***	-0.79***	-0.79***	-0.79***	-0.78***	-0.79***	-0.79***	-0.79***	-0.79***
	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
$HOT*MTB_{t-1}$	-	2.12*	-	-	-	2.57*	-	-	-	-1.42	-	-
	-	(1.22)	-	-	-	(1.53)	-	-	-	(2.27)	-	-
$HOT*Size_{t-1}$	-	1.12*	-	1.11*	-	0.75	-	0.68	-	0.37	-	0.34
	-	(0.62)	-	(0.62)	-	(0.80)	-	(0.80)	-	(0.96)	-	(0.97)
R^2	0.48	0.49	0.47	0.48	0.52	0.52	0.52	0.52	0.61	0.61	0.61	0.61
Adjusted R^2	0.45	0.45	0.45	0.45	0.49	0.49	0.49	0.49	0.57	0.57	0.58	0.58
F-Test	15.53***	14.42***	16.44***	15.73***	15.43***	14.08***	16.29***	15.40***	15.79***	14.13***	16.80***	15.81***
N	327	327	327	327	276	276	276	276	198	198	198	198

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+4, IPO+5 and IPO+7. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage from the pre-IPO year. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

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Table 3.11 (continued)

	Book Leverage (D/A_t)											
	IPO+1	IPO+1	IPO+1	IPO+1	IPO+2	IPO+2	IPO+2	IPO+2	IPO+3	IPO+3	IPO+3	IPO+3
Panel A: Mean Values												
Hot	13.65	13.65	13.65	13.65	15.18	15.18	15.18	15.18	15.41	15.41	15.41	15.41
Cold	17.04	17.04	17.04	17.04	18.82	18.82	18.82	18.82	17.51	17.51	17.51	17.51
t- value (difference)	(2.6)	(2.6)	(2.6)	(2.6)	(2.56)	(2.56)	(2.56)	(2.56)	(1.36)	(1.36)	(1.36)	(1.36)
Panel B: Regression Analysis												
HOT	0.17	-8.83	0.11	-12.78**	-0.12	-13.61*	0.05	-12.22*	1.96	-12.56	1.96	-9.61
	(1.27)	(6.38)	(1.26)	(5.42)	(1.46)	(7.93)	(1.45)	(6.83)	(1.52)	(8.79)	(1.53)	(7.82)
M/B_{t-1}	-1.29***	-0.70	-	-	-1.53***	-1.89*	-	-	-1.28**	-2.20*	-	-
	(0.37)	(0.71)	-	-	(0.49)	(1.02)	-	-	(0.43)	(0.93)	-	-
$EBITDA/A_{t-1}$	-0.07*	-0.08**	-0.08**	-0.09**	-0.04	-0.05	-0.07*	-0.07*	-0.08*	-0.09*	-0.10**	-0.11***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
$SIZE_{t-1}$	1.01***	0.37	1.25***	0.46	0.94***	0.19	1.14***	0.39	1.01***	0.34	1.09***	0.49
	(0.29)	(0.46)	(0.28)	(0.44)	(0.34)	(0.55)	(0.32)	(0.52)	(0.36)	(0.54)	(0.35)	(0.52)
PPE/A_{t-1}	0.17***	0.18***	0.19***	0.19***	0.16***	0.15***	0.17***	0.17***	0.16***	0.16***	0.17***	0.17***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$R\&D/A_{t-1}$	-0.07	-0.08	-0.11	-0.12	-0.12	-0.14*	-0.17	-0.18**	-0.00	0.00	-0.06	-0.05
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.14)	(0.14)	(0.14)	(0.14)
RDD_{t-1}	1.35	1.33	2.06	1.87	1.05	0.88	1.42	1.23	2.06	2.18	2.31	2.39
	(1.63)	(1.64)	(1.61)	(1.61)	(1.64)	(1.63)	(1.62)	(1.62)	(1.72)	(1.68)	(1.73)	(1.69)
$D/A_{Pre\text{-}IPO}$	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
$HOT*MTB_{t-1}$	-	-0.75	-	-	-	0.55	-	-	-	1.21	-	-
	-	(0.81)	-	-	-	(1.11)	-	-	-	(1.03)	-	-
$HOT*Size_{t-1}$	-	1.07*	-	1.31**	-	1.24*	-	1.21*	-	1.21*	-	1.13
	-	(0.57)	-	(0.54)	-	(0.71)	-	(0.66)	-	(0.75)	-	(0.73)
R^2	0.22	0.22	0.20	0.21	0.22	0.22	0.20	0.21	0.23	0.24	0.23	0.23
Adjusted R^2	0.19	0.20	0.18	0.18	0.19	0.19	018	0.18	0.20	0.20	0.19	0.20
F-Test	8.67***	8.08***	8.44***	8.32***	8.09***	7.45***	8.02***	7.80***	6.73***	6.23***	6.79***	6.58***
N	554	554	554	554	519	519	519	519	391	391	391	391

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+1, IPO+2 and IPO+3. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the book leverage scaled by year end assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and %1 level, respectively.

Table 3.11 (continued)

	Book Leverage (D/A_t)											
	IPO+4	IPO+4	IPO+4	IPO+4	IPO+5	IPO+5	IPO+5	IPO+5	IPO+7	IPO+7	IPO+7	IPO+7
Panel A: Mean Values												
Hot	15.54	15.54	15.54	15.54	15.17	15.17	15.17	15.17	15.16	15.16	15.16	15.16
Cold	17.27	17.27	17.27	17.27	17.53	17.53	17.53	17.53	15.85	15.85	15.85	15.85
t -value (difference)	(1.08)	(1.08)	(1.08)	(1.08)	(1.31)	(1.31)	(1.31)	(1.31)	(0.37)	(0.37)	(0.37)	(0.37)
Panel B: Regression Analysis												
HOT	1.95	-11.59	2.02	-7.79	2.17	-8.13	2.16	-2.91	2.62	6.55	2.62	3.98
	(1.52)	(8.23)	(1.52)	(7.47)	(1.65)	(10.58)	(1.65)	(9.50)	(1.67)	(12.50)	(1.66)	(11.64)
M/B_{t-1}	-1.10	-2.31**	-	-	-1.28	-3.21**	-	-	-0.08	1.32	-	-
	(0.70)	(0.96)	-	-	(0.83)	(1.38)	-	-	(1.16)	(2.09)	-	-
$EBITDA/A_{t-1}$	-0.07	-0.07	-0.10*	-0.09	-0.11*	-0.10*	-0.13**	-0.13**	-0.25***	-0.26***	-0.25***	-0.25***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.07)	(0.08)	(0.07)	(0.07)
$SIZE_{t-1}$	0.96**	0.43	1.00*	0.48	0.81*	0.48	0.79*	0.51	1.06**	1.06	1.06**	1.12*
	(0.35)	(0.52)	(0.35)	(0.52)	(0.42)	(0.61)	(0.43)	(0.62)	(0.50)	(0.57)	(0.50)	(0.57)
PPE/A_{t-1}	0.17***	0.17***	0.18***	0.18***	0.24***	0.24***	0.25***	0.25***	0.17***	0.17***	0.17***	0.17***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$R\&D/A_{t-1}$	-0.13	-0.09	-0.23	-0.23	-0.35**	-0.32	-0.42***	-0.42*	-0.41**	-0.44	-0.41**	-0.41**
	(0.17)	(0.18)	(0.18)	(0.18)	(0.15)	(0.15)	(0.15)	(0.15)	(0.19)	(0.21)	(0.19)	(0.18)
RDD_{t-1}	0.71	0.96	0.62	0.64	-0.41	-0.31	-0.42	-0.43	0.31	0.09	0.30	0.31
	(1.71)	(1.70)	(1.70)	(1.68)	(1.95)	(1.94)	(1.91)	(1.91)	(2.05)	(2.13)	(2.02)	(2.01)
$D/A_{Pre\text{-}IPO}$	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
$HOT*MTB_{t-1}$	-	1.78	-	-	-	2.67	-	-	-	-1.98	-	-
	-	(1.38)	-	-	-	(1.65)	-	-	-	(2.40)	-	-
$HOT*Size_{t-1}$	-	1.01	-	0.94	-	0.57	-	0.48	-	-0.08	-	-0.13
	-	(0.68)	-	(0.68)	-	(0.86)	-	(0.86)	-	(1.06)	-	(1.08)
R^2	0.23	0.24	0.22	0.23	0.27	0.28	0.26	0.27	0.33	0.33	0.33	0.33
Adjusted R^2	0.19	0.19	0.18	0.18	0.22	0.22	0.22	0.22	0.27	0.26	0.27	0.27
F-Test	5.36***	5.00***	5.50***	5.28***	5.62***	5.17***	5.83***	5.49***	5.19***	4.65***	5.54***	5.19***
N	327	327	327	327	276	276	276	276	198	198	198	198

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+4, IPO+5 and IPO+7. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the book leverage scaled by year end assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

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Table 3.12: The Impact of Market Timing in the Long-Run for SEO Firms

	$D/At - D/A_{Pre\text{-}SEO}$											
	SEO+1	SEO+1	SEO+1	SEO+1	SEO+2	SEO+2	SEO+2	SEO+2	SEO+3	SEO+3	SEO+3	SEO+3
Panel A: Mean Values												
HOT	-0.16	-0.16	-0.16	-0.16	-1.03	-1.03	-1.03	-1.03	1.10	1.10	1.10	1.10
COLD	3.36	3.36	3.36	3.36	3.31	3.31	3.31	3.31	3.88	3.88	3.88	3.88
t-value (difference)	(1.89)	(1.89)	(1.89)	(1.89)	(2.10)	(2.10)	(2.10)	(2.10)	(1.25)	(1.25)	(1.25)	(1.25)
Panel B: Regression Analysis												
HOT	-1.79	-1.33	-1.86	-0.94	-1.84	-9.41	-1.75	-6.88	-0.95	-12.45	-0.39	1.81
	(1.67)	(8.05)	(1.66)	(6.82)	(1.76)	(8.51)	(1.77)	(7.46)	(2.03)	(9.49)	(2.03)	(7.92)
M/B_{t-1}	0.43	0.38	-	-	-0.20	-0.41	-	-	-1.56**	-3.59***	-	-
	(0.61)	(0.91)	-	-	(0.60)	(0.91)	-	-	(0.77)	(1.12)	-	-
$EBITDA/A_{t-1}$	-0.02	-0.02	-0.02	-0.02	0.02	0.03	0.02	0.03	-0.10*	-0.10*	-0.09*	-0.09*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$SIZE_{t-1}$	1.43***	1.46***	1.41***	1.46***	1.71***	1.30***	1.72***	1.39**	1.43***	1.11*	1.50***	1.64**
	(0.42)	(0.53)	(0.42)	(0.52)	(0.43)	(0.62)	(0.43)	(0.62)	(0.44)	(0.68)	(0.44)	(0.69)
PPE/A_{t-1}	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.10**	0.10**	0.12**	0.12**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
$R\&D/A_{t-1}$	-0.02	-0.02	-0.02	-0.02	-0.10	-0.12	-0.11	-0.11*	-0.17	-0.26***	-0.24**	-0.24
	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.07)	(0.07)	(0.07)	(0.12)	(0.10)	(0.11)	(0.10)
RDD_{t-1}	2.49	2.53	2.41	2.44	0.73	0.59	0.79	0.66	0.43	0.18	0.96	0.91
	(1.80)	(1.83)	(1.78)	(1.77)	(2.11)	(2.11)	(2.12)	(2.12)	(2.40)	(2.38)	(2.39)	(2.38)
$D/A_{Pre\text{-}SEO}$	-0.48***	-0.48***	-0.49***	-0.49***	-0.58***	-0.58***	-0.58***	-0.58***	-0.55***	-0.55***	-0.55***	-0.55***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.88)
$HOT*M/B_{t-1}$	-	0.08	-	-	-	0.53	-	-	-	3.82***	-	-
	-	(1.19)	-	-	-	(1.04)	-	-	-	(1.44)	-	-
$HOT*Size_{t-1}$	-	-0.06	-	-0.09	-	0.59	-	0.47	-	0.41	-	-0.20
	-	(0.65)	-	(0.62)	-	(0.70)	-	(0.67)	-	(0.74)	-	(0.73)
R^2	0.33	0.33	0.33	0.33	0.41	0.41	0.41	0.41	0.37	0.39	0.36	0.36
Adjusted R^2	0.28	0.27	0.28	0.28	0.36	0.36	0.37	0.37	0.31	0.32	0.30	0.30
F-Test	6.78***	6.02***	7.19***	6.74***	8.39***	7.48***	8.94***	8.41***	6.13***	5.90***	6.21***	5.81***
N	255	255	255	255	222	222	222	222	195	195	195	195

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO+1, SEO+2 and SEO+3. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage from the pre-SEO year. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.12 (continued)

	Book Leverage (D/A_t)											
	SEO+1	SEO+1	SEO+1	SEO+1	SEO+2	SEO+2	SEO+2	SEO+2	SEO+3	SEO+3	SEO+3	SEO+3
Panel A: Mean Values												
Hot	20.99	20.99	20.99	20.99	19.96	19.96	19.96	19.96	21.35	21.35	21.35	21.35
Cold	21.66	21.66	21.66	21.66	21.82	21.82	21.82	21.82	21.08	21.08	21.08	21.08
t value (difference)	(0.31)	(0.31)	(0.31)	(0.31)	(0.82)	(0.82)	(0.82)	(0.82)	(0.11)	(0.11)	(0.11)	(0.11)
Panel B: Regression Analysis												
HOT	0.19	-5.94	0.26	-1.95	-0.44	-5.28	-0.05	-4.44	0.97	-11.66	1.51	4.21
	(1.95)	(8.50)	(1.93)	(7.89)	(2.01)	(8.98)	(1.99)	(8.39)	(2.36)	(10.47)	(2.32)	(9.11)
M/B_{t-1}	-0.34	-1.15	-	-	-0.80	-0.86	-	-	-1.51*	-3.77***	-	-
	(0.68)	(1.06)	-	-	(0.62)	(0.94)	-	-	(0.83)	(1.20)	-	-
$EBITDA/A_{t-1}$	-0.01	-0.01	-0.01	-0.01	0.02	0.02	0.01	0.02	-0.14**	-0.13**	-0.13**	-0.13**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)
$SIZE_{t-1}$	2.51***	2.33***	2.53***	2.40***	2.51***	2.22***	2.55***	2.28***	2.15***	1.80**	2.22***	2.40***
	(0.41)	(0.62)	(0.41)	(0.63)	(0.38)	(0.72)	(0.39)	(0.73)	(0.45)	(0.82)	(0.45)	(0.85)
PPE/A_{t-1}	0.17****	0.17***	0.17***	0.17***	0.15***	0.15***	0.15***	0.15***	0.21***	0.20***	0.22***	0.22***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
$R\&D/A_{t-1}$	0.01	0.02	0.00	0.00	-0.11	-0.12	-0.15**	-0.15**	-0.23*	-0.34***	-0.31***	-0.31***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)	(0.07)	(0.13)	(0.11)	(0.12)	(0.11)
RDD_{t-1}	4.35**	4.49**	4.43**	4.35**	1.60	1.50	1.86	1.75	0.80	0.52	1.32	1.26
	(2.06)	(2.12)	(2.05)	(2.07)	(2.38)	(2.40)	(2.40)	(2.41)	(2.77)	(2.75)	(2.74)	(2.73)
$D/A_{Pre\text{-}SEO}$	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
$HOT*MTB_{t-1}$	-	1.36	-	-	-	0.16	-	-	-	4.24***	-	-
	-	(1.39)	-	-	-	(1.10)	-	-	-	(1.71)	-	-
$HOT*Size_{t-1}$	-	0.33	-	0.21	-	0.41	-	0.40	-	0.44	-	-0.25
	-	(0.73)	-	(0.73)	-	(0.76)	-	(0.77)	-	(0.84)	-	(0.86)
R^2	0.30	0.31	0.30	0.30	0.36	0.36	0.36	0.36	0.37	0.39	0.36	0.36
Adjusted R^2	0.26	0.26	0.26	0.26	0.31	0.31	0.31	0.31	0.32	0.33	0.31	0.31
F-Test	6.49***	5.80***	6.93***	6.48***	7.31***	6.45***	7.67***	7.18***	6.61***	6.29***	6.83***	6.37***
N	255	255	255	255	222	222	222	222	195	195	195	195

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO+4, SEO+1 and SEO+2. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage from the pre-SEO year and book leverage scaled by year end assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

3.7 Capital structure rebalancing

This section examines whether firms revert to their target leverage ratios after the issuance event. This may occur in two possible ways. The first would be that firms would issue securities in subsequent years to adjust their capital structure and move towards their targets. However, if firms are not moving towards a particular target, no obvious tendency of reversal would be observed. The second possible alternative would be that the firm characteristics have changed and the target leverage would now resemble the existing leverage levels. This could be due to the existence of recapitalization costs. Given that recapitalizing capital would be costly, firms would not issue (retire) securities frequently. These activities would be limited and also be lumped in clusters. When managers do raise capital, this not only reflects current expectations but also anticipation of the landscape of the future.[37]

It can be argued that hot and cold market firms may have different outlooks about their futures and thus choose to raise different levels of capitals during equity issues. The earlier analysis indicates that hot market IPO and SEO firms appear to be underleveraged before the issue event. However, this may in fact be optimal from a dynamic view. This could be due to the fact that over a certain period of time, managers may in fact be anticipating changes in the future that brings the target leverage ratio back in line to their current ratios. However, this change happens due to changes in the firm characteristics rather than leverage itself. If this notion is supported in this section, it would explain the disappearance of the hot market effect post issuance and also casts doubts on the market timing findings from previous sections.

Examining changes in leverage in subsequent years would give a better picture of this. If firms that go public in a hot market have a leverage ratio that is in fact optimal and yet lower than their cold market counterparts, there should be no systematic increase in debt ratios. Panel A, Table 3.13 reveals that both hot market and cold market firms continue to increase their leverage levels in the IPO+1 and IPO+2 period. However, the differences in increases between the two groups are insignificant. Unreported results show that hot market

[37] See Fischer et al (1989) and Titman and Tsyplakov (2003) where current optimal ratios may in fact not be optimal if future recapitalization costs are considered.

firms appear to be content with their debt levels after these two years and changes in leverage are small in subsequent years. A similar trend is observed for cold market firms, except for the IPO+5 period where the leverage ratio increases by 2.03%. To further evaluate the notion of recapitalization versus market timing considerations, the following regression for the change in leverage is done:

$$\frac{D}{A_t} - \frac{D}{A_{t-1}} = \alpha + \beta_1 HOT + \beta_2 Market_t + \beta_3 \frac{M}{B}_{t-1} + \beta_4 \frac{EBITDA}{A}_{t-1} + \beta_5 Size_{t-1} + \beta_6 \frac{PPE}{A}_{t-1} + \beta_7 \frac{R\&D}{A}_{t-1} + \beta_8 RDD_{t-1} + \beta_9 d_{high-lev} + \beta_{10} d_{low-lev} + \varepsilon_t \quad \textbf{(3-10)}$$

$$\frac{D}{A_t} - \frac{D}{A_{t-1}} = \alpha + \beta_1 HOT + \beta_2 Market_t + \beta_3 \frac{M}{B}_{t-1} + \beta_4 \frac{EBITDA}{A}_{t-1} + \beta_5 Size_{t-1} + \beta_6 \frac{PPE}{A}_{t-1} + \beta_7 \frac{R\&D}{A}_{t-1} + \beta_8 RDD_{t-1} + \beta_9 d_{high-lev} + \beta_{10} d_{low-lev} + \beta_{11} HOT * M/B_{t-1} + \beta_{12} HOT * Size_{t-1} + \varepsilon_t \quad \textbf{(3-11)}$$

We model the change in leverage to distinguish whether firms indeed were timing the market or the current leverage ratios at the end of the issue year was in fact a representation of managers having different expectations of the future (e.g. anticipating changes in growth opportunities. Alti (2006) argues that after these expectated changes are realized, leverage levels would be back in line with firm characteristics although it would be the characteristics rather leverage levels which move. In the above expressions, the dummy variable $d_{high\text{-}lev}$ takes the value of 1 if lagged book leverage is in the top twentieth percentile; 0, otherwise. The second dummy, $d_{low\text{-}lev}$ takes the value of 1 if lagged book leverage is in the bottom twentieth percentile; 0, otherwise.[38] The model also includes the Market dummy which takes the value of 1 if the IPO market in the year t is hot (the IPO volume exceeds the median value); 0, otherwise.[39] This is intended to control for external market conditions that may influence financing decisions due to the cyclical nature of hot and cold markets. The results are reported in Panel B, Table 3.13. If firms were indeed timing the equity market, they would indeed be underleveraged at the end of the IPO year. Thus, they would steadily increase their leverage ratios in subsequent years. This is not the case as the HOT dummy has a positive correlation in the IPO+1 and negative IPO+2

[38] This expression excludes lagged leverage as it would counter the effect of market timing. This is based on Alti (2006).

[39] SEO volume is not used as these firms would still be influenced by conditions in the IPO market. Alti (2006) uses a similar construct.

period. Unreported results show that the coefficient becomes positive in the IPO+3 period but remains insignificant.

The leverage ratio of a firm is also influenced by external financing issuance. The net debt issued is further considered in Table 3.13. The average net debt issued is relatively the same for hot and cold firms in both IPO+1 and IPO+2 period. Unreported results show that the levels only differ significantly during the IPO+5 year. The regressions results reveal that the hot dummy is positive but insignificant during the two years considered. The result for the interaction term shows that the increase of size significantly increases the net debt issued during the IPO+1 period suggesting that larger firms may revert to targets faster. Unreported results show that the coefficient increases to 1.76 during the IPO+3 period but remains insignificant statistically. The coefficient then turns negative and remains insignificant during IPO+4 and IPO+5 periods. The effect of net equity issued is then considered. The average level of net equity issued by hot market firms is surprisingly higher than cold market firms during the IPO+1 period. The level is, however, lower for the IPO+2 period. The hot dummy is positive but insignificant in the IPO+1 period and gets larger during the next year. This, to a certain extent, undermines the reversal notion as well as the market timing expectations. Unreported results show that the hot variable remains positive for the IPO+3 period. However, the coefficient becomes -2.83 and statistically significant in the next year. This coefficient remains negative up to IPO+7 period.

Table 3.13: Issuance Activity and Capital Structure Rebalancing for IPO Firms

	Change in Book Leverage (D/A_t - D/A_{t-1})				Net Debt Issued (d/A_t)			
	IPO+1	IPO+1	IPO+2	IPO+2	IPO+1	IPO+1	IPO+2	IPO+2
Panel A: Mean Values								
Hot	1.34	1.34	1.17	1.17	2.99	2.99	3.31	3.31
Cold	1.31	1.31	1.77	1.77	3.23	3.23	2.90	2.90
t -value (difference)	(0.38)	(0.38)	(0.71)	(0.71)	(0.26)	(0.26)	(0.42)	(0.42)
Panel B: Regression Analysis								
HOT	0.12	-5.66	-0.66	-5.40	0.25	-10.00**	0.32	-4.82
	(0.82)	(4.37)	(1.01)	(4.65)	(1.03)	(4.91)	(1.12)	(4.85)
$Market_t$	-0.57	-0.73	-0.55	-0.51	-0.85	-1.00	0.82	0.88
	(0.91)	(0.93)	(0.86)	(0.85)	(1.02)	(1.03)	(0.96)	(0.95)
M/B_{t-1}	0.01	0.43	-0.11	-0.36	0.19	0.45	-0.14	-0.67
	(0.28)	(0.44)	(0.39)	(1.02)	(0.32)	(0.50)	(0.42)	(1.05)
$EBITDA/A_{t-1}$	0.01	-0.00	0.02	0.02	0.01	-0.00	0.05	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
$SIZE_{t-1}$	0.16	-0.25	-0.01	-0.25	0.11	-0.54	0.01	0.22
	(0.21)	(0.25)	(0.11)	(0.33)	(0.23)	(0.35)	(0.21)	(0.34)
PPE/A_{t-1}	0.03	0.03	0.01	0.01	0.04*	0.04*	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
$R\&D/A_{t-1}$	0.02	0.02	-0.01	-0.01	0.07	0.05	-0.01	-0.02
	(0.05)	(0.05)	(0.05)	(0.05)	(0.10)	(0.06)	(0.06)	(0.06)
RDD_{t-1}	1.68	1.65	0.64	0.59	3.21*	3.10**	0.85	0.80
	(1.03)	(1.03)	(1.04)	(1.03)	(1.29)	(1.31)	(1.17)	(1.17)
$d_{high-lev}$	-5.25***	-5.34***	-4.50***	-4.57***	-3.26*	-3.42**	-3.06**	-3.14**
	(1.10)	(1.31)	(1.27)	(1.28)	(1.70)	(1.70)	(1.54)	(1.55)
$d_{low-lev}$	2.37***	2.40***	2.02**	2.04**	0.32	0.32	0.70	0.69
	(0.85)	(0.85)	(0.86)	(0.88)	(0.97)	(0.98)	(0.93)	(0.94)
$HOT*MTB_{t-1}$	-	-0.52	-	0.36	-	-0.27	-	0.75
	-	(0.54)	-	(1.03)	-	(0.59)	-	(1.06)
$HOT*Size_{t-1}$	-	0.70	-	0.41	-	1.10**	-	0.37
	-	(0.36)	-	(0.42)	-	(0.42)	-	(0.45)
R^2	0.11	0.12	0.10	0.10	0.06	0.07	0.08	0.08
Adjusted R^2	0.08	0.08	0.06	0.06	0.02	0.03	0.04	0.04
F-Test	3.33***	3.28***	2.71***	2.50***	1.60**	1.78**	2.15***	2.00***
N	554	554	518	518	554	554	518	518

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+1 and IPO+2. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage and the net debt issued scaled by total assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.13 (continued)

	Net Equity Issued (e/A_t)				$d_t/(\|d_t+e_t\|)$			
	IPO+1	IPO+1	IPO+2	IPO+2	IPO+1	IPO+1	IPO+2	IPO+2
Panel A: Mean Values								
Hot	7.01	7.01	6.44	6.44	21.66	21.66	16.27	16.27
Cold	6.76	6.76	8.77	8.77	11.25	11.25	15.20	15.20
t- value (difference)	(0.15)	(0.15)	(1.42)	(1.42)	(1.32)	(1.32)	(0.15)	(0.15)
Panel B: Regression Analysis								
HOT	1.12	-5.92	3.20**	8.19	6.07	-6.69	3.97	-14.71
	(1.39)	(9.02)	(1.55)	(10.99)	(7.73)	(41.62)	(7.58)	(36.21)
$Market_t$	-0.03	-0.13	2.54	2.57	6.25	5.76	4.83	5.51
	(1.67)	(1.69)	(1.56)	(1.57)	(8.18)	(8.32)	(6.65)	(6.64)
M/B_{t-1}	0.06	0.33	1.86*	0.41	-6.48	-5.48	-5.05*	-11.42
	(0.67)	(0.67)	(0.94)	(0.98)	(2.61)	(3.30)	(3.14)	(7.29)
$EBITDA/A_{t-1}$	0.26***	0.25***	0.54***	0.54***	-0.09	-0.11	0.26	0.26
	(0.13)	(0.13)	(0.08)	(0.08)	(0.24)	(0.24)	(0.18)	(0.18)
$SIZE_{t-1}$	-1.17***	-1.63***	-1.28***	-0.75	-2.92	-3.97	0.08	0.15
	(0.45)	(0.53)	(0.43)	(0.71)	(1.95)	(2.65)	(1.58)	(2.81)
PPE/A_{t-1}	-0.04	-0.04	-0.04	-0.05	-0.11	-0.11	0.20	0.19
	(0.03)	(0.03)	(0.04)	(0.04)	(0.18)	(0.18)	(0.15)	(0.15)
$R\&D/A_{t-1}$	-0.29	-0.31	0.31	0.30	1.06	1.03	0.29	0.12
	(0.24)	(0.24)	(0.26)	(0.26)	(0.76)	(0.76)	(0.43)	(0.39)
RDD_{t-1}	-1.74	-1.83	2.64	2.76	-8.73	-8.73	1.91	2.02
	(2.21)	(2.22)	(2.09)	(2.07)	(10.60)	(10.55)	(8.42)	(8.25)
$d_{high-lev}$	0.76	0.00	0.58	0.63	18.48	18.21	-32.44***	-33.48***
	(1.87)	(0.00)	(2.04)	(2.08)	(12.31)	(12.47)	(12.45)	(12.52)
$d_{low-lev}$	-2.00	-2.24	-3.12	-3.34	4.37	4.40	5.51	5.17
	(1.58)	(1.58)	(2.09)	(2.08)	(8.36)	(8.37)	(6.76)	(6.62)
$HOT*MTB_{t-1}$	-	-0.31	-	2.05	-	-1.32	-	9.01
	-	(1.04)	-	(1.38)	-	(4.80)	-	(7.11)
$HOT*Size_{t-1}$	-	0.78	-	-0.87	-	1.65	-	0.14
	-	(0.81)	-	(0.92)	-	(3.66)	-	(3.44)
R^2	0.08	0.08	0.28	0.28	0.06	0.06	0.12	0.13
Adjusted R^2	0.05	0.05	0.25	0.25	0.01	0.01	0.07	0.07
F-Test	2.40***	2.23***	9.47***	8.84***	1.26	1.16	2.50***	2.41***
N	554	554	518	518	422	422	392	392

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the IPO+1 and IPO+2. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the net equity issued scaled by total assets and the share of debt in net issuance activity. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Interestingly, the results could also show that financing patterns exhibited by hot market firms could indeed be a reflection of pecking order considerations. The results in the earlier sections show that hot market firms tend to have lower profits. Thus, they may indeed rely more extensively on external financing. Considering net debt issued as a fraction of total securities issued would be able to test this notion further.[40] Panel A, Table 3.13 shows that average for this ratio is almost double for hot market firms during the first year after the IPO. The level is, however, almost similar for hot market firms during the second year after the IPO. Unreported results show that during the third year onwards the levels drop to less than half of cold market firms. This suggests that hot market firms only issue comparable levels of debt during the first two years after the IPO event. The regression results further support this notion of reverting to target leverage. In the first year the hot dummy has a large positive coefficient of 6.07 suggesting a large economical significance. The interaction term shows that larger firms are able to move faster to their targets. The dummy has a positive coefficient of 3.97 during the second year after the IPO. This shows that a huge bulk of reversal occurs in the first and second year. This effect increases further for firms with more growth opportunities as seen from the interaction results. Unreported results show that the dummy remains positive during the third year and turns negative from the fourth year onwards.

