Bill Francis – Iftekhar Hasan – Zenu Sharma

Leverage and growth: effect of stock options

EUROJÄRJESTELMÄ
EUROSYSTEMET

Bank of Finland Research
Discussion Papers
19 • 2011

Suomen Pankki
Bank of Finland
PO Box 160
FI-00101 HELSINKI
Finland
☎ +358 10 8311

http://www.suomenpankki.fi/en
E-mail: Research@bof.fi

Bank of Finland Research
Discussion Papers
19 • 2011

Bill Francis* – Iftekhar Hasan** – Zenu Sharma***

Leverage and growth: effect of stock options

* Lally School of Management, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA.
** Lally School of Management, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA and Bank of Finland, FI 00101 Helsinki, Finland. Corresponding author.
*** Long Island University, C.W. Post, Brooksville, New York.

http://www.suomenpankki.fi/en

ISBN 978-952-462-775-7
ISSN 0785-3572
(print)

ISBN 978-952-462-776-4
ISSN 1456-6184
(online)

Helsinki 2011

Leverage and growth: effect of stock options

Bank of Finland Research
Discussion Papers 19/2011

Bill Francis – Iftekhar Hasan − Zenu Sharma
Monetary Policy and Research Department

Abstract

This paper investigates the potential effects of stock options on managers' investment decisions and therefore on a firm's growth or, alternatively, on its leverage-growth relationship. To structure the analysis addressing this issue, the paper utilizes a framework establishing a negative relationship between leverage and the firm's growth. However, in contrast to some of the existing results, the empirical analysis of manufacturing firms in this paper shows that the negative relationship between leverage and growth has changed significantly. Primarily this paper documents that, as options based compensation in manager's portfolio increases, the negative effect of leverage on growth disappears. The paper argues that this is an important finding, because it implies that when managers are compensated with options debt ceases to pre-commit managers. On addressing the potential endogeneity problem between leverage, growth and compensation the paper finds that option delta instead of book leverage negatively affects growth, and that book leverage and option delta are inversely related. Finally, the paper also examines the effect of corporate governance on the relationship between leverage, incentives and the firm's growth and finds that leverage is negatively related to growth only in poorly governed firms.

Keywords: leverage, stock options, compensation schemes, coporate governance

JEL classification numbers: G32, G34, C21

Vauhdittavatko optioperusteiset yritysjohdon palkitsemisjärjestelmät yritysten kasvua?

Suomen Pankin keskustelualoitteita 19/2011

Bill Francis – Iftekhar Hasan − Zenu Sharma
Rahapolitiikka- ja tutkimusosasto

Tiivistelmä

Tässä työssä tarkastellaan yritysjohdon optiojärjestelmien vaikutuksia yritysjohtajien investointipäätöksiin ja siten myös yritysten kasvuun. Koska työssä itse asiassa tarkastellaan, muuttavatko yritysjohdon (osake)optiojärjestelmät yrityksen velkaantumisasteen ja kasvun välistä riippuvuutta, analyysin lähtökohtana on oletus velkaantumisen haitallisista kasvuvaikutuksista. Tässä työssä saatujen, teollisuusyrityksistä kerättyihin tilastotietoihin perustuvien estimointitulosten mukaan velkaantumisen haitallisten kasvuvaikutusten voimakkuus on kuitenkin vaihdellut tarkasteluajanjaksona. Työssä raportoidaan ennen kaikkea, että velkaantumisen haitalliset kasvuvaikutukset näyttävät häviävän, kun johtajien varallisuuden tuleva arvo riippuu myös yritysjohdon optioihin perustuvan palkitsemisjärjestelmän tuotoista. Tulosta pidetään työssä merkittävänä, koska siitä seuraa, että velka ei enää sitouta yritysjohtoa, kun sen kannusteita muokataan optioihin perustuvalla palkitsemisjärjestelmällä. Estimoinnit, joilla yritetään hallita tilastolliseen analyysiin mahdollisesti liittyvää endogeenisuusongelmaa, viittaavat siihen, että kirjanpitoarvoista lasketun velkaantumisasteen sijaan option suojausparametrit tai hinnan herkkyysmittarit, erityisesti ns. osakeoption delta, korreloivat negatiivisesti yrityksen kasvun kanssa. Estimointitulokset viittaavat myös siihen, että yrityksen velkaantuminen vaikuttaa haitallisesti nimenomaan niiden yritysten kasvuun, joiden hallinto- ja kontrollijärjestelmien toiminnassa on puutteita.

Avainsanat: velkaantumisaste, osakeoptiot, palkitsemisjärjestelmät, yritysten hallinto- ja kontrollijärjestelmä

JEL-luokittelu: G32, G34, C21

Contents

1. Introduction

Debt pre commits managers (e.g Jensen (1986)). By binding future cash flows of firms that have low growth opportunities, it forces managers to curtail more risky and less profitable investments. Lang, Ofek and Stulz (1996) show that leverage has a negative impact on firms' future growth because the presence of debt prevents managers from overinvesting. However, in addition to debt, firms use a plethora of mechanisms to ensure that managers maximize firm value. For example stock options, which tie manager's pay to firm value, should incentivize managers to not waste free cash flows and instead invest in value-increasing positive net present value (NPV) projects.

In addition to aligning managerial interests with those of shareholders, options also affect managers' incentives to shift risk. As options create convex pay-offs and have zero downside risk, they may encourage managers to take more risk (e.g. Agarwal and Mandelkar (1987)).[1] Since increasing firm risk may get translated in higher coupon rate it may increase a firm's debt service burden. Therefore even in presence of options, by diverting firm's free cash flows debt would serve as a disciplining device (Childs and Mauer (2008). However, holding undiversified position in the firm can have the opposite effect of reducing their risk appetite (e.g. Lambert, Larcker, and Verrecchia (1991), Carpenter (2000), Ross (2004), Knopf, Nam, and Thornton (2002))[2]. If managers are risk averse they would refrain from making value decreasing risky investments, in which case debt would only acting as a financing device.

[1] Agarwal and Mandelker (1987) find a positive relationship between security holdings of managers and changes in firm variance and financial leverage, which they attribute to changes in the risk preferences of the managers in the presence of stock options.

[2] Lambert, Larcker and Verrecchia (1991), Carpenter (2000), and Ross (2004) argue that under certain assumptions stock options can lead to less, as opposed to more, risk-taking. Knopf, Nam and Thornton (2002) find that as the sensitivity of options to stock price increases firm hedge more.

Because various corporate governance mechanisms interact with each other, ex ante it is unclear how options will affect managers' investment behavior and their attitude towards risk. The presence of options in managers' compensation portfolio can exacerbate or mitigate the disciplining role of debt. In this paper, we investigate whether and in which direction options affect managers' investment decisions and therefore firm growth.

In particular, we examine the effect of using options on the leverage-growth relationship. In addressing this issue we utilize a framework similar to Lang, Ofek and Stulz (1996) who show a negative relationship between leverage and growth in large manufacturing firms. In contrast to their results, our analysis of manufacturing firms shows that the previously documented negative relationship between leverage and growth has changed significantly. Primarily we find that as options based compensation in manager's portfolio increases the negative effect of leverage on growth disappears. Disappearance of the negative relationship between leverage and growth is an important finding because it implies that when managers are compensated with options debt ceases to pre commit managers. It further suggests that options instead pre commit managers wherein managers reject negative NPV projects that decrease firm value. Further, because options are intended to induce risk-taking for risk-averse managers, managers' reluctance to overinvest in presence of options is counterintuitive and is indicative of risk-aversion.

We define growth as net investment in year one, divided by fixed assets in year zero. As we are interested in examining the role of stock options, and their influence on the disciplining role of debt, we look at the relationship between leverage and growth in subsamples of levels and types of compensation. We divide our sample based on the fraction of compensation received by managers in the form of equity and non-equity based pay. For the non-equity based components of compensation, which are salary and bonus, we find that as the fraction of compensation in the

form of salary and bonus increases, the relationship between leverage and growth becomes negative. When we examine the relationship between leverage and growth at different levels of equity-based components of pay, especially stock options, we find opposite results. We find that a negative relationship between leverage and growth disappears as CEOs' compensation in the form of options increases.

Lang, Ofek and Stulz (1996) further contend that leverage affects growth of firms that have fewer investment opportunities because the likelihood of managers wasting resources in such firms is higher. To create a distinction between high and low growth firms we create two separate dummy variables. One, for Tobin's Q greater than 1 in order to represent high growth opportunities; and another second for Tobin's Q less than 1 in order to represent low growth opportunities. Then we interact these dummy variables with book leverage itself. When we examine the relationship between growth and book leverage in low growth firms, we find that the relationship is negative and significant for firms that give zero options. However, the size of the coefficient on book leverage decreases in the sample of firms that give more than zero options and is insignificant for firms in which more than 40% of CEOs' compensation is paid in the form of options. When we include a measure of incentive intensity, which is a ratio of equity based pay to non-equity based pay, in the original estimation equation we find that the negative coefficient on book leverage disappears and incentive intensity instead negatively affects firm growth.

The rationale for managerial compensation as an explanation for the disappearing role of debt as a disciplining mechanism comes from various papers examining the effect of options on manager's risk preferences. For example, Hirshliefer and Thakor (1992) argue that when managers have career concerns, using stock options may actually motivate them to follow a

conservative investment policy. Further, unlike shareholders who can diversify their portfolio, because of the restrictions imposed on options granted to managers, managers' wealth gets tied to firm-specific investments. As a result, use of options can make managers risk-averse (e.g. Lambert, Larcker, and Verrecchia (1991), Carpenter (2000), Ross (2004), Knopf, Nam, and Thornton (2002)). If managers are already conservative in their outlook then the debt should have no effect on growth.

However, as convexity of payoffs can also make managers aggressive in risk-taking we examine aspects of stock options that influence risk preferences of managers. We follow the existing literature and look at the sensitivity of options to stock price (i.e. option delta) and the sensitivity of options to stock price volatility (i.e. option vega). Arguably, higher option delta indicates high pay for performance relation for CEOs and can induce risk-aversion (e.g. Guay (1999)). On the other hand higher option vega indicates a convexity of payoffs and creates incentives for managers to take on more risks (e.g. Guay (1999), Coles, Daniel and Naveen (2006). We find that when we include option delta and vega in our main estimation, the negative sign on book leverage disappears and delta negatively relates to growth. In addition when we include an interaction of book leverage and option delta in the estimation equation, we find that it has a positive relationship with growth, suggesting that options and debt are substitutes. These findings are consistent with Shaw (2008) who finds that a firm, who's CEO has high option deltas, experiences lower yield spreads in new debt issues. They are also consistent with the findings of Billet, Mauer and Zhang (2006) who show that bondholders react positively to increases in option deltas.

We also address the endogeneity concerns between leverage, growth and compensation by using simultaneous equation modeling. We find that option delta instead of book leverage negatively affects growth, and that book leverage and option delta is inversely related.

