Managerial Entrenchment and Capital Structure

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Abstract

This paper examines the relationship between managerial entrenchment and capital structure using a sample of 1,929 US firms over the period of 1990 to 2006. I find a positive relationship between managerial entrenchment, measured as the amount of antitakeover provisions in place, and financial leverage. The results are robust to different specifications, moreover, analysis of leverage levels before and after the enactment of state antitakeover legislation reinforces this picture. I find no evidence that managers seek to avoid debt, on the contrary, leverage levels are higher when the management team is in power.

Keywords: Capital structure, Corporate governance, Managerial entrenchment, Takeover defences

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1.0 Introduction

"How do firms choose their capital structures?" is the question where Myers' (1984) "capital structure puzzle" refers to. A puzzle that is widely investigated, however, it seems the academic world is struggling with pieces that match and yet will not fit. Graham and Leary (2011) review recent empirical research on capital structure and conclude that to a substantial degree capital structure variation is still unexplained. Although recent advances, existing empirical research delivers inadequate explanatory models.

The combination of capital structure being one of the fundamental areas in the profession of finance and potential progress that can be made makes it a relevant and interesting topic to be studied. In this research, I look beyond the traditional approaches to capital structure and investigate the explanatory power of an agency-based view. More specifically, I examine the impact of managerial entrenchment on leverage outcomes, and commence my inquiry by posing the following research question. *Does managerial entrenchment explain variation in capital structure?*

The goal of this research is comparable to that of Berger, Ofek and Yermack (1997) in that both studies try to explain leverage variation from an agency-based view. In fact, the main focus in both investigations is on managerial entrenchment as a possible leverage determinant. However, my study focuses on takeover defences as a measure of managerial entrenchment, whereas Berger et al. (1997) put more weight on monitoring and managerial compensation as corporate governance mechanisms. In contrast to their research, in which they conclude that managerial entrenchment is associated with lower debt levels, I find that a higher degree of managerial entrenchment is related to higher financial leverage. This relationship is statistically and economically significant. Despite the fact that causality is hard to proof in a corporate governance context, my results hold in an additional analysis of an exogenous shock to managerial entrenchment. I find higher leverage levels in firms incorporated in states that enacted antitakeover laws.

Thus, this study focusses on a narrower definition of managerial entrenchment, one that defines entrenched managers as being less vulnerable to the threat of a hostile takeover, as opposed to definitions that take into account a wide range of internal corporate governance mechanisms. To measure entrenchment I use antitakeover indices which are explained in the literature section. I conclude that managerial entrenchment does indeed explain variation in capital structure, underlining the importance of agency-based views of capital structure.

However, different corporate governance mechanisms seem to have divergent effects on leverage outcomes, which I show in this paper.

This study is organised as follows. First, I review existing theoretical literature on capital structure and corporate governance, discuss their implications, and handle the most relevant empirical evidence thus far. Thereafter follow the hypothesised relationships which are tested in this paper. Subsequently, I elaborate on the data collection and preparation process, the research methodology and its final results. Then I shortly discuss potential endogeneity issues and perform an exogenous shock analysis to verify my earlier findings. Finally, I recapitulate on the empirical results of this paper and compare them with the capital structure literature, resulting in this paper's conclusion and a short discussion on future research avenues.

2.0 Literature review and hypotheses

2.1 Literature review

Traditional capital structure models

The two most investigated traditional capital structure models are the static trade-off and pecking order model. Before reviewing the agency view on capital structure, I discuss these traditional models because a large set of leverage determinants is derived from and explained by them.

The static trade-off model arises when market frictions affect the way capital structure is related to firm value and thereby it departures from the capital structure irrelevance principle of the Modigliani-Miller Theorem. For instance, the tax-deductibility of interest payments leads to a higher firm value when the debt ratio increases because a larger part of operating income flows to the firm's investors. On the other hand, the costs associated with financial distress are translated in a reduction of firm value when a higher debt ratio leads to an increased probability of default. As a result, in the trade-off view managers weigh the costs and benefits associated with leverage and then decide the optimal (target) debt ratio. Thus, the static trade-off model clearly takes into account both the bright and dark side of debt and so

rationalizes an interior solution with regard to the optimum amount of leverage (Myers, 1984).

In addition to the trade-off model, Myers (1984) and Myers and Majluf (1984) present a pecking order capital structure model that is based on the information asymmetry between managers and outside investors. They conclude that firms should rely respectively on operating cash flow and debt financing for funding investment opportunities and should issue equity only when all other sources of funds are exhausted. The reason for the existence of such a financing hierarchy are the adverse selection costs associated with equity issuance and to a lesser extent debt issuance. More specifically, information asymmetry induces outside investors to discount the value of their claim on productive enterprise, resulting in outside funds becoming more expensive from the firm's perspective. This problem is most severe for equity funding because equity investors are subordinated to all other claimants, which results in the highest required discount.

The static trade trade-off and pecking order model are not mutually exclusive but rather complementary. As stated above, the pecking order view is based on information asymmetry and works best in explaining financing behaviour in such a context. However, one can regard the pecking order view as simply another trade-off theory that focusses on the costs and benefits of retaining earnings versus debt or equity issuance. The view that capital structure theories are better regarded as being complementary is clearly encouraged by Graham and Leary (2011) who conclude that yet another large sample study investigating the relative importance of the trade-off and pecking order model may only result in marginal progress. In contrast, they articulate that empirical research may deliver better insights in leverage variation by investigating capital structure beyond the traditional views. My research develops in this vein by examining the agency view on capital structure.

Clearly, much of the empirical literature is based on the traditional capital structure models. Rajan and Zingales (1995) investigate four factors that are correlated with leverage most consistently in earlier research and find a significant positive relationship for *size* and *tangibility* with *book/market leverage* and a significant negative relationship for *market-to-book* and *profitability* with *book/market leverage*. These four variables are also statistically significant and show the same sign in an empirical study by Lemmon, Roberts and Zender (2008) after adding additional independent variables. Moreover, Frank and Goyal (2009) and Titman and Wessels (1988) find similar results for different samples, making these leverage determinants widely accepted.

The determinants that are empirically identified are consistent with both the trade-off and pecking order theory. In a trade-off view, for large companies the costs of financial distress such as legal fees and administrative costs are relatively low and therefore are expected to be more levered (Titman & Wessels, 1988). In addition, market-to-book is viewed as a measure for growth companies for which the costs of financial distress are higher (in which case profitable projects cannot be financed and must be forgone) so lower debt ratios are expected. From a pecking order point of view, profitable firms can rely more on internal financing as an alternative to debt and as a result are less levered. Market-to-book is then considered as an alternative measure of profitability. Moreover, large firms are regarded as being less risky (Rajan & Zingales, 1995) and so can borrow more at better terms. Clearly, the empirical results are theoretically supported, whereby theories are complementary as Graham and Leary (2011) suggest.

Thus, extant research on capital structure has provided us with leverage determinants that are significantly correlated with firm debt ratios and theoretically supported. However, a large part of the mainly cross-sectional and relatively stable leverage variation remains unexplained. Lemmon et al. (2008) include higher order terms to account for possible nonlinear relationships and different lag lengths in order to catch both short and long run effects but find only a small positive impact on explained variation in leverage. Latter study concludes that a large part of the firm heterogeneity remains unobserved and therefore future research should identify additional leverage determinants.

Market timing

Before I proceed to the agency view on capital structure, I review one important alternative capital structure theory, namely the market timing theory. Baker and Wurgler (2002) argue that when a firm needs outside funding managers act opportunistically and issue equity if the cost of equity is relatively low (relatively high stock price) and they issue debt if the cost of equity is relatively high (relatively low stock price). Moreover, the management team might decide to opportunistically repurchase equity when they think their company is undervalued. Baker and Wurgler (2002) argue that the eventual capital structures we find are the result of such market timing behaviour. A critical assumption is that managers actually believe it is possible to time the market. Clearly, market timing behaviour is disadvantageous for equity investors buying or selling the firm's stock at issues and repurchases respectively, because

they enter (exit) at relatively high (low) share prices. On the other hand, market timing behaviour is advantageous for investors that hold shares for the long run.

In an anonymous survey of 392 responding chief financial officers, Graham and Harvey (2001) report that stock price performance is indeed an important determinant for equity issues. Thus, managers admit they handle opportunistically when raising outside funds, which means they indeed believe it is possible to time issues. Baker and Wurgler (2002) empirically test if market timing behaviour does explain observed leverage variation. They construct a weighted average score for external finance which takes a high value if past high market-to-book values were accommodated with relatively large debt or equity issues but takes a low value otherwise. Therefore, this variable measures if a company exhibited relatively large leverage changes when its market value of equity was high relative to its book value. Moreover, it takes into account leverage changes from the time of a company's initial public offering until the year of measurement. Baker and Wurgler (2002) find that this "weighted average external financing" variable is negatively related to book leverage and statistically significant at the 1% level. This result holds after including various controls such as the four leverage determinants identified by Rajan and Zingales (1995), which means market-to-book ratio at time t-1 is controlled for. Thus, their results indicate that managers issue equity when their company's share price is relatively high as measured by a high market-to-book ratio, and therefore high past market valuations are associated with low book leverage levels today. Furthermore, they also regress *future* leverage on the weighted average external finance variable and find that historical issuance decisions are significantly related to future leverage levels for more than 10 years, after controlling for more contemporaneous leverage determinants. Baker and Wurgler (2002) conclude that managers are not adjusting their firm's financial leverage to an optimal level as trade-off theories of capital structure dictate but rather let their firm's leverage level swing aimlessly, dependent on opportunistic behaviour. The persistence of the leverage impact of historical external funding decisions, when market-to-book is relatively high, substantiates their view.

In contrast to Baker and Wurgler (2002) who conclude that market timing is not followed up by subsequent rebalancing to an optimal leverage level, Leary and Roberts (2005) argue that managers do rebalance their firm's capital structure when one takes adjustment costs into account. In their model it takes more time for companies to adjust to their optimal capital structure after a leverage shock because adjustment costs make frequent rebalancing suboptimal. Therefore, it is more attainable for companies to have a *target range* for their leverage levels. In addition, Graham and Harvey (2001) find in their survey evidence

that managers work indeed with a target range for their company's capital structure. Leary and Roberts (2005) empirically investigate the impact of adjustment costs on the persistence of market timing issues on capital structure. For their analysis they replicate the sample and methodology used in Baker and Wurgler (2002) and additionally construct proxies for debt issuance costs. Their results show reduced coefficients for the weighted average external finance variable in subsamples of firms with lower debt issuance costs, indicating that firms with relatively low adjustment costs rebalance more timely.

Thus, Leary and Roberts (2005) show that if one takes adjustment costs into account managers seem to rebalance, whereby an optimal capital structure *range* appears to better fit than a strict optimal capital structure. Therefore, the trade-off theory of capital structure is still useful despite the observed persistence of leverage shocks. In conclusion, there is substantial evidence of market timing behaviour by managers but they also seem to keep an eye on their firm's optimal leverage level.

Agency view on capital structure

Whereas the traditional models focus mainly on business and market characteristics as drivers of leverage, the conflict of interests between managers and the company's shareholders is also a possible source of capital structure variation. Clearly, the link between agency theory and capital structure is not a novel one, Jensen and Meckling (1976) pose the first thorough model that relates these concepts. Beginning with the separation of ownership and control in corporations, which causes diverging interests between management and investors. More specifically, managers are incentivised to waste resources on personal benefits at the expense of outside investors because generally they do not share equally in the profits of the company. Jensen and Meckling (1976) show that these agency costs which are reflected in management's expenditures on non-monetary personal benefits, have an impact on the optimal amount and mix (equity/debt) of outside funding. This optimal mix is such that the total agency costs are minimized, whereby one takes into account the monitoring costs and other related value decreases associated with debt or outside equity. In summary, management behaviour may influence the eventual capital structures we find in corporations.

Additionally, Jensen (1986) develops a theory based on the management-shareholder conflict in which he ties the free cash flow problem to capital structure. Jensen (1986) defines a firm's free cash flow as excess cash flow after all positive net present value projects have

been invested in. The free cash flow problem then arises when the management team declines to distribute free cash flow to investors but instead invests the cash in projects that earn returns below the required cost of capital and start "building empires". Jensen (1986) argues that debt can lower the aforementioned agency costs because debt forces the management team to pay out interest, thereby reducing free cash flow that can be wasted on negative net present value projects. Thus, from an agency perspective, debt can be viewed as a controlling device. He continues that debt is potentially a strong substitute for dividends. Because dividends can be foregone, debt is a tougher antidote for the free cash flow problem. Moreover, if the firm fails to pay the interest and principal repayment, poor performing management can be removed through a bankruptcy. Jensen (1986) acknowledges that the efficiency and control benefits of debt are a possible determinant of financial leverage.