Given our earlier findings, we do not expect hot market firms in the SEO sample to exhibit a similar pattern. Panel A, Table 3.14 shows that the change in leverage for hot market firms in first year is slightly lower than cold market firms but the difference is insignificant. The difference is negative in the second year for hot market firms. Unreported results show that the changes remain low for the third year after the SEO event. The difference between hot and cold market firms is also insignificant. After controlling for firm-specific characteristics, the results are reported in Panel B. The hot dummy is positive but insignificant for the first year after the SEO and turns negative in the second year.. Unreported results indicate that the effect remains insignificant in the third year after the SEO event.

[40] The definition used is similar to Alti (2006) where the fraction of debt to net external financing is net debt issues divided by absolute value of the sum of net debt and equity issues. Since this ratio is likely to be very large in cases of pure recapitalization, values where the denominator is less than 5% of total assets are dropped.

The average net debt issued for hot market firms in the first year after the SEO event is relatively similar to cold market firms but the level is significantly lower in the SEO+2 period. The regression results in are reported in Panel B, Table 3.14. The hot dummy is negative in the first year after the SEO. However, the interaction term indicates that the negative effect is countered for hot market firms with higher growth opportunities. The hot dummy is negative during the second year after the SEO and is statistically significant. Net equity issued for hot market firms in the year after the SEO is quite small and barely a tenth that of cold market firms. This difference is also statistically significant. The level is slightly higher for the second year after the SEO but remains far lower than cold market firms. This clearly indicates that hot market firms reduce equity issues significantly after making an SEO.

After controlling for firm specific characteristics, the regressions results in Panel B indicate that the hot dummy has a negative coefficient of 8.26, which is very significant. The interaction term shows that growth opportunities and size further reduces the net equity issued. In the following year, the hot dummy is even larger indicating that hot market firms issue even lower amounts of net equity. The next analysis considers net debt issued as a fraction of total securities issued. The mean level for hot market firms is much lower than cold market firms in the first year after the SEO event. The level is just about a third in the second year after the SEO. The hot dummy has a large negative coefficient but is insignificant during the first two years after the SEO event.

Table 3.14: Issuance Activity and Capital Structure Rebalancing for SEO Firms

	Change in Book Leverage(D/A_t - D/A_{t-1})				Net Debt Issued (d/A_t)			
	SEO+1	SEO+1	SEO+2	SEO+2	SEO+1	SEO+1	SEO+2	SEO+2
Panel A: Mean Values								
HOT	0.12	0.12	-0.75	-0.75	1.77	1.77	-1.34	-1.34
COLD	0.14	0.14	0.33	0.33	2.81	2.81	3.53	3.53
t-value (difference)	(0.06)	(0.06)	(0.86)	(0.86)	(0.71)	(0.71)	(2.90)	(2.90)
Panel B: Regression Analysis								
HOT	0.38	-1.34	-0.56	-7.00	-0.47	0.07	-3.93**	-10.62
	(1.32)	(5.45)	(1.16)	(6.23)	(1.46)	(6.07)	(1.56)	(8.53)
$Market_t$	0.16	0.26	0.73	0.56	1.11	1.16	-1.52	-1.80
	(1.27)	(1.27)	(1.30)	(1.35)	(1.48)	(1.48)	(1.95)	(2.08)
M/B_{t-1}	0.56	-0.05	0.05	-0.14	1.26**	1.04	1.27**	1.29
	(0.58)	(0.84)	(0.62)	(0.87)	(0.56)	(0.73)	(0.61)	(0.87)
$EBITDA/A_{t-1}$	0.03	0.04	0.12***	0.12***	0.08**	0.08**	0.15**	0.15**
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.06)	(0.06)
$SIZE_{t-1}$	0.30	0.32	0.15	-0.19	0.07	0.15	-0.13	-0.54
	(0.30)	(0.44)	(0.27)	(0.43)	(0.34)	(0.48)	(0.34)	(0.49)
PPE/A_{t-1}	-0.01	-0.01	-0.03	-0.03	0.06*	0.06*	0.03	0.03
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
$R\&D/A_{t-1}$	0.05	0.06	-0.04	-0.06	0.07	0.07	-0.03	-0.03
	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)
RDD_{t-1}	2.84*	3.06**	0.53	0.42	2.56	2.67	0.48	0.31
	(1.50)	(1.54)	(1.35)	(1.37)	(1.56)	(1.67)	(1.85)	(1.89)
$d_{high\text{-}lev}$	-9.18*	-9.32*	-5.92**	-5.77**	-9.35*	-9.42*	-3.84	-3.51
	(4.77)	(4.75)	(2.49)	(2.47)	(5.02)	(5.04)	(4.20)	(4.28)
$d_{low\text{-}lev}$	3.83**	3.69**	4.23**	4.22**	1.35	1.31	2.27	2.40
	(1.58)	(1.58)	(1.92)	(1.91)	(1.65)	(1.66)	(2.07)	(2.07)
$HOT*MTB_{t-1}$	-	1.01	-	0.47	-	0.35	-	-0.02
	-	(1.08)	-	(1.03)	-	(1.03)	-	(0.10)
$HOT*SIZE_{t-1}$	-	-0.02	-	0.50	-	-0.12	-	0.61
	-	(0.45)	-	(0.49)	-	0.52	-	(0.65)
R^2	0.13	0.14	0.18	0.18	0.14	0.14	0.17	0.17
Adjusted R^2	0.06	0.06	0.10	0.09	0.07	0.06	0.09	0.08
F-Test	1.88**	1.75**	2.29***	2.10***	1.95**	1.78**	2.15***	1.97**
N	255	255	222	222	255	255	222	222

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO+1 and SEO+2. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the change in book leverage and the net debt issued scaled by total assets. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

Table 3.14 (continued)

	Net Equity Issued (e/A_t)				$d_t/(\|d_t+e_t\|)$			
	SEO+1	SEO+1	SEO+2	SEO+2	SEO+1	SEO+1	SEO+2	SEO+2
Panel A: Mean Values								
HOT	0.61	0.61	1.82	1.82	10.75	10.75	3.74	3.74
COLD	10.03	10.03	13.84	13.84	17.00	17.00	14.52	14.52
t-value (difference)	(3.39)	(3.39)	(3.35)	(3.55)	(0.71)	(0.71)	(1.16)	(1.16)
Panel B: Regression Analysis								
HOT	-8.62***	-31.54**	-11.55***	-55.89**	-4.12	-9.41	-10.33	-36.66
	(2.71)	(13.92)	(3.29)	(26.79)	(7.92)	(33.93)	(9.29)	(39.63)
$Market_t$	1.67	0.91	-2.23	-4.24	3.02	3.59	-13.13	-13.96
	(2.89)	(2.92)	(3.36)	(3.35)	(9.06)	(8.99)	(9.36)	(9.64)
M/B_{t-1}	3.25**	5.27***	3.73**	4.28**	3.83	1.18	3.87*	3.70
	(1.47)	(1.84)	(1.47)	(2.01)	(2.55)	(2.68)	(2.13)	(3.29)
$EBITDA/A_{t-1}$	0.23*	0.21*	0.28	0.34	0.27*	0.29**	0.20	0.23
	(0.12)	(0.11)	(0.30)	(0.28)	(0.14)	(0.14)	(0.14)	(0.14)
$SIZE_{t-1}$	-1.15	-2.85***	-0.83	-3.69**	2.48	2.81	1.35	-0.13
	(0.73)	(1.07)	(0.96)	(1.82)	(2.22)	(2.30)	(2.38)	(2.97)
PPE/A_{t-1}	-0.05	-0.04	-0.02	-0.01	0.44**	0.44**	0.38*	0.38*
	(0.05)	(0.05)	(0.06)	(0.06)	(0.20)	(0.20)	(0.20)	(0.20)
$R\&D/A_{t-1}$	-0.04	-0.09	0.67*	0.68**	0.28	0.32	-0.03	-0.05
	(0.24)	(0.26)	(0.34)	(0.33)	(0.27)	(0.29)	(0.31)	(0.30)
RDD_{t-1}	0.15	-1.48	6.20	4.99	10.28	11.07	-9.81	-10.31
	(3.50)	(3.79)	(4.70)	(3.85)	(10.62)	(10.61)	(12.02)	(12.21)
$d_{high\text{-}lev}$	0.78	1.59	-0.88	1.58	-46.80	-47.39	-44.51*	-44.48
	(3.85)	(3.56)	(5.42)	(5.67)	(28.43)	(28.61)	(26.61)	(27.10)
$d_{low\text{-}lev}$	-4.71	-4.61	-5.94	-4.86	13.78	12.94	4.21	4.41
	(4.94)	(4.62)	(5.21)	(5.09)	(9.87)	(9.97)	(10.16)	(10.47)
$HOT*MTB_{t-1}$	-	-3.09	-	-1.08	-	4.61	-	0.58
	-	(2.49)	-	(2.89)	-	(4.22)	-	(4.48)
$HOT*SIZE_{t-1}$	-	2.75***	-	4.24**	-	-0.42	-	2.30
	-	(1.21)	-	(2.04)	-	(3.31)	-	(3.43)
R^2	0.21	0.24	0.22	0.25	0.13	0.13	0.12	0.12
Adjusted R^2	0.14	0.17	0.14	0.17	0.04	0.03	0.01	0.00
F-Test	3.21***	3.49***	2.94***	3.19***	1.41	1.30	1.10	0.99
N	255	255	222	222	206	206	170	170

Panel A reports the mean values of hot and cold market firms for each dependent variable. The differences (t-values) are reported in parentheses. The period *t* denotes the SEO+1 and SEO+2. All regressions are estimated with industry dummies. The standard errors that are robust to heteroscedasticity are reported in parentheses. The dependent variable is the net equity issued scaled by total assets and the share of debt in net issuance activity. All variables are expressed in percentage terms. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1% level, respectively.

3.8 Conclusion

The previous studies have shown that firms attempt to time the market when issuing equity. It is argued that their decisions are influenced purely by market conditions. Favourable market conditions would thus lead to a hot market in equity issues as studied in this paper for IPOs and SEOs in the UK. The results have revealed the pattern of equity issues in hot markets and how it impacts firms in the short and long-run. These effects are evaluated from three different angles. Firstly, how do managers view hot markets? The literature iterates that hot markets act as a window of opportunity for managers to issue equity. Given that issue volume is a good indicator for market conditions, it has been the key issue throughout this study. Thus, the hot market dummy used in this is used to capture equity market timing attempts by firms. The second angle is why firms time the market? The basic idea of finance is that firms would raise external capital to fund future or current projects. This study attempts to answer the motivation of firms to time the market which leads to abnormal increase in issue volumes. The third angle is to what extent firms time the market and how these attempts influence their future financing policies. If a firm were to issue more equity during a hot market, they would deviate away from their target capital. Thus, in subsequent years, they may attempt to reverse these timing attempts.

Based on these three aspects, we summarize the main findings. Looking at the first two aspects, we conclude that firms that go public in the hot market raise more capital than their cold market counterparts. When comparing the hot and cold market firms, hot market firms had significantly lower levels of post-event leverage. They also had poorer investment opportunities during the IPO and subsequent years. This resulted in their profitability levels to be significantly lower than cold market firms. These findings negate the hypothesis that hot market firms grew faster than cold market firms. In the SEO market, hot market firms similarly raised more capital than cold market firms raised relative to their assets. Further investigations revealed that they also had similar levels of pre-issue leverage. Hot market firms, however, appear to be overleveraged and had deviated further from their target leverage levels than cold market firms. Thus, hot market firms had reduced leverage levels significantly more than cold market firms. The extent of reduction also matches the level of deviation from their target capital structure. They also lowered their investment levels and

profitability levels improved slightly after the SEO year and moved closer to levels of cold market firms in subsequent years.

Findings from the third aspect reveal that hot market IPO firms do increase their leverage ratios in subsequent years. The bulk of the reversal is evidenced in the second year after the IPO event. Thus, it can be said that IPO market timing does not have a long-term influence on capital structure. However, cold market firms significantly lower their leverage ratios. This raises the question of whether cold market firms were in fact timing the debt market instead of the equity market and were now lowering leverage levels to revert to their target. Unreported results reveal that both hot market and cold market firms converge to a relatively similar level of leverage in subsequent years. Hot market firms do not significantly increase debt issues after the SEO event suggesting that they are in a financially weak position and raises further questions on their motivations. Net equity issues of hot market firms also are only similar to cold market firms during the SEO year. In subsequent years net equity issues are significantly lower. The results indicate that firms with inferior investment opportunities and profitability levels are the most likely to issue during hot markets suggesting that they would otherwise have difficulties in raising capital. These raises further questions which would require further analysis which we delegate to further research.

Overall, market timing considerations seem to influence capital structure decisions. However, our results indicate that the effect is temporary in nature and does not persist. This is evidenced in both the IPO and SEO market. In the long-run, firms appear to be moving towards pre-determined target leverage. This conclusion is similar to Hovakimian (2004) who provides evidence where firms that have target debt ratios can engage in timing the equity market. Thus, there remain doubts whether market timing would suffice as a stand-alone theory in explaining financing behaviour or would act as a bridge in closing the gaps existing in the current framework. Myers (2001) iterates this view by suggesting that currently there is no universal theory to explain capital structure and there is no reason to expect one.

Chapter 4 : Equity Mispricing, Financial Constraints, Market Timing and Targeting Behaviour of Companies[41]

4.1 Introduction

We focus on the equity market timing behaviour of firms in the UK. According to the market timing theory of capital structure, firms increase equity issues when the equity market is favourable and reduce equity issues during periods of unfavourable market conditions. If managers are able to successfully time the market and lower the overall cost of capital, they would be adding to shareholder value. Given this motivation, managers would also be retiring debt and repurchasing equity to deliver further value subject to whether the market value of equity has deviated from fundamental value of the firm.

We make four contributions to the existing literature. Elliot et al. (2007) find that the effect of market timing is statistically and economically significant while Hovakimian (2006) shows that although firms time equity issues, the effects are economically small and short-lived, which contrasts with the findings of Baker and Wurgler (2002). As there is no consensus in the literature, we examine firstly the presence of equity market timing for firms in the UK. We investigate into this presence by testing whether deviation from intrinsic value causes managers to adjust their issuing behaviour. If the market timing theory holds, we expect to document a significant increase (decrease) in debt to fund the deficit during periods of undervaluation (overvaluation). In doing so, as emphasized in Hasan et al. (2011), among others, we consider both the economic and statistical significance of timing as implied in the regression results. Our study also uses Rogers' (1993) standard errors as discussed in detail in Peterson (2009). Therefore the conclusions are robust and indicative.

The second contribution is provided by scrutinizing how financial constraints influences timing behaviour: Korajczyk and Levy (2003) find that financially flexible firms time their issues and less flexible firms do not have the luxury of timing their issues. DeAngelo et al.

[41] This chapter has benefited from presentations at the EFMA Annual Meeting 2011 in Portugal in June 2011 as well as the IFABS 2011 (JBF Conference) in Rome in July 2011.

(2010), on the other hand, find that short term cash needs is the main driver behind timing of equity issues in the SEO market. As our paper is based on a sample for UK firms, the notion of financial constraints affecting timing behaviour would be more plausible relative to the US context. Similar to Guariglia (2008), we study UK firms to allow a better understanding of the issues surrounding timing and financial constraints. The author's sample is based on UK firms as well and further argues that the lack of corporate bond and commercial papers, thinner and more heavily regulated banking and equity market and the smaller amount of venture capital financing would lead to financial constraints playing a far more important role in firm behaviour in the UK and European context than that in the US. We aim to examine whether having the financial capacity to adjust security issues affects managerial timing decisions. The focus of our paper is different as we directly use firm-level measures of flexibility and mispricing while the others have generally focused on market-wide measures.

The third contribution encompasses looking at the repurchasing of securities: Rau and Vermaelan (2002) suggest that the majority of repurchase activity in the UK is tax driven. Their findings reveal that share repurchases in the UK are influenced by differences in the way repurchases are taxed and regulated. This differs from the US where studies such as Ikenberry et al. (1995) find that under-pricing plays a key role in share buybacks. Oswald and Young (2004), contrastingly, find that as share prices fall, managers appear to respond by buying more shares, thus giving support for the market timing framework as a valid explanation for share buybacks. We separate firms that are in a financial surplus as opposed to those in financial deficits. Given that managers pro-actively time security issues, we expect that repurchasing behaviour to be also heavily influenced by mispricing.

The last contribution we make is by examining issuing and repurchasing activities in coherent with targeting behaviour. This contribution stems from Hovakimian (2004) who concludes that even firms that have target leverage levels can engage in timing behaviour. In addition, Warr *et al*. (2011) find that firms above their target leverage together with overvalued shares adjust faster to target leverage. This suggests that managers have a larger motive to issue equities during periods of overvaluation and over-leverage. Building on their work, we examine whether deviation from target leverage would affect timing

behaviour. However, we also consider directly the influence of financial deficit (or surplus) as well as equity mispricing simultaneously with distance from target leverage on issuing behaviour. We hypothesize in this paper that managers may be reluctant to time the market if this action causes them to drift further from their target leverage levels and that these decisions would also be driven by whether they are in a deficit or surplus.

We draw several main findings and conclusions from this study. Firstly, firms time the equity market by increasing equity issues during periods of overvaluation to finance their deficit. Managers are able to spot deviations from fundamental value and adjust their issues accordingly. This effect is economically and statistically significant. Consistent with the literature, our findings hold after testing for robustness. Secondly, we find that financial constraints play an important role in timing behaviour. Constrained firms issue more debt during periods of undervaluation and retire more debt during periods of overvaluation relative to unconstrained firms. One can contend that since constrained firms would benefit most from timing opportunities they behave more strategically than unconstrained firms. Thus, it is clear that there is a significant difference between timing behaviour of constrained and unconstrained firms.

The third and fourth findings have to be interpreted closely together as the implications drawn from the analysis are closely tied in. If we assume that firms do not have target leverage or we believe that firms do not deviate from their targets, we find that issuing and repurchasing behaviours are influenced by equity mispricing. Once financial constraints are considered, we find that issuing behaviour is not restricted by financial flexibility. Repurchasing behaviour is, however, severely limited to the firm's financial capacity as evidenced in the findings. Once we relax the initial assumption we find that mispricing is able to account for repurchasing and issuing activities given that these actions do not cause firms to deviate further from their targets. Thus, market timing attempts are more obvious and significant when they are parallel with targeting behaviour. We are also able to infer from these results that the cost of being off target significantly outweighs the benefit gained from timing the market. Therefore, managers are reluctant to time the market if timing attempts cause leverage to drift further away from pre-determined levels.

We next review the relevant literature. Then we provide the data description, variable definitions, describe how equity mispricing is valued and quantify the basic model used throughout the paper. In what follows, we empirically test how mispricing affects issuance activities and then consider the impact of constraints and repurchasing. This study also explores how targeting and deviation from targets influence timing behaviour. Finally, we conclude the main findings and their implications.

4.2 Literature Review

Market timing theory of capital structure is fast becoming a very important aspect and widely researched in the literature of corporate finance. This section reviews the literature from several different aspects. Firstly, it looks at how firms finance their external deficit. Baker and Wurgler (2002) show that capital structure is the aggregate outcome of firms' historical attempts to time the market. This approach would dictate that managers should be able to identify opportunities to raise capital at a lower cost and make adjustments to financing the deficit accordingly. The authors find strong support for these hypotheses. However, empirical studies thus far show that during different periods, debt issues and equity issues track the financing deficit differently.

Secondly, this section looks at repurchasing and financial constraints pertaining to market timing and equity mispricing. Hovakimian (2006) found that firms time equity issues to periods of high market-to-book ratios but the effects are economically small and short-lived. This study also proves that the effect of timing of equity repurchases on leverage ratios is even weaker. More interestingly, the author found that debt issues have a significant long-lasting effect on capital structure, but their timing is unlikely to induce a negative relation between market-to-book and leverage. Debt redemptions also have a significant effect on leverage ratios.

Lastly, although market conditions may be attractive, managers may be reluctant to make adjustments to their issuance activities due to targeting behaviour. In this sense, market timing would be attractive only when the adjustment would be parallel to their goal of reaching a pre-determined target level. Hovakimian (2004) finds that firms that have target

debt ratios can engage in market timing activities. Alti (2006) documents that although attractive market conditions may cause firms to deviate from their original leverage ratios, the effect tends to be reversed and firms tend to rebalance their capital structure sooner or later. Thus, the dynamics of a firm would indicate that firms may in fact have target leverage levels and still attempt to time the market when managers find equity markets to be favourable.

4.2.1 Financing the deficit and mispricing

Financing patterns are first explored in Shyam-Sunder and Myers (1999) who test the relationship between net changes in leverage and financing deficit. In theory, if the pecking order holds, a one-to-one relationship would be observed. They find strong evidence for this notion. In their study, the deficit coefficient is able to better explain net debt issues and also change in leverage ratios than the target adjustment coefficient.[42] The results hold even after considering actual and anticipated deficits via the use of instruments. However, Frank and Goyal (2003) find that net equity issued tracks the financing deficit more closely. Their results show that debt financing is not the main source of financing opted for by managers as the magnitude of equity financing is greater than debt financing. Huang and Ritter (2009) test the change in leverage and financing deficit and show that the pecking order coefficient is either highly significant or not significant at all. They argue that the pecking order is not able to explain their results because in some years the pecking order slope is insignificant. Butler *et al*. (2011) find that although the level of net financing is an important factor in explaining future stock returns the composition constituted by debt or equity is irrelevant.

Bayless and Chaplinsky (1996) examine the windows of opportunity for seasoned equity offerings (SEOs). They directly link the decision to issue equity to the cost of issuing. Hovakimian et al. (2001) found that US SEOs were also highly correlated with stock prices. In the UK, Marsh (1982) documented a similar pattern where firms tend to issue equity when prices are high. Baker and Wurgler (2002) propose that managers would reduce reliance on debt and opt for equity when they perceive the equity market to be more favourable. They test this notion by interacting the market-to-book ratio with the amount of

[42] In their study, the deficit coefficient ranges from 0.69 to 0.85 and the target adjustment coefficient ranges from 0.10 to 0.41.

capital raised (i.e., financing deficit) and show that there is a strong link between external finance weighted average market-to-book ratio and net change in leverage. Further evidence on managers' attempts to time the market is provided by the survey evidence of Graham and Harvey (2001).

There have been contrasting findings in the literature that raise further questions over the theoretical implications of market timing. Alti (2006) finds that although firms do attempt to time the market, the effect is temporary in nature. The author finds that firms tend to rebalance their capital structure within two years after timing the market. Flannery and Rangan (2006) further test the market timing theory and find that more than half of the observed changes in leverage levels are brought about by targeting behaviour. In their study, less than 10% of changes can be explained by market timing and pecking order considerations. Further contention is highlighted in Hovakimian (2006) where the negative correlation between the market-to-book and leverage is not driven by market timing attempts but instead by growth opportunities. Mahajan and Tartaroglu (2008) show that the negative relationship between the leverage ratio and the historical market-to-book ratio is not attributed to market timing. Their findings significantly support the dynamic trade-off view of capital structure. Another recent study (Liu, 2009) found the impact of time varying targets and adjustment costs to reveal that the historical market-to-book ratio has a significant impact on leverage even when firms are not timing the market. Liu uses alternative proxies of market timing and show they have no effect on leverage. The author concludes that the evidence is largely consistent with partial adjustment models.

On the other hand, there are some studies that provide strong support for the theory. Welch (2004) found that equity price shocks also have a long-lasting effect on capital structure. Welch iterates that firms do not rebalance their capital structure in response to shocks in market value in spite of active net issuing activity. Thus, it can be said that stock returns are the primary driver of capital structure changes. Kayhan and Titman (2007) look at stock prices and financing deficits and find that these two elements have strong influences on capital structure changes. They conclude that the financing deficit affects firms differently depending on their valuation levels. Indirect evidence is provided by Jenter (2005) where perceived mispricing by managers is an important determinant in their decision making.

The empirical evidence suggests that managers attempt to actively time the market in both their own private trades and also in firm-level decisions. Elliot *et al.* (2007) make a further significant contribution when they find that overvalued firms are more likely to issue equity to fund the financing deficit. The effect is also economically significant as a deviation of 10% from intrinsic value causes an 8% change in the amount of equity issued. Hertzel and Li (2010) decompose the market-to-book ratio into two separate components, namely the growth and mispricing components. Their findings show that firms with higher element of mispricing decrease long-term debt and have a lower level of post-issue earnings. These results are consistent with the timing aspect of issuance activities.

4.2.2 Financial constraints and repurchasing

Evidence from several survey results suggest that managers are mostly concerned about financial constraints when they consider how to finance their deficit.[43] However, only the pecking order theory proposed by Myers and Majluf (1984) incorporates the significance of constraints in financing choices by managers. Fama and French (2005) find that the pecking order is unable to explain leverage levels given that equity issues are a commonplace occurrence instead of a last resort of financing choice as proposed by the pecking order. The trade-off theory, on the other hand, has its pitfalls as the theory fails to explain why many profitable firms remain 'under-levered' and not capitalize on the benefit of increasing their reliance on debt financing. Furthermore, empirical studies seldom detect rebalancing activities when firms are over-levered. DeAngelo and DeAngelo (2007) propose that the shortcomings of these theories can be compensated if financial flexibility, capital structure and dividend policies are considered together. Further implications of financial flexibility is shown by Byoun (2011) who finds evidence to support the hypothesis that financial flexibility is the main driver behind capital structure decisions.

Korajczyk and Levy (2003) further expand the scope of argument by looking at how financial constraints and macroeconomic conditions affect capital structure choices. The authors suggest that these two factors can induce time-series and cross-sectional heterogeneity in firm behaviour. Firms' target capital structures are modelled as a function of macroeconomic conditions and firm-specific variables while the sample is split into financially constrained and unconstrained firms. The findings show that target leverage is

[43] Refer to Graham and Harvey (2001), Bancel and Mittoo (2004) and Brounen et al. (2004).

counter-cyclical for the relatively unconstrained sample but pro-cyclical for constrained sample. Macroeconomic conditions are found to be significant for issuance decision for unconstrained firms but less so for constrained firms. Thus, the authors argue that unconstrained firms are able to time their issues to periods when the relative pricing of assets are favourable, constrained firms cannot time the market and settle for whatever option available to them. This provides support for the notion that unconstrained firms time their issue choice to coincide with periods of favourable macroeconomic conditions while constrained firms are unable to do so. Further evidence is provided by Faulkender *et al*. (2007) who investigate the role played by adjustment costs in firms correcting back towards their target leverage ratios and find faster adjustment speeds among those firms with better excess to external capital.

There are studies that find contrasting results from the above mentioned. Baker et al. (2003) show that investments by constrained firms are strongly dependent on stock price movements, suggesting that market timing plays an important role for these firms. DeAngelo *et al.* (2010) find that market timing opportunities play a significant role on the probability of firms conducting SEOs. In their study, a majority of issuers would run out of cash without the proceeds from the issues a year after the SEO. Thus, the short term need for cash is the primary motive for firms conducting SEOs with market timing opportunities and life-cycle stage playing secondary roles. Bolton et al. (2011) investigate how firms should optimally time the equity market. The authors show that only firms with low cash-to-asset ratios should time the equity market and issue during favourable equity market conditions. Cook and Tang (2010), on the other hand, show that firms adjust faster towards their target leverage in good macroeconomic conditions as opposed to bad states regardless of financial constraints. Thus, the implications of financial constraints on timing behaviour remain an open debate.

Wansley et al. (1989) identify five main motives behind share repurchases: reaching a target leverage level, eliminating free cash flow, anti-takeover motive, signalling of undervaluation and wealth transfer due to timing. In this paper, we focus on the timing motive. In order to be able to transfer wealth (as an alternative policy to dividend payouts),

managers will adjust their repurchasing to reflect mispricing in the equity market.[44] Barclay and Smith (1988) find that there are higher costs associated with repurchases and these costs are not incurred for dividends payouts. Therefore, managers prefer dividends to repurchases for making distributions to shareholders. Contrastingly, Grullon and Michealy (2002) show that firms finance their repurchases with funds that would otherwise have been used to increase dividends. The authors' findings indicate that firms have gradually substituted repurchases for dividends.[45]

Ikenberry et al. (2000) further examine repurchasing activities and find that there is a strong link between repurchasing and price movements. Cook et al. (2004) document that managers repurchase following price drops and prices stabilize following repurchase trades. Oswald and Young (2004) find that in the UK, despite the prevailing regulatory environment, under-pricing represents an important determinant of repurchase activities. Zhang (2005) finds that firms repurchase following price drops, suggesting that managers are attempting to time the market. The market, however, responds positively only to small and value firms making repurchases. Thus, the author argues that at least managers are able to deliver value to long-term shareholders for high market-to-book value firms in repurchases. These studies also suggest that managers are attempting to signal undervaluation. Dittmar and Dittmar (2008) provide contention for these findings by showing that mis-valuations are not the driving force behind financing (including repurchasing) activities. Economic expansion leads to additional equity issues and also repurchases.

4.2.3 Market timing and target leverage

Survey evidence by Graham and Harvey (2001) indicates that 81% of managers admit to having some form of target leverage in mind. These managers also admit that they issue equity when it is perceived as being overvalued. Recent studies have documented that target leverage plays an important role in issuance activities and firms move towards target

[44] See Brockman and Chung (2001) and Chan et al. (2007) for empirical evidence on substantial managerial ability to time repurchases. Ginglinger and Hamon (2007) find contrary evidence where repurchases are not based on managerial timing ability.

[45] Dittmar and Dittmar (2002) further document that repurchases accounted for 44.2% of total payout in the US in 2000 compared to 11.82% in 1971.

leverage.[46] These studies indicate that firms frequently deviate from their targets. Faulkender *et al*. (2007) suggest that one of the reasons for this occurrence would be that firms may have a target capital structure but also have a band around it within which they engage in the timing of security issues and repurchases. Hovakimian (2004) studies the role of target leverage in issuance and repurchasing activities and finds that equity issues and repurchases have no significant lasting effect on capital structure but debt issues and repurchases do. Furthermore, the results indicate that firms are able to pursue market-timing strategies because deviations and costs associated with deviating from target leverage induced by equity transactions are small and transitory. Thus, the author concludes that firms that have target debt ratios can engage in timing the equity market.