As managers in diversified firms have the flexibility to reallocate the burden of debt-service between high and low growth segments, the negative relationship between book leverage and investment in these firms can be attenuated by the cross-subsidization between different segments (e.g. Ahn, Denis and Denis (2006)). In our sample when we examine the relationship between leverage and growth in focused versus diversified firms, we find that the negative coefficient on book leverage in the case of focused firms is twice as large compared to diversified firms. However, the negative relationship between leverage and growth in focused firms disappears upon the inclusion of option deltas and vegas.

Finally, we examine the effect of corporate governance on leverage, incentives and growth relationship. We sort firms on the basis of their corporate governance scores. We define poorly governed firms as those that have governance index greater than 12 and well governed firms as those whose governance index is less than 6. We find leverage is negatively related to growth only in poorly governed firms. In addition, when we include option deltas, both book leverage and option delta have a negative relationship with growth in poorly governed firms. We contend that when firms are poorly managed shareholders use all mechanisms to discipline managers.

This paper contributes to the stream of literature examining the relationship between capital structure and investment. In contrast to Lang, Ofek and Stulz (1996) few papers examining the leverage-investment relationship find mixed results. For example Lyandres and Zdhanov (2005) find a positive relationship between leverage and investment for COMPUSTAT

firms from 1970–2003. They argue that in a dynamic setting, firms compare the benefits of waiting, as value of real options increase with time, against the cost of rising default risk. The presence of debt makes this option to wait less valuable, which makes shareholders become more aggressive in their investment decisions. Ahn, Denis and Denis (2006) also look at the relationship between leverage and investment, but they do it in the context of diversified and focused firms. They argue that in diversified firms, investment is unevenly distributed over the high and low growth segments, and managers have the discretion to allocate debt service burden between different segments. Over-allocation of debt service requirements to high growth, and non-core segments could result in under-investment; thus a negative relation between leverage and investment. These papers however test the relationship between contemporaneous leverage and investment, which is different from the relationship between current leverage and future growth.

Unlike Ahn, Denis and Denis (2006) and Lyandres and Zdhanov (2005) who examine the effect of leverage on contemporaneous investment we follow Lang, Ofek and Stulz (1996) and look at future growth and find that leverage has no affect on growth after incentives created by options are accounted for. Secondly, we explore the negative association between leverage and growth from the lens of managerial incentives. As options also pre commit managers, they provide a better explanation for the mixed findings on the relationship between leverage and growth. This paper also contributes to the stream of literature examining the competing incentives created by stock options. In contrast to Coles, Daniel and Naveen (2006) who show that option vegas are positively related to riskier financing and investment policies, we show that option deltas prevent managers from overinvesting. These results are consistent with Shaw (2008) who finds that option delta is associated with lower yield spreads in corporate debt issues.

While Shaw (2008) examines the effect of risk-shifting incentives of options from debtholders' perspective; we examine their effect on managers' investment behavior.

In Section II, we provide a description of data and definition of variables, Section III presents the results and Section IV concludes.

2. Data and Methodology

2.1. Description of Data

We obtain our data from two sources. The accounting information comes from COMPUSTAT, and the compensation information comes from ExecuComp. ExecuComp has complete information on the compensation structures of the top five to seven executives from 1992, and covers S&P 400, S&P 500, and S&P 600 firms. We investigate manufacturing firms (SIC 2000–3999), and our sample period ranges from 1993–2005. The total number of firms in the database is 2,616. Of these manufacturing concerns are 1,070. Our final sample consists of roughly 680 firms.

2.2. Definition of Variables

As stated earlier, to examine the relationship between leverage and growth we follow the model used by Lang, Ofek and Stulz (1996).[3] Our dependent variable, growth, is defined as the net investment in year t+1 divided by the fixed assets at year zero. Net investment is defined as capital expenditures, minus the depreciation expense in the same year. We focus on growth in capital expenditures net of depreciation expense. We suspect that the relationship between capital expenditure and leverage may be biased because depreciation expense is a non-debt tax

[3] The other measures used in their paper are employee growth and growth in capital expenditures. Growth in capital expenditures is defined as growth change in capital expenditures from zero one to year one divided by capital expenditures in year zero.

shield that negatively relates to leverage (e.g. Dammon and Senbet (1988)). However, to be consistent with the literature we also look at inflation adjusted one year and three year growth in capital expenditures.

In our regression model, our main variable of interest is book leverage. We measure book leverage as the total debt of a firm in year zero, divided by total assets in year zero. We also use market leverage to verify our conjecture, however, we base most of our analysis on book leverage. Market leverage is measured as the total debt of the firm, divided by total debt plus the market value of the equity of a firm. It should be noted that market leverage also captures the investors' expectations of the future price of a firm; it is therefore likely to have a negative relationship with growth.

We define total compensation as TDC1, which includes salary, bonus, long-term incentive plans, additional perks, value of restricted stock granted, and Black & Scholes value of stock options granted. Salary and bonus constitute the non-equity based components of CEO pay and Black and Scholes value of options along-with value of restricted grants comprise as the equity based components of CEO pay. We take these variables directly from ExecuComp. CEO is defined by the "CEOANN" field in the database.

To estimate the values of deltas and vegas, we follow the Core and Guay (2002), and use the modified Black & Scholes, and Merton (1973). An option delta is the change in the value of the option with a unit change in stock price and option vega is the change in value of the options with respect to the volatility. In order to calculate delta and vega we obtain data for old and new grants from ExecuComp database. Stock volatility is a standard deviation of returns calculated over 60 months. Dividend yield is the company's average dividend yield over the past three years. Risk-free rate is the seven-year Treasury note rate. We obtain all this information from

ExecuComp. We obtain end of year stock price data from Centre for Research and Securities Prices (i.e. CRSP). For new options time to maturity is the difference between the exercise date and the respective fiscal year. For old unvested options the time to maturity is assumed to be one year less than the time to maturity of new option grants. And for old vested options the time to maturity is three years less than that for unvested options. The exercise price of old options is calculated as the year end stock price minus the average realizable profit; where average realizable profit is the extent to which the option is in the money (value of grants/number of grants). Option vega is therefore the sum of dollar vega for new and old options. Similarly, option delta is the sum of dollar deltas new and old options.

We control for all the variables that are likely to affect the growth of a firm starting with Tobin's Q. Tobin's Q is calculated as the total debt, plus the market value of the equity, divided by the total assets. This measure serves as a proxy for growth opportunities faced by the firm. In addition to Tobin's Q, we control for sales growth, which we measure as sales in year zero minus the sales in year -1, divided by sales in year -1; and cash flow divided by total assets. Cash flow is measured as the sum of income before extraordinary items and depreciation divided by total assets. Capital expenditures in firms include the extension of existing capital assets, funds for construction and reclassification of inventory to property. However, not all capital expenditures can be considered as growth. Therefore, we control for expenses incurred to maintain the existing assets by including capital expenditures incurred in the current year divided by fixed assets of the previous year.

3. Results

3.1. Descriptive Statistics

In Table 1 we present the descriptive statistics. The sample includes both medium and large firms. Our first growth measure, net investment scaled by fixed assets, is 3% on average. We also include in the table, other measures of growth – capital expenditures growth at time t+1 (21%), and employee growth at time t+1 (5%). On average, firms in the sample finance 22% (book leverage) of the assets with debt. The overall market leverage is approximately 20%. We define high growth firms as those with a Tobin's Q greater than one. Most firms in our sample are high growth with an average of 1.87. Our measure of capital expenditures incurred by the firm for the maintenance of existing assets ($Capex_{(t)}/FA_{(t-1)}$) is 29%. Finally, free cash flows constitute 10% of the total assets in our sample.

[Insert Table 1 around here.]

Within Table 1 we present results for compensation for CEOs during this period. The average compensation drawn by a CEO is $4 million, whereas the median is $2 million. Of the $4 million, the average salary earned by a CEO during this period is $600 thousand and the average bonus is $588 thousand. On average, options constitute $2 million of total compensation, which is 40% of the total compensation; salary constitutes almost 30%, and bonus 18%. The share of salary in total compensation has declined over time and that of options has risen, which highlights the popularity of options as a preferred mode of compensating CEOs. The large difference in means and medians of compensation data indicates that our compensation sample is highly skewed. Further, the compensation data contains many outlying observations, therefore, we winsorize our variables of interest at the 1st and 99th percentiles.

In Table 2, we present correlation scores between dependent and independent variables. Both, book and market leverage are negatively correlated to growth. Total compensation and options is positively related to growth, but the cash compensation, which is sum of salary and bonus are negatively related. Further, delta is negatively related to both book leverage and growth. In contrast, vega is unrelated book leverage and net growth in investment. Despite a positive relationship between options and net investment, the negative effect of delta points to existence of competing incentives. Finally, delta is negatively related to Z-Score, which measures probability of default, which means risk aversion reduces bankruptcy risk. And vega is positively related to Z-Score which means that risk-taking increases bankruptcy risk. None of the correlation scores are large enough to warrant concerns for multicolinearity, except the correlation score between delta and vega (72%).

[Insert Table 2 around here.]

Both measures of leverage are negatively correlated with net investment. Our measure of growth opportunities, Tobin's Q ratio, is negatively related to both leverage and non-equity based components of compensation, and it is positively correlated with net investment and total compensation and options.

3.2. Regression Results

Our first sets of results involve panel data estimates for the full sample. Our methodology is closer to Aivazian, Ge and Qiu (2005) who examine leverage-growth relationship in publicly traded Canadian firms from 1982–1999. The authors argue that the pooling regressions approach

used by Lang, Ofek and Stulz (1996) ignores firm-specific individual effects. The authors instead use firm-fixed effects along with instrumental variables to correct for endogeneity and conclude that after correcting for biases, the negative impact of leverage on investment is more severe than previously perceived. We use firm-fixed effects without instrumental variables instead. Model 1 estimates the regression equation using book leverage and Model 2 estimates the regression equation using market leverage for the period 1993–2005. The coefficient on book leverage and market leverage is negative and significant. Tobin's Q ratio, sales growth, cash flow, and standardized capital expenditures have a positive relationship with net investment. The time period for the Lang, Ofek and Stulz (1996) study extends over 1970–1989.

[Insert Table 3 around here.]

Model 3 and Model 4 estimate the relationship between leverage and net investment during the period 1970–1989. The coefficient on book leverage during 1970–1989 is 120% of the coefficient on book leverage during 1993–2005. Similarly, the coefficient on market leverage during 1970–1989 is 312% of the coefficient on book leverage from 1993–2005. Models 5–8 explore the relationship between leverage and one-year capital expenditures growth. Consistent with the results for net investment the relationship between leverage and one-year capital expenditures growth is negative, although the size of the coefficient in the 1990s and beyond is much smaller as compared to 1970s and 1980s. Further, the chi-square tests between the coefficients on book leverage in the two sample periods confirm that the relationship between leverage and growth has changed significantly.

The large difference in the size of coefficient during these two time periods suggests that there is something different about the 1990s that influenced the documented negative relationship between leverage and growth. As Frydman and Jenter (2010) note that firms began using options more frequently in the early 1980s however by the beginning of 1990s, options composed as the largest component of CEO's compensation. The authors further document and increase the fraction of options in CEO pay from 20% in early 1990s to 49% in 2000.