Corporate governance, the market for corporate control and managerial entrenchment

Thus, it is well established that agency theory and the capital structure literature should be considered as partially overlapping areas of research. Unfortunately, it is difficult to observe and analyse actual management behaviour in a large sample of companies, however, it is possible to examine the corporate governance mechanisms that are in place in companies. Corporate governance is the entire set of controls that suppliers of funding use to ensure themselves of receiving a proper return on their investment (Shleifer and Vishny, 1997). Thus, corporate governance mechanisms are the means to alleviate the agency problems inherent in the division of ownership and control of funds.

In my research I focus on the takeover market as such a mechanism and examine management's defence against it. Jensen (1986) argues that takeovers are a powerful tool for capital restructuring and refers to the oil industry in the 1980s when mergers were associated with substantial debt creation. However, these changes are not only brought about by an actual takeover but also by the threat of a takeover. Again using the oil industry as an example, Jensen (1986) argues that a takeover threat induces the target management to restructure, pay out cash, and move to an accompanying higher leverage level.

Thus, the takeover market is potentially a powerful corporate governance mechanism through which a bad performing management team can be replaced. Martynova and Renneboog (2005) review the extensive literature on takeover activity and examine the main

drivers in the market for corporate control. Especially during the takeover wave in the 1980s, the underlying motive for takeovers was to alleviate corporate inefficiencies which were often agency related. Martynova and Renneboog (2005) report many hostile takeovers and divestitures during this period, probably motivated by the wealth gains of refocus strategies. Therefore, the diversification strategy that characterised the preceding takeover wave was reversed and inefficient conglomerates were broken up. Moreover, these deals were associated with a substantial amount of debt funding, further alleviating the free cash flow problem. Martynova and Renneboog (2005) recognise that the enactment of state antitakeover legislation in the second half of the 1980s was an important factor contributing to the eventual decline in takeover activity in the US. These antitakeover laws allow the target management to undertake far-reaching defence measures against hostile acquirers and therefore enhance the degree of managerial entrenchment. I will return to the state antitakeover legislation later in my research when analysing its effect on financial leverage.

My research examines a firm's corporate governance structure as a possible determinant of capital structure variation, for which I use the corporate governance indices explained in the next paragraphs. In order to gauge and compare companies on their corporate governance structure, Gompers, Ishii and Metrick (2003) construct a coherent "Governance Index" (hereafter abbreviated to "G index"). They use publications of the Invester Responsibilty Research Center (IRRC) listing the existence of antitakeover provisions in a large sample of US firms. The IRRC obtains these data from various public sources such as annual reports, corporate charters and corporate bylaws. A wide range of antitakeover provisions are included in the G index, for instance, classified boards which delay the time in which an outsider can gain control of the board because board replacement is only allowed incrementally. Another example are poison pills which can severely dilute a hostile acquirer's voting power because target shareholders are allowed to purchase shares in the company at a discount, whereas the bidder has no such right. Moreover, state antitakeover legislation, executive/director protection devices and supermajority requirements are also included in the G index, making this index a very comprehensive proxy for a firm's corporate governance structure.

The G index is created by counting the number of these antitakeover provisions that are present in an individual firm for a given year, with twenty-four distinct provisions specified. In effect, the G index measures the balance of power between shareholders and the management team. Low values indicate few provisions and thus a high level of shareholder rights/power whereas high values mean that a company accommodates relatively many

takeover defences, and thereby management is in power through entrenchment. Gompers et al. (2003) investigate the empirical relationship between the G index and corporate performance measures such as profitability and sales growth. Managerial entrenchment is associated with large firms and relatively poor corporate performance. Moreover, the stock returns of low G firms outperformed those of high G firms during the 1990s. In conclusion, firms with high shareholder power (low G value) are associated with superior performance compared to firms with relatively many antitakeover provisions (high G value). These results are in support of the hypothesis that the entrenching antitakeover provisions induce higher agency costs. However, although their results are clear-cut, Gompers et al. (2003) warn for possible causality issues such as an unobservable that is both correlated with the G index and also explains corporate performance. I will readdress such causality concerns in my own analysis.

Bebchuck, Cohen and Ferrell (2009) expand on Gompers et al. (2003) and focus in their study on six of the twenty-four corporate governance provisions that are associated with the heaviest resistance among investors. In random order these are: Poison pills, staggered boards, golden parachutes, supermajority requirements for approval of mergers, and limits to both shareholder bylaw amendments and shareholder charter amendments. They construct the "Entrenchment index" (hereafter abbreviated to "E index") that can take an integer value on the interval zero to six. For the period of 1990 to 2003, they find that these six provisions drive the correlation with firm value (Tobin's Q) and that the other provisions in the G index are not significantly correlated with firm value. However, Bebchuck et al. (2009) recognise that the management team of low value firms might be more likely to deploy takeover defences to protect their position, which might be the reason we find entrenchment provisions in low value firms. This possibility of reverse causality is also present when investigating the relationship between managerial entrenchment and leverage, which I take into account in the research design.

Managerial stock ownership, stock options remuneration and executive characteristics

Jensen and Meckling (1976) explain that agency theory is important in understanding capital structure. As explained earlier, the division of ownership and control causes managers to invest in projects that personally benefit them but which destroy firm value. One can deduce from Jensen and Meckling's (1976) model how managerial stock ownership can alleviate this

problem. The higher the amount of equity owned by the management team, the more they are personally affected by their company's value, resulting in less inefficient use of corporate resources. However, this interpretation may not be entirely adequate as Morck, Shleifer and Vishny (1988) point out. For instance, higher degrees of inside ownership may lead to effective entrenchment of the management team because it becomes harder to replace them through a hostile takeover. Therefore, external market discipline will be lower if managers own relatively large amounts of equity and even may collapse if insiders possess enough voting rights. Morck et al. (1988) conclude that the relationship between inside ownership and firm value is non-monotonic, finding firm value (Tobin's Q) to first increase with the percentage of board ownership but declining after 5% board ownership and again increasing after 25% board ownership. Managerial entrenchment is assumed to cause the negative relationship for the middle range but complete convergence of interests leads to higher firm value again at higher levels.

However, later studies cast doubt on the relationship articulated by Morck et al. (1988). For instance, Cho (1998) warns that managerial stock ownership might not be exogenous, resulting in misspecification of previous models. He examines managerial stock ownership, firm value and investment policy in a simultaneous regression analysis, finding evidence that both capital expenditures and R&D expenditures positively affect firm value, and in turn, firm value positively affects insider ownership. In Cho's (1998) model, managerial ownership, measured for different ranges, does not significantly affect firm value as measured by Tobin's Q, and thus these results conflict with Morck et al. (1988). In summary, managerial ownership may alleviate the conflict of interests between shareholders and the managers of a company but it can also entrench the management team from external market discipline. This two-sided nature of managerial stock holdings is widely recognised in the academic literature; however, there is no agreement on its relationship to firm value.

Comparably, the same investigation can be applied to financial leverage. Following Jensen's (1986) argument, one would expect managerial equity ownership to be negatively related to financial leverage if it effectively entrenches management. On the other hand, if the management team is more concerned about firm value maximization because of their stake in the company, one would expect a positive relationship. Berger et al. (1997) regress leverage levels on CEO direct stock ownership and find a significant positive relationship. This is consistent with the view that managerial ownership causes interests of managers and shareholders to converge. However, they also acknowledge that managers might increase their firm's leverage in order to enhance their own voting power as Stulz (1988) argues. Therefore,

the ambiguous theoretical arguments with regard to managerial equity ownership also surface when investigating its relationship with financial leverage.

The previous paragraphs handled managerial equity ownership and how it can both alleviate the conflict of interests between the management team and shareholders but also aggravate it through managerial entrenchment. A less ambiguous corporate governance mechanism is the use of stock options in executive remuneration. If managers are granted stock options, part of their remuneration is based on financial performance, hence pay-for-performance. However, this does not automatically mean that the executive also owns a substantial amount of equity. Thus, stock option remuneration does not exhibit the duality we find for managerial stock ownership. Berger et al. (1997) and John and Litov (2010) both find a positive relationship between CEO option holdings and leverage, which they interpret as resulting from converging interests. Moreover, Berger et al. (1997) recognise that stock options remuneration is better at predicting the degree of performance-based incentives compared to managerial equity ownership.

Additionally, the characteristics of the firm's executives may also impact corporate outcomes. For instance, Hillier, Grinblatt and Titman (2012) argue that if the time on the job of a CEO increases, his loyalty to the employees (s)he deals with on a daily basis also increases. This will make it harder for him/her to make tough decisions regarding restructurings and layoffs. For example, if the value of the firm could be increased through a restructuring which requires substantial layoffs, a CEO with more loyalty towards his/her employees might not give the green light. In this case the interests of the firm's employees are put first compared to the interests of its shareholders. Likewise, a CEO that is quite a long time with the firm might avoid debt for the same reason. In addition, Berger et al. (1997) argue that a CEO exhibits more control over internal corporate governance mechanisms such as board monitoring as (s)he is more years in office. Thus, as tenure lengthens it is likely that the CEO becomes more entrenched and faces less discipline. Berger et al. (1997) and John and Litov (2010) both find the natural logarithm of CEO tenure to be negatively related to financial leverage. Moreover, Frank and Goyal (2007) examine the influence of CEO characteristics on financial leverage and find that CEO tenure is most significantly (and negatively) related to leverage. Frank and Goyal (2007) investigate the claim that CEO characteristics do have far-reaching effects on corporate policies by focussing on leverage outcomes. They study a large sample of 2,248 US firms and 3,898 CEOs over the period of 1993 to 2004, for which they find that a technical education and years in office are negatively related to financial leverage. Moreover, a MBA or law degree and a former career in finance

are positively related to leverage. On the other hand, gender and age are not found to be statistically significant leverage determinants.

Interestingly, Frank and Goyal (2007) also investigate the effect of inside ownership and option holdings on financial leverage and find that CEO stock ownership has a non-linear relationship with leverage. For CEO stock holdings below 1% there exists a negative relationship, between 1% and 5% the results are inconclusive but after 5% stock ownership a significant positive relationship exists. This finding is consistent with the view that managerial equity ownership has a dual nature since it can align management's and shareholders' interests but also may entrench managers. However, in this case the positive relationship for high levels of CEO stock ownership is hard to interpret since entrenched managers are expected to avoid debt as explained earlier. In addition, Frank and Goyal (2007) find a significant negative relationship for CEO option holdings and financial leverage, which conflicts with the results of Berger et al. (1997) and John and Litov (2010). It also runs opposite to the view that options remunerations as a pay-for-performance incentive should lead to higher leverage levels because managers will act more like shareholders.

In summary, managerial equity ownership, stock options remuneration and CEO characteristics are theorised to have an impact on financial leverage outcomes. However, the relationship between inside ownership and corporate outcomes is ambiguous. Moreover, empirical results on option holdings are inconclusive as some studies are contradictory. I will further examine these variables in this paper and try to shed light on their complex workings.

Stakeholder theory of capital structure

In the previous paragraphs I discussed mainly the agency view on capital structure, outlining how the conflict of interests between a firm's management and its shareholders can affect leverage choice and how it might differ from the optimum. Moreover, managerial entrenchment and corporate governance mechanisms are discussed, including how they define the relative power of executives and shareholders. However, more parties are involved in the daily business of a company or the products it markets. The stakeholder theory of capital structure is a branch of capital structure research that focusses on non-financial stakeholders of the firm as a potential determinant of the optimal capital structure. I will shortly discuss this view as it explains how managers might simultaneously act in the interests of shareholders and other stakeholders.

Titman (1984) argues that if the customers of a company are hurt if it goes bankrupt, for instance if they cannot acquire spare parts anymore or service discontinuous, they are only willing to pay a lower price for its products when expected future bankruptcy increases. Therefore, increased chance of bankruptcy in the future results in less revenue now. The same argument holds for suppliers or employees of the company, for example, these stakeholders are less willing to make important firm specific investments if the company is more likely to go bankrupt in the future. These costs of debt are born by the firm's equity holders. Thus, if the management team recognises the interests of non-financial stakeholders in setting its leverage level it actually might enhance firm value. The stakeholder theory of capital structure also predicts the nature of firms that should on average be less levered. For example, high-tech companies should be less levered than hotel chains since the former requires more firm specific investments from its employees and supplier, plus its customers might depend on the company for future maintenance. Similarly, Hillier et al. (2012) argue that the negative relationship between R&D expenses and financial leverage could be explained by stakeholder theory using the same arguments.