Elsas et al. (2006) show that large investments are mainly financed by externally obtained funds. There is evidence to support market timing but they are transitory in nature and only affect leverage ratios temporarily. In the long-run, firms move toward target leverage. Alti (2006) also finds that firms time the market in the short-run but revert to target leverage eventually. Further insight is provided by Warr *et al*. (2011) where firms that are over-levered would adjust faster to target leverage given that the present value of bankruptcy costs would be higher. More interestingly, over-levered firms would adjust faster to target leverage in the presence of overvaluation. Byoun (2008) documents that most of the adjustments to target leverage occurs if firms have a financing surplus (deficit) and are over-levered (under-levered).

Furthermore, Chang et al. (2006) examine the role of analyst coverage on financing decisions and find that firms that receive less coverage issue equity less frequently. Hence, these firms are inclined to time the market and issue larger amounts of equity when conditions in the equity market are more favourable. Theoretically, firms that receive less coverage would have higher levels of information asymmetry leading to more frequent mispricing. During periods of undervaluation, firms may resort to debt financing and therefore move away from their target leverage. When market conditions improve, these firms will have a stronger incentive to make a larger equity issue to move closer to their target levels. The authors further iterate that even if higher valuations move them

[46] See Hovakimian *et al.* (2001), Fama and French (2002), Frank and Goyal (2004), Gaud *et al.* (2005), Kayhan and Titman (2007), Lemmon et al. (2008), Antoniou et al. (2008) and Huang and Ritter (2009).

automatically closer to a target market value-to-leverage, they may still be inclined to issue equity more extensively due to anticipated future difficulties in issuing. Hence, managers are trading off the temporary cost of being under-levered against the benefit arising from reduction in the future possibility of being over-levered and financial flexibility. Binsbergen et al. (2010) further document that the cost of being over-levered is higher than that of being under-levered, which implies that equity market timing should be more attractive for managers whose firms are above their target leverage.

4.3 Data

4.3.1 Data description and descriptive statistics

Our initial sample comprises all U.K. firms available on Datastream during the period of 1984-2008.[47] The choice of the sample period is guided by availability of data and based on the objective of measuring mispricing in the study[48]. Following the literature, we exclude financial firms from the sample. Definitions of dependent variables are provided in table 4.1, definitions of explanatory and control variables are provided in table 4.2 and definition of other relevant variables and measures used are provided in table 4.3.

To control for the influence of outliers, values for BL, Δdbl and Δe that exceed 100% in absolute value are also dropped from the sample. Missing firm-year observations are also excluded from the data set. The final sample comprises of 11,201 firm-year observations. The summary statistics of firm specific characteristics and financing activities are summarized in Panel A of Table 4.4. Panel B shows the correlation matrix of all the variables used in the regressions. We find that book leverage of firms in the UK is about 18% (17.81). The correlation matrix indicates that none of the independent variables have a high level of correlation. The variance inflation factor (VIF) values are far less than 10, revealing the absence of the multicollinearity problem. Although some of the correlations exceed 80%, these are not among the explanatory variables.

[47] We include dead firms to avoid potential survivorship and selection bias.
[48] Our sample is limited due to lack of access to the new issues database as well as I/B/E/S for forecast data at HUBS currently.

4.3.2 Measuring the financing deficit

Similar to Elliot *et al.* (2007), we expand the model used by Shyam-Sunder and Myers (1999) and include a measure of valuation to proxy for timing. The model used regresses the net debt issued on the financing deficit and is defined as DEF_{it} for firm *i* in year *t* as follows:

$$\boldsymbol{DEF_{it} = DIV_{it} + I_{it} + \Delta W_{it} - C_{it} \equiv \Delta d_{it} + \Delta e_{it}} \quad \textbf{(4-1)}$$

where DIV_{it} is cash dividends, I_{it} is net investments, ΔW_{it} is net working capital, C_{it} is cash flow after interest and taxes. The sum is identical to net debt issued (Δd_{it}) and net equity issued (Δe_{it}). Similar to Kayhan and Titman (2007), we define a positive deficit when a firm invests more than it internally generates. A negative deficit (surplus) occurs when a firm generates more cash than it invests. Thus, when $\Delta d + \Delta e$ is less than zero, firms are repurchasing (in a surplus) and when this measure is greater than zero, firms are raising capital (in a deficit).

4.3.3 Equity Mispricing

We measure mispricing with the ratio of intrinsic value (IV) to current market price (MP).[49] Our approach draws from the work of Rhodes-Kropf et al. (2005) who decompose the market-to-book ratio into a measure of growth options and a measure of valuations. The authors argue that value to market measures mispricing by the market and book to value measures growth opportunities. Intrinsic value is measured as follows:[50]

$$\boldsymbol{V_{equity} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r_e)^t}} \quad \textbf{(4-2)}$$

$$\boldsymbol{V_{equity} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r_e)^t} = \sum_{t=1}^{N} \frac{FCFE_t}{1+r_e{}^t} + \frac{Terminal\,Value}{(1+r_e)^N}} \quad \textbf{(4-3)}$$

Terminal value is calculated as:

$$\boldsymbol{Terminal\,Value = \frac{FCFE_N(1+g)}{(r_e - g)}} \quad \textbf{(4-4)}$$

where g is the long-term growth. Elliot et. al. (2007 and 2008) utilize the residual income model which utilizes the residual income approach. In their studies, they utilize the future expected earnings for the company and make use of 3 years of future earnings data.

[49] We utilize an approach similar to Elliot *et al.* (2007).
[50] This is based on Benninga (2011).

Furthermore, their tests use a perfect foresight version of the residual income model as elaborated in D'Mello and Shroff (2000). Elliot et. al. (2007) further assume a clean surplus relation where changes in retained earnings are similar to net income less dividends paid and argue that based on this assumption, the residual income model can be shown to be similar to the dividend discount model. Given that we are unable to procure similar data of forecasted earnings, we assume that the firms experience constant growth and utilise a simpler approach.[51]

Given that FCFE occurs throughout the year we make adjustments as follows:

$$\boldsymbol{V_{equity} = \left[\sum_{t=1}^{N} \frac{FCFE_t}{(1+r_e)^t}\right](1+r_e)^{0.5}}$$

$$\boldsymbol{= \left[\frac{FCFE(1+g)}{1+r_e{}^t}\right](1+r_e)^{0.5}} \quad \textbf{(4-5)}$$

$FCFE_t$ is free cash flow to equity at time *t* and r_e is the cost of equity. FCFE is the sum of net income plus depreciation minus change in non cash working capital minus capital expenditure minus principal repayments of debt capital plus new debt issued. A firm's cost of equity is calculated as below[52]:

$$\boldsymbol{r_E = r_{rf} + \beta_i(r_m - r_{rf})} \quad \textbf{(4-6)}$$

where short-term treasury bills are used as a proxy for the risk free rate (r_{rf}), and r_m is the total market return (see Elliot *et al.*,2007). β_i is measured as:

$$\boldsymbol{\beta_i = \frac{Cov_i market}{\sigma^2 market}} \quad \textbf{(4-7)}$$

where FTSE All Share Index is used as a proxy for market.[53] Similar to Elliot *et al. (*2007), our purpose is to measure deviation from fundamental value. This is measured as:

$$\boldsymbol{Misvaluation = \frac{IV_{it}}{MP_{it}}} \quad \textbf{(4-8)}$$

where IV_{it} is intrinsic value and MP_{it} is market value of equity. In our study we use a dummy variable, UNDVD, which takes the value of 1 if the firm is undervalued (indicating that mispricing is greater than one).[54] In the spirit of Elliot *et al.* (2007), we interact

[51] Our approach in measuring mispricing may suffer from unrealistic assumptions but the limitation in our approach arises as forecasted data (I/B/E/S) is currently unavailable at HUBS.

[52] Elliot et. al. (2007) show that the single factor model as used in our approach and the Fama and French (2007) model lead to similar results. Furthermore, Elliot et al. (2008) find that the three factor model leads to noisier results; hence we opt for the simple single factor model.

[53] We estimate beta using a 36 month rolling approach. Our results are similar when using a 60 month approach.

[54] The overall mispricing measure in our sample has an average of 1.07. Throughout the sample the average varies overtime from 0.36 to 3.38.

UNDVD with the financing deficit variable.[55] The purpose of the interaction is to allow the model to incorporate a timing element based on the valuation measure and directly test the impact of market timing on issuing behaviour. Our basic model is shown as:

$$\Delta dbl_{it} = \alpha + \beta_1 DEF_{it} + \varepsilon_{it} \quad \textbf{(4-9)}$$

$$\Delta dbl_{it} = \alpha + \beta_1 DEF_{it} + \beta_2 UNDVD_{it} + \beta_3 (UNDVD \times DEF)_{it} + \varepsilon_{it} \quad \textbf{(4-10)}$$

We expect the coefficient for the deficit measure to be positive as firms will have the choice of financing the deficit with a combination of debt and equity. If firms time debt issues to coincide with equity undervaluation we expect the coefficient β_2 to be positive. Furthermore, if firms increase debt issues to finance their deficit during periods of undervaluation, we expect β_3 to be positive as well suggesting that a larger portion of debt would be financed via debt issues relative to periods of overvaluation

[55] All interaction variables used are robust to multicollinearity problem.

Table 4.1 Definition of Dependent Variables

Variable	Definition	Source
Book Leverage (BL)	Total book debt divided by total assets	Datastream
Market Leverage (ML)	Total book debt divided by market value of equity at date of financial year end of each firm plus book debt	Datastream
Net book debt issued (Δdbl/A)	Net change in total book debt divided by total assets	Datastream
Net market debt issued (Δdml/A)	Net change in total market debt divided by total assets	Datastream

Table 4.2 Definition of Explanatory and Control Variables

Variable	Definition	Source
Undervaluation dummy (UNDVD)	A dummy variable which takes the value of 1 when intrinsic value is greater than market value and 0 if otherwise	Datastream
Constrained dummy (CD)	A dummy which variable that takes the value of 1 when firms are in the bottom three deciles and 0 if otherwise	Datastream
Unconstrained dummy (UCD)	A dummy which variable takes the value of 1 when firms are in the top three deciles and zero if otherwise	Datastream
Under levered dummy (UNLVD)	A dummy variable which takes the value of 1 if firms' leverage levels at the beginning of the year are below the estimated D* or the industry median	Datastream
Financing deficit (DEF)	Deficit is total cash dividends plus net investments plus net working capital minus cash flow after interest and taxes	Datastream
Deficit dummy (DD)	A dummy variables which takes the value of 1 when firms are in a deficit (i.e. firm invests more than it internally generates) and 0 if otherwise.	Datastream
Target leverage (D*)	The fitted values for each individual firm based on the estimation / industry median	Datastream
Distance from target leverage levels (DISTBL / DISTML)	Difference between target leverage (estimated value of D* or industry median) and beginning of the year leverage	Datastream
Deviation from target leverage levels (DEVBL / DEVML)	Absolute difference between target leverage (estimated value of D* or industry median) and beginning of the year leverage	Datastream
Profitability (PROF)	Earnings before interest, taxes and depreciation divided by total assets	Datastream
SIZE	Natural logarithm of net sales in millions of 1984 pounds	Datastream
Tangibility (TANG)	Net plant, property and equipment over total assets	Datastream
Research and Development (R&D)	Research and development expenses divided by total assets	Datastream
Capital Expenditure (CAPEX)	Net capital expenditure divided by total assets	Datastream

Table 4.3 Definition of Other Relevant Variables and Measures

Variable	Definition	Source
Net equity issued (e/A)	Changes in book equity minus the changes in retained earnings divided by total assets	Datastream
Free cash flow to equity holders (FCFE)	Sum of net income plus depreciation minus change in non cash working capital minus capital expenditure minus principal repayments of debt capital plus new debt issued	Datastream
Cost of equity (r_E)	Equity risk premium times individual stock beta plus the risk free rate	Datastream
Risk free rate (r_{rf})	Short-term treasury bills returns matched to the financial year end for each firm	Datastream
Total market return (r_m)	Market return for FTSE All Share Index matched to the financial year end for each firm	Datastream
Intrinsic Value (IV)	Estimated value of equity based on the Free Cash Flow to Equity	Datastream
Market Price (MP)	Market price for share of each firm matched to the financial year end for each firm	Datastream
Beta (B)	Individual stock beta matched to the financial year end for each firm	Datastream
Growth (g)	Long term GDP growth adjusted for using the GDP deflator throughout the sample period	Office for National Statistics

Table 4.4: Summary statistics and correlation matrix of firm specific characteristics and financing activities of firms in the sample

Panel A: Descriptive Statistics															
	BL	**ML**	**Δdbl/A**	**Δdml/A**	**e/A**	**DEF**	**ΔSIZE**	**ΔPPE**	**ΔRD**	**ΔPROF**	**ΔCAPEX**	**DEVBL**	**DEVML**	**DISTBL**	**DISTML**
Mean	0.1781	0.2011	0.0122	0.0052	0.0376	0.0497	0.0952	-0.0041	0.0003	-0.0054	-0.0039	0.1554	0.1379	0.0470	0.0190
Median	0.1524	0.1489	0.0000	0.0000	0.0012	0.0118	0.0561	-0.0028	0.0000	-0.0009	-0.0009	0.1187	0.1171	0.0473	0.0630
Std Dev	0.1619	0.2003	0.1133	0.1689	0.1538	0.1895	0.4730	0.0714	0.0414	0.2636	0.0588	0.1552	0.1091	0.2145	0.1748
Minimum	0.0000	0.0000	-0.9883	-9.0255	-0.8996	-1.1903	-7.7432	-0.8107	-1.1663	-3.6518	-0.9611	0.0000	0.0000	-0.9399	-0.8437
Maximum	0.9960	0.9970	0.9751	0.9271	0.9940	1.7772	8.0296	0.9483	0.9102	3.4097	0.7976	1.0000	0.8437	1.0000	0.6667
Panel B: Correlation Matrix															
	BL	**ML**	**Δdbl**	**Δdml**	**Δe**	**DEF**	**ΔSize**	**ΔPPE**	**ΔRD**	**ΔPROF**	**ΔCAPEX**	**DEVBL**	**DEVML**	**DISTBL**	
ML	0.760**														
Δdbl	0.279**	0.154**													
Δdml	0.183**	0.122**	0.722**												
Δe	-0.075**	-0.067**	-0.0164	-0.0109											
DEF	0.106**	0.038**	0.587**	0.423**	0.802**										
ΔSIZE	-0.019*	-0.039**	0.228**	0.183**	0.153**	0.260**									
ΔPPE	0.021*	0.024*	0.082**	0.059**	-0.084**	-0.019*	0.045**								
ΔRD	-0.000	-0.006	-0.025**	-0.018	-0.106**	-0.101**	-0.017	0.087**							
ΔPROF	-0.037**	-0.012	-0.024*	-0.033**	0.028**	0.008	0.144**	-0.093**	-0.220**						
ΔCAPEX	-0.043**	-0.043**	0.020*	0.026**	-0.050**	-0.029**	0.016	0.264**	0.028**	-0.071**					
DEVBL	0.123**	0.027*	-0.046**	-0.042**	0.086**	0.042**	0.001	-0.025**	-0.028**	0.103**	-0.026**				
DEVML	0.146**	0.335**	-0.101**	-0.133**	-0.022*	-0.078**	-0.036**	-0.025**	0.016	0.026**	-0.017	0.197**			
DISTBL	-0.511**	-0.379**	0.097**	0.065**	0.045**	0.095**	0.021*	0.029**	0.001	0.073**	0.011	0.401**	-0.073**		
DISML	-0.541**	-0.718**	0.197**	0.200**	-0.026**	0.097**	0.038**	-0.004	0.016	-0.016	0.040**	-0.037**	-0.407**	0.438**	

This table records summary statistics of the firms in the sample. Panel A reports the summary statistics. Panel B reports the correlation matrix with Pearson's significance levels (*p<0.01, and **p<0.01). Book leverage, BL, is the ratio of total book debt to total assets. Market Leverage, ML, is the ratio of book value of debt to market value of equity plus book value of total debt. Net debt issued, Δdbl is the net change in book debt. Δdml is the net change in market debt. Net equity issued, Δe is the change in book equity minus the change in retained earnings. DEF is the financing deficit which is the sum of dividends, investments and change in working capital minus the cash flow after interest and taxes scaled by assets. ΔSIZE is the change in natural log of sales. ΔPPE is the change in tangible assets divided by total assets. ΔRD is the change in research and development expenses divided by total assets. ΔPROF is the change in operating income divided by total assets. ΔCAPEX is the change in capital expenditure divided by total assets. All the variables except size are scaled by total assets. DEV, the absolute deviation from target capital structure is the difference between target leverage (D*) and the beginning of the year book value of debt$|D_{it}^{*} - D_{it-1}|$. DIST is the difference between target capital structure (D*) and the beginning of the year book value.

4.4 Does Equity Mispricing Influence Issuance Activities?

4.4.1 Mispricing and timing attempts

The results for estimating the models expressed in equation 4-9 and 4-10 are reported in Table 4.5.[56] The first column reports the regressions results without the interaction variable. The deficit coefficient is 0.4038 indicating that about 40% of the deficit is financed by debt. Figure 4.1 plots the financing deficit, net debt issued and net equity issued for firms in our sample. It shows that the proportion of debt and equity issued to finance the deficit varies over time. The second column in Table 4.5 includes the interaction variable. For overvalued firms, on average, firms retire about 3.70% of debt as a percentage of assets.[57] Undervalued firms, on the other hand, issue about 3.90% of debt as a percentage of assets.[58] This indicates an average swing of 200%. Thus, the effect of equity mispricing is economically and statistically significant.

4.4.2 Robustness of Results

The last three columns in Table 4.5 further present the results of estimating the model specified in equation 4-10 for three sub-periods in our sample. Each sub-period has an economically significant coefficient and statistically significant. The interaction term for the first sub-period is marginally significant but the dummy variable remains significant both economically and statistically. In addition to the cross-sectional time-series regressions reported in Table 4.5, we utilize Fama and Macbeth (1973) framework and estimate the model annually. The results are presented graphically in Figure 4.2. The deficit coefficient for undervalued firms is always larger than the deficit coefficient for overvalued firms. The difference is, however, more obvious in certain years than others. This suggests that not only the individual stock prices but the overall situation of the equity market could play a role in issuance decisions. To further test for robustness of the results thus far, we further include other known determinants of capital structure as documented in prior studies.[59]

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[56] All our regressions control for firm fixed effects, using year dummies and makes corrections for within group correlation (see Peterson, 2009). All results report the coefficients and Rogers standard errors (see Rogers, 1993). Our results are robust to using White standard errors (White, 1980), although White standard errors are generally smaller. In other words, our results regarding the significance level of estimated coefficients are conservative.

[57] This is done by plugging the average deficit value of 0.0497 into the model -0.0539+(0.0497x0.3409).

[58] This is calculated as -0.0539+(0.0497x0.3409) + (0.0695x1)+(1x0.1278x0.0497).

[59] See Rajan and Zingales (1995), Frank and Goyal (2003), Hovakimian (2006) and Flannery and Rangan (2006).

The expanded models are as follows:

$$\Delta dbl_{it} = \alpha + \beta_1 DEF_{it} + \beta_2 UNDVD_{it} + \beta_3 (UNDVD \times DEF)_{it} + \beta_4 \Delta SIZE_{it} + \beta_5 \Delta TANG_{it} + \beta_6 \Delta RD_{it} + \beta_7 \Delta PROF_{it} + \beta_8 \Delta CAPEX_{it} + \varepsilon_{it} \quad \textbf{(4-11)}$$

Given that the net debt issued and deficit variable is a difference measure, we measure the control variables in difference terms to allow a consistent estimate. We expect a positive coefficient for tangibility as tangible assets serve as collateral to debt. Thus firms with a larger amount of tangible assets would be able to raise more debt. Size is also expected to have a positive coefficient given that larger firms can afford more debt and also face a smaller degree of information asymmetry. The correlation with profitability is ambiguous as a higher level of profitability reduces dependence on debt as firms are able to meet financing demands via internally generated funds but managers may also attempt to lower effective tax rates via the tax deductibility of interest payments. Growth opportunities are captured via the use of research and development expenses and also capital expenditures.

The results for regressing equation 4-11 are reported in Table 4.6. The result in the first column indicates that firm size, asset tangibility, research and development expenses and also capital expenditure have a positive and statistically significant effect on debt issues. Profitability has a negative and significant effect on debt issues. More importantly, undervalued firms issue on average about 3.70% of debt as a percentage of total assets.[60] Overvalued firms, on the other hand, retire about 3.70% of debt as a percentage of total assets.[61] This further validates that notion that equity mispricing plays a significant role in financing choices indicating an increase of 200 percentage points of net debt issued. We further test the robustness of our results thus far by splitting the sample based on size, growth (using market to book ratio) and profitability to address the endogeneity concerns of the independent variables. The results are reported in column two to seven of Table 4-6. Our findings are robust for each sub-sample.

[60] This is calculated as -0.0552+(0.0497*0.3398)+(0.0681)+(0.0497*0.1235)+(0.0952*0.0145)+(0.0937*-0.0041)+(0.0003*0.0828)+(-0.0121*-0.0054)+(0.0378*-0.0039).

[61] This is calculated as -0.0552+(0.0497*0.3398)+(0.0952*0.0145)+(0.0937*-0.0041)+(0.0003*0.0828)+(-0.0121*-0.0054)+(0.0378*-0.0039).

Table 4.5: Equity Mispricing and Market Timing

	All Firms		1984-1992	1993-2000	2001-2008
	1	2	3	4	5
CONS	-0.0185	-0.0539***	-0.0554***	-0.0572***	-0.0403***
	(0.0138)	(0.0129)	(0.0118)	(0.0046)	(0.0039)
DEF	0.4038***	0.3409***	0.4231***	0.3616***	0.3279***
	(0.0053)	(0.0058)	(0.0183)	(0.0124)	(0.0077)
UNDVD	-	0.0695***	0.0847***	0.0819***	0.0608***
	-	(0.0020)	(0.0046)	(0.0040)	(0.0031)
UNDVD*DEF	-	0.1278***	0.0458*	0.1456***	0.1295***
	-	(0.0156)	(0.0267)	(0.0201)	(0.0148)
Adjusted R^2	0.3992	0.4866	0.5106	0.5319	0.4793
Wald(p-values)	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	11201	2059	3102	5873
Period	1984-2008	1984-2008	1984-1992	1993-2000	2001-2008

The dependent variable is net debt issued divided by total assets. Columns 1 and 2 represent the entire sample. Columns 3 – 5 represent sub period regressions (1984 – 1992, 1993 – 2000 and 2001 – 2008)/ Regressions control for firm fixed effects and include unreported year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Figure 4.1: Financing the Deficit

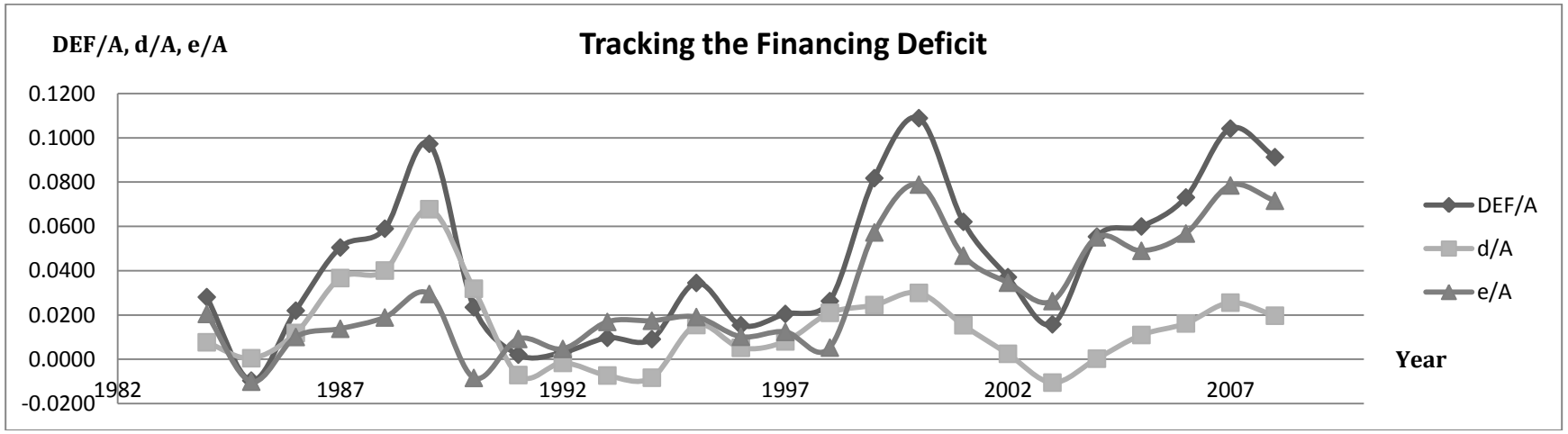


Figure 4.2: Annual Deficit Coefficient: Undervalued vs. Overvalued Firms

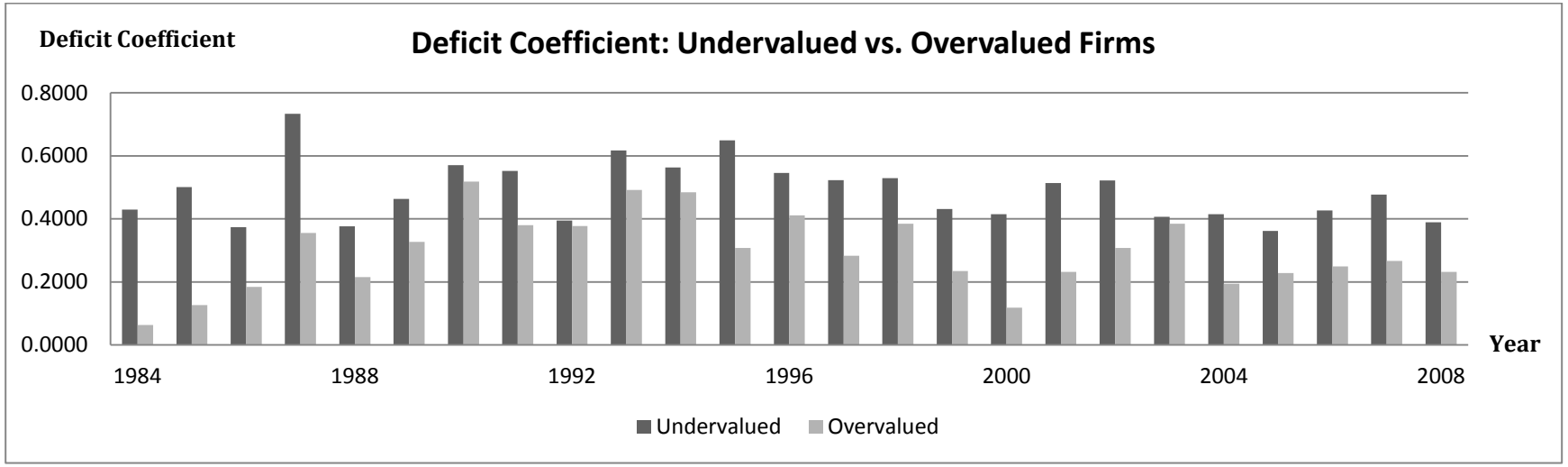


Table 4.6: Robustness of results related to equity mispricing and market timing

	All Firms	Size < Median	Size > Median	MTB<Median	MTB > Median	Prof < Median	Prof > Median
	1	2	3	4	5	6	7
CONS	-0.0552***	0.0799	-0.0495***	-0.0493***	-0.0586*	-0.0674	-0.0492***
	(0.0127)	(0.0640)	(0.0105)	(0.0134)	(0.0332)	(0.0543)	(0.0104)
DEF	0.3398***	0.2968***	0.4940***	0.4046***	0.3043***	0.2921***	0.4984***
	(0.0059)	(0.0078)	(0.0100)	(0.0087)	(0.0089)	(0.0083)	(0.0107)
UNDVD	0.0681***	0.0817***	0.0601***	0.0603***	0.0743***	0.0718***	0.0624***
	(0.0020)	(0.0038)	(0.0022)	(0.0027)	(0.0032)	(0.0039)	(0.0023)
UNDVD*DEF	0.1235***	0.1152***	0.0316**	0.0679***	0.1694***	0.1467***	0.1083***
	(0.0102)	(0.0160)	(0.0192)	(0.0148)	(0.0153)	(0.0025)	(0.0150)
ΔSIZE	0.0145***	-	-	0.0091***	0.0189***	0.0115***	0.0101**
	(0.0019)	-	-	(0.0026)	(0.0033)	(0.0025)	(0.0039)
ΔTANG	0.0937***	0.1071***	0.0743***	0.0670***	0.1555***	0.0973***	0.0931***
	(0.0121)	(0.0165)	(0.0192)	(0.0153)	(0.0209)	(0.0178)	(0.0177)
ΔRD	0.0828***	0.0656***	0.1546**	0.0328	0.0839***	0.1061***	-0.1382**
	(0.0208)	(0.0245)	(0.0771)	(0.0561)	(0.0250)	(0.0253)	(0.0602)
ΔPROF	-0.0121***	-0.0037	-0.0105	-0.1641***	-0.0068	-	-
	(0.0032)	(0.0038)	(0.0077)	(0.0052)	(0.0045)	-	-
ΔCAPEX	0.0378***	0.0368**	0.0552**	0.0462**	0.0063	0.0423**	0.0574***
	(0.0142)	(0.0187)	(0.0248)	(0.0189)	(0.0230)	(0.0214)	(0.0183)
Adjusted R^2	0.4967	0.4337	0.5954	0.5634	0.4608	0.4515	0.5932
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	5534	5541	5361	5394	5419	5390
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net debt issued divided by total assets. Column 1 represents the entire sample. Columns 2 – 7 represent sub sample regressions (size < median, size > median, growth < median, growth > median, profitability < median and profitability > median). Regressions control for firm fixed effects and include unreported industry and year dummies. Roger (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

4.5 Constraints and Repurchasing

The previous section showed that equity mispricing influences firms' decision making with regard to financing the deficit. Consistent with the market timing theory, we find that debt issues are lower during periods of overvaluation. This section examines the impact of financial constraints on such timing attempts and further dissects the impact with regards to financial constraints and repurchasing behaviour.