3.3. Measures of Compensation

To first establish that compensation has any role to play in changing the relationship between leverage and growth, we split our sample based on terciles of total compensation (TDC1) received by managers. We standardize the total compensation by total assets of the firm. The size of the firm has been shown to have a positive relationship with compensation (e.g. Bebchuk and Grinstien (2004), Baker and Hall (2004)). Total compensation measure (TDC1) includes salary, bonus, and value of stock options granted, long-term incentives, and value perks. Smith and Watts (1982) contend that each of these different types of compensation specifically salary, bonus and options create different incentives for managers.

When managers are simply paid in the form of salaries, they are concerned with diversifying their "employment risk" and they tend to make investments that decrease firm-risk. The upshot of remunerating managers with salaries is that managers are more likely to choose projects, which have stable cash flows. As a firm becomes larger managers can claim greater compensation or extract greater rents (e.g. Shleifer and Vishny (1989), Baker and Hall (2004)). A positive correlation between firm size and salary could create incentives for managers to waste cash flows on value-decreasing investments (e.g. Jensen (1986)). However, Smith and Watts

(1982) discuss the incentive problems associated with a fixed component of compensation, for example salary. They argue that because salaries, ex-ante do not tie manager's wealth to firm value, they have no incentive effects. Lack of evidence related to annual re-negotiation of salary contracts casts further doubt on their role in motivating managers. Therefore, we also argue that the salary component of the compensation does not create incentives and expect that in firms that compensate managers more in the form of salary, the relationship between leverage and growth to remain negative.

Unlike salary, bonuses are a performance-based compensation measure where the performance benchmark is usually set to be accounting profits or stock price. Bonus contracts are negotiated at the end of the year, and are usually set by the compensation committee. There is, however, room for negotiation between the compensation committee and CEO. So, whether or not bonuses are an effective tool in aligning managers' interests with those of shareholders is questionable. For example Grinstien and Hribar (2004) investigate CEO compensation for completing M&A deals. They find that CEOs who have more power receive significantly higher bonuses. They also find that there is a positive relation between bonus compensation and their measures of effort but they do not find any significant relation between deal performance and bonuses. As bonuses are largely discretionary in nature they may not efficiently pre commit managers and as a result may not have a significant impact on the relationship between leverage and growth.

Haugen and Senbet (1981) show that use of call-options as a compensation mechanism provides incentives to managers to undertake risky projects. The intuition behind how stock options affect risk-taking in managers is straightforward. Stockholders of a levered firm can be viewed as holding a European call option where the exercise price is equal to the value of debt.

As value of this call-option is an increasing function of the variance of cash flows of the underlying asset they create incentives for managers to engage in high-risk activities at the expense of the debtholders. Consequently, presence of stock options can cause managers to overinvest, thereby worsening the negative effect of leverage on growth.

Stock options, however, can also make managers more risk-averse. For example Lambert, Larcker and Verrecchia (1991) argue that restrictions imposed on stock based compensation granted to managers prevents them from diversifying firm specific risk which may make them value their options differently. Consequently options may not provide adequate risk-seeking incentives to managers. Similarly, Carpenter (2000) and Ross (2004) show that it is not the case that convex incentive structures always make managers more risk loving. Under certain circumstances, convex payment schedules may make managers more risk averse. Finally, Lewellen (2006) shows that increase in stock volatility due to leverage can be large enough to expose managers to firm specific risk. Further, these costs can especially large for managers with stock options or high ownership stake in firms. So, if options can make managers risk averse, they may reduce the manager's incentive to overinvest, thereby making the role of leverage as a disciplining mechanism redundant.

Since theory offers mixed predictions about the effect of incentives created by options on managers' risk preferences; and shift in managers' risk preferences has direct implications for the disciplining role of debt. In this section we examine each component of compensation separately and explore if any of these variables in particular are driving the results.

[Insert Table 4 around here.]

Model 1 of Table 4 shows the fixed effects regression results for subsamples based on terciles of total compensation (TDC1/TA). We term the subsamples created based on terciles as groups. Book leverage has a negative and significant relationship with net investment in the first and second group. As compensation increases, the relationship becomes statistically insignificant. The control variables, which include Tobin's Q, both sales growth and capital expenditures have a positive relationship with growth. Relationship between cash flow and growth is initially negative, but loses significance at higher groups. In the case of market leverage, the relationship between leverage and net investment is negative and significant in the first and second group. The results for both book leverage and market leverage indicate that the relationship between leverage and firm growth varies at different levels of compensation.

Model 2 of Table 4 displays the fixed effects regression results for groups formed on the basis of salary (Salary/TDC1). The results show that the coefficient on book leverage is negative and statistically significant in the second and third group. For market leverage the coefficient is negative only in the third group. Model 3 of Table 4 explores the relationship between leverage and growth in subsamples of bonus (Bonus/TDC1). We find that the relationship between both book and market leverage and net investment is negative and statistically significant in the second and third group. Model 4 of Table 4 presents regression results for groups based on stock options (Options/TDC1). On average, 40% of compensation every year is stock-based. We find that the relation between book leverage and net investment is negative in the first and second group only. In the case of market leverage, the relationship between leverage and net investment is negative in the second and third group. In summary, these findings indicate that as the compensation in the form of options increases and salary and bonus decreases the negative relationship between leverage and growth disappears.

Core and Guay (1999) argue that to control for risk-related incentive problems, equity holders are expected to manage both the convexity and slope of the relation between firm performance and managers' wealth. As a result, stock options, but not common stockholdings, impact on the sensitivity of CEOs' wealth-to-equity risk. This sensitivity is positively related to firms' investment opportunities in a cross-section of firms. To examine whether incentives created by shares owned by CEOs offset the relationship between leverage and growth we sort the sample based on shares owned by the CEO (Shares Owned/Common Shares). Model 5 of Table 4 shows the results for this estimation. The results indicate that the book leverage and market leverage is negatively related to net investment in the first and third groups only.

Guay (1999) argues that sensitivity of options to stock price (options delta) represents the pay for performance relation and as an option's delta increases a manager is more likely to become risk-averse. On the other hand, sensitivity of options to volatility (option vega) represents the convexity of options and therefore creates incentives for managers to take on more risk. Coles, Daniel and Naveen (2006) provide empirical evidence for the relation between the structure of managerial compensation and investment policy, debt policy, and firm-risk. They find that higher sensitivity of CEO wealth to stock volatility (vega) leads to riskier policy choices, including more investment in research and development (R&D), less investment in property, plant and equipment, more focus on fewer lines of business, and higher leverage. Simultaneously they find that riskier policy choices lead to compensation structure with higher vega and lower delta.

We also look at the sensitivity of the options granted to stock price and volatility. We sort the data on options' deltas and vegas. Model 6 of Table 4 shows the regression results of subsamples based on deltas. For the first and second group the relationship between book and

market leverage and net investment is negative. Model 7 shows the regression results for subsamples based on vegas. The relationship between book leverage and net investment is negative in the third group only. In the case of market leverage, the relationship between market leverage and growth is negative in the first and second group. In short, leverage has no effect on growth when managers are risk-averse (i.e. when they have a higher option delta, or lower option vega).

Finally, we examine the relationship between leverage and growth changes, with change in pay for performance sensitivity (i.e. PPS) of stock-based compensation. We calculate the PPS using methods by Palia (2001). PPS is calculated as follows:

$$PPS = \{[(SharesOwnd/CSO) + (Options/CSO)\times Delta]\times 100\}, \quad (1)$$

Where SharesOwnd is the number of shares held in the firm by the executive, CSO is common shares outstanding, and Options is the number of stock options held by the executive. Model 8 of Table 4 displays the results for PPS of options. Consistent with the previous results, we find that the relationship between book leverage and net investment is negative for the first group and it disappears when PPS is high. The relationship is negative for market leverage in the first and second groups.

The results in this section suggest that the relationship between leverage and net investment varies with the level and form of compensation. We find that at high levels of salary and bonus the relationship between leverage and growth is negative, indicating that managers with high fixed compensation leverage serves as a useful disciplining tool for managers. Conversely, stock options tie managers' wealth to the firm-value but they create competing risk-

taking incentives for managers. In contrast to salary and bonus, we find that at high levels of options-based compensation, leverage has no effect on growth, indicating that options serve as a pre-commitment tool and a substitute for debt as a governing mechanism. In firms that pay no options the relationship between leverage leads to a 14% reduction in future growth.

Further, we find that in addition to the fraction of options in total compensation, the sensitivity of options to stock price and volatility of stock price also matters. As higher delta makes managers risk-averse at high levels of delta the negative relationship between leverage and growth disappears; the reverse of which is the case for vega, at high levels of vega the relationship between leverage and growth turns negative. Our results suggest that option-based compensation contracts do prevent over-investment and therefore they mitigate the disciplining role of debt.

3.4. Growth Opportunities

Lang, Ofek and Stulz (1996) find that the relationship between leverage and growth is negative for firms that have low growth options. We utilize the same methodology as the authors and define low growth firms as firms with Tobin's q less than one, and high growth firms as firms with Tobin's Q greater than one. We include the interaction of book leverage and a dummy variable that equals one if a firm has low growth opportunities and zero otherwise, in our estimation. Similarly we also include an interaction of book leverage and a dummy variable that equals one if a firm has high growth opportunities and zero otherwise. The regression results for this estimation are reported in Table 5.

[Insert Table 5 around here.]

Model 1 of Table 5 reports results for the full sample. Book leverage in a firm with low growth opportunities leads to a 12% reduction in net investment, whereas book leverage in a firm with high growth opportunities leads to a reduction of 9% in net investment of firms. These findings are consistent with Lang, Ofek and Stulz (1996), however, the size of coefficient is much smaller. Aivazian, Ge and Qiu (2005) report that after accounting of firm level heterogeneity the negative relationship between leverage and growth is much stronger. Compared to Lang, Ofek and Stulz (1996) and Aivazian, Ge and Qiu (2005), we find that although the relationship between leverage and growth in US manufacturing firms in the 1990s is still negative the size of the impact is much less pronounced. Further, consistent with the literature, we also find that the leverage has a greater negative effect on growth of firms with low growth opportunities as compared to firms with high growth opportunities.

In Models 2, 3, and 4 we examine the relationship between and leverage and growth in non-option paying firms, option paying firms and firms in which above median (i.e. Options/TDC1>0.40) of managers' pay comes in the form of stock options. For non-option paying firms (i.e. Options/TDC1=0) book leverage in low growth firms leads to a 23% reduction in net investment and book leverage in high growth firms leads to a 16% reduction in net investment. In option paying firms (i.e. Options/TDC1>0) book leverage in low growth firms leads to a 8% reduction in net investment and book leverage in high growth firms does not affect net investment. Furthermore, in firms where more than 40% of managers' compensation comes in the form of options (i.e. Options/TDC1>0.40) book leverage in low growth firms as well as high growth firms does not affect net investment.