Empirical research and interpretation of leverage and managerial entrenchment

In this section I review empirical research that investigates the effect of managerial entrenchment on leverage and most closely connects to this paper. Berger et al. (1997) attempt to shed light on this relationship in a study of 434 large US listed companies over the period of 1984 to 1991. They measure managerial entrenchment using a range of variables that gauge the degree to which management is shielded from corporate governance mechanisms. Measures of leverage are then regressed on these entrenchment variables in OLS, "between firms" and "within firm" estimates. Berger et al. (1997) conclude that entrenched management is associated with lower levels of leverage. However, one is left to wonder to what extent the variables they use adequately capture entrenchment. Because most of them concern internal corporate governance mechanisms, such as CEO option holdings and board size/composition, less focus is on the threat of a takeover. Precisely the takeover market plays an important role in Jensen's (1986) free cash flow theory, in which the threat of takeover can force management to increase debt and control spending.

Additionally, Berger et al. (1997) perform an exogenous shock test that includes 27 unsuccessful tender offers arguing that a tender offer, albeit unsuccessful, puts pressure on the

incumbent management team, effectively reducing managerial security. They find a substantial increase in leverage after such an event. Unfortunately, this result is open to different interpretations. For instance, one can argue that the entrenched management takes on the additional debt as a defensive tool only to repel the imminent threat (Harris and Raviv, 1988). On the other hand, the unsuccessful tender offer might be more effective and have a long run impact on financing policy because management now feels more vulnerable. The last interpretation seems to fit best because Berger et al. (1997) report that the increase in leverage persists over time, which would be the case if management is intentionally adopting a more optimal capital structure.

In conclusion, Berger et al. (1997) find a negative relationship between managerial entrenchment and levels of leverage. However, the heavy weight on internal corporate governance mechanisms and unclear causality require caution in drawing conclusions. Their analysis of unsuccessful tender offer events handles these drawbacks but the limited number of observations in their event analysis is a source of concern.

In contrast, John and Litov (2010) focus on external corporate governance and find a positive relationship between managerial entrenchment, measured using the aforementioned entrenchment indices, and financial leverage. They expand the study by Berger et al. (1997) both in sample size and corporate governance measures. John and Litov (2010) investigate leverage determinants over the years 1990 to 2006 using unbalanced panel data of 15,635 firm year observations that include 2,069 unique firms (compared to 3,085 firm year observations of 434 unique firms over the period of 1984 to 1991 in Berger et al. (1997)). Moreover, they include the aforementioned G index as an additional corporate governance measure and perform an exogenous shock analysis examining the impact of state antitakeover legislation on corporate leverage. Thus, John and Litov (2010) perform an extensive empirical investigation using a large sample of US firms whereby they also take external corporate governance into account.

John and Litov (2010) report a positive relationship between the G index in OLS regressions with book and market leverage as dependent variables. Moreover, the G index is highly significant at the 1% level after controlling for a range of variables including the leverage determinants assessed by Rajan and Zingales (1995), the corporate governance measures used in Berger et al. (1997) and a credit rating dummy. Their results are highly robust to different specifications. Interestingly, John and Litov (2010) find for some corporate governance measures different results compared to Berger et al. (1997). For instance, CEO stock ownership is negatively but insignificant related to leverage in contrast to a statistically

significant positive relationship reported by Berger et al. (1997). Among the corporate governance measures, managerial ownership and the antitakeover provisions that constitute the G index are mostly considered as effective takeover defences and so these variables are the closest measures for managerial entrenchment. This could explain why managerial stock ownership is not a significant determinant of financial leverage when the G index is included in the regression model. However, the inconsistent sign and significance of managerial stock ownership can also be the result of its dubious role in a corporate governance context. As mentioned earlier, Morck et al. (1988) recognize that managerial stock ownership can both align management and shareholder interests but also entrench the management team. In contrast to CEO *stock* ownership, CEO *option* ownership does show the same relationship with leverage in both studies. CEO option ownership defined as the number of vested options held by the CEO divided by total shares outstanding has a significant positive relationship with leverage. This relationship can be explained by the fact that stock options better align managers' compensation to the stock performance of the company and thus inducing them to act more like shareholders.

John and Litov (2010) address the possible endogeneity issues that are associated with using the G index by analysing the impact of an exogenous shock to managerial entrenchment on financial leverage. They use the enactment of state antitakeover legislation as such an event and find a positive change in book and market leverage for companies incorporated in states that pass antitakeover laws. This effect is statistically significant if leverage change is defined as the change in *levels* of book and market leverage at the end of two consecutive fiscal years (the first differences). In contrast, the results are mixed when using the net leverage change definition from Garvey and Hanka (1999) that incorporates debt and equity issuance decisions. However, latter definition does not take into account important items such as retained earnings and therefore it does not include internal financing. Garvey and Hanka (1999) perform a comparable analysis of the effect of antitakeover legislation on financial leverage and conclude that firms incorporated in states that passed these laws reduced their use of debt. Thus their results conflict with John and Litov (2010) who attribute the more restrictive sample used by Garvey and Hanka (1999) to cause the difference.

John and Litov (2010) argue that the positive relationship they find between managerial entrenchment and leverage is due to the better terms debt holders provide to the company. A governance system that properly aligns management's with shareholders' interests is "equity-oriented", as they call it. Such a governance system induces the management team to seek relatively risky but value increasing investments because of

shareholders' limited liability. However, debt holders do not profit from risk taking as they only have fixed claims, but they do bear the downside risk. Subsequently, John and Litov (2010) argue that a less equity-oriented management team might be good news for the firm's debt holders. Managers who have a wide range of takeover defences to their disposal are less impressionable by the threat of takeover and can more easily start building diversified empires, which means debt holders bear less downside risk. John and Litov (2010) test this argument empirically by a simultaneous regression analysis of book leverage, entrenchment and credit rating. They find evidence that firms led by entrenched managers (measured using the G index) are indeed found to be less risky as entrenchment results in better credit ratings and subsequently these firms borrow more. Thus, credit ratings explain partly the positive relationship between managerial entrenchment and leverage.

Clearly, the study by John and Litov (2010) shows many similarities with my research as both studies focus on managers' defence against takeover threats to gauge for entrenchment. In addition, I will take dividend policy into account because leverage and dividends might act like substitutes (Jensen, 1986). Moreover, in the exogenous shock analysis I focus on the business combination laws as part of the state antitakeover legislation whereas John and Litov (2010) do not focus specifically on one form of antitakeover legislation. Finally, I investigate the effect of CEO stock ownership on leverage in more detail.

The financing decision in corporate takeovers

I complete this literature section by discussing research on corporate takeovers as a source of capital structure variation. Martynova and Renneboog (2009) investigate the financing decision in corporate takeovers during the period of 1993 to 2001 in Europe. Their study is unique both in dataset (hand-collected) and methodology. Whereas earlier studies focus solely on the payment method in corporate takeovers, Martynova and Renneboog (2009) examine the sources of funding. Clearly, the payment method and the sources of funding do not have to coincide. For instance, a cash payment does not necessarily have to be funded by internal cash flow but can also be funded by debt and equity issues. Their methodology enables them to investigate corporate financing decisions in a novel way and better test capital structure theories. Firstly, Martynova and Renneboog (2009) review existing literature on the corporate financing determinants and partition the extensive body of capital structure research into two

main avenues: cost of capital models and agency-based models. Cost of capital explanations of capital structure take into account market imperfections and their effect on the relative costs of debt and equity. The aforementioned static trade-off, pecking order, and market timing models fall into this category. Additionally, Martynova and Renneboog (2009) also investigate a firm's regulatory environment as it might influence the relative costs of debt and equity. Secondly, they examine agency-based models of capital structure, which focus on the conflict of interests between managers, shareholders, and debt holders, plus how different securities may alleviate this conflict.

To investigate the financing decision in corporate takeovers, Martynova and Renneboog (2009) perform a multinomial logit regression in which they distinguish four different sources of funding as their dependent variables: cash, debt, equity, and a mix of debt and equity. More specifically, they include three logit models in their analysis, which predict the probability that cash financing, debt financing, or a mix of debt and equity financing is used relative to the "all equity" benchmark. Martynova and Renneboog (2009) find empirical evidence for the cost of capital explanation, for example, the probability of cash financing increases when internal cash flow is high, which is in line with the pecking order theory. In addition, market timing is also empirically supported because a recent rise in the company's stock value is associated with an increased likelihood of equity financing. They also find the regulatory environment to be a statistically significant determinant in the financing choice. For instance, firms are more inclined to issue equity in countries with strong shareholder rights protection and issue debt in countries with relatively strong debt holder rights protection. These results hold when the takeover payment method is controlled for.

On the other hand, Martynova and Renneboog (2009) do not find evidence that agency problems are a significant determinant of the financing decision in corporate takeovers. For instance, firms that are characterised by a diffuse ownership structure seem to be indifferent to the financing choice. Whereas one might expect such firms to avoid debt because the management team faces less monitoring from its dispersed shareholders, there is no empirical evidence found in their study for such an effect. Moreover, Martynova and Renneboog (2009) investigate if firms which are more vulnerable to a takeover are more likely to opt for debt financing, which constrains spending and might repel a hostile takeover. They do not find any evidence for such an effect. Furthermore, their results do not indicate that the riskiness of a firm, measured as its market risk exposure (beta), has an impact on the financing decision. For example, risky firms might be confronted with less attractive terms set by creditors and therefore are less likely to fund a takeover with debt. However, no such relationship is found.

In contrast, Martynova and Renneboog (2009) do find evidence that growth companies (measured using Tobin's Q) are more likely to issue equity to finance a takeover. Firms with potentially highly profitable projects should limit borrowing to avoid underinvestment, which arises if profitable projects are foregone because most of the gains go to the firm's debt holders. Latter result is also in line with earlier studies finding a strong negative relationship between Tobin's Q and financial leverage.

In summary, Martynova and Renneboog (2009) find substantial evidence for the cost of capital models of capital structure but their results do not support the agency-based models. Thus, their results indicate that the financing decision in corporate takeovers is best explained by the traditional models and market timing. Moreover, regulation also plays a significant role since firms in countries with relatively strong shareholder rights tend to issue equity versus internal cash flow and firms in countries with relatively strong creditor rights tend to issue debt versus equity.

2.3 Hypotheses

In the previous part I examined academic research on leverage determinants and the role managers play in setting leverage targets. Whereas traditional models focus on business and market characteristics determining the optimal leverage level that managers pursue, the agency view on capital structure examines why managers might not optimize shareholder wealth and the role of corporate governance mechanisms to alleviate the conflict of interests. In this section I hypothesise the relationships between various corporate governance related variables and financial leverage, which I test empirically in the remaining part of this paper.

Managerial entrenchment

I concentrate on Jensen's (1986) argument that debt is an effective control device for management's investment expenditures. Subsequently, for my hypotheses I assume managers dislike the performance pressure that results from an increase in leverage and, if possible, will avoid debt for this reason. In this case the strength of a firm's corporate governance mechanisms influences its capital structure. This line of thought is similar to Berger et al. (1997) and John and Litov (2010). The first hypothesis concentrates on external corporate governance in the form of the takeover market whereby takeover defences are considered to

reduce the effectiveness of it. I use the G and E index that measure the amount of antitakeover provisions, and pose the following hypothesis.

Hypothesis 1. *Leverage is negatively related to the amount of antitakeover provisions.*

Dividends

Secondly, to further explore the role of debt as a controlling device, I investigate the possible substitutionary relationship between dividends and leverage. Jensen (1986) argues that debt and dividends can both alleviate the free cash flow problem. Because the free cash flow available to the management team is reduced both by dividend pay-out and the interest payments on debt, he argues that both mechanisms control management's spending. Thus, one would expect lower financial leverage in companies that pay-out dividends if they are substitutes. If dividends and leverage have indeed a substitutionary nature, one expects a negative relationship.