4.5.1 Financial constraints

During periods of overvaluation, managers issue more equity to finance their deficit, resulting in lower levels of leverage ratios. Theoretical implications and empirical evidence propose that financial flexibility plays a critical role in capital structure decisions. However, the studies discussed in the literature review section find contrasting results as to how market timing is influenced by such constraints. In this section, we examine timing behaviour by employing constrained and unconstrained dummy variables. The model in the earlier section assumes that firms do not differ in their capacity to time the market and thus ignores the implications from financial constraints. We expand our earlier model to include measures of financial constraints to evaluate whether firms financing behaviour is influenced by such constraints. Financial constraints may play an important role as firms may be able to identify opportunities in the market but lack the capacity to time the market. On the other hand, firms may be more pressed to time the market as favourable market conditions may be an opportunity to raise capital in capital markets which may otherwise be difficult for constrained firms. The first method used to classify financial constraints is based on real assets (total assets) at the beginning of the year. Firms are ranked based on this criterion and the ones in the top (bottom) three deciles are classified as unconstrained (constrained). Therefore, we include a constrained (or unconstrained) dummy variable, CD (or UCD), in the model and interact it with undervaluation dummy and financing deficit:

$$\Delta dbl_{it} = \alpha + \beta_1 DEF_{it} + \beta_2 UNDVD_{it} + \beta_3 (UNDVD \times DEF)_{it} + \beta_4 CD/UCD_{it} + \beta_5 (CD/UCD \times DEF)_{it} + \beta_6 (UNDVD \times CD/UCD)_{it} + \beta_7 (UNDVD \times CD/UCD \times DEF)_{it} + \beta_8 \Delta SIZE_{it} + \beta_9 \Delta TANG_{it} + \beta_{10} \Delta RD_{it} + \beta_{11} \Delta PROF_{it} + \beta_{12} \Delta CAPEX_{it} + \varepsilon_{it} \quad \textbf{(4-12)}$$

Regression results for the expression in 4-12 are reported in Table 4.7. The first column shows that the interaction between the constrained dummy, the undervaluation dummy and the deficit measure has a positive and significant coefficient. This indicates that the constrained firms would be inclined to issue more debt during periods of undervaluation and vice versa. We further illustrate this by using the average values from table 4-4 and plugging it into the model based on the coefficient results where during periods of overvaluation; constrained firms retired more debt than unconstrained firms (4.32% vs. 2.91%). In the presence of undervaluation (when equity markets are less favourable), constrained firms issued more debt than unconstrained firms (4.86% vs. 3.42%.). The second column looks at segregating unconstrained firms from the sample by including the unconstrained dummy instead. The interaction between the unconstrained dummy, the undervaluation dummy and the deficit measure has a negative and significant coefficient. Thus, we get similar results indicating that constrained firms react more strongly to equity mispricing. This illustrates that managers of constrained firms are more concerned with overvaluation (favourable market conditions) and time their equity issues during these periods. These managers reduce their reliance on debt as a source of financing during these periods. During periods of undervaluation, constrained firms issue more debt to reduce the cost of capital suggesting that timing behaviour during overvaluation maybe motivated by building financial slack for future financing needs.

This section further considers financial constraints and equity mispricing using alternative proxies for constraints. Following Guariglia (2008), we utilize firm age, coverage ratio and cash flows. The definitions of these measures also mirror Guariglia's study of UK firms. We rank firms based on these three different criteria as a measure of robustness. Firms in the top (bottom) three deciles are considered financially unconstrained (constrained). The earlier regressions are repeated using this criterion and are reported in the next six columns of Table 4-7. Similarly, we find that constrained firms retire more debt during periods of overvaluation relative to unconstrained firms. During periods of undervaluation, all firms reduce their reliance on equity and resort to debt financing. This swing is larger for constrained firms. Therefore, it can be concluded that constrained firms are more likely to issue equity during periods of overvaluation (i.e. when the cost of equity is lower) to

finance their deficit.[62] In the presence of undervaluation constrained firms issue more debt to lower their overall cost of capital. Therefore, the findings shed more light on the ongoing debate in the literature. They suggest that financial constraints play an important role in market timing and constrained firms time the market more significantly.

4.5.2 Repurchasing activities

In this section, the effect of financial surplus on market timing is examined. The sample is split into firms that are in surplus (repurchasing)[63] and firms that are in deficit (issuing).[64] Given prior studies, we expect net repurchasing and issuance to be equally influenced by mispricing. The regressions from the model in equation 4-11 are done for firms that are in surplus and firms that are in deficit. The results for these regressions are reported in the first column of tables 4-8 and 4-9. We first analyze firms in deficit and find that equity mispricing plays a significant role in financing behaviour. During periods of undervaluation firms issue more debt than during periods of overvaluation (7.48% vs. -0.66%). Looking at firms in a financial surplus, we find that repurchasing behaviour is also significantly influenced by equity mispricing. When equity is undervalued, managers retire less debt relative to periods of overvaluation (-0.96% vs. -6.27%). Therefore, managers rely more on debt financing during periods of undervaluation and retire more debt during periods of overvaluation.

[62] We assume that the cost of debt is constant during periods of overvaluation or undervaluation.
[63] Repurchasing firms are identified when $\Delta e+\Delta d < 0$.
[64] Issuing firms are identified when $\Delta e+\Delta d > 0$.

Table 4.7: Financial Constraints and Market Timing

	CD SIZE	UCD SIZE	CD AGE	UCD AGE	CD COV	UCD COV	CO CF	UCD CF
CONS	-0.0529***	-0.0564***	-0.0576***	-0.0561***	-0.0459***	-0.0558***	-0.0462***	-0.0555***
	(0.0127)	(0.0126)	(0.0129)	(0.128)	(0.0127)	(0.0127)	(0.0128)	(0.0127)
DEF	0.4588***	0.3016***	0.3877***	0.3214***	0.3771***	0.3247***	0.3452***	0.3228***
	(0.0087)	(0.0063)	(0.0023)	(0.0066)	(0.0089)	(0.0062)	(0.0087)	(0.0062)
UNDVD	0.0614***	0.0732***	0.0652***	0.0706***	0.0602***	0.0738***	0.0608***	0.0773***
	(0.0022)	(0.0025)	(0.0023)	(0.0025)	(0.0023)	(0.0025)	(0.0023)	(0.0025)
CD/UCD	-0.0041	0.0063	0.0028	0.0049	-0.0180***	0.0151***	-0.0176***	0.0194***
	(0.0038)	(0.0044)	(0.0036)	(0.0044)	(0.0028)	(0.0033)	(0.0028)	(0.0036)
UNDVD*DEF	0.0387***	0.1266***	0.0839***	0.1353***	0.1009***	0.1236***	0.1340***	0.1085***
	(0.0133)	(0.0116)	(0.0127)	(0.0116)	(0.0136)	(0.0117)	(0.0130)	(0.0120)
(CD/UCD)*DEF	-0.2004***	0.2463***	-0.1085***	0.0940***	-0.0634***	0.1226***	-0.0092	0.1525***
	(0.0113)	(0.0155)	(0.0114)	(0.0144)	(0.0114)	(0.0172)	(0.0111)	(0.0178)
(CD/UNCD)*UNDVD	0.0244***	-0.0183***	0.0089**	-0.0090**	0.0295***	-0.0175***	0.0290***	-0.0270***
	(0.0047)	(0.0040)	(0.0044)	(0.0041)	(0.0044)	(0.0040)	(0.0046)	(0.0040)
UNDVD*DEF*(CD/UCD)	0.0820***	-0.1355***	0.0799***	-0.0738***	0.0086	-0.0790***	-0.0593***	-0.0700***
	(0.0212)	(0.0241)	(0.0209)	(0.0243)	(0.0210)	(0.0250)	(0.0219)	(0.0252)
ΔSIZE	0.0153***	0.0150***	0.0144***	0.0145***	0.0147***	0.0146***	0.0144***	0.0148***
	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)
ΔTANG	0.1022***	0.0957***	0.0910***	0.0925***	0.0936***	0.0970***	0.0954***	0.0968***
	(0.0119)	(0.0119)	(0.0120)	(0.0121)	(0.0120)	(0.0121)	(0.0121)	(0.0120)
ΔR&D	0.0691***	0.0691***	0.0796***	0.0772***	0.0763***	0.0800***	0.0832***	0.0821***
	(0.0204)	(0.0205)	(0.0207)	(0.0208)	(0.0208)	(0.0207)	(0.0208)	(0.0207)
ΔPROF	-0.0076**	-0.0095***	-0.0098***	-0.0116***	-0.0090***	-0.0103***	-0.0098***	-0.0104***
	(0.0031)	(0.0031)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0031)
ΔCAPEX	0.0356**	0.0401***	0.0393***	0.0380***	0.0369***	0.0363**	0.0364**	0.0365**
	(0.0139)	(0.0140)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)
Adjusted R^2	0.5159	0.5115	0.5018	0.4989	0.5018	0.5007	0.4996	0.5034
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	11201	11201	11201	11201	11201	11201	11201
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net debt issued divided by total assets. Regressions in column 1 and 2 represent constrained and unconstrained dummy based on asset size. Regressions in column 3 and 4 represent constrained and unconstrained firms based on firm age. Regressions in column 5 and 6 represent constrained and unconstrained firms based on cash flow. Regressions in column 7 and 8 represent constrained and unconstrained based on coverage ratio. Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 4.8: The Effect of Financial Constraints on Issuing Behaviour

	Firms in Deficit								
	ALL FIRMS	CD SIZE	UCD SIZE	CD AGE	UCD AGE	CD COV	UCD COV	CD CF	UCD CF
CONS	-0.0273	-0.0308*	0.0252	-0.0318*	-0.0245	-0.0249	-0.0273	-0.0207	-0.0274
	(0.0170)	(0.0174)	(0.0171)	(0.0173)	(0.0172)	(0.0172)	(0.0170)	(0.0172)	(0.0171)
DEF	0.1380***	0.1715***	0.1313***	0.1477***	0.1238***	0.1678***	0.1290***	0.1165***	0.1326***
	(0.0090)	(0.0157)	(0.0094)	(0.0122)	(0.0099)	(0.0134)	(0.0095)	(0.0134)	(0.0094)
UNDVD	0.0334***	0.0325***	0.0391***	0.0320***	0.0355***	0.0311***	0.0388***	0.0277***	0.0385***
	(0.0033)	(0.0038)	(0.0041)	(0.0038)	(0.0040)	(0.0039)	(0.0040)	(0.0038)	(0.0041)
CD/UCD	-	0.0065	0.0035	0.0056	-0.0058	-0.0035	-0.0000	-0.0110**	-0.0010
	-	(0.0057)	(0.0066)	(0.0055)	(0.0066)	(0.0047)	(0.0056)	(0.0047)	(0.0060)
UNDVD*DEF	0.3318***	0.3277***	0.3098***	0.3361***	0.3156***	0.3184***	0.3222***	0.3643***	0.3093***
	(0.0146)	(0.0211)	(0.0166)	(0.0185)	(0.0165)	(0.0195)	(0.0169)	(0.0189)	(0.0171)
(CD/UCD)*DEF	-	-0.0477**	0.1152***	-0.0206	0.0729***	-0.0492***	0.1003***	0.0379**	0.0755**
	-	(0.0185)	(0.0330)	(0.0167)	(0.0230)	(0.0169)	(0.0286)	(0.0168)	(0.0326)
(CD/UCD)*UNDVD	-	0.0114	-0.0104	0.0077	-0.0059	0.0145**	-0.0100	0.0205***	-0.0097
	-	(0.0077)	(0.0069)	(0.0074)	(0.0068)	(0.0073)	(0.0068)	(0.0077)	(0.0069)
UNDVD*DEF*(CD/UVD)	-	-0.0403	-0.0102	-0.0258	0.0565	-0.0084	-0.0421	-0.0884***	0.0091
	-	(0.0316)	(0.0423)	(0.0303)	(0.0362)	(0.0305)	(0.0384)	(0.0322)	(0.0415)
ΔSIZE	0.0059***	0.0060***	0.0063***	0.0061***	0.0063***	0.0061***	0.0061***	0.0060***	0.0061***
	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)
ΔTANG	0.0308**	0.0371**	0.0347**	0.0298**	0.0276*	0.0319**	0.0334**	0.0323**	0.0345**
	(0.0147)	(0.0148)	(0.0147)	(0.0148)	(0.0147)	(0.0147)	(0.0147)	(0.0147)	(0.0148)
ΔR&D	0.0232	0.0214	0.0175	0.0204	0.0153	0.0140	0.0212	0.0278	0.0222
	(0.0239)	(0.0239)	(0.0239)	(0.0240)	(0.0240)	(0.0241)	(0.0239)	(0.0240)	(0.0239)
ΔPROF	-0.0085**	-0.0066	-0.0073*	-0.0083*	-0.0085**	-0.0061	-0.0069	-0.0085*	-0.0075*
	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0043)	(0.0044)	(0.0043)	(0.0044)	(0.0043)
ΔCAPEX	0.0649***	0.0631***	0.0644***	0.0650***	0.0668***	0.0670***	0.0628***	0.0652***	0.0642***
	(0.0166)	(0.0166)	(0.0165)	(0.0166)	(0.0165)	(0.0166)	(0.0165)	(0.0166)	(0.0165)
Adjusted R^2	0.4041	0.4058	0.4076	0.4044	0.4072	0.4063	0.4064	0.4049	0.4058
Wald (p-values)	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
Observations	6203	6203	6203	6203	6203	6203	6203	6203	6203
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net debt issued divided by total assets. Column 1 represents firms in deficit. Regressions in column 2 and 3 represent constrained and unconstrained dummy base on asset size. Regressions in column 4 and 5 represent constrained and unconstrained firms based on firm age. Regressions in column 6 and 7 represent constrained and unconstrained firms based on cash flow. Regressions in column 8 and 9 represent constrained and unconstrained based on coverage ratio. Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

To control for financial capacity influencing issuing and repurchasing behaviour, firms are further analyzed using financial constraints criterion as discussed above. The results for the regressions are reported in columns 2 to 9 of tables 4-8 and 4-9. The results reported in the second column indicates that the interaction between the constrained dummy, the undervaluation dummy and the deficit variable is negative but insignificant, suggesting that financial constraints do not play a significant role in issuing activities for firms in a financial deficit. The results of the interaction in the third column which interacts the unconstrained dummy instead of the constrained dummy with the undervaluation dummy and deficit is also insignificant. The alternative proxies used in the regressions in columns 4 to 9 also indicate a similar pattern. The second and third columns of Table 4-9 report the results regarding the impact of financial constraints on financing behaviour for firms in a surplus. Examining the results in the second column, we find the interaction between the constrained dummy, the undervaluation dummy and deficit has a negative coefficient and is significant. Thus, constrained firms are retiring more debt in period of overvaluation compared to unconstrained firms. The third column records an opposite positive coefficient that is also significant when the unconstrained dummy is used instead. Therefore, constrained firms clearly time the repurchases.

The regressions are repeated for constraints based on age, cash flows and coverage ratios and the results are reported in six columns in Table 4-9. The results indicate a similar pattern and provide a similar conclusion. Firms do significantly alter the composition of their issuing and repurchasing activities to reflect mispricing in equities. Financially flexibility plays an important role in timing ability of firms. Constrained firms are more sensitive to equity mispricing as seen from the results. This is especially evident in repurchasing activities. However, the analysis is done assuming that firms do not differ in their leverage levels at the beginning of the year. We have not thus far discriminated firms based on deviation from their target leverage levels.[65]

[65] This assumption will be relaxed and tested in later sections.

4.6 Market Timing and Target Leverage

4.6.1 Do firms that have target leverage engage in market timing?

This section examines whether timing attempts are centred on and around a target level of leverage. During periods of favourable equity market conditions, managers would issue equities and temporarily deviate from their target capital structure and be under-levered. Under this view, firms would trade off the cost of being off target with the benefit gained from timing the market. On the other hand, if equity market conditions were unfavourable, managers would increase debt issues and temporarily be over-levered. Given that Binsbergen *et al.* (2010) document that the cost of being over-levered is higher than that of being under-levered we hypothesize that managers may be reluctant to increase leverage levels during periods of undervaluation if they were over-levered. Hence, they would be more inclined to increase equity issues during periods of overvaluation if they are over-levered.[66]

To estimate a proxy for target leverage (D*), we use fitted values from the following model:

$$D^*_{it} = \alpha + \beta_1 SIZE_{it-1} + \beta_2 TANG_{it-1} + \beta_3 RD_{it-1} + \beta_4 PROF_{it-1} + \beta_5 CAPEX_{it-1} + \varepsilon_{it} \quad \textbf{(4-13)}$$

Similar to Hovakimian *et al.* (2001), the dependent variable is censored both by below (0) and above (1) values. Consistent estimates are obtained by estimating the model as a Tobit regression with double censoring. The regressions are done on a yearly basis with industry dummies. The model used in the first section of this chapter assumes that firms would be inclined to time the market regardless of whether they were under or above their leverage targets. In order to test our hypothesis and incorporate targeting behaviour into the model, we introduce a new dummy into the model (UNDLVD), which is one if book leverage at the beginning of the year is less than D*; zero, otherwise.

[66] Lemmon and Zender (2010) show that when debt capacity is reached firms no longer follow the pecking order as they put their preference for equity issues. Thus, over-levered firms may opt for equity even during periods of undervaluation.

Table 4.9: The effect of financial constraints on repurchasing behaviour

	Firms in Surplus								
	ALL FIRMS	CD SIZE	UCD SIZE	CD AGE	UCD AGE	CD COV	UCD COV	CD CF	UCD CF
CONS	-0.0116	-0.0171	-0.0198	-0.0122	-0.0113	-0.0096	-0.0130	-0.0073	-0.0135
	(0.0157)	(0.159)	(0.0157)	(0.0160)	(0.0159)	(0.0158)	(0.0157)	(0.0158)	(0.0156)
SUR	0.6607***	0.6541***	0.6420***	0.6595***	0.6870***	0.6383***	0.6546***	0.6480***	0.6643***
	(0.126)	(0.143)	(0.0158)	(0.0142)	(0.0153)	(0.0180)	(0.0137)	(0.0173)	(0.0144)
UNDVD	0.0161***	0.0185***	0.0163***	0.0155***	0.0153***	0.0162***	0.0173***	0.0163***	0.0155***
	(0.0032)	(0.0035)	(0.0039)	(0.0036)	(0.0038)	(0.0036)	(0.0039)	(0.0035)	(0.0040)
CD/UCD	-	0.0068	-0.0129**	-0.0027	-0.0053	-0.0062	0.0076	-0.0098**	0.0026
	-	(0.0059)	(0.0063)	(0.0056)	(0.0062)	(0.0042)	(0.0048)	(0.0040)	(0.0051)
UNDVD*SUR	-0.4821***	-0.4040***	-0.5302***	-0.4613***	-0.5269***	-0.4407***	-0.4807***	-0.4239***	-0.5885***
	(0.0232)	(0.0280)	(0.0283)	(0.0278)	(0.0275)	(0.0309)	(0.0278)	(0.0293)	(0.0291)
(CD/UCD)*SUR	-	0.0276	0.0504**	0.0060	-0.0773***	0.0329	0.0298	0.0161	-0.0142
	-	(0.0269)	(0.0248)	(0.0287)	(0.0254)	(0.0232)	(0.0323)	(0.0232)	(0.0272)
(CD/UCD)*UNDVD	-	-0.0038	0.0012	0.0034	0.0031	0.0040	-0.0049	-0.0011	0.0007
	-	(0.0073)	(0.0062)	(0.0067)	(0.0064)	(0.0071)	(0.0062)	(0.0073)	(0.0062)
UNDVD*DEF*(CD/UCD)	-	-0.2284***	0.1683***	-0.0620	0.1473***	-0.0763	-0.0137	-0.1555***	0.2649***
	-	(0.0492)	(0.0481)	(0.0499)	(0.0501)	(0.0473)	(0.0524)	(0.0486)	(0.0473)
ΔSIZE	0.0285***	0.0284***	0.0279***	0.0283***	0.0281***	0.0280***	0.0285***	0.0284***	0.0291***
	(0.0039)	(0.0038)	(0.0038)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0038)
ΔTANG	0.0730***	0.0762***	0.0794***	0.0734***	0.0698***	0.0745***	0.0732***	0.0776***	0.0803***
	(0.0192)	(0.0192)	(0.0191)	(0.0193)	(0.0192)	(0.0193)	(0.0193)	(0.0193)	(0.0191)
ΔR&D	-0.1296***	-0.1405***	-0.1450***	-0.1368***	-0.1313***	-0.1294***	-0.1302***	-0.1342***	-0.1368***
	(0.0462)	(0.0461)	(0.0459)	(0.0464)	(0.0462)	(0.0467)	(0.0464)	(0.0463)	(0.0459)
ΔPROF	-0.0197***	-0.0217***	-0.0206***	-0.0202***	-0.0201***	-0.0179***	-0.0194***	-0.0180***	-0.0218***
	(0.0049)	(0.0049)	(0.0049)	(0.0049)	(0.0049)	(0.0050)	(0.0049)	(0.0050)	(0.0049)
ΔCAPEX	-0.0056	-0.0122	-0.0085	0.0050	-0.0068	-0.0097	-0.0066	-0.0140	-0.0137
	(0.0246)	(0.0245)	(0.0244)	(0.0246)	(0.0245)	(0.0246)	(0.0246)	(0.0246)	(0.0244)
Adjusted R^2	0.5978	0.6012	0.6032	0.5977	0.5990	0.5985	0.5976	0.5998	0.6034
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	4389	4389	4389	4389	4389	4389	4389	4389	4389
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net debt issued divided by total assets. Column 1 represents firms in surplus. Regressions in column 2 and 3 represent constrained and unconstrained dummy base on asset size. Regressions in column 4 and 5 represent constrained and unconstrained firms based on firm age. Regressions in column 6 and 7 represent constrained and unconstrained firms based on cash flow. Regressions in column 8 and 9 represent constrained and unconstrained based on coverage ratio. Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

To examine whether being over-levered or under-levered influences timing behaviour, we interact the undervaluation dummy with the financing deficit measure and the under-levered dummy. Hence, the model from 4-11 will be expanded and is as follows:

$$\Delta dbl_{it} = \alpha + \beta_1 DEF_{it} + \beta_2 UNDVD_{it} + \beta_3 (UNDVD \times DEF)_{it} + \beta_4 UNDLVD_{it} + \beta_5 (UNDLVD \times DEF)_{it} + \beta_6 (UNDVD \times UNDLVD)_{it} + \beta_7 \begin{pmatrix} UNDVD \times UNDLVD \times \\ DEF \end{pmatrix}_{it} + \beta_8 \Delta SIZE_{it} + \beta_9 \Delta TANG_{it} + \beta_{10} \Delta RD_{it} + \beta_{11} \Delta PROF_{it} + \beta_{12} \Delta CAPEX_{it} + \varepsilon_{it} \quad \textbf{(4-14)}$$

We find that the interaction between the under-levered dummy, the undervaluation dummy and the deficit dummy to have a positive coefficient that is economically and statistically significant. It is clear that target leverage plays a crucial role in timing strategy. Examining the results in column 1 of Table 4-10 closer indicates two significantly different effects on mispricing and net debt issued. Looking at periods of equity overvaluation, firms that were over their target leverage levels retired about 6.51% of debt as a percentage of assets compared to 2.10% for firms below their target leverage. There is a significant economic difference as overvaluation allows firms to retire debt at a cheaper rate by relying on equity issues and would thus be able to reach an optimal target. As expected, during periods of undervaluation over-levered firms issued less debt than firms below their target (2.15% vs. 3.84%). This signifies an increase of 1.69 percentage points or a jump of 79%. Thus, managers seem to time issues to coincide with their target levels.

Table 4.10: Do firms that have target book leverage engage in market timing?

	All Firms	Under-levered Firms	Over-levered Firms	All Firms	Under-levered Firms	Over-levered Firms
CONS	-0.0877***	-0.0440***	-0.0498**	-0.0930***	-0.0585***	-0.0322*
	(0.0124)	(0.0134)	(0.0229)	(0.0120)	(0.0145)	(0.0177)
DEF	0.4380***	0.2198***	0.4776***	0.4304***	0.1583***	0.4345***
	(0.0084)	(0.0067)	(0.0107)	(0.0074)	(0.0066)	(0.0090)
UNDVD	0.0843***	0.0509***	0.0739***	0.0777***	0.0391***	0.0667***
	(0.0028)	(0.0023)	(0.0034)	(0.0025)	(0.0023)	(0.0029)
UNDLVD	0.0532***	-	-	0.0756***	-	-
	(0.0025)	-	-	(0.0025)	-	-
UNDVD*DEF	0.0462***	0.1954***	0.0154	0.0808***	0.2063***	0.0585***
	(0.0147)	(0.0121)	(0.0169)	(0.0137)	(0.0113)	(0.0154)
UNDLVD*DEF	-0.1844***	-	-	-0.2347***	-	-
	(0.0108)	-	-	(0.0104)	-	-
UNDVD*UNDLVD	-0.0338***	-	-	-0.0410***	-	-
	(0.0035)	-	-	(0.0035)	-	-
UNDVD*DEF*UNDLVD	0.1341***	-	-	0.1159***	-	-
	(0.0194)	-	-	(0.0189)	-	-
ΔSIZE	0.0134***	0.0069***	0.0264***	0.0138***	0.0043**	0.0326***
	(0.0019)	(0.0020)	(0.0041)	(0.0018)	(0.0017)	(0.0040)
ΔTANG	0.0940***	0.0184	0.1456***	0.0853***	0.0260*	0.0946***
	(0.0117)	(0.0142)	(0.0207)	(0.0114)	(0.0135)	(0.0181)
ΔRD	0.0674***	0.0440**	0.0475	0.0366*	0.0588***	-0.1061**
	(0.0201)	(0.0210)	(0.0639)	(0.0196)	(0.0179)	(0.0477)
ΔPROF	-0.0086***	-0.0076**	0.0029	-0.0051*	0.0012	-0.0031
	(0.0031)	(0.0031)	(0.0082)	(0.0030)	(0.0029)	(0.0064)
ΔCAPEX	0.0283**	0.0701***	-0.0087	0.0186	0.0416***	-0.0223
	(0.0137)	(0.0163)	(0.0245)	(0.0133)	(0.0157)	(0.0211)
DEV	-	0.0200***	-0.1977***	-	0.2488***	-0.2920***
	-	(0.0072)	(0.0148)	-	(0.0199)	(0.0139)
Adjusted R^2	0.5294	0.4530	0.6395	0.5558	0.4703	0.6486
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	6543	4222	11201	5523	5154
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net book debt issued divided by total assets. Columns 1 and 4 represent all firms. Column 1 to 3 uses fitted values of book debt as a proxy for target leverage. Columns 4 to 6 repeat the regressions using industry median of book debt as a proxy for target leverage. Regressions control for firm fixed effects and include unreported year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

We test our hypothesis by running separate regressions for firms that are above and under their target leverage. The results are reported in the second and third columns of Table 4-10. The findings further validate our findings above. Under-levered firms significantly increase their net debt issues to finance the deficit, whereas for firms that are above their target leverage the coefficient is not significantly different from zero. The additional variable included in the regressions, DEV, is the absolute difference between leverage at the beginning of the year and D*.[67] This variable has also a large and significant coefficient explaining the large overall difference detected above between under- and over-levered firms. It further validates the assumption that firms do adopt optimal leverage levels. The regressions are then repeated using industry median as a proxy for target leverage. The results are reported in the last three columns of Table 4-10. We find further support for our hypothesis as the results are qualitatively similar. This shows that our results are insensitive to either proxy for target leverage.

We further test our results using proxies for target market leverage. We report the results in tables 4-11 and 4-12. The regressions in Table 4-11 utilize fitted market leverage levels in columns 1 to 3 and industry market leverage median in columns 4 to 6 as a proxy for target debt. To provide additional robustness checks, the regressions in Table 4-12 utilize net market debt issued with fitted market leverage as a proxy for target leverage in column 1 to 3 and industry median as a proxy for market leverage. The results further consolidate our findings that managers are inclined to time issues to coincide with targeting behaviour.

[67] We use a similar method to Hovakimian *et al.* (2001) and use the absolute measure of deviation from target leverage, $|D_{it}^{*} - D_{it-1}|$ to capture target adjustment behaviour.

Table 4.11: Do firms that have target market leverage engage in market timing?