In Models 5–8 of Table 5 we replicate our analysis using one-year growth in capital expenditures measure of future growth. The results indicate that on average book leverage in low growth firms, leads to a 67% reduction in capital expenditures growth. In high growth firms, book leverage has no relationship with capital expenditures growth. In non-option paying firms (i.e. Options/TDC1=0) book leverage in low growth firms leads to a 88% reduction in capital expenditures growth and book leverage in high growth firms again is unrelated to capital expenditures growth. In option paying firms (i.e. Options/TDC1>0) book leverage in low growth firms leads to a 58% reduction and book leverage in high growth firms does not affect capital expenditures growth. Finally, in firms where more than 40% of managers' compensation comes in the form of options (i.e. Options/TDC1>0.40) book leverage in low growth firms leads to a reduction of 49% and in high growth firms book leverage has no effect on capital expenditures growth.

Our findings suggest that as the options based component in CEOs' compensation portfolio increases the negative relation between leverage and growth disappears. These findings imply that options create incentives for managers to make investments that improve firm-value and that options make managers more risk-averse and debt is no longer a useful disciplining device. Thus, as options-based compensation increases, the leverage merely becomes a financing device for a firm and loses its relevance as a governance mechanism.

3.5. Compensation and Leverage

In this section we directly examine the relationship between leverage, growth and compensation. Both Grossman and Hart (1982) and Jensen (1986) argue that managers issue debt because leverage binds future cash flows and prevents managers from wasting resources. If shareholders

provide incentives to managers to make positive NPV investment through options, managers should feel a lesser need to use leverage as a disciplining mechanism. As a result, with an increase in option-based compensation, leverage should have declined as the use of leverage as a disciplining mechanism would have become redundant. However, as Figure I shows that firms' leverage ratios do not display any specific declining trend over last few decades and yet the negative relationship impact of leverage on growth has declined considerably. Therefore, in this section we examine mechanisms that can have an effect on disciplining the role of debt but not on the levels of debt. To accomplish this we include a measure of incentives created by equity based compensation as an additional explanatory variable in the original leverage-growth equation. Specifically we calculate a ratio of options plus restricted grants to salary plus bonus and call it incentive intensity. The results for this estimation are reported in Table 6.

[Insert Figure I around here.]

[Insert Table 6 around here.]

Model 1 of Table 6 examines the relationship between, leverage and incentive intensity and net investment. Incentive intensity has a negative effect on net investment. Models 2 and 3 show results for one-year and three-year growth in capital expenditures. Incentive intensity again has a negative relationship with three-year growth in capital expenditures. Further, in all the models negative effect of book leverage on growth disappears.

The results indicate that increasing incentive intensity by one unit reduces the net investment of a firm by 0.1%. The negative relationship between incentives and net investment appears counter-intuitive on first glance. However, from the perspective of an optimal

investment policy a negative relationship between options-based compensation and growth would imply that CEOs with more options in their compensation portfolio are less likely to over-invest.

3.6. Sensitivity of Options

Use of options as a method of incentivizing managers has the side effect of excessive risk-shifting. Options can increase or decrease managers' risk appetite depending on the underlying utility function of the manager (e.g. Lambert, Larcker, and Verrecchia (1991), Carpenter (2000), Knopf, Nam, and Thornton (2002), Coles, Daniel, Naveen (2006)). A shift in managers' risk appetite has direct implications for debtholders' incentives to monitor the managers. Although, DeFusco, Johnson, and Zorn (1990) and Ortiz-Molina (2006) find evidence consistent with the risk-shifting by managers from equity-holders to debtholders; Coles, Daniel and Naveen (2006) and Billett, Mauer, and Zhang (2006), Knopf, Nam and Thorton (2002) and Shaw (2008) find interesting results when they contrast the value-increasing (option's delta) versus risk-taking (option's vega) incentives created by options. Increasing option's delta can make a manager risk-averse because they increase sensitivity of managers' pay to performance. On the other hand option's vega makes managers' compensation contracts convex to firm returns and as a result encourage them to take on riskier projects. Shaw (2008) finds that higher option delta (i.e. sensitivity of CEOs' wealth to stock price) is associated with lower yield spreads on new debt issues and option vega (i.e. sensitivity of CEOs' wealth to the volatility of stock price) is unrelated to the cost of debt.

[Insert Table 7 around here.]

We include delta and vega in our original estimation equation and examine the relationship between book leverage and net investment. The results for this estimation are reported in Table 7. Model 1 examines the relationship between book leverage, delta and net investment. As the results indicate, when we include delta in the regression equation, the negative effect of book leverage disappears and the variable becomes statistically insignificant; similarly the coefficient for vega is negative and significant. Models 2 and 3 show results for one-year and three-year capital expenditures growth. Again, book leverage has no affect and rather deltas have a negative relationship with growth of capital expenditures.

The results in this section highlight the transmission mechanism through which options affect the disciplining role of debt. The findings in this section suggest that the sensitivity of options to stock prices, which arguably induce risk-aversion in managerial decision-making, render the negative relationship between leverage and growth redundant. It is important to distinguish this result from the findings of Cole, Daniel and Naveen (2006) who in examine the effect of option vega on firm's investment policies. The authors find that option vegas have a negative relationship with net capital expenditures and positive relationship with R&D. Further, they find that option deltas positively correlate with net capital expenditures and negatively with R&D. As it is obvious from Table 2, correlation between wealth vega and wealth delta in our sample is extremely high. When we separately examine the relationship wealth delta and net investment growth, we find a negative relationship. However, consistent with findings of Coles, Daniel and Naveen when we look at wealth vega and net investment growth, we also find a negative association. The authors make their assertions about vegas, after using delta as a control

variable which is different from our set up. We contend that option deltas induce risk aversion and therefore prevent over investment.

Next we include an interaction term between option delta and leverage in our estimation equation. The results are presented in Table 8.

[Insert Table 8 around here.]

As the results show, coefficient on the interaction between option delta and book leverage is positive. Option delta has a negative relationship with growth and book leverage has no effect. Then we examine the interaction term more closely. We look at marginal effects of option delta and book leverage. We find that higher levels of option delta, book leverage has no relationship with firm growth, however, at lower levels of option delta it has a negative relationship. These findings confirm our original hypothesis that option delta acts as a substitute for book debt to discipline managers.[4]

3.7. Endogeneity

In this section we address the potential endogeneity concerns in the relationship between leverage, growth and options. Aivazian, Ge and Qiu (2005) examine the relationship between leverage and growth and use tangible assets as an instrument for leverage in their estimation. The authors argue that tangible assets tend to reduce the bankruptcy costs in a firm and thereby facilitate the use of leverage. As a result the tangible assets should be positively correlated with

[4] Parrino and Weisbach (1999) find that overinvestment problems are more severe for firms that have less stable cashflows. Therefore the cost of debt should increase. In order to examine the risk-shifting incentives of managers in firms with risky versus non-risky debt, we examine the relationship between leverage, growth and compensation incentives in firms with investment grade and speculative grade S&P senior debt rating. Primarily we find that leverage has a negative relationship with growth if the firm's rating is less than BBB. Further the negative coefficient on leverage disappears when option deltas are included in the estimation equation.

leverage and inversely correlated with growth opportunities. Rajgopal and Shevlin (2002) examine options-based compensation and their effect on managers' risk-taking behavior. The authors address the endogeneity between risk incentives created by options and investment in risky projects using a simultaneous equation framework.[5] The authors find that endogenously determined risk incentives created by stock options do increase risk taking but they find no relationship between risk taking and level of risk incentives. Coles, Daniel and Naveen (2006) also explore the relationship between option delta, option vega and firm's investment and financing decisions in a simultaneous equation framework. The authors find that convexity of options (i.e. option vegas) motivate managers to allocate resources to riskier investments and increase leverage, although the pay for performance relation (i.e. option delta) has no effect on investment but has an effect of reducing book leverage.

Our set up, like the previous studies also suffers from endogeneity problems. First of all, a firm's capital structure determines its future growth. However, at the same time, both a firm's capital structure and its growth potential determine managerial incentives. Since compensation incentives have a direct influence on manager's investment and financing decisions, the relationship between leverage, growth and compensation is simultaneously determined. Following the extant literature we utilize the simultaneous equation framework to address the endogeneity concerns between leverage, delta and growth. Specifically, we estimate the following system of equations:

$$\text{Net Investment}_{(t+1)} = \text{Book Leverage}_{(t)} + \text{Delta}_{(t)} + \text{Tobin's Q}_{(t)} + \text{Sales Growth}_{(t)} +$$

[5] Rajgopal and Shevlin (2002) use simultaneous equation modeling to examine the relationship between risk incentives created by stock options and exploration risk in oil and gas companies. The authors use risk incentives created by stock options, a firm's investment opportunity set and leverage to model exploration risk. Risk incentives created by stock options, on the other hand, are a function of exploration risk, a firm's investment opportunity set, sensitivity of CEOs' wealth to stock price, cash balances, risk aversion of the CEO and firm-size.

$$\text{Capex/FA}_{(t)} + \text{Cash Flow/TA}_{(t)}, \quad (2)$$

$$\text{Book Leverage}_{(t)} = \text{Net Investment}_{(t+1)} + \text{Delta}_{(t)} + \text{Z Score}_{(t)} + + \text{Cash Flow}_{(t)} + \text{Log Assets}_{(t)}, \quad (3)$$

$$\text{Delta}_{(t)} = \text{Book Leverage}_{(t)} + \text{Net Investment}_{(t+1)} + \text{Log Assets}_{(t)} + \text{Stock Volatility}_{(t)} + \text{Tenure}_{(t)}, \quad (4)$$

[Insert Table 9 around here.]

We include Z-Score in Equation 2 to capture bankruptcy risk as it can be a major determinant of firm's leverage. Z-Score is measured as: (1.2×Net working capital +1.4×Retained earnings + 3.3×Earnings before interest and taxes +0.999×Net Sales)/Total assets. We also include CEO tenure which is the difference between current fiscal year and the year that the executive became CEO, as given by Became_CEO, to capture CEO's risk aversion. The results for this estimation are presented in Table 9. Model 1 presents the results for Equation 1; Model 2 presents results for Equation 2 and Model 3 represents results for Equation 3. The results indicate that, after correcting the simultaneity bias, delta has negative relationships with net investment. Consistent with the findings of Coles, Daniel and Naveen (2006), the results in Model 2 indicate that option delta has a negative relationship with book leverage. The negative effect of option delta on book leverage is also consistent with the argument that higher option delta makes managers more risk-averse. As high option deltas induce risk-aversion, the negative relationship between option delta and net investment is consistent with the pre commitment role played by stock options. Further, book leverage and Z-score have a negative relationship. Both book leverage and net investment have a positive and significant effect on option deltas.

3.8. Focused versus diversified firms

Ahn, Denis and Denis (2005) examine the relationship between leverage and investment in diversified and focused firms. The authors find that within the diversified firms, segments with low growth opportunities exhibit a less negative relationship between leverage and investment as opposed to segments with high growth segments. The authors argue that managerial discretion in diversified firms offsets the disciplinary role of debt. Therefore, we examine the relationship between book leverage and growth in focused and diversified firms in our sample. The data for segments comes from Compustat Segment Data Files. The results for this estimation are presented in Table 10.

[Insert Table 10 around here.]