Hypothesis 2. *Leverage levels are lower for dividend paying companies.*

Inside ownership

Next, I examine inside ownership as a possible determinant of leverage. Managerial stock ownership is an interesting variable to investigate because of its dualistic nature, as outlined by Morck et al. (1988). The academic literature recognises that inside ownership can both alleviate the conflict of interests between management and shareholders but also may entrench the management team when they control a large part of the votes. However, the exact relationship is debatable as outlined earlier. Intuitively, one expects convergence of interests until the point insiders control enough votes so that they become effectively entrenched. Using Jensen's (1986) free cash flow theory, this translates into a positive relationship between leverage and managerial stock ownership for relatively low levels of inside ownership but debt avoiding behaviour for relatively high levels when managers become entrenched. To give some direction to my analysis, I view managerial stock ownership as a corporate governance mechanisms to align managers' and shareholders' interests. Therefore, I expect a positive effect of managerial stock ownership on leverage, but keep in mind that the relationship might be non-monotonic.

Hypothesis 3. *Leverage is positively related to the degree of managerial stock ownership.*

Stock options remuneration

In contrast to managerial stock ownership, stock options remuneration does not have such a dualistic nature. Berger et al. (1997) argue that stock options are an important part of performance based compensation packages. The pay-for-performance characteristic of executive option holdings ensures that the interests of managers and shareholders are closely aligned. Thus, option holdings can reduce managers' preference for low leverage levels, therefore, I pose the following hypothesis.

Hypothesis 4. *Leverage is positively related to the degree of stock options remuneration.*

CEO tenure

Lastly, I examine the relationship between CEO tenure and leverage. As described earlier, a CEO that is quite some time on the job might become more concerned about the employment of his subordinates as his loyalty to them increases. A CEO with a long tenure, therefore, might avoid debt in order to "keep the company safe". Moreover, Berger et al. (1997) argue that if a CEO's time in office lengthens, (s)he can exercise more control over internal monitoring, which augments the first effect. Thus, I expect to observe lower leverage levels in companies with a CEO that is relatively long in position.

Hypothesis 5. *Leverage is negatively related to CEO tenure.*

3.0 Data and methodology

3.1 Data

Corporate financial data are obtained from Compustat for the period of 1990-2006. G and E index data are obtained from the Yale and Harvard websites respectively.[1] Due to restrictions on the availability of the RiskMetrics database, I only use the composite indices from the aforementioned sources. G and E index data are available for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006. Intermediate years are assigned an index value equal to the most recent available value to that respective date. The entrenchment datasets are merged with the Center for Research in Security Prices (CRSP) database using the historical ticker symbol. Subsequently, the resulting dataset is merged with the Compustat database using the latest 6-digit CUSIP code. About 85% of the observations in the IRRC sample remains after this procedure. CEO stock and option holdings and dates of CEO entry/exit are obtained from Execucomp. Executive data is only available as of 1992 which is the start date of the Execucomp database.

For this study, I exclude utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60 - 69) because these companies differ markedly in their underlying business and face other regulation. Following Gompers et al. (2003), I also exclude firms with dual class stock because these firms differ significantly in their voting and thus control structure. The presence of different voting structures could obscure the effect of other corporate governance mechanisms. Moreover, firm year observations that report non-positive stockholders' equity or non-positive revenues are removed from the dataset. If companies do not report R&D expenses, I assign a zero for that item. Likewise for dividend payments. Finally, I require that all items for constructing book and market leverage are available at both time t and t+1. Firm years containing missing values after these adjustments are excluded from the sample. The final dataset contains 14,692 firm year observations of

[1] The composite Governance Index is publicly available on Andrew Metrick's Yale School of Management webpage, http://faculty.som.yale.edu/andrewmetrick/data.html. The composite Entrenchment index is publicly available on Lucian Bebchuk's Harvard Law School webpage, http://www.law.harvard.edu/faculty/bebchuk/data.shtml.

1,929 unique US firms. The subset including the Execucomp data contains 10,366 firm year observations of 1,501 unique US companies.

Figure 1 (see following page) shows the trend in the average value of the G and E index over the period of 1990-2006. Notice that, although the entrenchment levels are only assessed for the years 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2006, intermediate years still show variation, which is the result of companies exiting the sample because of, for example, bankruptcies and mergers. Clearly, the two entrenchment indices move in tandem, not only because they measure the same construct but also because the E index is constructed using a subset of the G index universe of provisions. The noticeable drop in value for both indices in the year 1998 can be explained by the addition of several hundred companies to the IRRC sample of firms being assessed. These additional firms are smaller in size which is correlated to the G index (Gompers et al., 2003). If corrected for this add-on, both indices show a slightly increasing trend over the 1990-2006 period.

Figure 2 shows the trend in book and market leverage over the period of 1990-2007. Average book leverage is quite stable over time, whereas average market leverage is more volatile. For the second half of the period, book leverage is declining with an uplift for the last two years. In contrast, the average value of market leverage does not show a distinctive trend over time although over the whole period it substantially decreases. Differences between the leverage measures are the result of the market equity component in market leverage (see methodology section). As a result, leverage in market value is also affected by stock market performance.

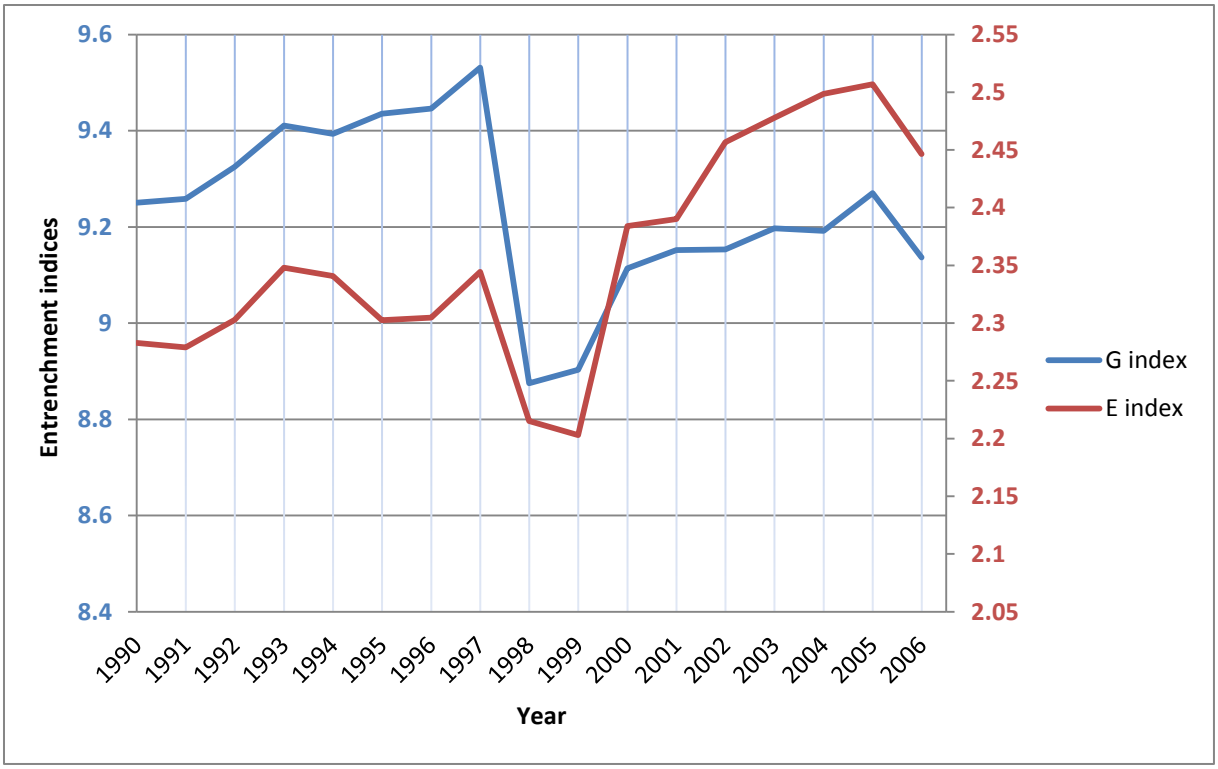

Figure 1. Trend figure of managerial entrenchment measured by Gompers, Ishii and Metrick's (2003) "G index" and Bebchuk, Cohen and Ferrell's (2009) "E index". The left vertical axis shows G index values and the right vertical axis shows E index values, indicated by matching colours.

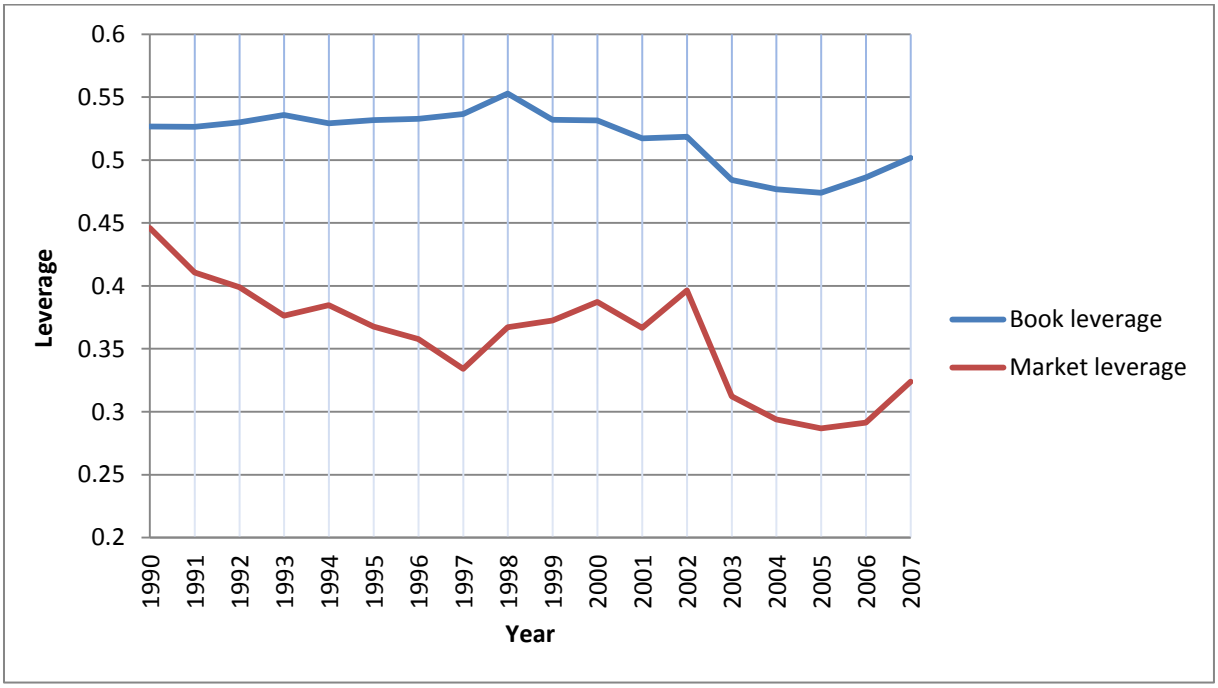

Figure 2. Trend figure of leverage levels measured in book and market value.

3.2 Methodology

The dependent variable in the regression analyses is leverage for which I use both book leverage and market leverage to check for robustness. Book leverage is constructed as total book debt divided by total book assets. Market leverage is defined as total book debt divided by the sum of total book assets plus the market value of equity minus the book value of equity.

The first set of control variables consists of the four capital structure determinants identified by Rajan and Zingales (1995). *Firm size* is measured as the natural logarithm of total assets. *Market-to-book* is calculated as total assets plus market equity minus book equity divided by total assets. *Profitability* is calculated as operating income before depreciation and amortization (EBITDA) divided by total assets. Finally, *tangibility* is constructed as net property, plant and equipment divided by total assets.

In addition to these four widely recognised leverage determinants, I include an additional set of control variables in most specifications. As Jensen (1986) recognises, debt (via interest payments) is a possible substitute for dividends in that both lead to the pay-out of cash to investors. Therefore, I include a dummy variable *dividend payer* that equals one if the firm pays dividends in a given year and zero otherwise. Furthermore, following Berger et al. (1997), in order to control for the suitability of a firm's assets to be pledged as collateral, I also include a control variable to gauge the uniqueness of a firm's assets. Very unique assets are argued to be less suitable as collateral because their use and value are often company-specific. *Asset uniqueness* is calculated as R&D expenses divided by sales. I truncate this ratio variable at 10 because of some extreme outliers which I find for pharmaceutical and biotech companies. The R&D/sales ratio may also gauge for the growth opportunities of a company (Berger et al., 1997) and the degree of company specific investments required by its stakeholders (Hillier et al., 2012).