	All Firms	Under-levered Firms	Over-levered Firms	All Firms	Under-levered Firms	Over-levered Firms
CONS	-0.0915***	-0.0549***	-0.0436*	-0.0847***	-0.0750***	-0.0362**
	(0.0123)	(0.0132)	(0.0236)	(0.0122)	(0.0168)	(0.0176)
DEF	0.4508***	0.2049***	0.4553***	0.4616***	0.1662***	0.4794***
	(0.0030)	(0.0022)	(0.0109)	(0.0079)	(0.0071)	(0.0093)
UNDVD	0.0805***	0.0492***	0.0676***	0.0724***	0.0455***	0.0614***
	(0.0030)	(0.0022)	(0.0037)	(0.0026)	(0.0026)	(0.0029)
UNDLVD	0.0648***	-	-	0.0615***	-	-
	(0.0027)	-	-	(0.0026)	-	-
UNDVD*DEF	0.0530***	0.2030***	0.0403**	0.0432***	0.2155***	0.0255
	(0.0162)	(0.0111)	(0.0191)	(0.0147)	(0.0120)	(0.0159)
UNDLVD*DEF	-0.2209***	-	-	-0.2631***	-	-
	(0.0108)	-	-	(0.0106)	-	-
UNDVD*UNDLVD	-0.0318***	-	-	-0.0288***	-	-
	(0.0037)	-	-	(0.0035)	-	-
UNDVD*DEF*UNDLVD	0.1384***	-	-	0.1708***	-	-
	(0.0201)	-	-	(0.0194)	-	-
ΔSIZE	0.0140***	0.0058***	0.0383***	0.0136***	0.0077***	0.0295***
	(0.0018)	(0.0019)	(0.0045)	(0.0018)	(0.0019)	(0.0040)
ΔTANG	0.0892***	0.0778***	0.0952***	0.0796***	0.0003	0.1059***
	(0.0115)	(0.0136)	(0.0221)	(0.0115)	(0.0151)	(0.0175)
ΔRD	0.0639***	0.0569***	-0.0007	0.0414**	0.0711***	-0.6227***
	(0.0199)	(0.0219)	(0.0570)	(0.0198)	(0.0181)	(0.1006)
ΔPROF	-0.0078**	-0.0032	-0.0158*	-0.0035	0.0005	0.0053
	(0.0030)	(0.0030)	(0.0085)	(0.0030)	(0.0031)	(0.0070)
ΔCAPEX	0.0260*	0.0227	0.0129	0.0303**	0.0390**	0.0123
	(0.0135)	(0.0163)	(0.0242)	(0.0134)	(0.0170)	(0.0207)
DEV	-	0.2054***	-0.1567***	-	0.2096***	-0.1446***
	-	(0.0166)	(0.0140)	-	(0.0140)	(0.0103)
Adjusted R^2	0.5420	0.4620	0.6331	0.5467	0.4567	0.6436
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	7035	3775	11201	5614	5124
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net book debt issued divided by total assets. Columns 1 and 4 represent all firms. Column 1 to 3 uses fitted values of market debt as a proxy for target leverage. Columns 4 to 6 repeat the regressions using industry median of market debt as a proxy for target leverage. Regressions control for firm fixed effects and include unreported year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 4.12: Net market debt issued and target market leverage

	All Firms	Under-levered Firms	Over-levered Firms	All Firms	Under-levered Firms	Over-levered Firms
CONS	-0.1248***	-0.0546***	-0.0548	-0.1099***	-0.0630***	-0.0344
	(0.0216)	(0.0146)	(0.0564)	(0.0215)	(0.0171)	(0.0401)
DEF	0.5521***	0.1800***	0.5784***	0.5662***	0.1248***	0.5758***
	(0.0148)	(0.0074)	(0.0260)	(0.0140)	(0.0072)	(0.0213)
UNDVD	0.1158***	0.0496***	0.0993***	0.0987***	0.0440***	0.0843***
	(0.0053)	(0.0025)	(0.0088)	(0.0046)	(0.0026)	(0.0065)
UNDLVD	0.0977	-	-	0.0878***	-	-
	(0.0047)	-	-	(0.0046)	-	-
UNDVD*DEF	0.0400	0.1670***	-0.0152	0.0113	0.1880***	-0.0163
	(0.0286)	(0.0123)	(0.0455)	(0.0260)	(0.0122)	(0.0362)
UNDLVD*DEF	-0.3464***	-	-	-0.4053***	-	-
	(0.0191)	-	-	(0.0188)	-	-
UNDVD*UNDLVD	-0.0658***	-	-	-0.0553***	-	-
	(0.0065)	-	-	(0.0063)	-	-
UNDVD*DEF*UNDLVD	0.1232***	-	-	0.1827***	-	-
	(0.0354)	-	-	(0.0343)	-	-
ΔSIZE	0.0233***	0.0123***	0.0604***	0.0227***	0.0140***	0.0478***
	(0.0032)	(0.0021)	(0.0108)	(0.0032)	(0.0020)	(0.0091)
ΔTANG	0.0667***	0.0350**	0.1025*	0.0565***	-0.0172	0.0798**
	(0.0203)	(0.0151)	(0.0527)	(0.0203)	(0.0154)	(0.0400)
ΔRD	0.0770**	0.0673***	0.0043	0.0398	0.0577***	-0.4643**
	(0.0350)	(0.0242)	(0.1362)	(0.0351)	(0.0184)	(0.2297)
ΔPROF	-0.0210***	-0.0044	-0.0659***	-0.0149***	-0.0038	-0.0428***
	(0.0053)	(0.0033)	(0.0204)	(0.0053)	(0.0032)	(0.0160)
ΔCAPEX	0.0573**	0.0748***	-0.0118	0.0617**	0.0872***	0.0283
	(0.0238)	(0.0180)	(0.0579)	(0.0238)	(0.0173)	(0.0473)
DEV	-	0.2286***	-0.3188***	-	0.1322***	-0.2770***
	-	(0.0183)	(0.0334)	-	(0.0143)	(0.0234)
Adjusted R^2	0.3589	0.3719	0.3789	0.3603	0.3888	0.3903
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	7035	3775	11201	5614	5124
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net market debt issued divided by total assets. Columns 1 and 4 represent all firms. Column 1 to 3 uses fitted values of market debt as a proxy for target leverage. Columns 4 to 6 repeat the regressions using industry median of market debt as a proxy for target leverage. Regressions control for firm fixed effects and include unreported year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

4.6.2 Considering financial deficit and distance from target leverage

In the previous sections, we have found that mispricing is a significant determinant of firms' repurchasing and issuing behaviour. Our analysis has so far assumed that firms do not deviate from their target financing mix and timing behaviour is not influenced by such deviations. In this section, we relaxed this assumption to test how mispricing plays a role in issuance and repurchasing if managers are also moving towards a target capital structure. As our earlier results indicate that managers react to equity mispricing differently if they are over-levered or under-levered, we further consider the effect of financial surplus and deficit. We evaluate the difference between financial surplus and deficit to build on the work of Byoun (2008) who show that adjustment to target levels are influenced by financial surplus and deficit as well as whether firms are under or over their target levels.

In this section, to investigate the strength of our findings in the previous sections, we replace the deficit measure with a deficit dummy (DD) that takes the value of 1 if the firm is in a financial deficit and 0 if in a financial surplus.[68] We also interact the undervaluation dummy with the deficit dummy as well as with the distance (DIST) variable.[69] The rational for this further interaction is to allow us to discriminate financing patterns for firms with a surplus (or deficit), the distance from target levels as well as equity mispricing. The further firms deviate from their target, the larger the above effect is expected. The model is as follows:

$$\Delta dbl_{it} = \alpha + \beta_1 DD_{it} + \beta_2 UNDVD_{it} + +\beta_3 DIST_{it} + \beta_4 (UNDVD \times DD)_{it}$$
$$\beta_5 (DIST \times DD)_{it} + \beta_6 (UNDVD \times DIST)_{it} + \beta_7 (UNDVD \times DIST \times DD)_{it} +$$
$$\beta_8 \Delta SIZE_{it} + \beta_9 \Delta TANG_{it} + \beta_{10} \Delta RD_{it} + \beta_{11} \Delta PROF_{it}$$
$$+\beta_{12} \Delta CAPEX_{it} + \varepsilon_{it} \qquad \textbf{(4-15)}$$

The results in the first column of Table 4-13 based on equation (4-15) shows that the distance variable has a positive and significant coefficient indicating, as expected,

[68] We replace deficit measure with the deficit dummy to allow an easier analysis and interpretation of the interaction results while simultaneously examining the effect of distance from target leverage. It also helps avoid splitting the sample.

[69] DIST = D* less leverage at the beginning of the year. The distance variable is estimated from the regression in equation (4-13) and thus is measured with error and its coefficient will be biased downwards. We correct the variance-covariance matrix of the coefficient estimates to account as the distance variable is estimated with errors. Our corrections procedure follows the recommendations by Murphy and Topel (1985).

managers issue debt to reach a target. The deficit dummy is also positive and significant. The interaction between the undervaluation dummy with the deficit dummy and the distance measure is also positive and significant, indicating that financial deficit (or surplus) and distance from target leverage plays a significant role in timing of issues and repurchases. Firms that are in a financial deficit will issue more debt in the presence of undervaluation to reach their targets based on how far they are from their targets. Firms that are in a financial surplus will retire more debt in the presence of overvaluation to move closer to their target levels. The further the distance from the target, the larger this effect. We further test the robustness of our findings using book industry median as a proxy for target leverage in column 2, fitted market debt in column 3 and industry market median in column 4. The results are similar and indicate a similar conclusion where distance from target leverage moderates timing behaviour. Columns 5 and 6 measures net market debt issued and uses fitted market leverage and industry median of market leverage as a proxy for target leverage. The results do not differ and hence our conclusions are robust to different measures of net debt issued and proxies of market leverage. Our results imply that managers consider all three aspects above when deciding on issuing behaviour.

4.7 Conclusion

The literature documents that equity market timing plays an important role in capital structure decisions. Managers attempt to time the market by issuing equity when they perceive conditions are favourable, as studied in this paper for the UK firms. Our results reveal how managers time the market and its impact on firms' capital structure as we study market timing from four different angles. Firstly, we examine whether managers increase debt issues during periods of undervaluation, i.e. when market conditions are unfavourable. This is done by estimating intrinsic value of the firms' equity. The second angle covered in this paper is how financial constraints influence timing behaviour. If managers are able to identify windows of opportunity, does the financial capacity of the firm influence timing attempts? This issue remains an ongoing debate in the literature.

The third angle examined in this study attempts to account for repurchasing activity. In the presence of overvaluation, managers may be tempted to issue equity and repurchases debt

and vice versa. Hence, we test this aspect of market timing by examining firms that are purely purchasing (firms in surplus) and firms that are purely raising capital (firms in deficit). The last angle looks at how targeting behaviour influences timing attempts. The literature provides ample support that managers do have some form of target leverage in mind and will make adjustments to leverage levels to reach this target. We differentiate firms based on the deviation from target capital structure and test timing behaviour for firms that are above and under their target levels.

Looking at these four aspects, findings from the analysis are as follows. Based on the first section, we find that firms whose share prices are undervalued increase reliance on debt issues to finance their deficit. This effect is economically and statistically significant. The results are robust to different time periods and after controlling for known determinants of capital structure. Consistent with the literature, we find that the impact of mispricing varies over time. Examining market timing from the second angle reveals intriguing results and allows us draw interesting conclusions. We find that constrained firms are more concerned with timing issues. During periods of overvaluation they retire significantly more debt and during periods of undervaluation they significantly issue more debt to finance their deficit. Clearly, financial constraints play a critical role in the ability of firms to time the market.

Findings from the third and fourth angle need to be interpreted closely together as the results are tied in. If we assume that firms do not have a target capital structure and there is no deviation from this said target, we find that mispricing heavily influences repurchasing activity. However, if we relax this assumption and account for targeting behaviour, we find that repurchasing and issuance activities are influenced by equity mispricing if these actions are in line with the goal of reaching a pre-determined target. Furthermore, we find that the distance from target leverage and demand for external financing also heavily influences timing behaviour. We are also able to infer that the cost of being off target is greater than any benefit gained from timing the equity market. Thus, firms that are below (above) their target leverage tend to increase (decrease) debt issues further during periods of undervaluation (overvaluation).

Table 4.13: The effect of surplus and distance on timing behaviour

	BL*= Fitted Values	BL* = Ind. Median	ML*= Fitted Values	ML* = Ind. Median	ML*= Fitted Values	ML* = Ind. Median
	1 (Δdbl)	2 (Δdbl)	3 (Δdbl)	4 (Δdbl)	5 (Δdml)	6 (Δdml)
CONS	-0.0900***	-0.0690***	-0.0785***	-0.0985***	-0.0961***	-0.1246***
	(0.0144)	(0.0134)	(0.0140)	(0.0135)	(0.0221)	(0.0226)
DD	0.0885***	0.0683***	0.0772***	0.0708***	0.0921***	0.0917***
	(0.0027)	(0.0025)	(0.0026)	(0.0025)	(0.0040)	(0.0041)
UNDVD	0.0730***	0.0476***	0.0595***	0.0503***	0.0748***	0.0737***
	(0.0033)	(0.0031)	(0.0032)	(0.0031)	(0.0050)	(0.0052)
DIST	0.1745***	0.5254***	0.3233***	0.4906***	0.5591***	0.5097***
	(0.0088)	(0.0123)	(0.0107)	(0.0120)	(0.0169)	(0.0201)
UNDVD*DD	0.0059	0.0174***	0.0150***	0.0152***	0.0089	-0.0010
	(0.0040)	(0.0037)	(0.0039)	(0.0037)	(0.0061)	(0.0062)
DD*DIST	-0.0888***	-0.2407***	-0.1257***	-0.2369***	-0.2741***	-0.2214***
	(0.0118)	(0.0150)	(0.0138)	(0.0148)	(0.0217)	(0.0248)
UNDVD*DIST	-0.0911***	-0.2074***	-0.1133***	-0.1931***	-0.2571***	-0.2004***
	(0.0139)	(0.0191)	(0.0169)	(0.0184)	(0.0265)	(0.0309)
UNDVD*DD*DIST	0.0428**	0.0777***	0.0397*	0.0722***	0.0158	0.1194***
	(0.0181)	(0.0242)	(0.0219)	(0.0235)	(0.0345)	(0.0393)
ΔSIZE	0.0345***	0.0310***	0.0327***	0.0312***	0.0406***	0.0403***
	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0033)	(0.0033)
ΔTANG	0.0559***	0.0364***	0.0750***	0.0407***	0.0594***	0.0166
	(0.0136)	(0.0127)	(0.0133)	(0.0128)	(0.0209)	(0.0214)
ΔRD	-0.0885***	-0.0865***	-0.0994***	-0.0837***	-0.0930***	-0.0689*
	(0.0233)	(0.0216)	(0.0227)	(0.0218)	(0.0356)	(0.0365)
ΔPROF	-0.0227***	-0.0063*	-0.0157***	-0.0063*	-0.0284***	-0.0203***
	(0.0036)	(0.0033)	(0.0035)	(0.0033)	(0.0054)	(0.0056)
ΔCAPEX	0.0130	0.0002	-0.0199	0.0036	0.0007	0.0314
	(0.0160)	(0.0148)	(0.0156)	(0.0150)	(0.0245)	(0.0250)
R^2	0.4507	0.5277	0.4800	0.5195	0.4216	0.3944
Adjusted R^2	0.3582	0.4482	0.3925	0.4386	0.3243	0.2925
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11201	11201	11201	11201	11201	11201
Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

The dependent variable is net book debt issued divided by total assets for Columns 1 to 4 and net market debt issued for columns 5 and 6. Regressions control for firm fixed effects and include unreported industry and year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Therefore, we are able to conclude that firms do time equity issues to periods of overvaluation. This behaviour is, however, significantly distinct for constrained firms versus unconstrained firms. Repurchasing behaviour, considered independently from targeting behaviour, does appear to be influenced by equity mispricing and is robust to financial constraints. Targeting behaviour also plays a significant role in determining willingness of managers to issue equity during periods of overvaluation, indicating that managers will only time the market if it suits their aim of reaching a pre-determined target. After taking into account deviation from target capital structure and financial surplus, managers do time repurchases to coincide with targeting behaviour. Overall, these considerations are critical in determining the impact of market timing on capital structure decisions.

Chapter 5 : Capital Structure and Market Timing in the UK: Deviation from Target Leverage and Security Issue Choice.[70]

5.1 Introduction

This chapter studies market timing behaviour by looking at equity mispricing of firms in the UK and its impact on capital structure. The market timing theory of capital structure posits that firms would issue debt during periods of undervaluation and equity during periods of overvaluation. If managers do adjust security issues accordingly, they would retire debt and repurchase shares based on equity mispricing as well. Thus managers would be able to exploit equity mispricing to deliver value to the firms by changing the financing mix.

In this study, we examine the target leverage and the determinants of deviation from target leverage. Thus, we firstly estimate target leverage and then examine how equity mispricing influences deviation from target levels. Hovakimian (2004) finds that firms that have target debt ratios can engage in timing the equity market. Warr et al (2011) show the speed of adjustment towards target levels are faster if firms are over-levered (under-levered) and equity is overvalued (undervalued). Thus, managers do consider targeting behaviour when timing security issues. Building on their work, we provide an alternative view whereby if firms increase (decrease) debt levels during periods of undervaluation (overvaluation), we conjecture that firms would be over-levered (under-levered). Thus our paper examines the determinants of deviation from target leverage and the influence of market timing in this deviation levels.

Flannery and Rangan (2006) argue that the pecking order coefficient (of the deficit variable) may simply reflect firm characteristics rather than changing market conditions. Huang and Ritter (2009) build on their work by relaxing the assumption in previous studies where it is implicitly assumed that the choice between issuing versus not issuing security is

[70] This chapter has been presented at the European Financial Management "Merton H. Miller" Doctoral Student Seminar 2011 in June 2011 in Braga, Portugal.

exogenous and firms resort to equity financing when the cost of equity is relatively low. We scrutinize whether firms are more likely to issue (or remain passive) in the presence of equity mispricing. This chapter looks at the issue decision not only as a resort of financing deficits, but driven by timing of equity markets. Our tests also consider repurchasing decisions (or remain passive). To provide evidence for UK firms and comparatively to US firms (see Elliot et al.2008), this paper further looks at the debt versus equity choice and the likelihood issue choices are influenced by equity mispricing which directly tests the market timing theory. The third aspect of this paper draws on the work of Rau and Vermaelan (2002) who document repurchasing in the UK to be tax driven. Contrasting their findings, Oswald and Young (2004) find that equity repurchases are driven by equity mispricing which mirrors the situation as documented in Ikenberry et al. (1995) for US firms. Thus, we test whether the repurchase decision is driven by equity mispricing, hence further affirming the market timing theory.

Lastly, we build on the findings of Baker and Wurgler (2002) and aim to examine whether equity mispricing influences firms' decision to actively alter the financing mix by issuing a particular type of security and simultaneously reducing another. If equities are overvalued, the cost of equity would hence be cheaper. Managers may be tempted to substitute existing debt with equity as well as opting for equity to finance deficit. This would further lower overall cost of capital of the company and thus further increase the value of company. We test this against a base of passive firms, which allows us to draw conclusions with regards to the influence of market timing on firms issue decisions.

We are able to draw several main findings and conclusions from our study. First, firms do increase debt levels when equities are undervalued and depress leverage levels when equities are overvalued. This leads them to deviate from optimal levels of capital structure. This finding may suggest that timing of security issues works within a framework similar to the one proposed under the trade-off view of capital structure, as managers' trade off costs of deviating from target leverage with benefits from timing the market i.e. from resorting to a relatively cheaper source of financing. Secondly, we model issue size and issue choice, we find that both are influenced by equity mispricing and market timing considerations. Interestingly, equity mispricing plays a bigger role in issue size. Firms are more likely to

issue debt during periods of undervaluation and equity during periods of overvaluation. Furthermore, firms are more likely to make debt (equity) reductions during periods of overvaluation (undervaluation). Lastly, we find that managers do actively issue debt and repurchase equity during periods of undervaluation. On the other hand, if equity is overvalued, we find that managers are also more likely to issue equity and retire debt. Thus, managers do swap one form of capital for the other suggesting that market timing considerations play a critical role in firms financing mix.

The remainder of this paper is organized as follows. Section 5.2 discusses the relevant literature and provides the motivation for this study. Section 5.3 describes the data, provides the definitions of the variables used, explains the methodology used to value equity and describes the basic models used in this paper. Section 5.4 develops empirical tests on how equity mispricing influences deviation from target capital structure. Section 5.5 empirically tests the security issue decisions in a logit and multinomial logit framework. The last section concludes the main findings and discusses the implication from this study.

5.2 Review of the literature and Motivation

Studies on capital structure have shown that equity mispricing plays an important role in security issues. This section reviews the relevant literature and develops the main motivation for this paper. Firstly the review covers target leverage. Proponents of the trade-off theory argue that firms have an optimal target capital structure. Cost of capital would be minimized at this optimal rate, thus maximizing firm value. However given that market imperfections such as asymmetric information and financing costs exist, firms may temporarily deviate from these targets.

Secondly this section looks at how market timing influences security issue choice. Older studies of capital structure have focused on the pecking order and trade-off explanation of capital structure decisions while timing issues are fast becoming a central theme in capital structure. Survey evidence by Graham and Harvey (2001) finds that managers actively engage in timing the market. In a more relevant survey, Brounen et al. (2006) also find that timing is a key element managers take into account when making security issue choices in

the UK. Baker and Wurgler (2002) attempt take this into a contextual framework and propose that capital structure is the cumulative outcome of previous timing attempts.

5.2.1 Optimal target and deviation from target

The trade-off theory proposes that firms have an optimal target capital structure which they aim to operate to maximise value. Managers would balance the benefit gained from issuing debt versus the cost of issuing debt such as bankruptcy and agency costs. The inclusion of tax benefits of debt and the bankruptcy penalties would allow the determination of an optimal capital structure (Hirshleifer, 1966). The trade-off between the tax benefit of debt and the deadweight costs of bankruptcy is shown in Kraus and Litzenberger (1973). After a certain point, the two effects just balance to reach equilibrium, where further borrowing would decrease the value of the firm.

Empirical studies have provided mixed results on target adjustment behaviour. Titman and Wessels (1988) find that transaction costs are an important determinant of capital structure suggesting that firms would balance costs vs. benefits of debt issues. Several other studies also support the notion of firms striving to maintain target leverage.[71] In these studies the evidence indicates that managers do adjust issues and repurchasing to reach a particular target and the correlation between several firm specific characteristics such as the marginal or effective tax rate, the proxies for growth opportunities and size are in line with predictions from the trade off theory. Contrasting to this view, Shyam-Sunder and Myers (1999) find that the pecking order model outperforms the target adjustment model. The theoretical implications of these results stems from Myers (1977), where high growth firms should have a lower level of leverage. This thus causes a negative correlation between growth proxies and leverage ratios as firms would reduce current leverage levels in anticipation of future growth being financed by debt.

Further evidence of target leverage is provided from survey results. Graham and Harvey (2001) find that managers admit to having a target ratio in mind when issuing debt. In the UK, Brounen et al. (2006) similarly find that managers take into account target levels of leverage when issuing debt. In addition to that the authors find that the tax advantage of interest payments, transaction costs of debt, debt levels of firms in similar industries and

[71] See Graham (1996), Hovakimian et al. (2001), Hovakimian (2004), Antoniou et al. (2008).

financial distress surrounding debt issues are important issues taken into consideration when managers make issue decisions. Further empirical evidence is provided by Hovakimian et al. (2004) who examine the role of dual issues and find that firms make dual issues to offset deviation from target levels that accumulate from earnings and losses. Leary and Roberts (2005) use a dynamic duration model to show that financing behaviour is consistent with the presence of adjustment costs.

Faulkender et al (2007) suggest that a plausible reason firms deviate from target capital structure would be due to managers having a target capital structure but also time security issues within a band around the target. In another recent study, Chang et al. (2006) find that firms that receive less analyst coverage issue equity less frequently and clumped in large issues. The authors show that there would be an inclination to time equity issues when conditions are more favourable. The theoretical underpinning would be that firms that receive less coverage would be faced with a higher degree of information asymmetry and thus their shares would be face a larger degree of mispricing. If the equity was undervalued, these firms would have a stronger motivation to issue debt and thus move away from their target leverage. Once market conditions improve, firms would be inclined to issue equity to reduce reliance on debt and thus be able to reduce the deviation levels. Even if higher valuations would move firms closer to target market leverage levels, managers would still be inclined to issue more equity as they anticipate future difficulty in issuing. Managers are thus trading off the cost of being below their target leverage with the benefit of being over their targets in the future and building financial slack.

Further insight is provided by Hovakimian (2004) who shows that firms are able to pursue market-timing strategies because deviations and costs associated with deviating from target leverage induced by equity transactions are small and transitory. The author concludes that firms that have target debt ratios can engage in timing the equity market. Alti (2006) also finds that firms time the market in the short-run but revert to target leverage eventually. In another recent study, Warr et al. (2011) show that firms that are over-levered would adjust faster to target leverage given that the present value of bankruptcy costs would be higher. More interestingly, over-levered firms would adjust faster to target leverage in the presence of overvaluation.

5.2.2 Security Issues and Repurchases

In a seminal study, Baker and Wurgler (2002) test the motivations for change in leverage ratios and find a strong link between external finance weighted average market to book ratio indicating that firms adjust leverage levels to suit external valuations. Thus managers would time issues when equity markets are favourable. The authors show that capital structure is the aggregate outcome of firms' historical attempts at timing the market. Further evidence on managers' attempts to time the market is provided by the survey evidence of Graham and Harvey (2001). In a more relevant survey study by Brounen et al. (2006) mangers indicate that the three of the four most significant factors affecting debt levels in the UK are related to market timing.[72] The authors also find that equity mispricing is the main factor looked at managers when deciding on equity issues. Further to that, Hovakimian et al. (2001) report that SEOs in the US have a strong correlation with stock prices. Marsh (1982) documents a similar pattern in the UK where firms tend to time equity issues when prices are high.

Further support for the market timing theory is seen in Welch (2004) who finds that equity price shows have a persistent effect on a firm's capital structure. The author however finds that firms do not rebalance their capital structure in response to shocks in market value in spite of active net issuing activity. Thus, stock returns are seen as the primary driver of capital structure changes. Elliot et al. (2007) find that firms are more likely to issue equity to fund their deficit when equity is overvalued. Studying managerial timing attempts, Jenter (2005) finds that managers attempt to actively time the market in both their own private trades and also at firm-level decisions. In a recent study, Hertzel and Li (2010) decompose the market-to-book ratio into two separate components, namely the growth and mispricing components. Their findings show that firms with higher element of mispricing decrease long-term debt and have a lower level of post-issue earnings. These results are consistent with the timing aspect of issuance activities.

In contrast to the above studies, several studies do not find support for the market timing theory. Hovakmian (2006) argues that the negative correlation between the market-to-book ratio and leverage is not driven by market timing considerations but rather it is capturing growth as firms with higher growth opportunities would tend to reduce reliance on current

[72] The top four attributes affecting leverage regimes in the UK are issuing debt when interest rates are particularly low, financing a deficit, equity undervaluation and changes in price of common stock.

debt issues as higher leverage levels may hamper their growh prospects. In addition to this study, Flannery and Rangan (2006) find that more than half of the observed changes in leverage levels are brought about by targeting behaviour. In their study, less than 10% of changes can be explained by market timing and pecking order considerations. Further to these studies, Mahajan and Tartaroglu (2008) show that the negative relationship between leverage and the market-to-book ratio is not attributed to market timing and the evidence in their study supports the dynamic trade-off theory. The debate is further extended by Liu (2009) who finds that the impact of time varying targets and adjustment costs indicates that the market-to-book ratio has a significant impact on leverage even when firms are not timing the market. The author further uses alternative proxies of market timing and is able to show they have no effect on leverage levels. Overall, Liu's study is more consistent with partial adjustment models.

The literature (Wansley et al.1989) suggests that firms repurchase shares for the following five reasons: reaching target leverage, eliminating free cash flow, anti-takeover motive, signalling undervaluation and wealth transfer due to timing. Brockman and Chung (2001) and Chan et al. (2007) provide empirical evidence for timing of managerial ability to time repurchases. Ikenberry et al. (2000) show that equity price movements drive repurchasing behaviour in the US. However, Rau and Vermaelen (2002) find that the majority of share buybacks in the UK are motivated by taxation purposes. This is in response to the regulation and taxes surrounding share repurchases in the UK. Oswald and Young (2004) however contend their findings for UK firms and show that as share prices fall, managers appear to respond by buying more shares and thus supporting the market timing framework to explain share buybacks. Interestingly, Doukas et al. (2010) find that firms also time debt issues by issuing during periods of hot debt markets showing that managers time debt issues as well as equity issues. Their results also show that firms issue more debt during hot periods to repurchase shares, suggesting that managers also actively substitute debt and equity.

5.3 Data and Empirical Approach

5.3.1 Data description and descriptive statistics

We initially collect data for all firms in the U.K. available on Datastream during the period of 1981 – 2008.[73] Consistent with the literature we exclude financial firms from the sample and the selection is done based on the motif of measuring equity mispricing. Definitions of dependent variables are provided in table 5.1, definitions of explanatory and control variables are provided in table 5.2 and definition of other variables and measures used are provided in table 5.3.

To eliminate the outliers, we exclude firms year observations for values where BD, Δdbl and Δe that exceed 100% in absolute value. Missing firm-year observations are also excluded from the data set. The final sample comprises of 11,105 firm-year observations. The summary statistics of firm specific characteristics and financing activities are summarized in Table 5.4. Overall firms leverage levels do not change much as pre-issue leverage is about 16.37% and post issue leverage is about 16.89%. We find that pure debt issuers have equities that are undervalued 69% of the time while firms that issue debt and repurchase equity are undervalued 78% of the time. Given that the average leverage levels in the sample is about 16%, the pre-issue leverage of these firms also do not suggest that they were attempting to reduce deviation from target levels.[74] In both instances firms increase their leverage levels. Post issue leverage suggests that as firms increase debt issues during undervaluation periods, they deviate away from target levels. Interestingly profitability, (EBIT), for both categories of firms is higher than the overall average of 2.80%.[75] Cash levels for both categories of firms are also lower than the overall average suggesting that these firms purse a lower cash holding strategy.

Pure equity issuers on the other hand have equities which are overvalued 82% of the time. These firms also do not seem to be motivated by targeting behaviour, in fact their attempts to time the equity market seems to drive them away from the average levels of debt in the UK. Firms that issue equity and retire debt on the other hand seem to be motivated by reaching a target and also timing their actions as their pre-issue leverage and post issue

[73] Our sample includes dead firms to mitigate problems of survivor and selection bias.
[74] This is assuming that firms would overall have a target close to the overall average of the sample.
[75] Profitability for pure debt issuers is 4.57% and 9.75% for firms that issue debt and repurchase equities.

leverage suggests (from 31% to 16%). Equities for these firms are overvalued about 97% of the time. Both categories also have an inferior level of performance as seen in their profitability levels which are below the overall average. Pure equity issuers have higher levels of cash than the overall average of firms in the sample suggesting that they follow a strategy of higher cash holdings. Pure equity repurchases appear to be motivated by purely timing considerations as their equities are undervalued almost 58% of the time and their pre-issue leverage and post-issue leverages are quite similar. Pure debt reductions on the other hand appear to be motivated by both timing and targeting behaviour as their pre-issue leverage and post issue leverages change drastically as well as the action is mostly accompanied with equity overvaluation (84% of the time). Thus we are able to infer that equity mispricing plays a significant role in financing and repurchasing behaviour from the summary statistics.

