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Abstract: Stock option grants to top managers have largely contributed to the dramatic increase in US executive pay in recent years. In this paper it is argued that stock options, compared to other forms of compensation, have created strong incentives for managers to engage in lobbying activities for higher compensation. The empirical results presented for the S&P 500 firms and the years from 1992 to 1997 show that the relative success of such skimming activities is shaped by institutional controls. Stock option grants are substantially lower when control by the board of directors and the shareholders is higher, and competition on the product market of a firm is stronger. (108 words)

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1. Introduction

Are today's top managers worth the money they earn? This question is of much public and academic concern in view of the highly increasing compensations granted to managers in the United States, but also in Europe. In 1998, the CEOs of the S&P 500 firms earned on average 7.9 million US \$, compared to 2.5 million US \$ in 1992.¹ And there seems to be no upper limit to the salaries received by top executives. In 1997, Henry R. Silverman of Cendant Corporation received approximately 257 million US \$ in stock options alone. This is an extreme example of a general development that saw median salaries for the CEOs of the S&P 500 firms double between 1970 and 1996, and the total income (i.e. including earnings from stock options) being quadrupled in real terms (Murphy 1999, p. 2486). At the same time, the gap between top managers and other employee groups has been widening. In 1998, an average CEO earned a total compensation (including stock options) that was 270 times higher than the average compensation of a production worker, a ratio that has risen from 26:1 in 1970. All these developments can largely be attributed to the increasing use of stock options in executive compensation (Perry and Zenner 2000).²

The issue of whether managers are worth these compensations has received differing interpretations. Proponents of principal-agent-theory stress the optimality of prevalent compensation contracts. In their view, contracts are efficiently designed by a rational principal intending to maximize firm-value. Thus, observed stock option compensations reflect an efficient provision of incentives to managers. Stock options serve as an incentive mechanism to direct the managers' efforts away from pursuing their self-interests, and towards increasing firm value. On the other hand, practitioners such as Graef Crystal (1991) doubt the optimality of managers' compensation contracts. According to this view, managers have some discretionary leeway to set their own pay, i.e. they can manipulate the pay process, or their contract-setting principal more generally, to their advantage. Then, current compensation levels may at least partly reflect rents

¹ The data on manager compensation for the Standard and Poor's 500 firms used in this paper is provided by Compustat's "Executive Compensation" database. The average compensation for the five top managers of the S&P 500 firms was 3.9 million US \$ in 1998.

² Recent surveys on the development of top executive compensation include e.g. Tosi et al. (2000), Murphy (1999), Abowd and David S. Kaplan (1999), Conyon and Murphy (2000), Conyon and Schwalbach (1999).

that the managers have been able to skim, e.g. in the form of stock option payments in a bullish stock market environment.

In this paper we provide arguments as well as empirical evidence for the second view. First, it is argued that stock options, compared to other forms of compensation, create strong incentives for managers to engage in lobbying activities for higher compensation. Stock options allow managers to raise their total income with a relatively low risk of losses, and with a relatively low risk of attracting the attention of the shareholders. We discuss these two points in turn and emphasize that managers hardly ever have to bear the downside risk potentially associated with stock options, and that stock option compensation is of low transparency to shareholders. An examination of stock option compensation of the S&P 500 firms and the years from 1992 to 1997 shows, however, that not all managers have succeeded in getting high stock option grants in the bullish stock market environment of the 90's. In the empirical analysis, it is tested whether differences in institutional controls can explain this variation. We find evidence that weakened checks and balances between the board of directors and top executives raise managers' pay in the form of stock options. Compensation through stock options is also higher in companies with a broad distribution of shares among shareholders. Finally, in sectors of the economy where product market competition is weak, higher amounts of stock options are granted to managers. These results hold even when a wide range of other potential influences, like individual and firm characteristics or firm profitability, is controlled for. Thus, managers facing weak institutional restrictions have been able to raise their total compensation via stock options more than their - equally successful - counterparts working in otherwise similar firms.