Columns 1 and 2 show results for the relationship between leverage and growth in focused and diversified firms. Consistent with Ahn, Denis and Denis (2006) leverage has a negative relationship with growth only in focused firms. In the next two models we include option delta in the estimation equation. As the results indicate, in sub-sample of focused firms, option delta negatively relates with growth and coefficient on book leverage is statistically insignificant. Both book leverage and option delta have no relationship with growth in diversified firms. Finally, columns 5 and 6 show results with option vega included in the estimation equation. Again, the coefficient on book leverage disappears and option vega instead has a negative relationship with growth in focused firms.

3.9. Governance

Finally, in this section, we examine the role of governance in disciplining managers. Afterall if a firm is well governed the risk of managers overinvesting should not exist. In order to examine the impact of governance we collect governance scores for each firm compiled by Gompers, Ishii and Metrick (2003). The governance scores are measure of shareholder rights and are created on a scale of 1 to 24. Firms with high governance score are poorly governed and those with lower score are considered well governed. We present the results of this estimation in Table 11. Similar to previous section, we first look at the relationship between leverage and growth and then we include measures of incentives.

[Insert Table 11 around here.]

As columns 1 and 2 show, leverage has a negative effect on growth in firms with poor governance. In well-governed firms, leverage has no effect on growth. Columns 3 and 4 include option delta in the estimation equation. Although option delta negatively relates to growth in case of poorly governed firms, the coefficient on book leverage is still negative and significant. In case of well governed both option delta and book leverage do not restrict growth. Similar is the case when we include option vega in estimation. These findings suggest that options fail to serve as an effective substitute for leverage for disciplining managers in poorly governed firms. Instead options function as a complement to debt in disciplining managers, when governance mechanisms are weak.

4. Conclusion

In this paper, we examine the link between leverage and growth of firms in the period 1993–2005. We find that the negative relationship of leverage on growth reduced significantly during this period. We argue that the change in this relationship is due to the increase in stock options. We therefore examine the relationship between leverage and growth at different levels of compensation. We find that at high levels of stock options, the negative relationship between leverage and growth disappears. We infer that the incentives created by stock-based compensation schemes are effective in checking agency problems between managers and shareholders, and thus options mitigate the disciplining role of debt.

We complete a series of robustness tests to confirm our hypothesis. We directly examine the relationship between compensation and growth, and consistently find that options have a negative effect on net investment. We also look at the sensitivity of options to stock price (i.e. delta) and sensitivity of options to stock price volatility (i.e. vega). We find that when we include delta in our main estimation, the negative sign on book leverage disappears. We utilize simultaneous equation modeling to address the endogeneity between leverage, growth and compensation and find that both book leverage and delta have a negative effect on growth. We further find that book leverage and delta is inversely related.

We examine the relationship between leverage and growth in focused and diversified firms, we find that the negative coefficient on book leverage in the case of focused segment firms is twice as large as compared to diversified. However, the negative relationship between leverage and growth disappears in firms when we include option delta and option vega in the estimation. In fact option delta instead negatively relates to debt in focused firms. Upon inclusion

of the interaction between option delta and book leverage, we find that it has a positive relationship with growth.

Finally, we examine the relationship between leverage, incentives and growth in poorly versus well-governed firms, we find that in poorly governed firms both option delta and book leverage have a negative relationship with growth. We contend that when governance problems are severe both book leverage and options act as complements rather than substitutes.

The findings in this paper indicate that with the increase in options as a preferred mode of compensating managers, debt no longer functions as a disciplining device. As stock options can also pre commit managers to follow a value-maximizing investment policy, use of debt to guide the investment policy of the firm is no longer necessary and debt can simply be used to finance investments.

References

Abowd, M. J., 1990. Does Performance-Based Managerial Compensation Affect Corporate Performance? The Industrial and Labor Relations Review 43(3), 52S-73S

Agrawal, A. and Mandelker, G., 1987. Managerial incentives and corporate investment and financing decisions. The Journal of Finance 42(4), 823-837.

Ahn, S., Denis, D. J. and Denis, M. D., 2006. Leverage and investment in diversified firms. The Journal of Financial Economics 79, 317-337.

Aivazian, V.A., Ge, Y. and Qiu, J., 2005. The impact of leverage on firm investment: Canadian evidence. The Journal of Corporate Finance 11, 277-291.

Amihud, Y. and Lev, B., 1981. Risk reduction as a managerial motive for conglomerate mergers. The Bell Journal of Economics 12(2), 605-617.

Baker, G. and Hall, B., 2004. CEO incentives and firm size, The Journal of Labor Economics 22 (4), 767-798

Bebchuk, L. and Grinstien, Y., 2004. Firm expansion and CEO pay. NBER, Unpublished Working Paper 11886.

Berkovitch, E., Israel, R. and Spiegel, Y., 2000. Managerial compensation and capital structure. The Journal of Economics and Management Strategy 9(4), 549-584.

Billet, M., Mauer, D. and Zhang, Y., 2006. Stockholder and bondholder wealth effects of CEO incentive grants. University of Iowa and Southern Methodist University, Unpublished Working paper.

Broussard, J., Buchenroth S. and Pilotte, E., 2004. CEO incentives, cash flow, and investment. The Financial Management 33 (2), 51-70.

Carpenter, J., 2000. Does option compensation increase managerial risk appetite? The Journal of Finance 55, 2311-2331.

Childs, P.D. and Mauer, D.C., 2008. Managerial Discretion, agency costs, and capital structure. Unpublished working paper.

Coles, J., Daniel, N., Naveen, L., 2006. Managerial incentives and risk-taking. The Journal of Financial Economics 79, 431-468.

Core, J. and Wayne, G., 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. The Journal of Accounting Research 40(3), 613-630.

Core, J. and Wayne G., 1999. The use of equity grants to manage optimal equity incentive levels. The Journal of Accounting and Economics 28, 151-184.

Dammon, R. M.,and Senbet L.W., 1988. The effect of taxes and depreciation on corporate investment and financial leverage. The Journal of Finance 43(2), 357-373.

Datta, S., Datta, I. M.,and Raman, K., 2001. Executive compensation and corporate acquisition decisions, The Journal of Finance 56(6), 2299-2336.

DeFusco, R., Johnson, R. and Zorn, T., 1990. The effect of executive stock option plans on stockholders and bondholders. The Journal of Finance 45(2), 617-627.

Frydman, C., Jenter, D., 2009. CEO compensation. Unpublished Working Paper.

Gompers, P., Ishii, J. and Metrick, A. 2003. Corporate governance and equity prices. Quarterly Journal of Economics 118: 107–155.

Grinstein, Y. and Hribar, P., 2004. CEO compensation and incentives – Evidence from M&A bonuses. The Journal of Financial Economics 73, 119-143.

Grossman, S.J. and Hart, O. D., 1982. The Economics of Information and Uncertainty, NBER Books, National Bureau of Economic Research, Inc, Number MCCA 82-1, Fall.

Guay, W., 1999. The sensitivity of CEO wealth to equity risk: An analysis of the magnitude and determinants. The Journal of Financial Economics 53, 43-71.

Hirshleifer, D., and Thakor, A. V. 1992. Managerial conservatism, project choice, and debt The Review of Financial Studies 5(3), 437-470.

Haugen, R. and Senbet, L., 1981. Resolving the agency problems of external capital through options. The Journal of Finance 36, 629-647.

Jensen, M., 1986. Agency cost of free cash flow, corporate finance, and takeovers. The American Economic Review 76 (2), 323-329.

Jensen, M. and Meckling, W., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. The Journal of Financial Economics 3, 305-360.

John, T. and John, K., 1993. Top-management compensation and capital structure. The Journal of Finance 48, 949-974.

Kadan, O. and Swinkels, J. M., 2008. Stocks or options? Moral hazard, firm viability, and the design of compensation contracts. The Review of Financial Studies 21, 451–482.

Knopf, J., Nam, J. and Thornton, J. Jr., 2002. The volatility and price sensitivities of managerial stock option portfolios and corporate hedging. The Journal of Finance 57, 801-812.

Lambert, R., Larcker, D. and Verrecchia, R., 1991. Portfolio considerations in valuing executive compensation. The Journal of Accounting Research 29, 129-149.

Lang, L., Ofek, E. and Stulz, R., 1996. Leverage, investment, and firm growth. The Journal of Financial Economics 40, 3-30.

Lang, L. H. P., Stulz, R. M. and Walkling, R. A., 1991. A Test of the free cash flow hypothesis: The case of bidder returns. The Journal of Financial Economics 29, 315–335.

Lewellen, K., 2006. Financing decisions when managers are risk averse. The Journal of Financial Economics 82 (3), 551-589.

Lyandres, E. and Zhdanov, A., 2005. Underinvestment or overinvestment: The effects of financial leverage on investment. EFA 2006 Zurich Meetings.

Mehran, H., 1995. Executive compensation structure, ownership, and firm performance. The Journal of Financial Economics 38(2), 163-84.

Ortiz-Molina, H., 2006. Top-management incentives and the pricing of corporate public debt. The Journal of Financial and Quantitative Analysis 41, 317-340.

R. Parrino, M.S. Weisbach, 1999. Measuring investment distortions arising from stockholder-bondholder conflicts. The Journal of Financial Economics 53, 3-42.

Palia, D., 2001. The endogeneity of managerial compensation in firm value. The Review of Financial Studies 14(3), 735-764.

Pindado, J. and De La Torre, C., 2004. The effect of ownership structure on under investment and over investment processes. EFMA 2004 Basel Meetings Paper.

Rajgopal, S. and Shevlin, T., 2002. Empirical evidence on the relation between stock option compensation and risk taking. The Journal of Accounting and Economics 2 (33), 145-171.

Ross, S., 2004. Compensation, incentives, and the duality of risk aversion and riskiness. The Journal of Finance 59, 207-225.

Shaw, K.W., 2008. CEO incentives and the cost of debt. University of Missouri-Columbia Unpublished Working Paper.

Shleifer, A., and Vishny, R. W., 1989. Management entrenchment – The case of manager-specific investments. The Journal of Financial Economics 25, 123-139.

Skaife, H., A., Collins, D., W., LaFond, R., 2006. The effect of corporate governance on firms' credit ratings. The Journal of Accounting and Economics 42(1-2), 203-243.

Smith, C. and Watts, R., 1982. Incentive and tax effects of executive compensation plans. The Australian Journal of Management 7, 139-157.