Table 5.1 Definition of Dependent Variables

Variable	Definition	Source
Book Debt (BD)	Total book debt divided by total assets	Datastream
Market Debt (MD)	Total book debt divided by market value of equity at date of financial year end of each firm plus book debt	Datastream
Net book debt issued (NDI)	Net change in total book debt divided by total assets	Datastream
Net equity issued (NEI)	Changes in book equity minus the changes in retained earnings divided by total assets	Datastream
Distance from target leverage (DIST)	Difference between target leverage (D*) and actual leverage	Datastream

Table 5.2 Definition of Explanatory and Control Variables

Variable	Definition	Source
Undervaluation dummy (UNDVD)	Undervaluation dummy which takes the value of 1 when intrinsic value is greater than market value and 0 if otherwise	Datastream
Market-to-book ratio (MTB)	Book value of total assets less book value of equity plus market value on the date of the financial year end to book value of total assets	Datastream
Profitability (EBIT)	Earnings before interest and taxes divided by total assets	Datastream
Non Debt Tax Shield (NDTS)	Ratio of depreciation to total assets	Datastream
SIZE	Natural logarithm of net sales in millions of 1981 pounds	Datastream
Tangibility (TANG)	Net plant, property and equipment over total assets	Datastream
Effective tax rate (ETR)	Total tax divided by total taxable income	Datastream
Industry Leverage (INDL)	Median value of leverage levels in a particular industry	Datastream
Research and Development (R&D)	Research and development expenses divided by total assets	Datastream
Capital Expenditure (CAPEX)	Net capital expenditure divided by total assets	Datastream
Cash (CASH)	Cash and cash equivalents divided by total assets	Datastream
D_{hi}	Dummy variable that takes the value of 1 when firm's debt ratio at the beginning of the year s in the top twentieth percentile of the sample	Datastream
D_{lo}	Dummy variable that takes the value of 1 when firm's debt ratio at the beginning of the year s in the bottom twentieth percentile of the sample	Datastream

Table 5.3 Definition of Other Relevant Variables and Measures

Variable	Definition	Source
Free cash flow to equity Holders (FCFE)	Sum of net income plus depreciation minus change in non cash working capital minus capital expenditure minus principal repayments of debt capital plus new debt issued	Datastream
Cost of equity (r_E)	Equity risk premium times individual stock beta plus the risk free rate	Datastream
Risk free rate (r_{rf})	Short-term treasury bills returns matched to the financial year end for each firm	Datastream
Total market return (r_m)	Market return for FTSE All Share Index matched to the financial year end for each firm	Datastream
Intrinsic Value (IV)	Estimated value of equity based on the Free Cash Flow to Equity	Datastream
Market Price (MP)	Market price for share of each firm matched to the financial year end for each firm	Datastream
Beta (B)	Individual stock beta matched to the financial year end for each firm	Datastream
Growth (g)	Long term GDP growth adjusted for using the GDP deflator throughout the sample period	Office for National Statistics

Table 5.4: Summary statistics of Issuing and Repurchasing Firms

	All Firms	Pure Debt Issuers	Issue Debt and Repurchase Equity	Pure Equity Issuers	Issue Equity and Retire Debt	Pure Equity Repurchases	Pure Debt Reductions
Pre Issue Leverage	0.1637(0.1534)	0.1820(0.1423)	0.1642(0.1462)	0.1151(0.1531)	0.3108(0.1650)	0.1265(0.1441)	0.2687(0.1378)
Post Issue Leverage	0.1689(0.1553)	0.2737(0.1353)	0.2991(0.1540)	0.0956(0.1403)	0.1644(0.1624)	0.1366(0.1389)	0.1852(0.1430)
NDI	0.0123(0.1081)	0.1207(0.0761)	0.1542(0.1025)	0.0011(0.0206)	-0.1797(0.1441)	0.0002(0.0222)	-0.1198(0.1013)
NEI	0.0408(0.1619)	0.0007(0.0761)	-0.1418(0.1087)	0.2667(0.2345)	0.2550(0.1997)	-0.1228(0.1102)	-0.0003(0.0187)
MTB	1.6718(1.1696)	1.5595(0.8297)	1.9942(1.1196)	2.0395(1.6919)	1.6969(1.1993)	1.9433(1.2680)	1.4898(0.9411)
EBIT	0.0280(0.2056)	0.0457(0.1625)	0.0975(0.1764)	-0.0737(0.2561)	-0.0893(0.2729)	0.1001(0.1649)	0.0364(0.2240)
NDTS	0.0323(0.4099)	0.0323(0.0426)	0.0343(0.0472)	0.0297(0.0416)	0.0365(0.0414)	0.0310(0.0348)	0.0396(0.0503)
SIZE	10.452(1.9947)	10.856(1.8941)	10.873(1.8259)	9.6641(1.8955)	9.7746(1.9083)	10.805(2.0428)	10.446(1.9357)
TANG	0.3229(0.2465)	0.3851(0.2576)	0.3519(0.2155)	0.2392(0.2525)	0.3029(0.2363)	0.3257(0.2346)	0.3226(0.2288)
ETR	0.2972(1.2137)	0.2548(1.2955)	0.3762(0.7739)	0.1772(1.2346)	0.1400(0.8743)	0.3937(0.9707)	0.2215(1.1642)
CAPEX	0.0608(0.0653)	0.0858(0.0857)	0.0828(0.0760)	0.0507(0.0686)	0.0517(0.0583)	0.0566(0.0545)	0.0488(0.0468)
R&D	0.0191(0.0601)	0.0081(0.0328)	0.0137(0.0410)	0.0375(0.0965)	0.0225(0.0692)	0.0182(0.0430)	0.0160(0.0566)
CASH	0.1353(0.1689)	0.0696(0.0913)	0.0985(0.1061)	0.2009(0.2097)	0.1355(0.1617)	0.1640(0.1740)	0.0924(0.1266)
UNDVD	40.62%	69.07%	78.10%	17.31%	3.31%	57.85%	15.61%
N(observations)	11105	1514	380	1300	454	669	974

This table records summary statistics of the firms in the sample. The figures report the mean values with standard deviation in parentheses. The first column reports figures for all firms in the sample. The second and fourth column reports figures for pure debt and equity issuers. The third and fifth column reports debt issues accompanied with equity repurchases as well as issue equities accompanied with debt reductions. The last two columns report figures for firms that are that purely reduce equity and debt. A firm is defined as issuing (repurchasing) debt when net debt issued is more (less) than 5%(-5%). Similarly, we define firms as issuing (reducing) equity when net equity issued is more (less) than 5%(-5%). Pre-issue leverage is leverage levels at the beginning of the year. Post-issue leverage is leverage levels at the end of the year. Net debt issued (NDI) is defined as net changes in leverage levels. Net equity issued is changes in book equity minus changes in retained earnings. Market-to-Book Ratio (MTB) is the ratio of book value of total assets less book value of equity plus market value of equity to book value of total assets. EBIT is defined as earnings before interest and taxes. Non debt tax shield, (NDTS), is measured as the ratio of depreciation to total assets. SIZE is the natural logarithm of total assets in millions of 1981 pounds. Tangibility of assets, (TANG), is defined as net plant, property and equipment. Effective tax rate, ETR, is total tax to total taxable income. Industry leverage, (INDL) is the median of the leverage levels of the industry the firm operates in. R&D and CAPEX are defined as research and development expenses and capital expenditure respectively. RDD is a dummy variable that takes the value of 1 if the data is not available in Datastream and zero otherwise. CASH is defined as cash and cash equivalents. All variables except size are scaled by total assets. UNDVD is a dummy variable which takes the value of 1 if firms are undervalued and 0 if firms are overvalued.

5.3.2 Equity Mispricing

We measure mispricing with the ratio of intrinsic value (IV) to current market price (MP).[76] Similar to the approach in Chapter 4, our approach draws from the work of Rhodes-Kropf et al. (2005) who decompose the market-to-book ratio into a measure of growth options and a measure of valuations. The authors argue that value to market measures mispricing by the market and book to value measures growth opportunities. Intrinsic value is measured as follows:[77]

$$\boldsymbol{V_{equity} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r_e)^t}} \quad \textbf{(5-1)}$$

$$\boldsymbol{V_{equity} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+r_e)^t} = \sum_{t=1}^{N} \frac{FCFE_t}{1+r_e{}^t} + \frac{Terminal\,Value}{(1+r_e)^N}} \quad \textbf{(5-2)}$$

Terminal value is calculated as:

$$\boldsymbol{Terminal\,Value = \frac{FCFE_N(1+g)}{(r_e - g)}} \quad \textbf{(5-3)}$$

where g is the long-term growth. Elliot et. al. (2007 and 2008) adopt the residual income model approach. In their studies, they utilize the future expected earnings for the company and make use of 3 years of future earnings data. Furthermore, their tests use a perfect foresight version of the residual income model as elaborated in D'Mello and Shroff (2000). Elliot et. al. (2007) further assume a clean surplus relation where changes in retained earnings are similar to net income less dividends paid and argue that based on this assumption, the residual income model can be shown to be similar to the dividend discount model. Given that we are unable to procure similar data of forecasted earnings, we assume that the firms experience constant growth and utilise a simpler approach.[78]

Given that FCFE occurs throughout the year we make adjustments as follows:

$$\boldsymbol{V_{equity} = \left[\sum_{t=1}^{N} \frac{FCFE_t}{(1+r_e)^t}\right](1+r_e)^{0.5}} \quad \textbf{(5-4)}$$

$FCFE_t$ is free cash flow to equity at time *t* and r_e is the cost of equity. FCFE is the sum of net income plus depreciation minus change in non cash working capital minus capital

[76] We utilize an approach similar to Elliot et al. (2007) and Warr et al (2011)
[77] This is based on Benninga (2011).
[78] Our approach in measuring mispricing may suffer from unrealistic assumptions but we are currently limited by the availability of forecasted data as I/B/E/S database is not available at HUBS.

expenditure minus principal repayments of debt capital plus new debt issued. A firm's cost of equity is calculated as below[79]:

$$\boldsymbol{r_E = r_{rf} + \beta_i(r_m - r_{rf})} \quad \textbf{(5-5)}$$

where short-term treasury bills are used as a proxy for the risk free rate (r_{rf}), and r_m is the total market return.[80] β_i is measured as:

$$\boldsymbol{\beta_i = \frac{Cov_i market}{\sigma^2 market}} \quad \textbf{(5-6)}$$

where FTSE All Share Index is used as a proxy for market.[81] Similar to Elliot, Koeter-Kant and Warr (2007), our purpose is to measure deviation from fundamental value. This is measured as:

$$\boldsymbol{Misvaluation = \frac{IV_{it}}{MP_{it}}} \quad \textbf{(5-7)}$$

where IV_{it} is intrinsic value and MP_{it} is market value of equity. In our study we use a dummy variable, UNDVD, which takes the value of 1 if the firm is undervalued (indicating that mispricing is greater than one).

5.3.3 Estimation procedure

The first section of our empirical tests involves estimation procedure in two stages that are described as the following equations:

$$\boldsymbol{D_{it+1} = B_{0_{it}} + W_{it}\alpha + \varepsilon_{it}} \quad \textbf{(5-8)}$$

$$\boldsymbol{DIST_{it} = \beta_0 + \beta_1 UNDVD_{it} + \gamma[controls]_{it} + D_{(hi)it} + D_{(lo)it} + \varepsilon_{it}} \quad \textbf{(5-9)}$$

In the first stage, equation 5-8 as above, the debt (book and market) to asset ratio is regressed on a vector of explanatory variables, W, that have been used in past studies as determinants of capital structure.[82] Although the set of explanatory variables used in this chapter to estimate target leverage differ from the ones used in Chapter 4, both set of variables have been validated by our empirical priors. Furthermore, there is no theoretical

[79] Elliot et. al. (2007) show that the single factor model as used in our approach and the Fama and French (2007) lead to similar results. Furthermore, Elliot et. al. (2008) find that the three factor model leads to noisier results, hence we opt for the simple single factor model.
[80] See Elliot et al. (2007).
[81] We estimate beta using a 36 month rolling approach. Our results are similar using a 60 month approach.
[82] See Hovakimian et al. (2001), Hovakimian (2004), Hovakimian et al. (2004), Flannery and Rangan (2006), Antoniou et al. (2008), and Warr et al (2011).

reasoning to expect our results to differ or be biased due to estimating target leverage via different set of explanatory variables. We estimate the debt ratio at time t+1 similar to Flannery and Rangan (2006) where D_{it+1} would be a firm i's desired debt ratio at t+1. The purpose of this first stage would be to estimate a firm's target leverage that is defined as the debt ratio that the firms would choose to be at in the absence of transaction costs, asymmetric information and other adjustment costs. In the second stage we model the distance from the target which is measured as the fitted values from estimations in equation 5-8 minus actual debt ratio ($D^* - D_t$) with a set of explanatory and γ , a set of control variables.[83] The key explanatory variable is the undervaluation dummy (UNDVD) which takes the value of one when firms equities are undervalued and zero when equities are overvalued. The D_{hi} and D_{lo} dummies take the value of one (zero otherwise) if the debt ratio at the beginning of the period is in the top and bottom twentieth percentile correspondingly. These dummies are intended as a control to capture target adjustment behaviour.

The second part of our empirical tests looks at the how well the undervaluation dummy predicts the likelihood that the firm will issue a particular type of security. Our approach is to use a binary variable to represent the issue type where the issue choice is modelled as follows:

$$\boldsymbol{Issue\ Decision_{it} = \beta_0 + \beta_1 UNDVD_{it} + \gamma[controls]_{it} + \varepsilon_{it}} \qquad \textbf{(5-10)}$$

$$\boldsymbol{Issue\ Type_{it} = \beta_0 + \beta_1 UNDVD_{it} + \gamma[controls]_{it} + \varepsilon_{it}} \qquad \textbf{(5-11)}$$

where Issue Decision take s the value of 1 if firms decide to raise capital and 0 if otherwise. Issue Type_{it} takes the value of 1 if the firm issues debt and 0 if the firms issues equity. A firm is defined as issuing debt if the ratio of net debt issued to total assets exceeds 5%. Similarly, a firm is issuing equity if the ratio of net equity issued exceeds 5%.[84] The key

[83] D^* for the purpose of this chapter is fitted values of D_{t+1} from equation 5-8.
[84] This approach is in line with similar studies in the literature i.e. Hovakimian (2004) and Hovakimian et al. (2004). Gaud et al. (2007). We exclude firms that issue both equity and debt.

explanatory variable is again the undervaluation dummy (UNDVD). Control variables are included based on the literature.[85]

5.4. Target Leverage and Deviation from Target Leverage

In this section we examine the first part of our empirical analysis which looks at what factors firms consider when determining their target leverage and deviating from this target. This is done by estimating the first stage of the regressions as expressed in equation 5-8. The list of the explanatory variables used to model target leverage and distance from target leverage as well as their expected relation are described in the first column of table 5.5.[86]

5.4.1. Determinants of Target Leverage

The results from the regression to determine the target leverage D_{t+1} are reported in table 5-5. We estimate the expression from equation 5-8 using the Fama and MacBeth (1973) framework as suggested in Fama and French (2002). In order to provide further robustness of our results, we further utilise the approach used in Hovakimian, Opler and Titman (2001). Thus we also report estimates censored by the value of zero using a Tobit regression with censoring to provide a consistent estimate. We include the market-to-book ratio, the non debt tax shield, firm size, tangibility, effective tax rate and industry leverage as determinants for estimating target leverage based on the literature discussed earlier. Market-to-book acts as a proxy for growth and thus we expect firms with higher growth opportunities to have lower levels of leverage as managers preserve debt capacity to allow greater borrowing in the future to finance growth. Non debt tax shield act as an alternative to tax shields as discussed in Modigliani and Miller (1963) and thus firms with higher levels of non debt tax shield would be less inclined to resort to borrowing. On the other hand, if firms possess relatively higher levels of tangible assets and thus have higher levels of depreciation expenses, these tangible assets serve as a collateral allowing firms to borrow more. Firm size is an important determinant as larger firms would have a larger debt capacity and thus hold more leverage on their balance sheets. Asset tangibility

[85] See Hovakimian et al. (2001), Hovakimian (2004), Hovakimian et al. (2004), Gaud et al. (2007), and Elliot et al. (2008).

[86] We base our expectations based on Titman and Wessels (1988), Hovakimian et al. (2001), Mao (2003), Flannery and Rangan (2006) and Warr et al (2011) as well as theoretical expectations.

measures the level of tangible assets which act as a collateral and thus firms with higher levels of asset tangibility would have higher levels of debt. The trade off theory predicts that firms with higher levels of taxes would opt for higher levels of debt thus the effective tax rate is expected to have a positive correlation with debt. Given that some industries are capital intensive and characterized by high leverage such as manufacturing based and others are known to have lower levels of leverage such as service based industries. Further to that Harris and Raviv (1991) argue that firms within a particular industry are likely to have similar levels of leverage and different industries tend to retain their leverage levels over time.

In line with our expectations, we find that growth opportunities as captured by the market-to-book ratio has a negative coefficient and is highly significant for both the market and book debt target ratio suggesting that firms tend to protect their future growth opportunities by limiting its leverage. Flannery and Rangan (2006) and Warr et al (2011) report a similar correlation. The non-debt tax shields have a positive correlation with target debt ratio which is consistent with results in Titman and Wessels (1988) and Mao (2003). Firms that possess relatively more fixed assets that generate higher levels of depreciation and thus tax credits indicating that such assets would have higher collateral value for securing debt which in turn increases the debt capacity of firms allowing them to have higher level of target leverage (see Mackie-Mason, 1990). Firm size has a positive and significant coefficient as expected given that larger firms would be have a more diversified cash flow which would be less volatile and thus more secure in servicing interest payments. A less volatile cash flow would also increase profitability and thus allow firms to fully use the tax shield of debt and thus reduce the probability and expected bankruptcy costs (see Hovakimian et al. 2001).

Tangibility also has a positive and significant correlation with target debt leverage suggesting that tangible assets serve as collateral and thus allow firms a higher debt capacity. Flannery and Rangan (2006) also report similar findings. The estimates reveal an inversely significant correlation with the effective tax rate which could be due to reverse causality i.e. firms with lower levels of leverage pay higher effective tax rate.[87] It remains

[87] Antoniou et al. (2008) also find a similar correlation.

puzzling why firms do not increase leverage levels to minimize their tax burden. The industry leverage has a positively significant coefficient indicating that leverage levels are influenced by industry effects (see Roberts, 2002).

5.4.2. Deviation from Target Leverage and Equity Mispricing

In this section we utilise fitted values from the results in the earlier section to measure the distance from target leverage which is the difference between the target leverage and the actual leverage ($D^* - D_t$). If firms are over leverage the distance measure would be negative and if firms are below their target the distance measure would be positive. The average distance measured for firms with undervalued versus overvalued equities are presented in figure 5-1. It is clear that firms do deviate from target levels and the distance from such targets is influenced by equity mispricing. Firms whose equity is undervalued have a smaller distance relative to firms that have overvalued equities.

Table 5.5: Determinants of Target Leverage

	Predicted Sign	$BD_{(t+1)FM}$	$MD_{(t+1)FM}$	$BD_{(t+1)TOB}$	$MD_{(t+1)TOB}$
CONS		-0.1399***	-0.0556	-0.0341***	-0.1611***
		(0.0235)	(0.0397)	(0.0041)	(0.0513)
MTB	-	-0.0045**	-0.0730***	-0.0060**	-0.0534***
		(0.0020)	(0.0095)	(0.0029)	(0.0033)
NDTS	-/+	0.2435***	0.2072*	0.1767**	0.0200
		(0.0538)	(0.1127)	(0.0754)	(0.0748)
SIZE	+	0.0179***	0.0194***	0.0229***	0.0207***
		(0.0010)	(0.0019)	(0.0020)	(0.0023)
TANG	+	0.0946***	0.1041***	0.1590***	0.1828***
		(0.0174)	(0.0206)	(0.0157)	(0.0197)
ETR	+	-0.0135***	-0.0193***	-0.0055***	-0.0085***
		(0.0030)	(0.0038)	(0.0013)	(0.0015)
INDL	+	0.5450***	0.7295***	0.7442***	0.8523***
		(0.1024)	(0.1748)	(0.2175)	(0.2496)
Observations		11105	11105	11105	11105
F-Test/ Chi^2 Test (p-values)		0.0000	0.0000	0.0000	0.0000
Average R^2 / Log likelihood		0.1463	0.2162	2721	1005
Period		1981-2008	1981-2008	1981-2008	1981-2008

The dependent variable in columns 1 and 3 is the book debt ratio in year t+1. The dependent variable in columns 2 and 4 is market debt ratio in year t+1. Regressions in column 1 and 2 are done based on a Fama and McBeth (1973). The table reports mean coefficients which is the average slope of the annual regressions. The time series standard errors are as in Fama and French (2002). Regressions in columns 3 and 4 utilise a censored Tobit framework, eliminating zero debt values as the lower limit. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Figure 5.1: Distance from Target Leverage

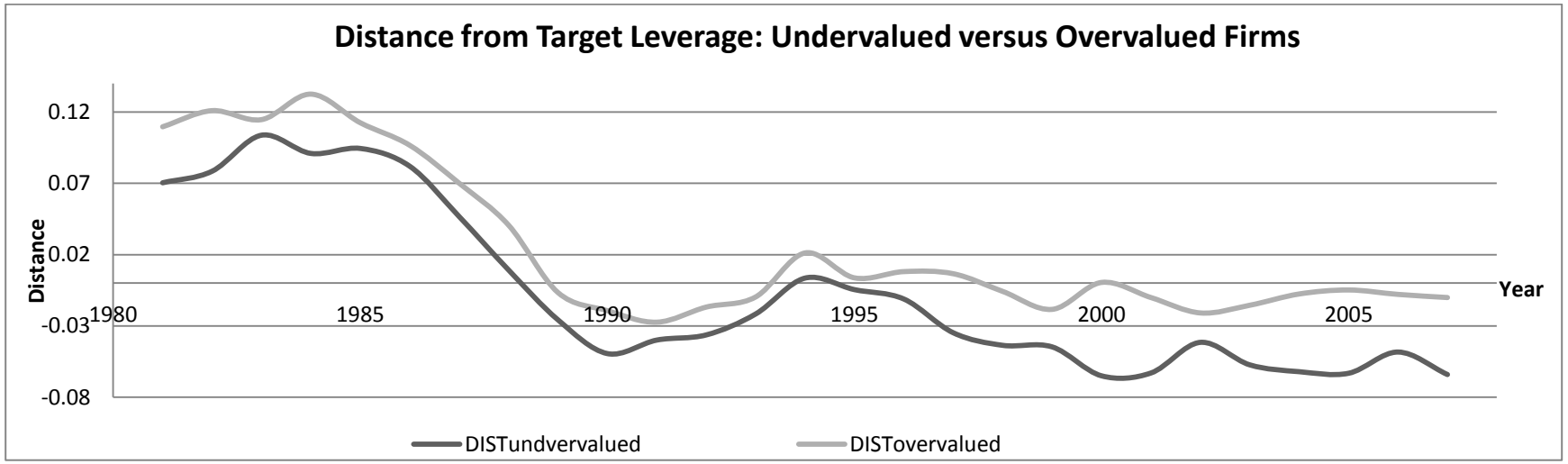
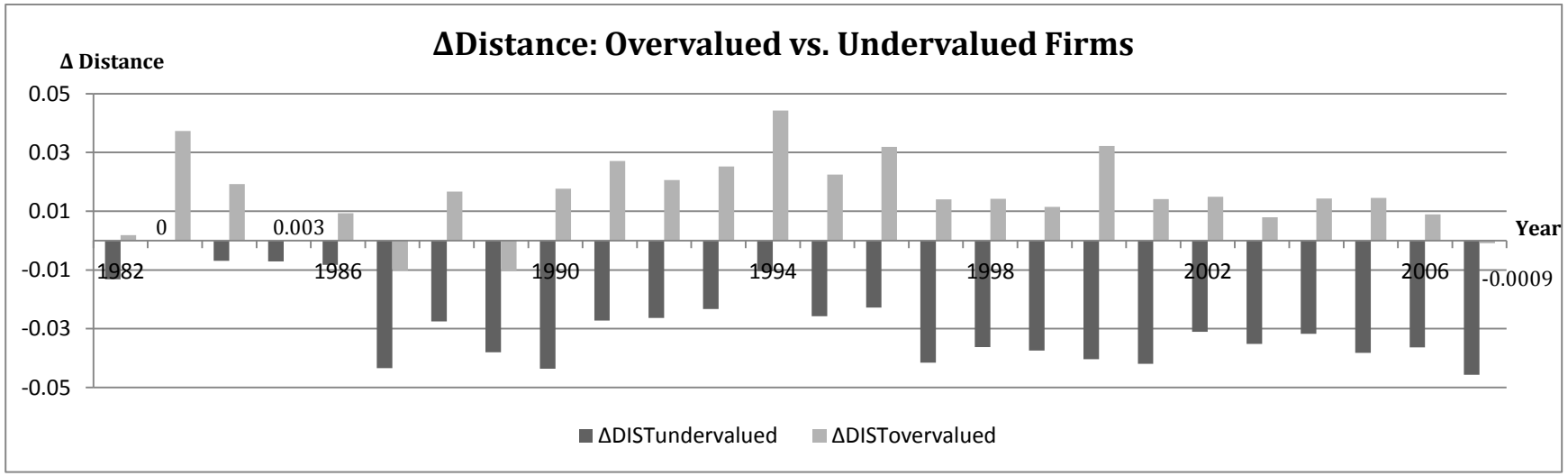


Figure 5.2: Change in Distance from Target Leverage



We estimate the regression as expressed in equation 5-9 to model the determinants of deviation from target leverage. If firms timing behaviour did not influence deviation from target leverage, the coefficient for the undervaluation dummy would not be different from zero. We expect the coefficient of the dummy to be negative as firms would issue more debt during periods of undervaluation relative to periods of overvaluation and thus have higher leverage levels. The results for this estimation are reported in the first four columns of table 5-6.[88] The coefficient of the undervaluation dummy is negatively significant as expected. The results are similar for market and book debt for both different sets of methods used to estimate target leverage. This suggests that the benefit of market timing outweighs the cost of deviating from target leverage.

Given that our estimations above assume that firms did not initially deviate from their target leverage, it is may suffer from endogeneity problems. To address this concern, we estimate the following regression:

$$\Delta DIST_{it} = \beta_0 + \beta_1 UNDVD_{it} + \gamma[controls]_{it} + D_{(hi)it} + D_{(lo)it} + \varepsilon_{it} \quad \textbf{(5-12)}$$

The undervaluation dummy again is intended to capture timing behaviour. The average change in distance for firms is represented in figure 5-2. The chart indicates that when equities are overvalued, the changes in distance are larger (or less negative). If timing behaviour does indeed influence deviation from target leverage, we expect that β_1 to be significantly different from zero and the coefficient to have an inverse relation with the change in distance from target leverage as firms would issue more leverage during periods of undervaluation. The results for estimating equation 5-11 are reported in the last four columns of table 5-6. We find that the coefficient for the undervaluation dummy to be negative and very significant. This indicates that firms are timing the market by increasing equity issues during periods of overvaluation and increasing debt issues during periods of undervaluation. Thus during periods of undervaluation, the change in distance from target leverage would be decreasing suggesting that firms would further be over-levered. The results further support the notion that the benefit gained from timing the market outweighs the cost of deviating from optimal levels.

[88] Regressions control for firm fixed effects, include unreported year dummies and report Rogers (1993) standard errors (see Peterson, 2009 for further details).