To account for a firm's credibility and the corresponding terms it faces in the debt markets, I include a *credit rating* variable which is constructed as follows. Following John and Litov (2010), I use the "Standard and Poor's (S&P) domestic long term issuer credit rating" which rates an issuer's overall capacity to meet its long-term financial obligations (with maturities exceeding one year). Then I scale these ratings on an interval from 1 to 6 for each firm year, with 6 matching to the highest credit rating. From high to low, AAA (6), AA(+/-) (5), A(+/-) (4), BBB(+/-) (3), BB(+/-) (2), and B+ or lower (1). Firms for which a credit rating is missing are assigned a zero.

Additionally, I include variables that measures the degree of inside ownership and stock options remuneration. For this purpose, I use the CEO data from Execucomp. *CEO stock ownership* is calculated as the number of shares owned directly by the CEO divided by the total amount of common shares outstanding. Likewise, *CEO option holdings* is calculated as the number of exercisable options held by the CEO divided by the total amount of common shares outstanding. Finally, I investigate the time in office of the CEO and construct the variable *CEO tenure* which is calculated as the natural logarithm of years in CEO position. All variable definitions and corresponding data sources are listed in table A1 in the appendix.

To investigate this paper's research question, I perform panel OLS regression analyses using an unbalanced panel dataset. In all specifications, the values of all independent variables are considered at time t-1 and the values of the dependent variables at time t. To investigate the effect of managerial entrenchment on leverage levels, I estimate the following regression.

$$Leverage_{i,t} = \alpha + \beta_1 "entrenchment\ index"_{i,t-1} + \beta_2 X_{i,t-1} + \nu_t + \varepsilon_{i,t}$$

In the regression above, β_1 is the coefficient of interest, the effect of managerial entrenchment on financial leverage. In this case, managerial entrenchment is measured using the G and E indices that count the amount of antitakeover provisions. X is a set of control variables, β_2 is the corresponding vector of coefficients, ν is year fixed effects and ε is the error term. I also include industry fixed effects in all specifications, which I construct using 2-digit SIC codes.

Because of the little variation in the G index on firm level, standard errors are likely to be autocorrelated for the main variable, implying that an important assumption for unbiased OLS estimation likely is violated. In line with John and Litov (2010), I cluster adjust standard errors at firm level so that they are corrected for possible autocorrelation. Moreover, this adjustment seems to be common practice in studies examining the entrenchment indices. In a related study, Harford, Mansi and Maxwell (2008) investigate the influence of corporate governance on firm cash holdings in the US and follow this same approach. They also include the G and E index as measures for corporate governance and report their results using firm level clustered standard errors.

4.0 Results

4.1 Descriptive statistics, correlations, and univariate analysis

Table 1
Summary statistics
Summary statistics for the variables used in the capital structure analysis. Book and market leverage are measured at t+1. Statistics are calculated using data of US listed firms over the period of 1990 to 2006, except for the CEO data which are only available for the period of 1992 to 2006 due to data coverage of the Execucomp database. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. CEO tenure is calculated as the natural logarithm of years in the CEO position. Firm size is calculated as the natural logarithm of total assets in millions of US dollars. For a complete list of variable definitions see table A1 in the appendix.

	Number of observations	Mean	Standard deviation	Minimum	Maximum
Book leverage	14,692	0.5144	0.1909	0.0271	0.9998
Market leverage	14,692	0.3501	0.2080	0.0037	1.0000
G index	14,692	9.2227	2.7117	2	17
E index	14,692	2.3666	1.3062	0	6
CEO stock ownership	10,366	0.0202	0.0549	0	0.8006
CEO option holdings	10,366	0.0078	0.0113	0	0.2280
CEO tenure	10,366	1.6417	0.9441	0	4.0254
Firm size	14,692	7.1237	1.4613	2.4619	13.5285
Tangibility	14,692	0.3096	0.2146	0.0023	0.9703
Market-to-book	14,692	1.9564	1.4200	0.2582	34.3471
Profitability	14,692	0.1402	0.1021	-1.2594	0.9651
Asset uniqueness	14,692	0.0701	0.4309	0	10
Dividend payer	14,692	0.5800	0.4936	0	1
Credit rating	14,692	1.5489	1.7276	0	6

Table 1 shows the descriptive statistics of the variables used in the regression analyses. Notice that the observed values for the G index do not range from 0 to 24 (the total set of possible values) but instead the minimum amount of assessed antitakeover provisions for a firm year observation is 2 and the maximum amount of antitakeover provisions is 17 for this sample.

Table 2 shows the correlations between the leverage and entrenchment variables and a set of control variables. The matrix shows very high correlations between book and market

leverage (0.7569) and the G and E index (0.7407), which is expected since these variables measure the same construct. Furthermore, high negative correlation is found between market-to-book ratio and market leverage. Examining these variables' definitions, the high correlation seems mechanical in nature as the numerator in market-to-book equals the denominator in market leverage. Therefore, I exclude market-to-book as an independent variable in the regressions with market leverage as dependent variable. The correlation between market-to-book ratio and book leverage is significantly lower but still substantial. I include market-to-book in the regressions with book leverage as dependent variable because in this case the correlation is not mechanical in nature and market-to-book is useful as a control variable for expected growth. Furthermore, all other correlation coefficients have the expected sign with the exception of the positive correlation between the entrenchment indices and leverage. If entrenched managers tend to avoid debt, a negative correlation is expected, however, further analysis is required to uncover the existing relationship.

Table 2
Correlation matrix
Matrix showing the correlations between the leverage variables, the entrenchment indices and the control variables from Rajan and Zingales (1995). Book and market leverage are measured at time t+1. Market-to-book ratio is abbreviated to MTB. Variable definitions are listed in table A1.

	Book leverage	Market leverage	G index	E index	Firm size	Tangi-bility	MTB	Profita-bility
Book leverage	1							
Market leverage	0.7569	1						
G index	0.1983	0.1526	1					
E index	0.1358	0.1319	0.7407	1				
Firm size	0.3701	0.1761	0.1739	0.0259	1			
Tangibility	0.1642	0.1857	0.0526	0.0530	0.1498	1		
MTB	-0.2665	-0.5274	-0.1146	-0.1332	0.0135	-0.1561	1	
Profitability	-0.1079	-0.2870	0.0322	-0.0038	0.1426	0.1633	0.3653	1

Table 3
Firm characteristics by G index quartiles
Univariate analysis of the means and medians of firm characteristics of 14,692 firm year observations over the period of 1990 to 2006. The statistics in the second part of this table are based on the subsample that includes Execucomp data, resulting in 10,366 firm year observations over the period of 1992 to 2006. Median values are in brackets. Quartiles are based on G index values and are uneven in size. The last column shows the t-statistics for the difference of means test between the first and fourth quartile. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

G index range	(←,7]	[8,9]	[10,11]	[12,→)	t-statistic
Book leverage	0.4575	0.4922	0.5427	0.5568	-22.77***
	[0.4612]	[0.5075]	[0.5559]	[0.5696]	
Market leverage	0.3060	0.3339	0.3735	0.3941	-18.22***
	[0.2593]	[0.3070]	[0.3480]	[0.3828]	
Firm size	6.7950	7.0589	7.2707	7.4619	-19.53***
	[6.5828]	[6.8738]	[7.1027]	[7.4279]	
Tangibility	0.2921	0.3041	0.3228	0.3241	-6.44***
	[0.2310]	[0.2484]	[0.2691]	[0.2858]	
Market-to-book	2.1486	2.0045	1.8877	1.7262	12.13***
	[1.6475]	[1.5638]	[1.5042]	[1.4495]	
Profitability	0.1371	0.1361	0.1425	0.1467	-3.98***
	[0.1393]	[0.1379]	[0.1396]	[0.1433]	
Asset uniqueness	0.0980	0.0968	0.0486	0.0256	7.40***
	[0.0016]	[0.0052]	[0.0059]	[0.0065]	
Dividend payer	0.4483	0.5017	0.6270	0.7936	-31.65***
	[0]	[1]	[1]	[1]	
Rating	1.0964	1.3288	1.7449	2.1831	-27.22***
	[0]	[0]	[2]	[3]	
N	4078	3865	3614	3135	
% of total observations	27.76	26.31	24.6	21.34	
CEO stock ownership	0.0365	0.0178	0.0149	0.0108	13.78***
	[0.0041]	[0.0030]	[0.0026]	[0.0022]	
CEO option holdings	0.0083	0.0091	0.0071	0.0062	6.96***
	[0.0042]	[0.0052]	[0.0045]	[0.0039]	
CEO tenure (in years)	8.8970	8.1329	7.2672	6.8413	9.51***
	[6]	[6]	[5]	[5]	
N	2621	2807	2594	2344	
% of total observations	25.28	27.08	25.02	22.61	

To investigate company characteristics that are associated with the presence of antitakeover provisions, I perform a univariate analysis of the G index. Table 3 shows mean and median values of company variables for quartiles based on the G index. These G index quartiles are uneven in size but the quartile ranges are chosen so that they are comparable in size. The first quartile consists of firms with G index values of 7 and lower, the second quartile consists of

firms with G index values of 8 and 9, the third quartile consists of firms with G index values of 10 and 11, and the fourth quartile consists of firms with G index values of 12 and higher.

Noticeable, firms differ markedly among the G index quartiles and the means of all variables are significantly different between the first and fourth quartile. The t-statistics for the difference of means test between the first and fourth quartile are shown in the last column. Firms with relatively many antitakeover provisions are more levered, larger in book assets, more likely to pay cash dividends, and receive a higher credit rating. Interestingly, firms with a high G index value seem more profitable, opposed to the findings of Gompers et al. (2003). However, latter study focused on stock returns. Moreover, the relationship between the G index and profitability is non-monotonic, as table 3 indicates at first a decrease in profitability but then an increase as the number of provisions increase. The relationship between profitability and the G index is most obscure of all firm variables.

In addition, firms with relatively many antitakeover provisions are associated with lower CEO stock ownership and relatively low stock options remuneration. Though, last variable shows a non-monotonic relationship. Moreover, CEOs of high G firms remain less long in office as the data indicate. On average, CEOs of firms in the highest G index quartile remain two years shorter in their function than CEOs of firms in the lowest G index quartile. However, the data do not indicate if this is due to forced leave.

4.2 Regression results

Table 4 shows the results of the panel OLS regression using 14,692 firm year observations of G index data over the period of 1990 to 2006. For specifications (3) and (6) I only include observations with full data on CEO stock and option holdings, resulting in 10,366 firm year observations. The results corroborate the picture that the correlation matrix paints. The G index is positively related to both book and market leverage and highly significant at a 1% level after controlling for the leverage determinants from Rajan and Zingales (1995). Moreover, adding additional control variables does not have a significant impact on the main results as columns (2), (3), (5) and (6) show. The results indicate that a higher degree of managerial entrenchment, measured as the amount of antitakeover provisions, is associated with higher financial leverage. Therefore, the regression analysis does not validate the hypothesised relationship *"H_1: Leverage is negatively related to the amount of antitakeover provisions"*. On the contrary, I find a positive relationship between the G index and leverage.