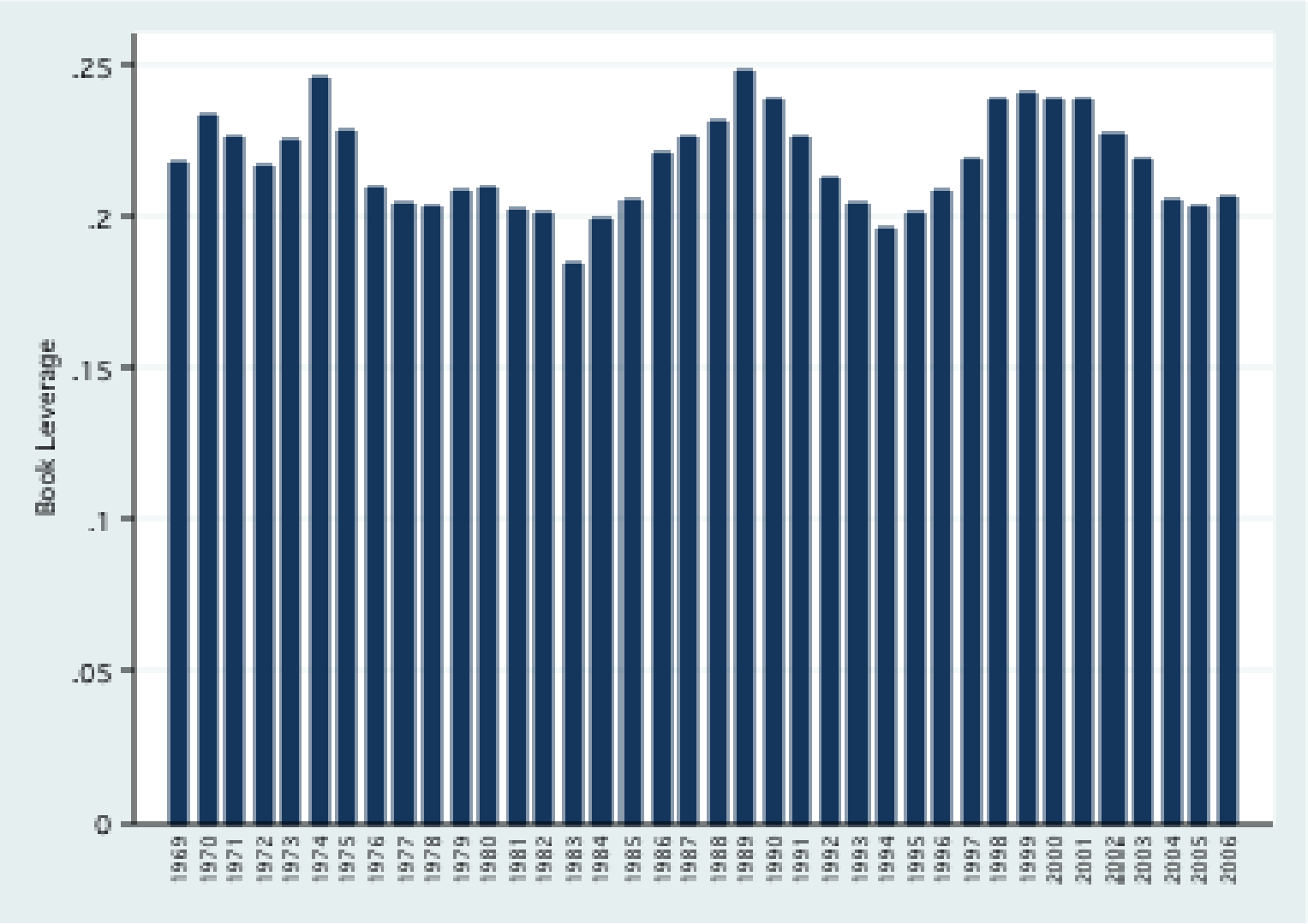

Figure I. Average book leverage for manufacturing firms for the period 1969 - 2006

Table 1 – Descriptive Statistics

The table presents descriptive statistics of the entire sample. The sample period is 1993–2005. All financial data has been obtained from COMPUSTAT. Net investment is capital expenditures at year +1 minus depreciation divided by fixed assets at the end of year zero. Capital expenditures growth is percent change in capital expenditures at year +1. Employment growth is percent change in employees at year +1. Book leverage is defined as total debt divided by total assets. Market leverage is debt divided by debt plus market value of equity. Tobin's Q is book value of debt plus market value of equity divided by total assets. Sales growth is growth in sales. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Compensation is obtained from ExecuComp. TDC1 is total compensation and it includes salary, bonus, options, long-term incentives, restricted stock and value of perks. Delta is change in CEO wealth with a unit change in price. Vega is change in CEO wealth with a unit change in volatility.

	Mean	Median	Standard	25th	75th	Obs
Net Investment$_{(t+1)}$/FA$_{(t)}$	0.03	0.01	0.22	-0.05	0.08	7723
Capex Growth$_{(t+1)}$	0.21	0.07	0.74	-0.18	0.39	7713
Employee Growth$_{(t+1)}$	0.05	0.02	0.23	-0.05	0.11	7771
Capex Growth$_{(t+3)}$	0.53	0.16	1.64	-0.29	0.78	6335
Employee Growth$_{(t+3)}$	0.19	0.07	0.58	-0.11	0.32	6390
Book Leverage	0.22	0.21	0.17	0.07	0.33	8108
Market Leverage	0.20	0.15	0.20	0.03	0.30	8095
Tobin's Q	1.87	1.36	1.55	0.95	2.14	8095
Sales Growth	0.13	0.08	0.31	-0.01	0.19	8105
Capex/FA	0.29	0.20	0.29	0.13	0.32	8016
Cash Flow/TA	0.10	0.11	0.13	0.06	0.16	7906
Total Assets ($ Million)	4433	931	17635	359	2816	8125
TDC1 ($ Thousands)	4041	2047	10097	1005	4350	8125
Salary ($ Thousands)	604	547	328	380	770	8125
Bonus ($ Thousands)	588	330	970	67	753	8125
Shares Owned ($ Thousands)	1649	196	9723	63	727	7712
Options ($ Thousands)	2181	616	9429	38	1971	8125
Delta ($ Thousands)	1326	562	2254	262	1314	6180
Vega ($ Thousands)	260	87	494	32	240	6180

Table 2 – Correlation Table

The table presents correlation scores. The sample period is 1993–2005. All financial data has been obtained from COMPUSTAT. Compensation is obtained from ExecuComp. TDC1 is total compensation and it includes salary, bonus, options, long-term incentives, restricted stock and value of perks. Delta is change in CEO wealth with a unit change in price. Vega is change in CEO wealth with a unit change in volatility.Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Market leverage is debt divided by debt plus market value of equity. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year.

	TDC1	Options	Cash Comp	Delta	Vega	Net $Inv_{(t+1)}$ /$FA_{(t)}$	Capex $Growth_{(t+1)}$	Employee $Growth_{(t+1)}$	Book Leverage	Market Leverage	Tobin's Q
TDC1	1										
Options	0.9523*	1									
Cash Compensation	0.1246*	0.1155*	1								
Delta	0.1619*	0.4044*	0.2271*	1							
Vega	0.1885*	0.4303*	0.3961*	0.7213*	1						
Net $Inv_{(t+1)}/FA_{(t)}$	0.0253*	0.0327*	-0.0032	-0.0499*	-0.0012	1					
Capex Growth	0.0027	0.0127	-0.0247*	0.0134	-0.0388*	0.6038*	1				
Employee Growth	0.0153	0.0272*	-0.0268*	-0.0094	-0.0042	0.3701*	0.3504*	1			
Book Leverage	-0.0070	-0.0399*	0.0754*	-0.0352*	0.0000	-0.1571*	-0.0826*	-0.1136*	1		
Market Leverage	-0.0252*	-0.0680*	0.0297*	-0.0939*	-0.0803*	-0.1947*	-0.1215*	-0.2078*	0.7937*	1	
Tobin's Q	0.0566*	0.1538*	0.0046	0.2072*	0.1985*	0.2698*	0.1541*	0.2737*	-0.2642*	-0.4929*	1
Z-Score	-0.0006	-0.0139	0.1016*	-0.1656*	0.0258*	0.1325*	-0.0054	0.0122	-0.3161*	-0.2323*	-0.0282*

Table 3 – Leverage and growth

This table presents the firm-fixed effect regression results for the periods 1993–2005 and 1977–1989. All financial data has been obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Market leverage is debt divided by debt plus market value of equity. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	1993-2005	1993-2005	1970-1989	1970-1989	1993-2005	1993-2005	1970-1989	1970-1989
	Net Investment$_{(t+1)}$/FA$_{(t)}$				Capex Growth$_{(t+1)}$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Book Leverage$_{(t)}$	-0.10***		-0.22***		-0.33**		-0.88***	
	[0.03]		[0.03]		[0.15]		[0.12]	
Market Leverage$_{(t)}$		-0.08***		-0.19***		-0.63***		-0.83***
		[0.03]		[0.02]		[0.11]		[0.09]
Tobin's Q$_{(t)}$	0.04***	0.03***	0.05***	0.04***	0.13***	0.12***	0.13***	0.11***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]	[0.02]
Sales Growth$_{(t)}$	0.02	0.02	0.07***	0.07***	0.21***	0.21***	0.46***	0.45***
	[0.02]	[0.02]	[0.02]	[0.02]	[0.07]	[0.06]	[0.06]	[0.06]
Capex$_{(t)}$/FA$_{(t-1)}$	0.13***	0.13***	0.10***	0.10***	-0.96***	-0.97***	-1.35***	-1.37***
	[0.02]	[0.02]	[0.02]	[0.02]	[0.07]	[0.07]	[0.07]	[0.07]
Cash Flow$_{(t)}$/TA$_{(t-1)}$	0.26***	0.25***	0.35***	0.32***	0.72***	0.62***	1.13***	0.97***
	[0.05]	[0.05]	[0.06]	[0.06]	[0.15]	[0.15]	[0.22]	[0.22]
Intercept	-0.11***	-0.11***	0.00	0.01	0.20***	0.28***	0.39***	0.44***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.05]	[0.05]	[0.06]	[0.06]
Obs	7486	7486	10531	10531	7488	7488	10527	10527
Number of firms	1014	1014	735	735	1014	1014	735	735
F Stat	44.09	45.74	43.84	51.25	40.97	44.80	45.52	46.01
Overall R- squared	0.21	0.20	0.25	0.25	0.07	0.08	0.07	0.07
Between R- squared	0.27	0.27	0.40	0.40	0.02	0.02	0.04	0.03
Within R- squared	0.20	0.20	0.21	0.21	0.13	0.14	0.16	0.17

Net Investment$_{(t+1)}$/FA$_{(t)}$

Test Book Leverage (1993 -2005) = Book Leverage (1970 -1989) : Chi-Sq (6.20) Prob Chi-Sq (0.0128)

Test Market Leverage (1993 -2005) = Market Leverage (1970 -1989) : Chi-Sq (12.16) Prob Chi-Sq (0.0005)

Capex Growth$_{(t+1)}$

Test Book Leverage (1993 -2005) = Book Leverage (1970 -1989) : Chi-Sq (6.55) Prob Chi-Sq (0.0105)

Test Market Leverage (1993 -2005) = Market Leverage (1970 -1989) : Chi-Sq (4.45) Prob Chi-Sq (0.0348)