Table 5.6: Determinants of Deviation (DIST) From Target leverage

Predicted Sign	$DISTBD_{FM}$	$DISTBD_{TOB}$	$DISTMD_{FM}$	$DISTMD_{TOB}$	$\Delta DISTBD_{FM}$	$\Delta DISTBD_{TOB}$	$\Delta DISTMD_{FM}$	$\Delta DISTMD_{TOB}$
CONST	0.0786***	-0.0942***	0.0993**	0.0114	0.0617**	0.0442	0.1837***	0.1426***
	(0.0340)	(0.0340)	(0.0407)	(0.0407)	(0.0297)	(0.0291)	(0.0404)	(0.0368)
UNDVD -	-0.0175***	-0.0170***	-0.0123***	-0.0124***	-0.0626***	-0.0613***	-0.0608***	-0.0607***
	(0.0023)	(0.0022)	(0.0025)	(0.0028)	(0.0027)	(0.0027)	(0.0032)	(0.0030)
MTB	-0.0028	-0.0044**	-0.0456***	-0.0260***	-0.0057***	-0.0069***	-0.0339***	-0.0217***
	(0.0017)	(0.0017)	(0.0022)	(0.0022)	(0.0020)	(0.0020)	(0.0028)	(0.0024)
NDTS	0.1775***	0.1107**	0.1722***	-0.0151	0.1846***	0.1291*	0.1068	-0.0047
	(0.0448)	(0.0448)	(0.0459)	(0.0459)	(0.0672)	(0.0671)	(0.0671)	(0.0648)
SIZE	0.0031	0.0081**	-0.0006	0.0007	-0.0028	-0.0023	-0.0094**	-0.0104***
	(0.0033)	(0.0033)	(0.0035)	(0.0035)	(0.0028)	(0.0027)	(0.0036)	(0.0032)
TANG	-0.0090	0.0554***	-0.0013	0.0774***	0.0021	0.0242*	0.0044	0.0377**
	(0.0191)	(0.0191)	(0.0184)	(0.0184)	(0.0148)	(0.0145)	(0.0175)	(0.0163)
ETR	-0.0119***	-0.0038***	-0.0165***	-0.0057***	-0.0141***	-0.0053***	-0.0192***	-0.0079***
	(0.0007)	(0.0007)	(0.0008)	(0.0008)	(0.0006)	(0.0006)	(0.0009)	(0.0008)
D_{hi}	-0.2547***	-0.2456***	-0.3160***	-0.3595***	-0.1131***	-0.1123***	-0.1576***	-0.1555***
	(0.0080)	(0.0079)	(0.0085)	(0.0086)	(0.0078)	90.1123)	(0.0079)	(0.0079)
D_{lo}	0.0787***	0.0766***	0.0771***	0.0744***	0.0257***	0.0243***	0.0251***	0.0228***
	(0.0046)	(0.0043)	(0.0164)	(0.0053)	(0.0047)	(0.0046)	(0.0066)	(0.0059)
Observations	11105	11105	11105	11105	9397	9397	9397	9397
R^2	0.7683	0.7616	0.7779	0.7746	0.2644	0.2523	0.2683	0.2968
Adjusted R^2	0.7322	0.7245	0.7456	0.7395	0.1515	0.1376	0.1560	0.1889
Wald (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Period	1981-2008	1981-2008	1981-2008	1981-2008	1982-2008	1982-2008	1982-2008	1982-2008

The dependent variable is the distance from target leverage which is measured as target leverage minus actual leverage. Columns 1 and 3 measure the distance using the FM framework for book and market debt respectively. Columns 2 and 4 measure the distance using the Tobin censured approach for book and market debt respectively. Columns 5 and 6 measure change in distance using the FM framework for book and market debt respectively. Columns 7 and 8 measure change in distance using the Tobin censured approach for book and market debt respectively. Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 5.7: Determinants of Distance and Change of Distance from Target Leverage: Over-Levered Firms

	Predicted Sign	$DISTBD_{FM}$	$DISTBD_{TOB}$	$DISTMD_{FM}$	$DISTMD_{TOB}$	$\Delta DISTBD_{FM}$	$\Delta DISTBD_{TOB}$	$\Delta DISTMD_{FM}$	$\Delta DISTMD_{TOB}$
CONST		-0.1358*	0.0227***	0.1761**	0.2460**	-0.1577***	-0.0625	-0.0366***	-0.1389**
		(0.0740)	(0.0068)	(0.0713)	(0.0749)	(0.0669)	(0.0645)	(0.0067)	(0.0641)
UNDVD	+	0.0214***	0.0232***	0.0064	0.0082	0.0454***	0.0409***	0.0437***	0.0394***
		(0.0040)	(0.0043)	(0.0051)	(0.0055)	(0.0037)	(0.0040)	(0.0048)	(0.0063)
MTB		0.0091*	0.0087*	0.0125***	-0.0058	0.0090**	0.0105**	0.0663***	0.0093*
		(0.0050)	(0.0049)	(0.0044)	(0.0044)	(0.0043)	(0.0042)	(0.0039)	(0.0050)
NDTS		0.0874	0.1252	-0.0638	-0.0159	-0.3170***	-0.2007*	-0.2577***	-0.1019
		(0.0969)	(0.0886)	(0.1016)	(0.0914)	(0.1082)	(0.1145)	(0.0902)	(0.1012)
Ln(asset)		-0.0171**	-0.0192***	-0.0026	-0.0072	0.0042	-0.0002	0.0032	0.0125**
		(0.0069)	(0.0067)	(0.0062)	(0.0062)	(0.0061)	(0.0063)	(0.0061)	(0.0057)
TANG		0.0934**	0.0603	0.0890**	0.0355	-0.0806***	-0.1138***	-0.0871***	-0.0825***
		(0.0397)	(0.0421)	(0.0397)	(0.0411)	(0.0257)	(0.0283)	(0.0264)	(0.0263)
ETR		0.0057***	0.0007	0.0065***	-0.0006	0.0161***	0.0067***	0.0238***	0.0070***
		(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0013)	(0.0013)	(0.0016)	(0.0022)
BD/MD		-	-	-	-	0.6126***	0.6250***	0.6819***	0.4360***
		-	-	-	-	(0.0290)	(0.0333)	(0.0307)	(0.0337)
Observations		4978	4663	5259	4632	3881	3612	4075	3525
R^2		0.5947	0.5830	0.5492	0.5356	0.4719	0.4698	0.4797	0.3056
Adjusted R^2		0.5014	0.4848	0.4427	0.4187	0.3489	0.3433	0.3536	0.1261
Wald(p-values)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Period		1981-2008	1981-2008	1981-2008	1981-2008	1982-2008	1982-2008	1982-2008	1982-2008

The dependent variable is distance from target leverage for columns 1 to 4 and change in distance for columns 5 to 8. Distance and change in distance is measured in absolute terms ($|D_{it}^{*} - D_{it}|$). Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

We provide further evidence of equity mispricing driving deviation from target capital structure by looking at firms that over their targets and below their targets separately. We would be able to draw more insights from these analyses. The market timing theory would predict that firms issue more debt during periods of undervaluation and thus we conjecture firms would then be temporarily over-levered.[89] In this section, we measure distance as an absolute measure of difference between the target and the actual debt ratio.[90] This is done to allow us to understand the significance of the distance from target rather than the direction. The results for regressions are reported in the first four columns of table 5-7. All four columns indicate that the coefficient is positive as expected, suggesting that firms increase leverage levels during periods of undervaluation and thus would be over-levered. The coefficients for the first two columns suggest that firms would be about 2% over their target leverage during periods of undervaluation. The coefficient of the undervaluation dummy for the next two columns are however not significantly different from zero. This could stem from the strong assumption that firms did not initially deviate from their target leverage. In order to address this concern, we estimate the difference in distance as expressed in equation 5-11. To control for target adjustment behaviour affecting distance levels, we include the lagged leverage variable in the regression. The results are reported in the last four columns of table 5-7. We find that all the coefficients are positive and very significant as expected, thus confirming our earlier findings.

We further analyse firms which are below their target levels, where the current debt level is below the fitted values as determined from table 5-5. To consistently estimate the effect of equity mispricing we substitute the undervaluation dummy with the overvaluation dummy which takes the value of 1 if equities are overvalued (zero otherwise).[91] If firms were timing the equity market, they would increase reliance on equities during periods of overvaluation and thus depressing their leverage ratios. If we assume that firms did not initially deviate from their target levels, market timing would cause firms to increase their absolute distance levels. We regress the expression in equation 5-9 with the overvaluation dummy as the key explanatory variable and the results are reported in the first four columns of table 5-8. If firms were indeed timing the market, we expect the dummy to significantly

[89] We initially assume that firms did not initially deviate from their target levels.
[90] Our approach draws from Hovakimian et al. (2001) where leverage deficit is measured in absolute terms.
[91] This substitution is intended to ease interpretation of the results.

different from zero and the coefficient to have a positive value. The results indicate that the dummy has a positive and very significant coefficient. Thus firms were indeed timing the market by issuing equities during periods of overvaluation and thus depressing the leverage ratio, causing firms to be under-levered. Relaxing the assumption that firms are operating at their target levels, we regress the change in distance and the results are reported in the last four columns of table 5-8. We find that the overvaluation dummy has a positive and significant coefficient as expected, confirming our earlier findings. Thus we are able conclude that firms indeed to adjust their issues to reflect equity mispricing. Managers increase equity issues during periods of overvaluation and reduce reliance on debt levels causing firms to deviate from their target levels. In the presence of undervaluation, firms would resort to debt financing leading to the over-levered scenario.

Table 5.8: Determinants of Distance and Change of Distance from Target Leverage: Under-Levered Firms

	Predicted Sign	$DISTBD_{FM}$	$DISTBD_{TOB}$	$DISTMD_{FM}$	$DISTMD_{TOB}$	$\Delta DISTBD_{FM}$	$\Delta DISTBD_{TOB}$	$\Delta DISTMD_{FM}$	$\Delta DISTMD_{TOB}$
CONST		0.0802***	-0.0117	-0.1914***	0.1472***	-0.1182***	-0.1789***	-0.1141***	-0.1420***
		(0.0209)	(0.0235)	(0.0310)	(0.0307)	(0.0178)	(0.0189)	(0.0399)	(0.0348)
OVVD	+	0.0063***	0.0062***	0.0059***	0.0082***	0.0165***	0.0216***	0.0214***	0.0223***
		(0.0016)	(0.0018)	(0.0020)	(0.0020)	(0.0018)	(0.0018)	(0.0036)	(0.0023)
MTB		-0.0026***	-0.0034***	0.0400***	-0.0250***	-0.0044***	-0.0051***	-0.0464***	-0.0145***
		(0.0007)	(0.0008)	(0.0021)	(0.0019)	(0.0009)	(0.0009)	(0.0036)	(0.0029)
NDTS		0.1527***	0.1029***	-0.1026***	-0.0091	0.1848***	0.1399***	0.2103***	0.0769
		(0.0274)	(0.0284)	(0.0352)	(0.0351)	(0.0244)	(0.0294)	(0.0467)	(0.0467)
SIZE		0.0035*	0.0043**	0.0019	-0.0025	0.0112***	0.0133***	0.0174***	0.0089***
		(0.0020)	(0.0021)	(0.0026)	(0.0026)	(0.0015)	(0.0016)	(0.0040)	(0.0034)
TANG		0.0207*	0.0630***	-0.0072	0.0674***	0.0507***	0.0840***	0.0656***	0.0963***
		(0.0124)	(0.0134)	(0.0137)	(0.0145)	(0.0096)	(0.0107)	(0.0148)	(0.0131)
ETR		-0.0088***	-0.0035	0.0118***	-0.0050***	-0.0142***	-0.0059***	-0.0202***	-0.0071***
		(0.0010)	(0.0007)	(0.0012)	(0.0007)	(0.0008)	(0.0006)	(0.0012)	(0.0009)
BD / MD		-	-	-	-	-0.6356***	-0.6022***	-0.6846***	-0.4336***
		-	-	-	-	(0.0251)	(0.0237)	(0.0279)	(0.0272)
Observations		5816	6105	5433	6087	4579	4858	4269	4848
R^2		0.5691	0.6235	0.6313	0.6374	0.4493	0.4382	0.4571	0.3914
Adjusted R^2		0.4755	0.5449	0.5515	0.5626	0.3313	0.3225	0.3434	0.2690
Wald(p-values)		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Period		1981-2007	1981-2007	1981-2007	1981-2007	1982-2007	1982-2007	1982-2007	1982-2007

The dependent variable is distance from target leverage for columns 1 to 4 and change in distance for columns 5 to 8. Distance and change in distance is measured in absolute terms ($|D_{it}^{*} - D_{it}|$). Regressions control for firm fixed effects and include year dummies. Rogers (1993) standard errors are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

5.5. Equity Mispricing and Security Issue Choice

In this section we discuss the second part of our empirical analysis. This section will look at how equity mispricing influences firms' security choice. In a multivariate analysis using logistic models, we test how well equity mispricing predicts the likelihood that a firm will issue a particular type of security. The key explanatory variable will be our mispricing measure, the undervaluation dummy and the estimates will done by including control variables drawn from previous studies of capital structure.[92] Given the predictions of the market timing theory, we expect the undervaluation dummy to have a positive coefficient in the debt vs. equity choice.

5.5.1. Determinants of Issue Choice and Issue Size

Similar to the previous studies we include known determinants as control variables. The non-debt tax shield is expected to have a negative coefficient as DeAngelo and Masulis (1980) argue that tax deductions for depreciations can substitute as tax benefits of debt financing. Size and tangibility are expected to have a positive coefficient as larger firms and firms with more tangible assets are more likely to issue debt over equity. We expect the sign of the effective tax rate to be positive. Similar to Elliot et al. (2008) we include leverage and the industry median leverage as a proxy for target leverage. In the spirit of Elliot et al. (2007 and 2008) we exclude the market-to-book ratio to avoid the multiple interpretations associated with this ratio. Given that the main aim is to separate the growth and valuation measures in our regressions, we instead capture growth opportunities via the inclusion of capital expenditure and research and development expenses as well as the RDD dummy which takes the value of 1 if research and development expenses is not available in Datastream. We expect the coefficient of capital expenditure to be positive given that tangible investments would generate a more fixed stream of income and thus more likely to be financed via debt issues. Research and development on the other hand is expected to be negatively related with debt issues. Lastly we include cash and expect a negative relationship with debt issues.

[92] Our controls are based on our empirical priors i.e. Rajan and Zingales (1995), Hovakimian et al. (2001),Flannery and Rangan (2006), Hovakimian (2006) and Elliot et al. (2008).

Similar to Huang and Ritter (2009) we estimate a two step model to estimate the issue decision and issue choice.[93] Several previous studies use a logit or probit approach (see Jung et. al. (1996) and Mackie-Mason (1990)) and implicitly assume the choice between issuing versus not issuing is exogenous. While Huang and Ritter's (2009) approach accounts for this problem, they do not distinguish the order of the decision and the approach doesn't allow clustering at firm levels. Hence their specification may suffer from correlation bias within groups. Our approach endogenizes the decision to issue or not to issue securities and further distinguishes the decision order of the approach adopted by managers which is a more realistic approach given that managers resort to external financing only after exhausting internal funds. Furthermore, our analysis also broadens the analysis to include the repurchase decision which has also influences capital structure. The decision tree is represented graphically in figure 5-3. Firms would make an initial decision to issue (or to repurchase) versus a no issue base (or not to repurchase). In the second stage firms would choose between issuing (or repurchasing) debt and equity.

We report the regressions as expressed in equation 5-10 and 5-11 in the first two columns of table 5-9 for issue versus no issue decisions and the second stage of pure debt issues versus pure equity issues.[94] The explanatory variables have some expected results and some surprising results. Cash, research and development expenses and non-debt tax shields have an inverse correlation as expected. Capital expenditure and firm size on the other hand have a positive sign as expected. Surprisingly the coefficients for asset tangibility and effective tax rate are negative.[95] More importantly the undervaluation dummy has a positive and is significant at 1%. This suggests that equity mispricing strongly predicts security issue choice. The odds ratio for this coefficient is 7.7341. In the third and fourth column we report the results for all debt issues (which include simultaneous debt issues and equity repurchasing). The coefficient is larger and is significant at 1%. The odds ratio is also larger (about 12.2405). Next we consider the repurchase decision.[96]

[93] Our study differs from theirs as we utilise a sequential logit model instead of a nested logit.
[94] All regressions contain unreported year dummies and robust standard errors clustered at firm level as discussed in detail in Peterson (2009).
[95] Antoniou et al. (2008) document a similar correlation for effective tax rate.
[96] Firms are defined as retiring debt when net debt issued scaled by assets is less than -5% and repurchasing equity when net equity issued is less than -5%.

Given that the market timing theory would imply that firms repurchase equity during periods of undervaluation and retire debt during periods of overvaluation, we change the binary variable issue type to be 1 when firms are repurchasing equity and 0 when firms are retiring debt. The results for estimating pure equity repurchases versus pure debt retired are reported in column 5 and 6. We find that the undervaluation dummy is positive and significant as expected. The odds ratio is calculated to be 8.7717. Thus our results indicate that equity mispricing does indeed drive repurchasing behaviour. Column 7 and 8 in the table further considers all equity repurchases versus all debt retired. The results are as expected where the undervaluation dummy has a larger coefficient and is significantly different from zero. The odds ratio is 16.8195, indicating that firms are more likely to retire debt during periods of overvaluation and repurchase equity during periods of undervaluation.

Hovakimian et al. (2001) find that issue size should be considered differently from issue choice and thus we consider issue size separately. Following their definition of issue size (net debt issued scaled by assets at the beginning of the year), we report the results in the first column of table 5-10. Following Hovakimian, et al. (2004) we include issue size and expect a negative correlation due to equity issues being larger than debt issue. We find that the undervaluation dummy is positive as expected and remains significant at 1%. In addition the effect is larger for issue size, hence the odds of firms making larger issues to reflect equity mispricing is higher as firms are more likely to make larger debt issues during periods of undervaluation and larger equity issues during periods of overvaluation. This indicates that the impact of market timing is larger on issue size relative to issue choice. The next column looks at all issue and reveals a similar positive significant coefficient. The effect is larger and the odds ratio is also larger. Further to that we consider repurchase size as well. The results for pure repurchase size are reported in the third column of table 5-10. Similarly, equity mispricing is significantly predicts repurchasing behaviour where the odds ratio is calculated to be 12.4013. Furthermore, we consider all repurchases in the last column of the table and find that the effect is larger and significant. The odds ratio (20.5775) is also much larger. Thus we are able to conclude that the market timing theory is able to predict security issue and repurchase choice as well as size.

Figure 5.3: Firms Issuing/ Repurchasing Decision Tree

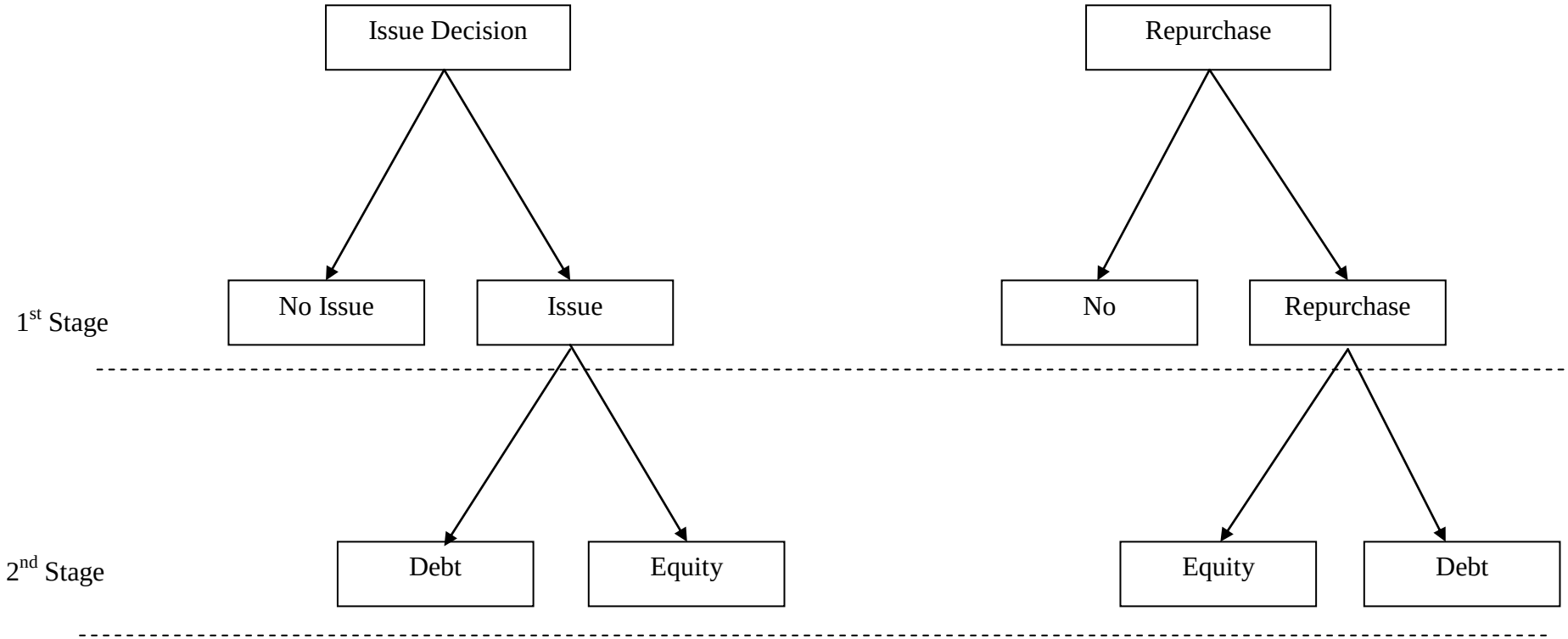


Table 5.9: Determinants of Issue Decision and Choice of Financing

	Pure Issues		All Issues		Pure Repurchases		All Repurchases	
	Issue Decision	Choice Decision	Issue Decision	Choice Decision	Repurchase Decision	Choice Decision	Repurchase Decision	Choice Decision
	Issue (vs. No Issue)	Debt (vs. Equity)	Issue (vs. No Issue)	Debt (vs. Equity)	Repurchase (vs. No Repurchase)	Equity (vs. Debt)	Repurchase (vs. No Repurchase)	Equity (vs. Debt)
CONST	0.5291	-1.9030***	0.7783**	-2.1047***	-0.7069*	-2.2966***	-0.1480	-1.9003***
	(0.3516)	(0.6112)	(0.3455)	(0.5512)	(0.4073)	(0.8728)	(0.3891)	(0.7122)
UNDVD	0.2890***	2.0456***	0.1347**	2.5048***	-0.3494***	2.1715***	-0.2812***	2.8225***
	(0.0604)	(0.1150)	(0.0565)	(0.5512)	(0.0731)	(0.1505)	(0.0626)	(0.1301)
NDTS	-2.8259***	-1.1041	-1.7199**	-2.2468	4.6297***	-14.0255***	3.3959***	-14.0150***
	(0.9278)	(1.4276)	(0.7962)	(1.3987)	(0.9750)	(2.4635)	(0.8102)	(2.6327)
SIZE	-0.1598***	0.0225	-0.1549***	0.0306	0.0110	0.0308	-0.0415**	-0.0267
	(0.0181)	(0.0367)	(0.0172)	(0.0325)	(0.0207)	(0.0433)	(0.0190)	(0.0347)
TANG	-1.4358***	-1.1821***	-1.3713***	-1.1540***	-0.3799**	1.1441***	-0.6691***	0.6568**
	(0.1952)	(0.2922)	(0.1794)	(0.2713)	(0.1883)	(0.3952)	(0.1732)	(0.3249)
ETR	-0.0758***	-0.0163	-0.0719***	0.0202	-0.0316	0.0023	-0.0314	0.0581
	(0.0220)	(0.0317)	(0.0209)	(0.0333)	(0.0229)	(0.0617)	(0.0208)	(0.0600)
LEVERAGE	4.0558***	8.0004***	4.3856***	6.6935***	1.3636***	-2.9097***	2.7791***	-0.0850
	(0.2763)	(0.7216)	(0.2658)	(0.5935)	(0.2868)	(0.6642)	(0.2503)	(0.4035)
INDL	0.0402	-1.5419	-0.4510	-1.5068	-2.0012	5.0152	-1.2850	2.9767
	(2.1211)	(3.6453)	(2.0453)	(3.2313)	(2.3516)	(4.9585)	(2.2425)	(3.9748)
CAPEX	5.5492***	8.5276***	5.0076***	9.4176***	-2.0479**	4.9925***	0.0516	7.8154***
	(0.6714)	(1.1129)	(0.6229)	(1.0733)	(0.8605)	(1.7796)	(0.6428)	(1.3463)
RD	2.1287***	-2.3999	1.9134***	-1.1743	-0.7292	0.6463	-0.0718	0.6045
	(0.5432)	(2.0086)	(0.5129)	(1.3889)	(0.8382)	(1.5005)	(0.7173)	(1.1832)
RDD	0.1028	0.0352	0.0930	-0.0784	-0.0213	-0.1899	-0.0115	-0.2074
	(0.0698)	(0.1395)	(0.0681)	(0.1260)	(0.0811)	(0.1613)	(0.0756)	(0.1337)
CASH	-0.4748**	-3.8340***	-0.4740**	-3.2555***	-0.9880***	3.4579***	-0.8647***	2.3004***
	(0.2036)	(0.5561)	(0.1920)	(0.4955)	(0.2519)	(0.6127)	(0.2165)	(0.4327)
Observations	7655		8384		6248		7128	
Chi^2 Test (p-values)	0.0000		0.0000		0.0000		0.0000	
Period	1981-2008		1981-2008		1981-2008		1981-2008	
Dependent = 1	2813	1513	3582	1869	1581	643	2401	1019
Dependent = 0	4842	1300	4802	1713	4667	938	4727	1382
Odds ratio for UNDVD	1.3351	7.7341	1.1441	12.2405	0.7051	8.7717	0.7459	16.8195

The table reports results from the sequential logit regressions. For columns 1 to 4, the passive firms are the base for the first level and the dependent variable equals 1 when firms issue securities and 0 if otherwise. Equity issuers are the base for the second level and the dependent variable is 1 if firms issue debt and 0 if firms issue equity. For columns 5 to 8, passive firms are the base for the first level and the dependent variable equals 1 when firms repurchase security and 0 if otherwise. Firms that retire debt are the base for the second level and the dependent variable is 1 if firms repurchase equity and 0 if firms retire debt. All regressions contain unreported year dummies and robust standard errors clustered at the firm level are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

5.5.2. Considering Passive Firms

In this section we consider issue choice for a firm against a no-transaction alternative. This allows us to examine how equity mispricing and market timing influences the decision to issue (or repurchase) versus a passive framework. This enriches our analysis at it allows to test whether market timing influences issue decision as well as type of issue. We estimate the following eight different scenarios relative to a no issue alternative:

i. Pure debt issue versus no issue
ii. Issue debt and repurchase equity versus no issue
iii. All debt issue versus no issue
iv. Equity repurchase versus no repurchase
v. Equity issue accompanied by debt reduction versus no issue
vi. All equity issue versus no issue
vii. Debt reduction versus no reduction

The results of the first scenario are reported in the first column of table 5-11. We find that the undervaluation dummy is positive and significant. The odds ratio of the undervaluation dummy is 4.5213, thus the probability of issuing debt versus no issue is higher during periods of undervaluation. The results in the second column shows that the undervaluation dummy has a larger coefficient (the odds ratio is also much higher, 6.2451) suggesting that equity mispricing plays a more important role in debt issues accompanied by equity reductions. The results in the third column are similar to that of the first column as expected. In the fourth column we report the fourth scenario, and find that the undervaluation dummy has a positive sign and is significant (the odds ratio is 2.2596). This suggests that equity reduction decision can be significantly attributed to equity undervaluation. The fifth to seventh column shows that the undervaluation dummy has a significantly negative coefficient as expected. Similar to the results for debt issues accompanied with equity reductions, equity issues accompanied with debt reductions are more likely to be influenced by equity mispricing as the odds ratio is also higher.[97] This suggests that equity

[97] The odds ratio for the undervaluation dummy for the fifth, sixth and seventh columns are 0.3956, 0.0483 and 0.2746. The odds indicate that the action studies in these columns are much more likely when the undervaluation dummy had a value of zero (equity was overvalued).

mispricing plays an important role in firms' decisions to substitute one form of financing for another. The last column reports the decision to reduce to debt levels versus a no reduction scenario. The undervaluation dummy has a negative sign as expected and is statistically significant, where the odds ratio is 0.2431. This indicates that firms are more likely to retire debt during periods of overvaluation (when the undervaluation dummy takes the value of zero).

Next, we model firms' decisions to make security issues and reductions against passive firms' alternative in a multinomial framework. To provide robustness we estimate the multinomial logit with two different frameworks. Firstly we look at pure debt issue, pure equity issues, pure debt reductions, pure equity repurchases and passive firms. We model the issue type decision in equation type using passive firms as a base in a multinomial logit model. The results are reported in table 5-12. Consistent with the predictions of the market timing theory, the undervaluation dummy has a positive correlation with the pure debt issue decision as documented in the first column. The second column shows that the undervaluation dummy has a negative correlation as predicted by the market timing theory. The correlation for the pure debt reductions is also negative in the third column. This implies that during periods of overvaluation firms are more likely to reduce debt. The last column indicates that firms are also likely to repurchase equity during periods of undervaluation. The results imply that firms are more likely to issue debt rather than repurchase equity during periods of undervaluation. Further to that, firms are more likely to reduce debt during periods of overvaluation relative to issue equity.

Lastly, we include pure debt issues, debt issues accompanied with equity repurchase, pure equity issues, equity issues accompanied with debt reduction, pure equity repurchase and passive firms as a base. The results of the multinomial logit regression are reported in the table 5-13. Looking across the table, the signs of the undervaluation dummy is as expected and significant at 1% indicating that equity mispricing is a significant determinant of firms financing decisions. Looking at the first two columns we find that equity mispricing plays a more important role in firms issuing debt accompanied with equity repurchased than in pure debt issues. Columns 3 and 4 indicate that equity mispricing plays a more important role in firms' decisions to issue equity accompanied with debt reductions relative to pure equity issues. Comparing the results in the last two columns further confirms this notion.