Table 4
Regression coefficient estimates: G index and additional determinants of financial leverage
OLS regressions of book and market leverage on the G index and control variables. Specifications (1), (2), (4) and (5) use data over the period of 1990 to 2006 and specifications (3) and (6) use data over the period of 1992 to 2006. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage			Market leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
G index	0.0070***	0.0061***	0.0055***	0.0080***	0.0077***	0.0082***
	(5.60)	(4.69)	(3.96)	(6.19)	(5.99)	(5.85)
CEO stock ownership			-0.1731**			-0.0824
			(2.02)			(1.29)
CEO option holdings			0.4037			1.3253***
			(1.14)			(3.88)
CEO tenure			-0.0089***			-0.0094***
			(2.91)			(3.20)
Firm size	0.0448***	0.0323***	0.0289***	0.0250***	0.0270***	0.0259***
	(16.74)	(9.08)	(7.09)	(8.73)	(7.12)	(6.25)
Tangibility	0.0576**	0.0553**	0.0446*	0.1514***	0.1515***	0.1421***
	(2.51)	(2.42)	(1.79)	(5.73)	(5.90)	(5.15)
Profitability	-0.2333***	-0.2703***	-0.2504***	-0.7323***	-0.8217***	-0.8324***
	(6.74)	(7.41)	(5.56)	(16.20)	(17.56)	(15.05)
Market-to-book	-0.0240***	-0.0228***	-0.0202***			
	(8.02)	(7.70)	(5.67)			
Asset uniqueness		-0.0194***	-0.0351**		-0.0723***	-0.1195***
		(2.64)	(2.19)		(4.60)	(3.69)
Dividend payer		0.0000	0.0209**		-0.0074	0.0106
		(0.00)	(2.55)		(0.97)	(1.35)
Credit rating		0.0146***	0.0157***		-0.0030	-0.0021
		(5.24)	(5.04)		(1.06)	(0.68)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	14,692	14,692	10,366	14,692	14,692	10,366
Adj R^2	0.3101	0.3187	0.3485	0.3382	0.3573	0.3961

I also examine the economic significance of the G index, therefore I multiply its marginal effect, given by the regression coefficient multiplied by its standard deviation and compare this to the mean leverage (see table 1 and table A2). When using the coefficients of specifications (3) and (6), I calculate that a one standard deviation increase in the G index is associated with a 2.91% and 6.38% increase in mean book and market leverage respectively (all relevant data are shown in table A2 in the appendix). However, a one provision increase is easier to interpret and is associated with a 1.07% and 2.35% increase in mean book and market leverage respectively. Compared to the economic impact of other leverage determinants, the G index has a fairly substantial impact on leverage. While a one standard

deviation increase in the variables defined by Rajan and Zingales (1995) is associated with an even larger increase in leverage, the G index scores higher than the executive ownership and compensation variables. In summary, the increase in leverage associated with an increase in the G index is substantial relative to other variables and therefore I conclude that this measure of managerial entrenchment is also an economically significant determinant of capital structure.

A quick look at the regression models reveals that the results are in line with earlier research. Market leverage is best explained by the regression models as measured by the adjusted R squared relative to book leverage. Firm size, tangibility, market-to-book and profitability are all consistent in sign and significance in the different specifications, again confirming the findings of Rajan and Zingales (1995). Of the additional controls, only asset uniqueness is a consistent predictor of financial leverage and, as expected, firms with firm-specific assets are found to borrow less. The credit rating variable is only significant in the book leverage regressions but it confirms that companies with higher credit ratings subsequently borrow more.

The dividend payer dummy is only statistically significant in specification (3) but the positive sign suggests that dividends and interest payments do not act like substitutes as in Jensen's (1986) argument. If debt would be a substitute for dividends, one expects dividend paying companies to be less levered. However, the positive sign in the book leverage regression and the insignificance of this variable in the market leverage regression do not support this view. Therefore, the results do not validate the hypothesised relationship *"H_2: Leverage levels are lower for dividend paying companies".*

Finally, the coefficient signs of the CEO variables are the same as in John and Litov's (2010) research. I examine these variables in more detail later in this paper when handling hypotheses 3, 4, and 5. In the next section, I perform a robustness check using the E index constructed by Bebchuk et al. (2009) to investigate if the positive relationship found between entrenchment and leverage is affected by the selection of antitakeover provisions included in the entrenchment index.

Robustness check

To check if the results are robust to a different measurement of managerial entrenchment, I also regress leverage on the E index plus the same controls. Remember that the E index is

constructed by counting the number of only six antitakeover provisions that receive the fiercest opposition from shareholders and are most negatively related to various measures of firm performance. The results in table 5 are largely equivalent to those in table 4 with the E index positively related to book and market leverage at the 1% level. The regression coefficients of the E index are approximately 2 times larger compared to the G index, which is due to the smaller range of possible values. Moreover, the E index is also economically significant since an increase of one standard deviation (provision) is associated with an increase of 2.43% (1.86%) and 5.81% (4.45%) in book and market leverage respectively. In conclusion, these regression results reinforce the positive relationship between managerial entrenchment, measured as the amount of antitakeover provisions in place, and leverage.

Table 5
Regression coefficient estimates: E index and additional determinants of financial leverage
OLS regressions of book and market leverage on the E index and control variables. Specifications (1), (2), (4) and (5) use data over the period of 1990 to 2006 and specifications (3) and (6) use data over the period of 1992 to 2006. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage			Market leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
E index	0.0131***	0.0116***	0.0096***	0.0166***	0.0161***	0.0156***
	(5.19)	(4.51)	(3.49)	(6.26)	(6.18)	(5.52)
CEO stock ownership			-0.1730**			-0.0785
			(2.02)			(1.24)
CEO option holdings			0.3717			1.2717***
			(1.05)			(3.74)
CEO tenure			-0.0090***			-0.0094***
			(2.95)			(3.23)
Firm size	0.0471***	0.0337***	0.0300***	0.0276***	0.0289***	0.0276***
	(17.98)	(9.48)	(7.35)	(9.83)	(7.59)	(6.65)
Tangibility	0.0571**	0.0542**	0.0420*	0.1500***	0.1494***	0.1379***
	(2.46)	(2.36)	(1.67)	(5.65)	(5.78)	(5.00)
Profitability	-0.2334***	-0.2741***	-0.2521***	-0.7319***	-0.8243***	-0.8337***
	(6.72)	(7.52)	(5.58)	(16.27)	(17.70)	(15.08)
Market-to-book	-0.0240***	-0.0227***	-0.0202***			
	(8.10)	(7.73)	(5.72)			
Asset uniqueness		-0.0200***	-0.0358**		-0.0729***	-0.1201***
		(2.75)	(2.22)		(4.71)	(3.70)
Dividend payer		0.0026	0.0240**		-0.0046	0.0148*
		(0.34)	(2.97)		(0.62)	(1.91)
Credit rating		0.0149***	0.0162***		-0.0026	-0.0014
		(5.35)	(5.18)		(0.92)	(0.46)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	14,692	14,692	10,366	14,692	14,692	10,366
Adj R^2	0.3086	0.3179	0.3472	0.3385	0.3578	0.3949

Endogeneity

As Gompers et al. (2003) discuss in their study, regression results should be interpreted with prudence because the assumed causality could in fact be non-existent if an omitted variable is both correlated with the dependent variable (in their case abnormal returns) and the G index. Although they investigate the G index in relation to abnormal returns and other performance measures, the same caution is required when investigating managerial entrenchment in relation to financial leverage. One cannot completely rule out the possibility that an unobservable variable influences both entrenchment and leverage. As an example, Gompers et al. (2003) mention a difficult to measure "corporate culture" that explains management behaviour. In addition, one can argue that the management team of a company under threat of a hostile takeover both increases the amount of takeover defences that comprise the G index and increases its leverage level by buying back shares of non-contenders with the use of debt. Such a recapitalization can also be viewed as an antitakeover tactic because management is buying voting rights (Harris & Raviv, 1988). This way the 1980s takeover wave and companies' defence measures could play a role in why I find the G index and leverage to be correlated. In order to clarify the causality of these variables, I examine the effect of an exogenous shock to managerial entrenchment on leverage outcomes in section 5.0, but first I address the remaining hypotheses in the next part.

Internal corporate governance

In the previous part of this paper I discovered a positive relationship between the number of antitakeover provisions in place and leverage. Translated in terms of managerial entrenchment, I find entrenched managers to increase leverage instead of avoiding it. However, this result contrasts Jensen's (1986) free cash flow story and the empirical results of Berger et al. (1997). A possible explanation could be provided if one discriminates between a company's external and internal corporate governance system. As I explained in the literature section, Berger et al. (1997) draw their conclusion from an analysis of mostly internal corporate governance measures. Whereas the entrenchment indices I use are an external corporate governance measure as they define the relative power of managers versus shareholders and the vulnerability of the firm to hostile takeovers. To shed light on this matter

and to find out if indeed internal and external corporate governance have different results on leverage outcomes, I test three additional hypotheses which are outlined in the hypotheses section of this paper.

Firstly, I investigate how inside stock ownership by the firm's CEO affects leverage. Table 4 and 5 indicate a negative relationship between CEO stock ownership and leverage. However, for the market leverage regression this relationship is not statistically significant at the 10% level. The negative sign in the book leverage regression contradicts the assumption that inside ownership leads to higher leverage. However, a more thorough investigation is required to fully test the hypothesised relationship. As I outlined earlier, the academic literature recognises that managerial stock ownership may have a different effect on corporate outcomes for different ranges of inside ownership. Following Morck et al. (1988), I perform a piecewise regression analysis to investigate the relationship between CEO stock ownership and leverage for different ranges. Whereas Morck et al. (1988) investigate board ownership, I examine CEO stock ownership, and thus other ownership ranges apply. Therefore, I use the CEO stock ownership ranges defined by Frank and Goyal (2007). I construct the following variables in order to perform a piecewise linear regression analysis of CEO stock ownership:

CEO stock ownership ≤ 1%	= CEO stock ownership if CEO stock ownership ≤ 0.01
	= 0.01 if CEO stock ownership > 0.01
1% < CEO stock ownership ≤ 5%	= 0 if CEO stock ownership ≤ 0.01
	= CEO stock ownership minus 0.01if 0.01 < CEO stock ownership ≤ 0.05
	= 0.04 if CEO stock ownership > 0.05
5% < CEO stock ownership	= 0 if CEO stock ownership ≤ 0.05
	= CEO stock ownership minus 0.05 if CEO stock ownership > 0.05

The results of the regression analysis using the CEO stock ownership variables as defined above are shown in table 6. These results show a positive relationship between CEO stock ownership and leverage for low levels of CEO stock ownership, which is statistically significant at the 1% level. Furthermore, between 1 and 5 percent stock ownership, the relationship is negative but for market leverage only statistically significant at the 10% level. Finally, for high levels of inside ownership (above 5%), the relationship is more obscure.

Table 6

Regression coefficient estimates: Piecewise linear regression analysis of CEO stock ownership

OLS regressions of book and market leverage on different ranges of CEO stock ownership and control variables. Sample consists of 1,501 unique US listed firms over the period of 1992 to 2006. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Specifications (1) and (3) are equal to specifications (3) and (6) in table 4, respectively. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage		Market leverage	
	(1)	(2)	(3)	(4)
G index	0.0055***	0.0054***	0.0082***	0.0082***
	(3.96)	(3.87)	(5.85)	(5.81)
CEO stock ownership	-0.1731**		-0.0824	
	(2.02)		(1.29)	
CEO stock ownership ≤ 1%		4.4115***		4.2613***
		(3.87)		(3.81)
1% < CEO stock ownership ≤ 5%		-1.2015***		-0.7052*
		(2.95)		(1.67)
5% < CEO stock ownership		-0.0983		-0.0802
		(0.84)		(0.87)
CEO option holdings	0.4037	0.3149	1.3253***	1.2312***
	(1.14)	(0.91)	(3.88)	(3.67)
CEO tenure	-0.0089***	-0.0134***	-0.0094***	-0.0147***
	(2.91)	(4.10)	(3.20)	(4.47)
Firm size	0.0289***	0.0313***	0.0259***	0.0284***
	(7.09)	(7.52)	(6.25)	(6.79)
Tangibility	0.0446*	0.0443*	0.1421***	0.1416***
	(1.79)	(1.79)	(5.15)	(5.16)
Profitability	-0.2504***	-0.2499***	-0.8324***	-0.8308***
	(5.56)	(5.64)	(15.05)	(15.02)
Market-to-book	-0.0202***	-0.0200***		
	(5.67)	(5.72)		
Asset uniqueness	-0.0351**	-0.0335**	-0.1195***	-0.1177***
	(2.19)	(2.11)	(3.69)	(3.65)
Dividend payer	0.0209**	0.0197**	0.0106	0.0096
	(2.55)	(2.42)	(1.35)	(1.22)
Credit rating	0.0157***	0.0158***	-0.0021	-0.0018
	(5.04)	(5.11)	(0.68)	(0.60)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
N	10,366	10,366	10,366	10,366
Adj R^2	0.3485	0.3525	0.3961	0.3992

These results are in line with the view that inside ownership alleviates the conflict of interests between managers and shareholders and induces the management team to pursue a more optimal leverage level, which explains the positive relationship for the lowest range of CEO stock ownership. However, the results also support the view that inside ownership may entrench managers, allowing them to avoid debt, which explains the negative relationship for

higher levels of CEO stock ownership. For the highest range of CEO stock ownership, the results are inconclusive, which may be explained by the fact that very high levels of inside ownership are associated with both managerial entrenchment and complete convergence of interests. I conclude that for relatively low levels of CEO stock ownership the hypothesised relationship *"H_3: Leverage is positively related to the degree of managerial stock ownership"* is validated. On the other hand, for moderate levels, CEO stock ownership has a negative effect on leverage.