Table 4 – Compensation Samples

This table presents firm-fixed effects regressions results for the period 1993–2005. Panel A presents results for book leverage as the main explanatory variable and Panel B looks at market leverage. Compensation data is obtained from ExecuComp. Model 1 splits the data based on quintiles sorted TDC1/TA. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Model 2 splits data based on quintiles sorted on Salary/TDC1. Model 3 splits data based on quintiles sorted on Bonus/TDC1. Model 4 splits data based on quintiles sorted on Options/TDC1. Model 5 splits data based on quintiles sorted on Shares owned/Common Shares Outstanding. Model 6 splits data based on quintiles sorted on Delta. Delta is defined as change in the value of options with a unit change in price. Model 7 splits data based on quintiles sorted on Vega. Vega is defined as change in the value of options with a unit change in volatility. Model 8 splits data based on quintiles sorted on PPS. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Market leverage is debt divided by debt plus market value of equity. Control variables include: Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	TDC1/ Assets	Salary/ TDC1	Bonus/ TDC1	Options/ TDC1	Shares Owned/ Common Shares	Delta	Vega	PPS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Book Leverage								
Group 1	-0.10***	0.02	-0.06	-0.12**	-0.15**	-0.12***	-0.08	-0.12**
	[0.04]	[0.07]	[0.07]	[0.06]	[0.07]	[0.04]	[0.08]	[0.05]
Group 2	-0.08**	-0.10*	-0.11**	-0.14***	-0.08	-0.10*	-0.03	-0.07
	[0.04]	[0.05]	[0.05]	[0.04]	[0.06]	[0.05]	[0.08]	[0.08]
Group 3	-0.05	-0.16***	-0.12***	-0.03	-0.19***	0.00	-0.10**	-0.04
	[0.06]	[0.05]	[0.04]	[0.06]	[0.07]	[0.08]	[0.04]	[0.08]
Panel B. Market Leverage								
Group 1	-0.09***	-0.06	-0.01	-0.12**	-0.10**	-0.19***	0.01	-0.14**
	[0.03]	[0.05]	[0.05]	[0.05]	[0.05]	[0.04]	[0.08]	[0.05]
Group 2	-0.07**	-0.01	-0.14***	-0.17***	-0.08	-0.09*	-0.10*	-0.15***
	[0.03]	[0.08]	[0.04]	[0.04]	[0.05]	[0.05]	[0.05]	[0.06]
Group 3	-0.12	-0.16***	-0.11**	-0.05	-0.17***	-0.03	-0.16***	0.02
	[0.09]	[0.03]	[0.05]	[0.07]	[0.05]	[0.09]	[0.04]	[0.09]

Table 5 – Growth Opportunities

This table presents firm-fixed effects regressions results for the period 1993–2005 for low and high growth firms. Low q is defined as Tobin's q less than one and high growth greater than one. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets and is adjusted using industry book leverage calculated at four-digit SIC code level. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net $Inv_{(t+1)}/FA_{(t)}$				Capex $Growth_{(t+1)}$			
	Full Sample	Options = 0	Options>0	Options>Median	Full Sample	Options = 0	Options>0	Options>Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Book $Leverage_{(t)}$x$Q_{(t)}$<1	-0.12***	-0.23***	-0.08**	-0.08	-0.67***	-0.88***	-0.58***	-0.49**
	[0.03]	[0.06]	[0.04]	[0.05]	[0.13]	[0.29]	[0.15]	[0.21]
Book $Leverage_{(t)}$x$Q_{(t)}$>1	-0.09**	-0.16***	-0.05	-0.05	-0.22	-0.39	-0.12	-0.01
	[0.04]	[0.06]	[0.04]	[0.05]	[0.15]	[0.24]	[0.17]	[0.22]
Tobin's $Q_{(t)}$	0.04***	0.03**	0.03***	0.03***	0.13***	0.09**	0.13***	0.13***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.04]	[0.02]	[0.02]
Sales $Growth_{(t)}$	0.02	0.06	0.01	0.02	0.21***	0.18	0.22***	0.25***
	[0.02]	[0.06]	[0.02]	[0.02]	[0.07]	[0.16]	[0.07]	[0.08]
$Capex_{(t)}/FA_{(t-1)}$	0.13***	0.07*	0.15***	0.14***	-0.96***	-1.42***	-0.89***	-0.81***
	[0.02]	[0.04]	[0.02]	[0.03]	[0.07]	[0.16]	[0.08]	[0.09]
Cash $Flow_{(t)}/TA_{(t-1)}$	0.25***	0.35***	0.23***	0.27***	0.67***	1.72***	0.47***	0.44**
	[0.05]	[0.10]	[0.05]	[0.06]	[0.15]	[0.37]	[0.17]	[0.18]
Intercept	-0.11***	-0.04	-0.11***	-0.01	0.21***	0.40***	0.39***	0.37***
	[0.01]	[0.04]	[0.02]	[0.02]	[0.05]	[0.13]	[0.06]	[0.08]
Obs	7486	1472	6014	3782	7488	1472	6016	3783
F Stat	46.99	13.54	32.72	21.41	42.35	9.68	32.25	19.34
Overall R- squared	0.20	0.21	0.21	0.23	0.07	0.08	0.08	0.09
Between R- squared	0.27	0.18	0.28	0.29	0.02	0.06	0.03	0.07
Within R- squared	0.21	0.22	0.20	0.21	0.14	0.18	0.13	0.14

Table 6 – Compensation and Growth

This table presents firm-fixed effects regressions results for the period 1993–2005. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net Investment$_{(t+1)}$ /FA$_{(t)}$ (1)	Capex Growth$_{(t+1)}$ (2)	Capex Growth($_{t+3)}$ (3)
Book Leverage$_{(t)}$	-0.05	-0.25	-0.35
	[0.04]	[0.17]	[0.49]
Incentive Intensity$_{(t)}$	-0.01*	-0.02	-0.08***
	[0.00]	[0.01]	[0.03]
Tobin's Q$_{(t)}$	0.04***	0.13***	0.12***
	[0.01]	[0.02]	[0.04]
Sales Growth$_{(t)}$	0.01	0.22***	0.03
	[0.02]	[0.07]	[0.15]
Capex$_{(t)}$/FA$_{(t-1)}$	0.15***	-0.89***	-2.36***
	[0.02]	[0.08]	[0.26]
Cash Flow$_{(t)}$/TA$_{(t-1)}$	0.23***	0.51***	1.42***
	[0.05]	[0.18]	[0.53]
Intercept	-0.13***	0.37***	1.26***
	[0.02]	[0.06]	[0.18]
Obs	5976	5978	4919
Number of firms	973	973	880
F Stat	29.95	28.55	21.21
Overall R-squared	0.21	0.07	0.04
Within R-squared	0.29	0.02	0.01
Between R-squared	0.20	0.13	0.16

Table 7 – Sensitivity of Options

This table presents firm-fixed effects regressions results for the period 1993–2005. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Delta is change in CEO wealth with a unit change in price. Vega is change in CEO wealth with a unit change in volatility. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net Investment$_{(t+1)}$ /FA$_{(t)}$ (1)	Capex Growth$_{(t+1)}$ (2)	Capex Growth$_{(t+3)}$ (3)	Net Investment$_{(t+1)}$ /FA$_{(t)}$ (4)	Capex Growth$_{(t+1)}$ (5)	Capex Growth$_{(t+3)}$ (6)
Delta$_{(t)}$	-0.02***	-0.03**	-0.17***			
	[0.00]	[0.01]	[0.04]			
Vega$_{(t)}$				-0.01**	-0.03**	-0.16***
				[0.00]	[0.01]	[0.05]
Book Leverage$_{(t)}$	-0.05	-0.24	-0.43	-0.05	-0.25	-0.44
	[0.04]	[0.18]	[0.51]	[0.04]	[0.18]	[0.51]
Tobin's Q$_{(t)}$	0.04***	0.13***	0.13***	0.04***	0.13***	0.13***
	[0.01]	[0.02]	[0.04]	[0.01]	[0.02]	[0.04]
Sales Growth$_{(t)}$	0.01	0.21***	0.01	0.01	0.22***	0.04
	[0.02]	[0.07]	[0.15]	[0.02]	[0.07]	[0.15]
Capex$_{(t)}$/FA$_{(t-1)}$	0.15***	-0.89***	-2.37***	0.16***	-0.87***	-2.28***
	[0.03]	[0.09]	[0.27]	[0.03]	[0.08]	[0.26]
Cash Flow$_{(t)}$/TA$_{(t-1)}$	0.23***	0.53***	1.35***	0.23***	0.53***	1.35***
	[0.06]	[0.18]	[0.50]	[0.06]	[0.18]	[0.51]
Intercept	-0.04**	0.15**	1.08***	-0.05**	0.09	0.72***
	[0.02]	[0.06]	[0.18]	[0.02]	[0.06]	[0.20]
Obs	5701	5703	4712	5700	5702	4711
Number of firms	959	959	867	959	959	867
F Stat	29.37	26.08	19.87	28.57	26.16	20.05
Overall R-squared	0.21	0.07	0.04	0.21	0.08	0.05
Within R-squared	0.28	0.02	0.01	0.28	0.03	0.01
Between R-squared	0.20	0.13	0.16	0.20	0.13	0.16

Table 8 – Sensitivity of Options – Interaction with Leverage

This table presents firm-fixed effects regressions results for the period 1993–2005. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Delta is change in CEO wealth with a unit change in price. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01

	Net Inv/FA	Capex Growth One year	Capex Growth Three year
	(1)	(2)	(3)
$Delta_{(t)}$* $Book\ Leverage_{(t)}$	0.07**	0.19	0.45
	[3.36]	[1.67]	[1.48]
$Delta_{(t)}$	-0.03**	-0.07*	-0.27**
	[4.43]	[2.42]	[3.35]
$Book\ Leverage_{(t)}$	-0.03	-0.18	-0.27
	[0.73]	[0.99]	[0.48]
Tobin's $Q_{(t)}$	0.04**	0.13**	0.13**
	[6.38]	[8.13]	[3.25]
$Sales\ Growth_{(t)}$	0.01	0.22**	0.01
	[0.68]	[2.93]	[0.09]
$Capex_{(t)}/FA_{(t-1)}$	0.15**	-0.89**	-2.38**
	[5.86]	[10.30]	[8.96]
$Cash\ Flow_{(t)}/TA_{(t-1)}$	0.22**	0.51**	1.31**
	[3.97]	[2.85]	[2.66]
Intercept	-0.05**	0.14*	1.04**
	[2.94]	[2.26]	[5.74]
Obs	5701	5703	4712
Number of gvkey	959	959	867
F Stat	28.13	24.77	18.82
Overall R-squared	0.21	0.07	0.04
Within R-squared	0.27	0.02	0.01
Between R-squared	0.21	0.13	0.16

Table 9 – Simultaneous Equation

This table presents simultaneous equation regressions results for the period 1993–2005. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Delta is change in CEO wealth with a unit change in price. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. Z Score is measured as: (1.2×Net working capital +1.4×Retained earnings + 3.3×Earnings before interest and taxes +0.999×Net Sales)/Total assets. CEO tenure is the difference between current fiscal year and the year that the executive became CEO, as given by Became_CEO. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net $Inv_{(t+1)}$/ $FA_{(t)}$	Book $Leverage_{(t)}$	$Delta_{(t)}$
	(1)	(2)	(3)
$Delta_{(t)}$	-0.03***	-0.06***	
	[0.01]	[0.01]	
Book $Leverage_{(t)}$	0.01		4.21***
	[0.07]		[0.38]
Tobin's $Q_{(t)}$	0.03***		0.24***
	[0.00]		[0.02]
Sales $Growth_{(t)}$	0.02**		
	[0.01]		
$Capex_{(t)}/FA_{(t-1)}$	0.21***		
	[0.01]		
Cash $Flow_{(t)}/TA_{(t-1)}$	0.26***	-0.03	
	[0.02]	[0.02]	
Net $Investment_{(t)}/FA_{(t+1)}$		-0.11***	0.34
		[0.03]	[0.27]
Z $Score_{(t)}$		-0.05***	
		[0.00]	
$Log(Assets)_{(t)}$		0.04***	0.35***
		[0.00]	[0.01]
Stock $Volatility_{(t)}$			1.81***
			[0.08]
$Tenure_{(t)}$			0.01***
			[0.00]
Intercept	-0.11***	0.10***	-5.46***
	[0.03]	[0.02]	[0.15]
Obs	5471	5471	5471
R-squared	0.22	0.13	0.14