Table 5.10: Determinants of Issue and Repurchase Size

	Pure Issues	All Issues	Pure Repurchases	All Repurchases
	Debt (vs. Equity)	Debt (vs. Equity)	Equity (vs. Debt)	Equity (vs. Debt)
CONST	0.9768	-0.7245	-2.6659**	-1.3773
	(1.1916)	(1.0715)	(1.2299)	(0.8765)
UNDVD	2.1921***	2.6910***	2.5178***	3.0242***
	(0.1505)	(0.1265)	(0.2016)	(0.15870
NDTS	-1.5525	-2.5804	-7.3370*	-9.2671***
	(2.4852)	(2.5653)	(4.1065)	(3.5240)
SIZE	-0.0512	0.0189	-0.0000	-0.0300
	(0.0482)	(0.0387)	(0.0582)	(0.0413)
TANG	-1.7870***	-1.3855***	1.9497***	1.1109***
	(0.3829)	(0.3255)	(0.4900)	(0.3818)
ETR	-0.0134	0.0093	0.0299	0.0705
	(0.0429)	(0.0389)	(0.0660)	(0.0602)
LEVERAGE	8.2234***	5.8641***	-2.7228***	-0.1630
	(0.9096)	(0.6507)	(0.8027)	(0.4389)
INDL	-1.9657	-2.4618	7.0570	0.2310
	(4.8815)	(3.9496)	(6.3583)	(4.4351)
ISSUE SIZE	-9.4374***	-3.4598***	-1.7476**	-1.5023***
	(0.8717)	(0.5353)	(0.7053)	(0.3830)
CAPEX	9.4456***	9.7504***	2.3020	5.6158***
	(1.7608)	(1.4713)	(2.2023)	(1.5280)
RD	-2.5880	-2.6862	1.4028	1.4114
	(2.5019)	(1.8523)	(1.8182)	(1.3693)
RDD	0.4096**	0.0088	-0.6549	-0.1685
	(0.1848)	(0.1536)	(0.2010)	(0.1576)
CASH	-2.8615***	-2.7981***	3.8292***	2.4841***
	(0.7489)	(0.6211)	(0.7122)	(0.5145)
Observations	1835	2613	1151	1883
Pseudo R^2	0.4743	0.4396	0.2958	0.3354
Chi^2 test (p-values)	0.000	0.0000	0.0000	0.000
Period	1981-2008	1981-2008	1981-2008	1981-2008
Dependent = 1	1072	1456	490	833
Dependent = 0	763	1157	665	1050
Odds ratio for UNDVD	8.9540	14.7464	12.4013	20.5775

This table provides results from logistics regressions. In columns 1 and 2, the dependent variable equals 1 when firms issue debt and 0 when firms issue equity. In columns 3 and 4, the dependent variable equals 1 when firms repurchase equity and 0 when firms retire debt. All regressions contain unreported year dummies and robust standard errors clustered at the firm level are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 5.11: Determinants of Issue and Repurchasing Choice: Considering Passive Firms

	Pure Debt Issue (vs. No Issue)	Debt Issue & Equity Reduction (vs. No Issue)	All Debt Issues (vs. No Issue)	Equity Reduction (vs. No Reduction)	Equity Issue (vs. No Issue)	Equity Issue and Debt Reduction (vs. No Issue)	All Equity Issues (vs. No Issue)	Debt Reduction (vs. No Reduction)
CONST	-1.2079*	-2.3108**	-1.1082	-3.8692***	0.4141	-0.7137	0.7430	-0.8515*
	(0.7329)	(0.9219)	(0.7125)	(1.0212)	(0.7617)	(1.3139)	(0.6796)	(0.5146)
UNDVD	1.5088***	1.8318***	1.5330***	0.8152***	-0.9273***	-3.0300***	-1.2924***	-1.4141***
	(0.0944)	(0.1817)	(0.0881)	(0.1125)	(0.0941)	(0.2803)	(0.0899)	(0.1007)
NDTS	-8.4253***	-5.0509	-7.1614***	0.3998	1.1002	4.9136***	2.1065**	7.1144***
	(2.1452)	(4.0156)	(2.0807)	(1.5681)	(1.0096)	(1.5135)	(0.9151)	(1.3663)
SIZE	-0.1857***	-0.2205***	-0.1939***	0.0271	-0.1222***	-0.0840**	-0.1181***	0.0170
	(0.0253)	(0.0428)	(0.0235)	(0.0363)	(0.0264)	(0.0403)	(0.0230)	(0.0236)
TANG	-1.7395***	-1.3275***	-1.7796***	0.1747	-1.0186***	-0.7076**	-0.8709***	-0.6737***
	(0.2558)	(0.4121)	(0.2417)	(0.3059)	(0.2769)	(0.3500)	(0.2244)	(0.2327)
ETR	-0.0556*	0.0911*	-0.0352	0.0104	-0.0866***	-0.0735**	-0.0910***	-0.0454*
	(0.0326)	(0.0522)	(0.0309)	(0.0346)	(0.0266)	(0.0337)	(0.0264)	(0.0274)
LEVERAGE	7.7240***	8.8327***	8.2038***	-0.1742	-0.2685	2.4595***	0.5351	2.3061***
	(0.4440)	(0.5262)	(0.4302)	(0.5402)	(0.3989)	(0.4735)	(0.3304)	(0.3429)
INDL	-0.5031	-4.4273	-1.4223	1.5003	0.0764	-2.5854	-0.5558	-4.6889*
	(2.8832)	(4.7029)	(2.6259)	(3.8521)	(2.9413)	(4.4860)	(2.3003)	(2.7792)
CAPEX	11.0601***	8.7229***	10.9711***	0.0689	1.1771	-2.0892	0.2375	-3.8753***
	(1.1859)	(1.8306)	(1.1158)	(1.1362)	(0.8938)	(1.5265)	(0.7878)	(1.1812)
RD	-1.3357	4.0140***	0.4990	-1.0231	1.8789***	0.6857	1.6894***	-0.5050
	(1.7655)	(1.2399)	(1.2547)	(1.1679)	(0.5607)	(1.0799)	(0.5334)	(1.1592)
RDD	0.0379	-0.2191	0.0442	-0.0950	0.0804	0.1259	0.1178	0.0152
	(0.0954)	(0.1564)	(0.0861)	(0.1216)	(0.0986)	(0.1514)	(0.0927)	(0.1002)
CASH	-3.4184***	-0.6088	-2.8945***	0.7180**	-0.2015	-0.6455	-0.2547	-2.7916***
	(0.4386)	(0.6155)	(0.3732)	(0.3195)	(0.2430)	(0.4076)	(0.2237)	(0.4213)
Observations	6115	4960	6518	5240	5929	5295	6410	5572
Pseudo R^2	0.2815	0.3262	0.2972	0.0527	0.0917	0.1491	0.0948	0.1135
Chi^2 Test (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Period	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007
Dependent = 1	1417	351	1820	635	1223	453	1669	934
Dependent = 0	4698	4609	4698	4605	4706	4842	4741	4638
Odds ratio for UNDVD	4.5213	6.2451	4.6320	2.2596	0.3956	0.0483	0.2746	0.2431

This table provides results from logistics regressions. The dependent variable takes the value of 1 when firms issue and / or repurchase securities and 0 if firms are passive. All regressions contain unreported year dummies and robust standard errors clustered at the firm level are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 5.12: Multinomial Logit Analysis of Pure Security Issues and Reductions (Passive Firms are the Base)

	Pure Debt Issue	Pure Equity Issue	Pure Debt Reductions	Pure Equity Repurchase
CONST	-2.3424***	-1.2445***	-1.3406***	-2.2811***
	(0.1020)	(0.0838)	(0.0872)	(0.1083)
UNDVD	1.4466***	-0.9716***	-1.3866***	0.6902***
	(0.0843)	(0.0875)	(0.0927)	(0.1039)
NDTS	-6.6032***	1.3343	5.1898***	0.9733
	(1.8351)	(1.0073)	(1.1623)	(1.3920)
SIZE	-0.1577***	-0.1157***	0.0168	0.0386
	(0.0226)	(0.0255)	(0.0216)	(0.0352)
TANG	-1.5851***	-1.0405***	-0.7586***	0.1560
	(0.2179)	(0.2692)	(0.2147)	(0.2828)
ETR	-0.0735**	-0.0771***	-0.0531**	0.0109
	(0.0305)	(0.0264)	(0.0264)	(0.0322)
LEVERAGE	6.7055***	-0.3803	2.5325***	-0.4718
	(0.3476)	(0.4452)	(0.3408)	(0.5566)
INDL	0.4898	0.0656	-4.3337*	0.9452
	(2.6750)	(2.8421)	(2.5245)	(3.4380)
CAPEX	10.0299***	1.3648	-3.3064***	0.3274
	(0.9122)	(0.9940)	(1.0680)	(1.0533)
RD	-1.5625	2.1508***	-0.0774	-0.4767
	(1.5915)	(0.5257)	(1.0141)	(0.9838)
RDD	-0.0166	0.0810	0.0332	-0.0986
	(0.0903)	(0.0955)	(0.0972)	(0.1163)
CASH	-3.3252***	-0.2309	-2.7124***	0.5947*
	(0.3947)	(0.2359)	(0.3697)	(0.3048)
Observations	9200	9200	9200	9200
Pseudo R^2	0.1276	0.1276	0.1276	0.1276
Chi^2 Test (p-values)	0.0000	0.0000	0.0000	0.0000
Period	1981-2007	1981-2007	1981-2007	1981-2007
Dependent = 1	1494	1277	963	661
Dependent = 0	4805	4805	4805	4805
Odds ratio for UNDVD	4.2486	0.3785	0.2499	1.9941

This table provides results from multinomial logistics regressions. Column 1 reports results for pure debt issuers, column 2 for pure equity issuers, column 3 for pure debt reductions and column 4 for pure equity repurchases. Passive firms the base in the regressions. All regressions contain unreported year dummies and robust standard errors clustered at the firm level are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

Table 5.13: Multinomial Logit Analysis of All Security Issues and Reductions (Passive Firms are the Base)

	Pure Debt Issues	Issue Debt & Repurchase Equity	Pure Equity Issues	Issue Equity & Retire Debt	Pure Debt Reductions	Pure Equity Reductions
CONST	-2.0219***	-3.8130***	-1.2450***	-1.9171***	-1.0888***	-2.3612***
	(0.0988)	(0.1708)	(0.0863)	(0.1225)	(0.0856)	(0.1112)
UNDVD	1.3377***	1.8689***	-0.9605***	-2.9475***	-1.4732***	0.7238***
	(0.0841)	(0.1520)	(0.0871)	(0.2646)	(0.0932)	(0.1042)
NDTS	-6.1374***	-4.4279*	1.4012	3.3021***	5.4366***	1.1594
	(1.7868)	(2.6495)	(0.9963)	(1.1296)	(1.0728)	(1.3391)
SIZE	-0.1362***	-0.1835***	-0.1171***	-0.1172***	0.0306	0.0368
	(0.0223)	(0.0361)	(0.0252)	(0.0348)	(0.0218)	(0.0349)
TANG	-1.5633***	-2.2254***	-0.9680***	-0.8387***	-0.7578***	0.2267
	(0.2130)	(0.3174)	(0.2644)	(0.3133)	(0.2133)	(0.2778)
ETR	-0.0717**	0.0165	-0.0833***	-0.0805***	-0.0562**	0.0112
	(0.0320)	(0.0465)	(0.0276)	(0.0294)	(0.0279)	(0.0327)
LEVERAGE	6.7653***	8.0703***	-0.2399	2.8581***	2.6277***	-0.5299
	(0.3319)	(0.3968)	(0.4365)	(0.4801)	(0.3369)	(0.5514)
INDL	0.4831	-4.6924	-0.0168	-0.4304	-3.8702	1.1823
	(2.6521)	(3.3574)	(2.7559)	(3.8569)	(2.5506)	(3.4127)
CAPEX	10.0492***	10.3052***	1.2884	-1.3115	-3.2599***	0.2115
	(0.8757)	(1.0576)	(0.9783)	(1.3534)	(1.0278)	(1.0430)
RD	-0.4277	1.6692	1.9510***	0.6737	0.4686	-0.8429
	(1.4470)	(1.4596)	(0.5303)	(0.9046)	(0.9941)	(0.9968)
RDD	0.0206	-0.2241	0.0839	0.1238	0.0428	-0.1069
	(0.0887)	(0.1451)	(0.0950)	(0.1374)	(0.0967)	(0.1168)
CASH	-3.8665***	-1.7800***	0.0539	-0.9838***	-2.7980***	0.8056***
	(0.4445)	(0.5229)	(0.2206)	(0.3580)	(0.3839)	(0.2799)
Observations	10077	10077	10077	10077	10077	10077
Pseudo R^2	0.1309	0.1309	0.1309	0.1309	0.1309	0.1309
Chi^2 Test (p-values)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Period	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007	1981-2007
Dependent = 1	1503	379	1287	449	971	663
Dependent = 0	4825	4825	4825	4825	4825	4825
Odds ratio for UNDVD	3.8103	6.4812	0.3827	0.0525	0.2292	2.0623

This table provides results from multinomial logistics regressions. Column 1 reports results for pure debt issuers, column 2 firms that issue debt accompanied with equity repurchases, column 3 for pure equity issuers, column 4 for firms that issue equity and reduce debt, column 5 for pure debt reductions and column 6 for pure equity repurchases. Passive firms the base in the regressions. All regressions contain unreported year dummies and robust standard errors clustered at the firm level are reported in parentheses. (*), (**) and (***) indicate that coefficients are significant at 10, 5 and 1 % level, respectively.

5.6. Conclusion

Previous studies have documented market timing plays an important role in firms issue decisions. In this paper we examine the issue decisions for UK firms. The findings reveal how firms time their issues and its influence on firms' capital structure. This paper looks at how such timing decisions influence deviation from target leverage levels. We further investigate the impact of market timing on issue choice and size as well as repurchasing choice and size. Expanding the empirical test, we scrutinize whether firms decision to simultaneously issue and repurchase securities are influenced by market timing considerations.[98]

Looking at the first section of our empirical specifications, we find that firms time security issues and these timing attempts causes them to deviate from target levels. This finding is robust whether we assume firms do or do not initially deviate from target leverage. These findings allow us to infer that firms are trading off the cost of deviating from target with the benefit gained from timing the market. We further examine the effect for firms above and under their target levels and arrive at similar conclusions. The second section of our analysis looks at timing of security issues. We find that both security issue and repurchasing choice and size is driven by equity mispricing, indicating that market timing plays an important role in both decisions. Furthermore, we find that decision to issue versus a no issue alternative is also significantly determined by market timing considerations. Lastly we find that firms reduce (increase) debt levels and increase (decrease) equity issues in periods of undervaluation (overvaluation). This allows us to conclude that firms are actively substituting one form of financing with the other to lower overall cost of capital in order to maximise value.

We are thus able to conclude that firms significantly time the market. The effect is evident and leads to firms deviating from their target levels. Issuing and repurchasing behaviour is also driven by market timing attempts. This is robust to considering issue choice and also issue size. Firms also actively change the financing mix to reflect equity mispricing and thus market timing plays a critical role in determining capital structure decisions.

[98] We estimate equity issues accompanied with debt reductions and debt issues accompanied by equity repurchasing.

Chapter 6 : Conclusions, Implications, Limitations and Further Research

The market timing theory of capital structure has attracted a substantial amount of research. However the empirical studies fail to provide a conclusive framework which is subjected to divergent views of market timing. To address this issue, these thesis look at several eminent aspects relevant to financing policy which are critical in providing a comprehensive understanding of the market timing theory.

6.1 Summary and Conclusions

The examination of the market timing theory in this thesis provides empirical evidence from the UK on how the behavioural concerns influence capital structure decisions. The study looks at the IPO and SEO event in the third chapter. In addition we consider whether firms' time repurchases as well as security issues in the second and third empirical chapter. In the second empirical chapter we indulge in the impact of financial constraints on timing behaviour as well as whether target levels influence timing attempts. Finally in the third empirical chapter we provide an alternative view for timing in the target leverage framework. We also examine the decision of managers to actively alter the composition of capital structure beyond financing needs.

The first empirical chapter shows that market timing does prevail in the IPO and SEO market in the UK. The literature discussed in this thesis finds ample support the market timing theory. If managers believe that market conditions are favourable, they would issue more equity during such periods leading to financing in waves. Thus we utilise the number of IPOs and SEOs in this chapter and identify timers as firms that issue during hot periods. We discuss the timing attempts of firms in both markets by looking at three different angels. The first angle examined is how do managers view hot markets? If the market timing theory holds managers would view hot markets as windows of opportunity and thus we would observe timing attempts by firms. Secondly, why do firms time the market? Firms typically raise funds to finance their projects and increase firm value. Thus it is puzzling why firms issue in particular waves to raise equity capital which leads to abnormal

peaks in financing patterns. The last angle covered in this chapter is the impact of timing attempts on the firm's capital structure. If firms do indeed time the equity market, they would be below their target levels and thus attempt to increase debt levels in subsequent years.

We find that firms do benefit from timing issuance in both markets. In both instances, firms of inferior quality issue during hot markets suggesting that they would otherwise have difficulty in raising capital. These findings are in line with Alti (2006) and DeAngelo et al. (2010). Further to that the motivations for issuing during hot periods differ in both markets. IPO firms seem to be motivated by pure timing incentives. SEO firms on the other hand seem to view hot markets as opportunities to lower leverage levels. Thus IPO firms do attempt to increase leverage levels in subsequent years. SEO firms as expected do not exhibit a similar trend given that their motivations differ. The aspect of inferior quality warrants further research and we are currently designing research questions to address this interesting aspect of market timing. In addition we also believe that targeting behaviour plays a critical role in timing attempts and as such is investigated further in the subsequent chapters. Table 6.1 summarises the findings and contributions of the fourth chapter and provides a relative comparison to the literature.

The second empirical chapter looks at timing behaviour in financing the deficit. This chapter looks at equity mispricing and provides direct empirical tests of the market timing theory. We look at timing behaviour from four aspects in this chapter. The first aspect examined looks at whether managers increase (decrease) reliance on equity during periods of overvaluation (undervaluation). Secondly, we question whether financial flexibility influences timing behaviour. Findings in previous studies provide contentions in this issue and I test the issues in a more direct manner to provide answers and insights. Next, we examine whether managers do indeed time repurchases of securities. The last angle covered looks at how targeting behaviour influences or limits timing behaviour. The literature provides theoretical and empirical justifications that firms do have target levels and constantly attempt to adjust towards such levels.

Table 6.1 Summary of Contributions and Findings for Chapter 4.

Issue	Findings and Contributions	Relative to literature
	IPO Markets	
Proceeds	We find that firms in the hot market raise more equity than cold markets.	Alti (2006) finds a similar correlation for US firms
Net debt issued in IPO year	We do not find a difference in the level of net debt issues for the IPO market.	Alti (2006) finds hot market firms in the US issue significantly less debt relative to cold market firms
Pre-IPO Leverage	We do not find a difference in the level of pre-IPO hot and cold market firms	Alti (2006) also records a similar level of pre-IPO leverage
Investment levels	Hot market firms have lower levels of investments suggesting they are inferior	A similar trend is documented in Alti (2006) for US firms
Profitability levels	Hot market firms are less profitable, further validating quality difference	Hot market firms in the US are also less profitable as documented in Alti (2006)
Dividend payouts	There is no significant difference in the amount of dividends paid	In the US market, hot market firms payout significantly higher levels of debt (Alti, 2006)
Impact on the short run	Hot market firms issue more equity and decrease leverage ratios to a larger extent than cold market firms.	The impact in the US is similar but more pronounced and market timing is more evident (Alti, 2006)
	Hot market firms stockpile significant more cash than cold market firms	The finding is similar to US firms (Alti, 2006)
Impact on the long run	We do not document a persistence in the effect of market timing in the IPO market in the UK	Our findings are similar to Alti (2006) however contrasts Baker and Wurgler (2002) who find a persistence in the effect of market timing
Reversal	Hot market firms do have a larger reliance on debt issues in the 1st year after the IPO event. Our results however differ from the US market as we document a convergence to a similar level of leverage where hot market firms increase debt issue while hot market firms reduce debt issues	In the US Alti (2006) finds that firms reverse the effect of market timing in the first two years after the IPO event

Table 6.1 (con't) Summary of Contributions and Findings for Chapter 4.

Issue	Findings and Contributions	Relative to literature
	SEO Markets	
Proceeds	We find that firms in the hot market raise more equity than cold markets	In line with expectations from Alti (2006)
Net debt issued in SEO year	We find that hot market firms issue significantly less debt than cold market firms	In line with expectations from Alti (2006)
Pre-SEO Leverage	Hot market firms have significant higher levels of leverage in the pre-issue year	These are contrasting to expectations from Alti(2006) suggesting differing motives in the SEO market
Investment levels	Hot market firms have significantly lower levels of investments suggesting less growth potential	The findings are in line with Alti (2006) in the US market
Profitability levels	Market timers have lower levels of profitability, validating quality inferiority	Findings are coherent with expectations from Alti (2006) study of US firms in the IPO market
Dividend payouts	There is no significant difference in the amount of dividends paid	The results are contrasting to expectations in the literature for US firms (Alti, 2006)
Impact on the short run	Hot market firms decrease leverage. Cold market firms contrastingly increase leverage	Our results reveal a different motivation for issuing in the SEO market and allow a different view relative to IPO market timing in the US market
	We do not document cash stockpiling by hot market firms	Although differing from expectations built from Alti (2006), the motivations of targeting do not lead us to expect cash stockpiling by firms issuing in the hot SEO market.
Impact on the long run	There is no persistence in the hot market effect in the SEO market in the UK	Our findings differ from initial expectations from Alti (2006) as timing attempts have different motives in the SEO market
Reversal	We do not document a reversal in the market timing effect	The findings are different with expectations from Alti (2006) but in line with our arguments of different motives in the SEO market

Based on the empirical evidence for these four aspects we are able to reach several conclusions as follows. Consistent with the literature for US studies i.e. Elliot et al. (2007), we find that firms increase equity issues during periods of overvaluation and thus a larger portion of the deficit would be financed by equity relative to periods of undervaluation. Furthering the debate in the literature, we find that constrained firms are more inclined to time security issues as well as repurchases. During periods of overvaluation constrained firms issue more equity and retire more debt. When equity is undervalued, firms issue more debt and repurchase more equity. This suggests that during such periods the cost of issuing and repurchasing has fallen allowing constrained firms to benefit the most by timing their issues and repurchases. The third and fourth issues need to be looked at in a parallel view given that the implications from these aspects are tied in. Starting from a viewpoint where it is assumed that firms do not have a target leverage level, or they do not deviate from these levels, we find that repurchasing is significantly influenced by equity mispricing, confirming with results in Oswald and Young (2004) and contrasting findings reported in Rau and Vermaelan (2002). Contributing further, we relax this assumption and find that issuing and repurchasing is only influenced by equity mispricing if these actions are in line with targeting behaviour. Introducing the influence of distance from target leverage into the analysis further shows firms' time issues and repurchases in line with reaching target levels which is consistent with the findings in Warr et al (2011). Thus we are able to draw from these findings that managers are acutely aware of the cost of being off target and actively trade-off these cost with benefits gained from timing equity markets. Table 6.2 summarises the findings and contributions of the fifth chapter and provides a relative comparison to the literature.

The third empirical chapter looks at the relationship between market timing and deviation from target levels. Building from Hovakimian (2004) and providing and alternative view of timing actions from Warr et. al. (2011), we investigate whether firms timing attempts causes them to deviate from target levels and model the determinants of deviation from target levels. In line with Huang and Ritter (2009) I develop a two stage framework to examine the issue and repurchase decision of firms in the UK. This allows the study to address the endogeneity concerns that arise in previous studies in the literature. Furthermore, we build on the model proposed by Baker and Wurgler (2002) and scrutinize

whether firms' timing attempts go beyond financing their deficit where managers actively swap one form of financing for another and thus altering the composition of their capital structure. We test this notion against a base of passive firms and thus are able to provide a more comprehensive view on the influence of market timing on capital structure.

Looking at these different aspects we are able to draw several main findings and conclusions from the analysis in the empirical sections of this chapter. Firstly, firms do increase leverage levels during periods of undervaluation and increase equity issues during periods of overvaluation. These timing actions cause them to deviate from target levels. Initial tests assume that firms do not deviate from target levels and the results are significant. Relaxing the assumption and allowing for firms to initially deviate from target levels, we find that the effect is larger and still very significant statistically. This important finding suggests that firms actively time issues and deviation from target levels are cause by such attempts, i.e. a reflection of equity mispricing. Secondly, we model issue choice and size and find that both are significantly influenced by equity mispricing. We also provide evidence that repurchasing of equity and retiring of debts in the UK is influenced by equity mispricing. Lastly, we find that managers actively issue debt and repurchase equity during periods of undervaluation and retire debt and issue equity during periods of overvaluation. Thus this points to an active rebalancing on the composition of capital structure by managers to reflect equity mispricing. Table 6.3 summarises the findings and contributions of the sixth chapter and provides a relative comparison to the literature.

Table 6.2 Summary of Contributions and Findings for Chapter 5.

Issue	Findings and Contributions	Relative to literature
Presence of market timing	Our results indicate that firms do adjust composition of deficit to reflect equity mispricing	The results confirm the findings in the US from Barker and Wurgler (2002) and Elliot et al (2007)
	The findings are statistically significant as well as economically significant	This portion of the results contradicts Hovakimian's (2006) findings
Repurchasing	Equity mispricing significantly influences repurchasing activities, indicating that managers do indeed time repurchases.	The findings contradict Rau and Vermaelan (2002) of UK firms but are in line with findings in Oswald and Young (2004) of UK firms and Ikenberry et al. (1995) of US firms
Influence of financial constraints	We find that constrained firms time the market more evidently than unconstrained firms	Our findings contrast Korajczyk and Levy (2003) but are in line with expectations from DeAngelo et al (2010). Both studies are in the US context
	Our findings indicate that the effect is more evident in repurchasing activities	
Influence of target levels	Managers are inclined to time issues to coincide with targeting behaviour	Our findings concur with conclusions in Hovakimian (2004) and are in line with expectations in Warr et al (2011)
	Financial deficit and surplus moderates this behaviour	

Table 6.3 Summary of Contributions and Findings for Chapter 6.

Issue	Findings and Contributions	Relative to literature
Deviation from Target levels	Our results indicate that managers issue debt during periods of undervaluation and this leads them to be over-levered in the post issue period. Furthermore equity is issued during periods of equity overvaluation leading them to be below their target leverage levels.	In line with our expectations market timing attempts lead firms to deviate from target levels. Our findings provide an alternative view from the one suggested in Warr et al (2011)
Issue Size	Equity mispricing influences issue size thus providing support for the market timing theory	Extending the work of Hovakimian et al (2001) we find that market timing implications do influence issue size as well
Issue Choice	We find that firms opt for debt issues during periods of undervaluation and opt for equity issues during periods of equity overvaluation	Our findings concur those of Elliot et al (2008) in the US market
Repurchase Size	Market timing consideration also influence firms repurchase size	Our findings are in line with expectations from Baker and Wurgler (2002) and Elliot et al (2008) in the US market
Repurchase Choice	Our results show that firms repurchase decision is also influenced by equity mispricing.	We extend the literature in the US market, and show that market timing theory also applies to the repurchase choice
Considering passive firms	The results are robust to including passive firms in the analysis	Provides additional robustness to the findings in Baker and Wurlger (2002) and Elliot et al (2008) for firms in the US market
Capital substitution	We find that managers actively swap one form of capital for the other to reflect equity mispricing in line with expectations from the market timing theory	This finding is an extension of the findings of the previous literature and suggests an active form of timing that goes beyond financing the deficit as suggested in Elliot et al (2007) for US firms.

Overall, this thesis provides empirical evidence of the market timing theory for UK firms. In light of this, we are able to conclude that firms in the IPO market attempt to undo timing attempts in subsequent years and SEO firms timing attempts are motivated by reaching target levels. We also find that financial flexibility is an important factor that needs to be considered when looking at the theoretical aspects of market timing. Constrained firms time issues and repurchases more evidently suggesting that they have the most to gain and thus it is a strategic decision by managers rather than constraints limiting timing actions. In addition to that we find that managers do seem to time issues and repurchases to coincide with target levels. Managers of over-levered firms would be inclined to issue equity during periods of overvaluation and reluctant to issue debt during periods of undervaluation. Similarly, managers of under-levered firms would be inclined to issue debt during periods of undervaluation but reluctant to increase equity issues during periods of overvaluation. Lastly, we find that managers' timing attempts cause firms to deviate from target levels. This suggests that firms deviate from target levels and adjust leverage levels to reflect equity mispricing.

6.2 Practical Implications

The present thesis reviews previous studies on market timing and examines various aspects of equity market timing including issue volume, the IPO and SEO event, financial constraints and targeting behaviour. In line with findings of studies quoted in the literature, managerial timing behaviour is prevalently found although varying across different characteristics and factors. It raises the market timing theory as a valid explanation and contributes towards resolving the capital structure puzzle. The existence of market timing warrants a rethink of the conventional views of capital structure as a common factor in every corporate finance activity. The evidence has been linked together to clarify the effect of market timing and different considerations affecting timing behaviour. This thesis provides a view of integrating between the behavioural view and the conventional view of finance.

The findings in this thesis have several implications for different agents in the economy. Firstly looking at managers, they would be able to raise more proceeds for the firm and thus be inclined to time the IPO and SEO market. This indicates that there are windows of opportunities driven by irrational managers leading to hot markets and thus managers would be able to exploit such windows. This also provides an opportunity for managers of inferior firm who would face difficulties in raising equity capital otherwise. In addition to that, managers do increase debt issues during periods of undervaluation and thus cause firms to deviate from target capital structure. If firms are over levered, there are associated bankruptcy costs that would increase the cost of bankruptcy. This could further lead to several agency problems as discussed in the literature. Furthermore firms would be hindered from accepting positive NPV projects in the future given that they are increasing debt levels purely based on market timing considerations. In the presence of overvaluations, managers would issue equity and thus lower debt levels. If this leads them to be below their target levels or operating sub-optimally, they may have large amounts of FCF and thus lead to other agency problems as discussed in the literature. Thus shareholders need to fully understand market timing mechanisms that lead firms increasing and decreasing leverage levels.

There are also further implications for shareholders. When managers issue equity during favourable market conditions (equity overvaluation or hot periods) they would be increasing the wealth of existing shareholders. Thus they are benefiting from these actions. This action is however done at the expense of new shareholders. There is expropriation of wealth and it is transferred from new shareholders to existing shareholders. Further to this, although market timing delivers value to existing share holders, it is at the expense of new shareholders. Such a situation would also raise implications for regulators in the capital market. It highlights the importance of raising transparency to reduce information asymmetry and thus avoid such expropriation of wealth. It would further encourage managers to focus on growth decisions that actually add cash flow as argued in Modigliani and Miller (1958) and thus create wealth instead of relying on transferring wealth to increase value. Thus there are serious implications of market timing for shareholders and regulators.

6.3 Limitations and Further Research

Inevitably, this thesis contains some limitations which in turn provide motivation for further research. In the analysis it is intrinsically assumed that the cost of debt is constant and does not materially change during the analysed period. This remains an interesting aspect that warrants further research as highlighted in Doukas et al. (2010) where managers do indeed time debt issues. In their study, the effect is persistent and managers do not rebalance capital structure levels in subsequent years. This raises further questions in the area of market timing given that the level of information asymmetry between managers and debtholders would be very minimal and why timing attempts in the debt markets are persistent and have a long lasting impact of capital structure.

Furthermore, in this thesis the findings depend on historical public information to conclude that manager do indeed time the equity market. However, this diverges from reality where managers don't solely rely on past information. Survey evidence indicates that managers make financing decisions based on their views of future markets. Thus the timing framework should take into consideration the game played between firms and investors about market information and views on future prospects of the firms as well as the market as a whole. The interpretation between different agents also remains puzzling. It is unclear whether managers are irrational or investors are irrational. It is an important aspect that provides the fundamental explanation of market timing. In this thesis, similar to the work of Baker and Wurgler (2002), the evidence indicates that managers are able to identify windows of opportunity and time equity markets. Thus, the evidence and findings suggest that market timing is explained by rational managers and irrational investors.

A further limitation of this study is that it focuses only on the equity market per se and ignores other capital markets such as the debt and derivative market. Future studies should consider the managers timing both equity issues and debt issues in a singular framework to provide a more complete picture of capital structure decisions. Finally, the managerial aspects of timing attempts also remains and interesting area to be discussed and developed. Given that the market timing theory posits that managers are able to add value to the firm

by timing security issues and repurchases, it remains puzzling why some managers opt not to do so. This remains an open question which I delegate to future research.

Clearly much work has to be done before the market timing theory is widely accepted in the finance literature. In light of this, this thesis raises several interesting aspects that warrant further research. It is clear that market timing are a result of financing decisions made by managers which reflect on the market conditions and how they view future variations in the market. This poses an interesting question as to whether variations in capital markets are predictable. Interestingly the more important question is how do managers estimate future market conditions? Do their methods reflect approaches utilised by researchers? It can be said that this question would also relate to other decisions that managers make including cash holdings and investment and thus has serious implications on firms' value. Another interesting question is how do investors in the market react to financing decisions made managers when timing the market? Alti and Sulaeman (2011) shed some insight into this question by looking at announcement of equity issues during periods of high stock prices and find that prices are only sustained when institutional ownership is high. It remains an open question that promises ample research opportunities. Given the complexity and dynamic nature of research in the area of corporate finance this thesis is unable to answer or raise all the relevant questions. It however highlights several key areas for future development in the area.

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