To further investigate the effect of internal corporate governance measures on leverage, I investigate two variables that are assumed to have a more monotonic effect on leverage as opposed to managerial stock ownership. Firstly, I examine the relationship between CEO option holdings and leverage. Table 6 shows a positive relationship but only statistically significant at the 1% level for the market leverage regression. The results support the view that stock options remuneration aligns the interests of managers and shareholders, reducing debt avoidance by the management team. Thus, at least for market leverage, the hypothesised relationship *"H_4: Leverage is positively related to the degree of stock options remuneration"* is validated.

Additionally, I examine the effect of a CEO's time in office on leverage. As table 6 shows, CEO tenure is negatively related to leverage and statistically significant at the 1% level in all specifications. Therefore the hypothesised relationship *"H_5: Leverage is negatively related to CEO tenure"* is validated by the empirical results. The regression results support the view that as a CEO's time in office lengthens, (s)he asserts more control over internal monitoring by the board and therefore (s)he is more able to avoid debt. Furthermore, as outlined in the literature section, a CEO that is quite some time with the company might become more loyal to its employees and thereby avoid debt for employment securing reasons.

Clearly, as I demonstrate empirically, the G and E index have the opposite effect on leverage compared to the CEO variables. The definition of corporate governance I deduced from Shleifer and Vishny (1997) is as follows: "Corporate governance is the entire set of controls that suppliers of funding use to ensure themselves of receiving a proper return on their investment". Thus, "good" corporate governance induces managers to act in the interest of shareholders and allows shareholders to discipline the management team. If I translate that to the variables used in this paper, good corporate governance is associated with low values for the G and E index (lower managerial entrenchment through antitakeover provisions and therefore higher discipline from the threat of takeover). Low values for these indices are associated with low leverage levels. On the other hand, managers can also be induced to act in

the shareholders' interest through stock options and stock ownership (for low levels), which are associated with higher levels of leverage. The contrasting effect of the entrenchment indices compared to the CEO variables and the endogeneity concerns discussed earlier require that more testing is needed before drawing conclusions about causality. Correspondingly, in the next section I perform an exogenous shock analysis.

5.0 Exogenous shock analysis

5.1 Business combination laws

In order to address the endogeneity issues associated with the entrenchment indices, I perform an exogenous shock analysis. More specifically, I analyse the leverage response of companies incorporated in states that enact corporate antitakeover laws. These laws apply only to businesses incorporated in the state enacting the laws and thereby induce an exogenous shock to the level of takeover vulnerability for only those companies incorporated. Since these legal changes are out of control of a firm's management team (but they can react in the way they manage their companies), antitakeover laws are suitable to address the uncertainty surrounding the causality between managerial entrenchment and financial leverage. I focus on business combination laws since these laws are considered to have the most severe impact among the second and third generation antitakeover laws (Bertrand & Mullainathan, 2003). In short, business combination laws prohibit a range of transactions between the acquirer and the target company unless approved by the target board. Transactions such as the sale of business relationships and the lease or mortgage of assets can be restricted under these laws. Moreover, raiders can be forbidden to plan a liquidation of the target company or to receive any financial assistance, such as loans and guarantees, from the acquired firm (Bertrand and Mullainathan, 2003). As a result, business combination laws can make a potential takeover candidate unattractive in case the target company decides not to cooperate, because of the severe restrictions the acquirer then faces, which may last for three to five years. Additionally, for bidders it may become unattainable to finance a takeover because the sale of the target's assets is excluded as a source of funds. In conclusion, business combination laws can be a powerful deterrent for hostile takeovers and therefore impose an obstruction to this corporate governance mechanism, effectively entrenching management.

5.2 Data and methodology

In the following research design I again use panel OLS regression techniques to investigate the effect of state antitakeover legislation on leverage outcomes. Therefore, I construct an *antitakeover law dummy* which equals one for all firm years when the state of incorporation passes the business combination laws and for all firm years thereafter. The dummy is coded zero otherwise. I obtain the years in which the individual states enacted the business combination laws from Bertrand and Mullainathan (2003), these dates are shown in table A3 in the appendix. Control variables remain as in the first research design but the CEO variables are omitted because of limited data availability before 1992.

I obtain company financial data from the Compustat database over the period of 1983 to 1993, which is broadly the period in which the business combination laws were passed. Data preparation procedures are equivalent to the first analysis with the additional requirement that firms must report at least 10 million dollars in stockholders' equity. Because this time I am not restricted to companies in the IRRC universe, a substantial amount of very small companies enter the data. I exclude these small firms from the sample because they differ significantly on corporate governance structure and ownership concentration. Furthermore, because in this sample only about 20 percent of the companies have a credit rating, I adjust the rating variable and create a rating dummy that equals one if the company has a credit rating and zero otherwise. For the regressions, I again cluster the standard errors at the company level.

5.3 Results

Table 7 shows the summary statistics of the sample used for the analysis of the impact of business combination laws on capital structure. The final sample consists of 26,175 firm year observations of 4,554 unique firms. The summary statistics are comparable to those of the IRRC sample used in the entrenchment indices analysis. Because I redefined the credit rating variable, only this variable shows a large difference in mean and standard deviation.

Table 8 shows the regression coefficient estimates. Clearly, the antitakeover law dummy which equals one if business combination laws are passed in the state of incorporation has a positive and significant relationship with financial leverage. Because approximately 55% of the companies in the sample are incorporated in Delaware, I also analyse a subsample

of non-Delaware incorporated firms. However, excluding firms incorporated in Delaware has no substantial impact on the results. In all specifications, the positive coefficient of the law dummy is statistically significant at the 1% level. Moreover, the impact of a firm being incorporated in a state that passed business combination laws on financial leverage is also economically significant. Using the coefficients from the full sample regressions, mean leverage increases with 5.98% and 7.06% for book and market values, respectively. Furthermore, for the non-Delaware subsamples these percentages are similar in magnitude. In conclusion, these results reinforce the findings of the entrenchment index regressions and alleviate the endogeneity concerns. More specifically, these results show that companies less vulnerable to hostile takeovers, measured as being subject to state antitakeover legislation, are associated with higher leverage. This relationship seems causal as the enactment of the business combination laws is an exogenous shock to a company's takeover defensiveness and higher leverage levels are observed after these laws are passed.

Table 7
Summary statistics
Summary statistics for the variables used in the business combination laws analysis. Book and market leverage are measured at t+1. Statistics are calculated using data of 4,554 unique US firms over the period of 1983 to 1993. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Firm size is calculated as the natural logarithm of total assets in millions of US dollars. For a complete list of variable definitions see table A1 in the appendix.

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Book leverage	26,175	0.4802	0.1999	0.0044	0.9935
Market leverage	26,175	0.3979	0.2305	0.0019	1.0000
Antitakeover law dummy	26,175	0.5210	0.4996	0	1
Firm size	26,175	5.1533	1.6112	2.3539	12.4352
Tangibility	26,175	0.3313	0.2147	0	0.9979
Market-to-book	26,175	1.6279	1.1294	0.1050	19.1452
Profitability	26,175	0.1328	0.1125	-1.1402	1.1283
Asset uniqueness	26,175	0.0773	0.5710	0	10
Dividend payer	26,175	0.5044	0.5000	0	1
Credit rating dummy	26,175	0.1926	0.3943	0	1

Table 8
Regression coefficient estimates: Antitakeover law dummy and additional determinants of financial leverage
OLS regressions of book and market leverage on the antitakeover law dummy and control variables. The regression coefficients are based on data of 4,554 unique US listed firms over the period of 1983 to 1993.The coefficients in column 2 and 4 are based on a subsample of all non-Delaware firms. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage		Market leverage	
	Full sample	Non-Delaware	Full sample	Non-Delaware
Antitakeover law dummy	0.0287***	0.0338***	0.0281***	0.0364***
	(5.09)	(5.04)	(4.22)	(4.65)
Firm size	0.0408***	0.0357***	0.0329***	0.0230***
	(21.63)	(12.57)	(15.35)	(7.26)
Tangibility	0.0979***	0.1339***	0.1762***	0.2074***
	(6.64)	(6.18)	(10.57)	(8.44)
Profitability	-0.1467***	-0.2150***	-0.6735***	-0.8091***
	(7.28)	(6.82)	(24.65)	(18.59)
Market-to-book	-0.0350***	-0.0352***		
	(16.46)	(11.75)		
Asset uniqueness	-0.0364***	-0.0381***	-0.0726***	-0.0828***
	(12.44)	(5.31)	(14.78)	(7.13)
Dividend payer	-0.0417***	-0.0445***	-0.0475***	-0.0432***
	(8.20)	(5.89)	(8.18)	(5.15)
Credit rating dummy	0.0567***	0.0608***	0.0396***	0.0447***
	(9.53)	(6.45)	(5.46)	(3.91)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
N	26,175	11,613	26,175	11,613
Adj R^2	0.3417	0.3502	0.3251	0.3435

Robustness check

Next, I check if the results hold in modified specifications. Firstly, I control for state of incorporation by including a state dummy that equals one if the state of incorporation passes business combination laws somewhere during the period of 1983-1993 and zero otherwise. This way I check if the results are not driven by the incorporation decision. For instance, states that pass business combination laws might also have enacted other corporate legislation that influences leverage outcomes. Table A4 in the appendix shows the results in which the significance of the antitakeover law dummy is reduced but the coefficient is still positive in sign and statistically significant at the 5% level for both book and market leverage. For the

non-Delaware sample, the coefficient is still statistically significant at the 1% level. Therefore, I conclude that, after controlling for the state of incorporation, the business combination laws have a positive effect on corporate financial leverage. Thus, financial leverage increases after an entrenchment increasing shock.

In addition, I examine the leverage reaction during the year following the enactment of antitakeover legislation. For this, I regress leverage *change* on a dummy that equals one for the year that business combination laws are passed and zero otherwise. I also include the initial leverage at the end of the preceding year as an additional control variable. Table 9 shows the regression results. Most coefficients are less significant than in the leverage levels regressions and the most evident predictor of leverage change is initial leverage. Clearly, the coefficient of leverage change in the year following the enactment of business combination laws shows a positive sign, which confirms earlier results. The law dummy is statistically significant at a 5% (10%) for change in book leverage (market leverage). Furthermore, I examine if firms anticipate business combination legislation before the actual law enactment. Though, the results show no evidence for anticipation as I find no significant leverage change in the year before and the year in which business combination laws are passed. Firms only lever up in the year after the laws are passed. In conclusion, the results show that antitakeover legislation has a positive impact on financial leverage during the year following the law enactment and I find no evidence that firms anticipate antitakeover legislation by adjusting leverage before the laws take effect.

Table 9

Regression coefficient estimates: State antitakeover legislation and additional determinants of financial leverage change

OLS regressions of changes in book and market leverage on the antitakeover law dummies and control variables. The regression coefficients are based on data of 4,554 unique US listed firms over the period of 1983 to 1993. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage change			Market leverage change		
Year before law enactment	-0.0022			-0.0018		
	(0.89)			(0.63)		
Year of law enactment		0.0008			0.0008	
		(0.32)			(0.26)	
Year following law enactm.			0.0058**			0.0050*
			(2.40)			(1.67)
Initial leverage	-0.1400***	-0.1400***	-0.1400***	-0.1308***	-0.1308***	-0.1308***
	(32.33)	(32.33)	(32.34)	(33.38)	(33.39)	(33.40)
Firm size	0.0051***	0.0050***	0.0050***	0.0012**	0.0012**	0.0012**
	(10.40)	(10.39)	(10.39)	(2.10)	(2.09)	(2.09)
Tangibility	0.0109***	0.0109***	0.0110***	0.0058	0.0058	0.0059
	(2.82)	(2.83)	(2.85)	(1.32)	(1.32)	(1.34)
Profitability	-0.0708***	-0.0708***	-0.0708***	-0.0634***	-0.0634***	-0.0635***
	(9.87)	(9.88)	(9.88)	(8.13)	(8.13)	(8.13)
Market-to-book	-0.0034***	-0.0034***	-0.0034***			
	(4.95)	(4.96)	(4.95)			
Asset uniqueness	-0.0037***	-0.0037***	-0.0037***	-0.0054***	-0.0054***	-0.0054***
	(3.46)	(3.46)	(3.46)	(4.61)	(4.61)	(4.61)
Dividend payer	-0.0001	-0.0001	-0.0001	-0.0058***	-0.0057***	-0.0057***
	(0.06)	(0.05)	(0.05)	(3.67)	(3.66)	(3.67)
Credit rating dummy	0.0060***	0.0060***	0.0059***	0.0065***	0.0065***	0.0064***
	(3.31)	(3.31)	(3.30)	(3.03)	(3.03)	(3.02)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	26,175	26,175	26,175	26,175	26,175	26,175
Adj R^2	.0714	.0714	.0715	.1150	.1150	.1151

6.0 Discussion and conclusion

This paper investigates the relationship between managerial entrenchment and capital structure and thus examines if an agency based view on capital structure can explain observed leverage variation in US companies. Managerial entrenchment is estimated using governance provision indices that measure the amount of takeover defences present in a company and therefore the degree of antitakeover measures available to the management team to shield itself from hostile takeovers. Firstly, I hypothesise that the amount of antitakeover provisions is negatively related to financial leverage, which I base on Jensen's (1986) free cash flow model that explains the performance pressure and reduction in management discretion associated with debt creation. In this story, higher leverage is good news for shareholders because of the organizational efficiency gains but bad news for managers because it restricts their spending on non-monetary personal benefits such as "wasteful" pet projects.