Table 10 – Focused versus Diversified Firms

This table presents firm-fixed effects regressions results for the period 1993–2005. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Focused firms are defined as firms with just one segment. Diversified firms are those with multiple segments. Segment data comes from Compustat Segment Data Files. Delta is change in CEO wealth with a unit change in price. Vega is change in CEO wealth with a unit change in volatility. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net $Inv_{(t+1)}/ FA_{(t)}$ Focused (1)	Net $Inv_{(t+1)}/ FA_{(t)}$ Diversified (2)	Net $Inv_{(t+1)}/ FA_{(t)}$ Focused (3)	Net $Inv_{(t+1)}/ FA_{(t)}$ Diversified (4)	Net $Inv_{(t+1)}/ FA_{(t)}$ Focused (5)	Net $Inv_{(t+1)}/ FA_{(t)}$ Diversified (6)
$Delta_{(t)}$			-0.03**	0.00		
			[2.78]	[0.66]		
$Vega_{(t)}$					-0.01*	0.00
					[1.98]	[0.41]
Book $Leverage_{(t)}$	-0.15*	-0.07	-0.09	-0.05	-0.09	-0.05
	[2.17]	[1.78]	[1.01]	[1.09]	[1.13]	[1.10]
$Q_{(t)}$	0.04**	0.04**	0.04**	0.04**	0.04**	0.04**
	[5.35]	[4.65]	[4.54]	[4.13]	[4.56]	[4.13]
Sales $Growth_{(t)}$	0.02	0.01	0.01	0.00	0.01	0.00
	[0.62]	[0.72]	[0.48]	[0.06]	[0.50]	[0.07]
$Capex_{(t)}/FA_{(t-1)}$	0.10**	0.08*	0.13**	0.10**	0.14**	0.10**
	[2.93]	[2.49]	[3.12]	[3.01]	[3.33]	[3.00]
Cash $Flow_{(t)}/TA_{(t-1)}$	0.28**	0.15**	0.29**	0.12*	0.30**	0.13*
	[3.40]	[3.25]	[3.06]	[2.43]	[3.07]	[2.43]
Intercept	-0.13**	-0.03	-0.14**	-0.08**	-0.17**	-0.05*
	[4.64]	[1.43]	[4.13]	[4.63]	[4.77]	[1.98]
Obs	2620	4740	1958	3656	1958	3655
Number of firms	632	821	562	752	562	751
F Stat	15.83	18.80	13.16	15.24	12.37	15.14
Overall R-squared	0.22	0.14	0.25	0.13	0.25	0.13
Between R-squared	0.33	0.18	0.34	0.13	0.35	0.13
Within R-squared	0.19	0.16	0.21	0.16	0.21	0.16

Table 11– Governance

This table presents firm-fixed effects regressions results for the period 1993–2005. Good governance is defined as firms with less than 6 score from governance index created by Gompers, Ishii and Metrick (2003). Poor governance are firms with governance score greater than 12. Compensation data is obtained from ExecuComp. TDC1 includes salary, bonus, options, restricted grants, long-term incentive, and other perks. Delta is change in CEO wealth with a unit change in price. Vega is change in CEO wealth with a unit change in volatility. All financial data is obtained from COMPUSTAT. Net investment is capital expenditures at year one minus depreciation divided by fixed assets at the end of year zero. Book leverage is defined as total debt divided by total assets. Tobin's Q is book value of debt plus market value of equity divided by total assets. All explanatory variables are computed for the base year; flow variables are normalized using total assets (TA) at the end of the previous year. Standard errors clustered at firm level are reported in parentheses, p-value 0.0001***, 0.001**, 0.01*.

	Net $Inv_{(t+1)}/ FA_{(t)}$ Good Governance (1)	Net $Inv_{(t+1)}/ FA_{(t)}$ Poor Governance (2)	Net $Inv_{(t+1)}/ FA_{(t)}$ Good Governance (3)	Net $Inv_{(t+1)}/ FA_{(t)}$ Poor Governance (4)	Net $Inv_{(t+1)}/ FA_{(t)}$ Good Governance (5)	Net $Inv_{(t+1)}/ FA_{(t)}$ Poor Governance (6)
$Delta_{(t)}$			-0.01	-0.01*		
			[0.011]	[0.004]		
$Vega_{(t)}$					-0.01	0.00
					[0.008]	[0.004]
Book $Leverage_{(t)}$	-0.02	-0.20***	0.02	-0.17***	0.02	-0.18***
	[0.081]	[0.055]	[0.099]	[0.054]	[0.100]	[0.054]
Tobin's $Q_{(t)}$	0.04***	0.02***	0.03***	0.02**	0.03***	0.02**
	[0.011]	[0.007]	[0.010]	[0.007]	[0.010]	[0.007]
Sales $Growth_{(t)}$	0.02	0.01	0.02	0.03*	0.02	0.03*
	[0.025]	[0.015]	[0.029]	[0.016]	[0.029]	[0.016]
$Capex_{(t)}/FA_{(t-1)}$	0.08*	0.25***	0.11*	0.22***	0.11*	0.22***
	[0.046]	[0.048]	[0.066]	[0.046]	[0.066]	[0.047]
Cash $Flow_{(t)}/TA_{(t-1)}$	0.19	0.08	0.23*	0.08	0.24*	0.08
	[0.131]	[0.060]	[0.132]	[0.069]	[0.133]	[0.069]
Intercept	-0.12***	0.02	-0.03	0.00	-0.05	0.00
	[0.031]	[0.020]	[0.038]	[0.021]	[0.045]	[0.024]
Obs	1845	1856	1341	1584	1341	1584
R-Squared	0.59	0.61	0.64	0.63	0.64	0.62
F Stat	8.26	13.25	5.57	14.03	5.59	13.79

BANK OF FINLAND RESEARCH
DISCUSSION PAPERS

ISSN 0785-3572, print; ISSN 1456-6184, online

1/2011 Hanna Freystätter **Financial factors in the boom-bust episode in Finland in the late 1980s and early 1990s.** 2011. 39 p. ISBN 978-952-462-653-8, print; ISBN 978-952-462-654-5, online.

2/2011 Marko Melolinna **What explains risk premia in crude oil futures?** 2011. 37 p. ISBN 978-952-462-658-3, print; ISBN 978-952-462-659-0, online.

3/2011 Harry Leinonen **Debit card interchange fees generally lead to cash-promoting cross-subsidisation.** 2011. 37 p. ISBN 978-952-462-660-6, print; ISBN 978-952-462-661-3, online.

4/2011 Yiwei Fang − Bill Francis − Iftekhar Hasan − Haizhi Wang **Product market relationships and cost of bank loans: evidence from strategic alliances.** 2011. 39 p. ISBN 978-952-462-662-0, print; ISBN 978-952-462-663-7, online.

5/2011 Yiwei Fang – Iftekhar Hasan – Katherin Marton **Bank efficiency in transition economies: recent evidence from South-Eastern Europe.** 2011. 40 p. ISBN 978-952-462-664-4, print; ISBN 978-952-462-665-1, online.

6/2011 Arturo Bris – Yrjö Koskinen – Mattias Nilsson **The euro and corporate financing.** 2011. 63 p. ISBN 978-952-462-666-8, print; ISBN 978-952-462-667-5, online.

7/2011 Yiwei Fang – Iftekhar Hasan – Katherin Marton **Market reforms, legal changes and bank risk-taking – evidence from transition economies.** 2011. 41 p. ISBN 978-952-462-668-2, print; ISBN 978-952-462-669-9, online.

8/2011 George W Evans – Seppo Honkapohja **Learning as a rational foundation for macroeconomics and finance.** 2011. 60 p. ISBN 978-952-462-670-5, print; ISBN 978-952-462-671-2, online.

9/2011 Seppo Honkapohja – Arja H Turunen-Red – Alan D Woodland **Growth, expectations and tariffs.** 2011. 49 p. ISBN 978-952-462-672-9, print; ISBN 978-952-462-673-6, online.

10/2011 Ilkka Kiema – Esa Jokivuolle **Leverage ratio requirement, credit allocation and bank stability.** 2011. 50 p. ISBN 978-952-462-757-3, print; ISBN 978-952-462-758-0, online.

11/2011 Matti Virén **Does housing allowance feed through into rental prices?** 2011. 29 p. ISBN 978-952-462-759-7, print; ISBN 978-952-462-760-3, online.

12/2011 Andrea Colciago – Lorenza Rossi **Endogenous market structures and labour market dynamics.** 2011. 48 p. ISBN 978-952-462-761-0, print; ISBN 978-952-462-762-7, online.

13/2011 Patrick M Crowley – Andrew Hughes Hallett **The great moderation under the microscope: decomposition of macroeconomic cycles in US and UK aggregate demand.** 2011. 34 p. ISBN 978-952-462-763-4, print; ISBN 978-952-462-764-1, online.

14/2011 Peter Nyberg – Mika Vaihekoski **Descriptive analysis of Finnish equity, bond and money market returns.** 2011. 60 p. ISBN 978-952-462-765-8, print; ISBN 978-952-462-766-5, online.

15/2011 Guido Ascari – Andrea Colciago – Lorenza Rossi **Limited asset market participation: does it really matter for monetary policy?** 2011. 56 p. ISBN 978-952-462-767-2, print; ISBN 978-952-462-768-9, online.

16/2011 Meri Obstbaum **The role of labour markets in fiscal policy transmission.** 2011. 70 p. ISBN 978-952-462-769-6, print; ISBN 978-952-462-770-2, online.

17/2011 Bill Francis – Iftekhar Hasan – Zenu Sharma **Incentives and innovation: evidence from OECD compensation contracts.** 2011. 60 p. ISBN 978-952-462-771-9, print; ISBN 978-952-462-772-6, online.

18/2011 Bill Fancis – Iftekhar Hasan – Qiang Wu **The impact of CFO gender on bank loan contracting.** 2011. 58 p. ISBN 978-952-462-773-3, print; ISBN 978-952-462-774-0, online.

19/2011 Bill Francis – Iftekhar Hasan – Zenu Sharma **Leverage and growth: effect of stock options.** 2011. 55 p. ISBN 978-952-462-775-7, print; ISBN 978-952-462-776-4, online.

Suomen Pankki
Bank of Finland
P.O.Box 160
FI-00101 HELSINKI
Finland

. 2343