The results of the regression analyses, however, show a positive relationship between the entrenchment indices and financial leverage measured in book and market value. Moreover, I show that this relationship is robust to different model specifications. When I regress financial leverage measured in book and market value on the entrenchment indices, both the G and E index coefficients show a statistically significant positive sign. Thus, the entrenchment coefficients are consistent in sign and highly significant in different specifications. Furthermore, I find that this relationship is also economically significant with changes in mean book leverage of 2.91% and 2.43%, and changes in mean market leverage of 6.38% and 5.81% for a marginal change of one standard deviation in the G and E index, respectively.

Although the regression results are clear-cut, cautious interpretation is required. As Gompers et al. (2003) discuss, the G index variable may be endogenous if an important causal factor is omitted from the model. That caveat also applies to this paper, for instance one may argue that the management team both increases leverage and puts in place antitakeover provisions included in the G index as a takeover defence. In this case, the assumed causality that runs from managerial entrenchment to leverage levels is not really there. In order to address this ambiguity, I perform an exogenous shock analysis. More specifically, I examine the impact of an exogenous shock in managerial entrenchment, in the form of business combination law enactment, on financial leverage. I find significantly higher leverage levels in firms incorporated in states that have passed these antitakeover laws, which is robust to different model specifications. Moreover, I also find that leverage *change* is positive and

significant in the year following the enactment of business combination laws in the state of incorporation. In summary, the exogenous shock analysis is confirmatory with regard to the entrenchment index regressions and indicates that causality runs from managerial entrenchment to leverage.

The empirical results in this paper conflict with the results of Berger et al. (1997) who conclude that managerial entrenchment is associated with lower leverage levels. It seems that different corporate governance mechanisms are inconsistent in their impact on financial leverage. Whereas Berger et al. (1997) define entrenchment as the degree to which managers are shielded from different corporate governance mechanisms (for which they use mainly internal corporate governance measures), I focus on the degree of antitakeover provisions that are present in a company. Thus, the results imply that the takeover market as an external corporate governance mechanism has a different impact on leverage policy than do internal mechanisms such as stock options. I test empirically the effect of CEO inside ownership, stock options remuneration, and tenure, finding results that corroborate this view. CEO inside ownership (for low non-entrenching levels), CEO stock options (pay-for-performance), and low CEO tenure (less loyalty towards employees relative to shareholders and less control over internal monitoring systems) are all associated with higher leverage. Therefore, as opposed to the G and E index, these CEO variables do have the expected relationship deduced from Jensen's (1986) free cash flow theory. The discrepancy might result from the fact that the G and E index are in particular a measure of the relative power of managers versus shareholders as the provisions included can neutralise the threat of a hostile takeover. Whereas the CEO variables gauge for the (non)presence of corporate governance systems focussed on aligning the interests between shareholders and managers. Thus, the difference lies in the fact that the entrenchment indices measure the possibility that the management team can be forcefully removed, whereas the CEO variables and the variables in Berger et al. (1997) measure the functioning of internal corporate governance systems. Speaking in terms of managerial entrenchment, the G and E index better measure the management team's shielding from the threat of takeover.

In summary, I find no evidence that entrenched managers, measured as the amount of antitakeover provisions to their disposal, avoid debt. On the contrary, the empirical results show a positive relationship between managerial entrenchment and financial leverage. The results of the exogenous shock analysis are confirmatory, alleviating endogeneity concerns. Higher shareholder power as measured by less entrenching provisions is associated with less leverage and thus the results seem to contrast Jensen's (1986) free cash flow theory. However,

shifting the point of view from the management-shareholder relationship to a view that includes a firm's debtholders offers a possible solution. A relatively equity holder unfriendly corporate governance system may be advantageous to debt holders because managers are free to invest in diversifying activities that are not necessarily value enhancing but they do reduce the firm's risk. Because shareholders are able to diversify themselves, low risk projects that earn a rate below the cost capital are disadvantageous for them. In contrary, debt holders care more about the firm's risk because they only receive fixed promised payments so they don't benefit from the upside potential in risky projects. Thus, "empire building" can be advantageous for debt holders who in turn may lend more, at lower cost, and under less restrictive terms to the firm. In fact, such an explanation does not necessarily contradict Jensen (1986). The fact that John and Litov (2010) find high G firms to have higher credit ratings corroborate this view. Future research should dig deeper in the manager-shareholder-debt holder triangular relationship whereby both investment and financing policy should be integrated into one model. For example, it would be interesting to investigate if entrenched managers are more likely to engage in diversifying acquisitions of companies in unrelated industries, and if such deals are more likely to be financed by debt. I look forward to future research on this topic.

7.0 References

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8.0 Appendix

Table A1
Variable definitions and data sources
All items are in book values unless indicated otherwise.

Variable	Definition	Data source
Book leverage	Total debt / total assets.	Compustat
Market leverage	Total debt / (total assets + market equity – book equity).	Compustat
Market equity	Total common shares outstanding * share price, at the end of the fiscal year.	Compustat
G index	Number of antitakeover provisions as defined by Gompers et al. (2003).	Yale School of Management website
E index	Number of antitakeover provisions as defined by Bebchuk et al. (2009).	Harvard Law School website
CEO stock ownership	Shares owned directly by the CEO / total common shares outstanding.	Execucomp
CEO option holdings	Exercisable options held by the CEO / total common shares outstanding.	Execucomp
CEO tenure	Natural logarithm of years in CEO position.	Execucomp
Firm size	Natural logarithm of total assets. Assets are in millions of US dollars.	Compustat
Tangibility	Net property, plant and equipment / total assets.	Compustat
Market-to-book	(Total assets + market equity – book equity) / total assets.	Compustat
Profitability	EBITDA / total assets.	Compustat
Asset uniqueness	R&D expenses / sales.	Compustat
Dividend payer	Dummy that equals one if the firm pays dividends and zero otherwise.	Compustat
Credit rating	Standard and Poor's (S&P) domestic long term issuer credit rating scaled on an interval from 1 to 6. From high to low, AAA (6), AA(+/-) (5), A(+/-) (4), BBB(+/-) (3), BB(+/-) (2), and B+ or lower (1). Firms for which a credit rating is missing are assigned a zero.	Compustat
Credit rating dummy	Dummy that equals one if the company has a credit rating and zero otherwise. (this dummy is only used	Compustat

	in the exogenous shock analysis)	
Antitakeover law dummy	Dummy that equals one after business combination laws are enacted in the state of incorporation and zero otherwise.	Bertrand and Mullainathan (2003)
State of incorporation dummy	Dummy that equals one if the state of incorporation passes business combination laws somewhere during the period of 1983-1993 and zero otherwise.	Bertrand and Mullainathan (2003)

Table A2
Economic impact of the independent variables
Economic impact is calculated as marginal increase times regression coefficient divided by mean leverage for both book and market leverage. Marginal increase is one standard deviation (SD). The G and E index are also examined using a marginal increase of one provision. The marginal increase of the dividend payer dummy is one. The marginal increase of the credit rating variable is a tranche as defined in table A1 and equals one. The regression coefficients are taken from the OLS regressions including all independent variables (specifications (3) and (6) in table 3 and 4). Except for the E index all coefficients are from the regressions including the G index as independent variable. Calculations are performed using 6 decimals for all inputs.

			Book leverage		Market leverage	
	Marginal increase	Standard deviation	Coefficient	Economic impact	Coefficient	Economic impact
G index	SD	2.7117	0.0055	2.91%	0.0082	6.38%
	provision	N/A	0.0055	1.07%	0.0082	2.35%
E index	SD	1.3062	0.0096	2.43%	0.0156	5.81%
	provision	N/A	0.0096	1.86%	0.0156	4.45%
CEO stock ownership	SD	0.0549	-0.1731	-1.85%	-0.0824	-1.29%
CEO option holdings	SD	0.0113	0.4037	0.88%	1.3253	4.27%
CEO tenure	SD	0.9441	-0.0089	-1.64%	-0.0094	-2.54%
Firm size	SD	1.4613	0.0289	8.22%	0.0259	10.81%
Tangibility	SD	0.2146	0.0446	1.86%	0.1421	8.71%
Profitability	SD	0.1021	-0.2504	-4.97%	-0.8324	-24.28%
Market-to-book	SD	1.4200	-0.0202	-5.59%		
Asset uniqueness	SD	0.4309	-0.0351	-2.94%	-0.1195	-14.70%
Dividend payer	unity	N/A	0.0209	4.06%	0.0106	3.03%
Credit rating	tranche	N/A	0.0157	3.04%	-0.0021	-0.59%

Table A3
State antitakeover legislation
This table indicates the states in which and year when business combination laws are passed. Data are obtained from Bertrand and Mullainathan (2003). The state year combinations are used to construct the antitakeover law dummies in the exogenous shock analysis.

State	Year
Arizona	1987
Connecticut	1989
Delaware	1988
Georgia	1988
Idaho	1988
Illinois	1989
Indiana	1986
Kansas	1989
Kentucky	1987
Maine	1988
Maryland	1989
Massachusetts	1989
Michigan	1989
Minnesota	1987
Missouri	1986
Nebraska	1988
Nevada	1991
New Jersey	1986
New York	1985
Oklahoma	1991
Ohio	1990
Pennsylvania	1989
Rhode Island	1990
South Carolina	1988
South Dakota	1990
Tennessee	1988
Virginia	1988
Washington	1987
Wisconsin	1987
Wyoming	1989

Table A4
Regression coefficient estimates: Antitakeover law dummy and additional determinants of financial leverage

OLS regressions of book and market leverage on the antitakeover law dummy and control variables. The added state of incorporation dummy equals one if the state of incorporation passes business combination laws somewhere during the period of 1983-1993 and zero otherwise. The regression coefficients are based on data of 4,554 unique US listed firms over the period of 1983 to 1993. Utilities (SIC codes starting with 48 and 49) and financial firms (SIC codes starting with 60-69) are excluded. Industry fixed effects are constructed using 2-digit SIC codes. Absolute t-values are shown in parentheses. Standard errors (not shown) are robust, cluster-adjusted at the company level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Book leverage		Market leverage	
	Full sample	Non-Delaware	Full sample	Non-Delaware
Antitakeover law dummy	0.0134**	0.0202***	0.0165**	0.0215***
	(2.35)	(2.88)	(2.52)	(2.71)
State of incorporation dummy	0.0264***	0.0218**	0.0200**	0.0240**
	(3.37)	(2.43)	(2.21)	(2.38)
Firm size	0.0404***	0.0354***	0.0326***	0.0226***
	(21.32)	(12.41)	(15.13)	(7.12)
Tangibility	0.0995***	0.1352***	0.1775***	0.2088***
	(6.74)	(6.24)	(10.62)	(8.47)
Profitability	-0.1472***	-0.2171***	-0.6739***	-0.8106***
	(7.30)	(6.86)	(24.63)	(18.57)
Market-to-book	-0.0350***	-0.0350***		
	(16.52)	(11.69)		
Asset uniqueness	-0.0365***	-0.0381***	-0.0727***	-0.0828***
	(12.44)	(5.30)	(14.79)	(7.13)
Dividend payer	-0.0416***	-0.0453***	-0.0474***	-0.0442***
	(8.18)	(5.98)	(8.17)	(5.24)
Credit rating dummy	0.0567***	0.0610***	0.0396***	0.0450***
	(9.53)	(6.46)	(5.46)	(3.93)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
N	26,175	11,613	26,175	11,613
Adj R^2	0.3427	0.3515	0.3255	0.3446