The results reported fit with a growing literature on institutional determinants of executive compensation (Betrand and Mullainathan 2000, Core et al. 1999, Daily et al. 1998, David et al. 1998, Finkelstein and Boyd 1998, Hartzell and Starks 2000, Westphal and Zajac 1994). Betrand and Mullainathan (2000), for example, offer evidence that CEOs in firms with weaker governance structures are relatively more rewarded for luck, i.e. observable shocks to performance beyond the manager's control, and are charged less for options they are granted. Our paper is in the same spirit by supporting the view that it matters whether managers are 'agents with or without principals'. To our knowledge, however, this is the first paper to analyze the issue with respect to stock option grants, which are arguably the most important component in executive compensation today and largely account for the developments mentioned at the outset.

Moreover, we try to extend the analysis in various respects. First, a broader view is taken with regard to institutional restrictions. We simultaneously include three important mechanisms of management control: the structure of shareholders, of the board of directors and of the product market of a firm. Second, the empirical analysis includes top managers in general and is not restricted to CEOs. And third, data for the years from 1992 to 1997 are studied, i.e. the period when the use of stock options has become the most prevalent.

In a broader view, the paper can be seen as a contribution to a growing literature on determinants of executive compensation not grounded in agency theory (Barkema and Gomez-Mejia 1998). As a special issue of the *Academy of Management Journal* on „Managerial Compensation and Firm Performance“ concluded: „In short, after at least six decades of research, the failure to identify a robust relationship between top management compensation and firm performance has led scholars into a blind alley. To move this stream of research forward requires that greater efforts be devoted to examining alternative mechanisms and criteria for how top management compensation is set.“ (Barkema and Gomez-Mejia 1998: 135). This finding is also increasingly accepted by proponents of principal-agent-theory. Kevin J. Murphy (1999) surveys a large number of studies based on agency theory that have investigated the mode of action of stock and stock-option plans for top executives. It becomes evident that the empirical basis for the justification of stock options as a pure incentive mechanism is indeed weak: “Although there is ample evidence that CEOs (and other employees) respond predictably to dysfunctional compensation arrangements, it is more difficult to document that the increase in stock-based incentives has led CEOs to work harder, smarter, and more in the interest of shareholders” (p. 2555-6). Thus, there seems to be room for alternative explanations. In this paper, an institutional approach is applied by ascribing the increase in stock option grants to weak institutional restrictions, allowing top executives to follow their own interests.

The paper proceeds as follows: Section 2 discusses the managers’ interest in stock options as a possible explanation for the prevalent compensation levels and compares this view to other approaches. In Section 3, three institutional factors that restrict the managers’ self-interested behavior are presented. We then test our hypotheses empirically for panel data including the top managers of the S&P 500 firms and the years from 1992 to 1997. Section 4 draws conclusions.

2. The Managers' Interest in Stock Options

Why should a top manager specifically strive for stock option compensation that an optimally controlling principal would not grant him? In this section, we argue that stock options, compared to other forms of compensation, allow managers to raise their total income with a relatively low risk of losses, and with a relatively low risk of attracting the attention of the shareholders. Stock options thus constitute a relatively attractive tool to raise income, and especially did so in the bullish stock market environment of the 90ies. The growing use of stock option compensation in this period can partly be considered a consequence of the managers' self-interest.

The first point of this view – that stock options generate a low risk of losses – contrasts with an optimal contracting view as provided by agency theory. According to this approach, stock options are a means of disciplining the management. They impose *more* risk on the managers because they make compensation dependent on the volatility of the firm's success and other factors. Managers might agree with such an incentive contract, but only if they are compensated for the greater risks taken. As managers are assumed to be risk averse, their expected total compensation including stock options should then in fact be higher than with a fixed income.

We do not take issue with this idea as such, but argue that in the very reality of management compensation, the additional risk managers have to bear is of little relevance. Managers hardly ever face downside risks; thus stock options are a relatively riskless way of increasing total compensation. Three observations support this view. First, stock options virtually never replace the basic salaries of managers, but are most commonly granted over and above the basic salary. Whenever this is the case, the management can only win when option plans are introduced or extended. In financial reports, no direct measures exist on how much managers are charged (if at all) for the stock options they are granted. However, one way of charging would be to adjust the managers' basic salaries downwards when options are given to them. Following the empirical approach of Bertrand and Mullainathan (2000), we tested whether this holds for the managers in our dataset (see Table A in the Appendix). Controlling for various measures of firm success and including firm and year fixed effects, we find the opposite relationship. The managers' basic salaries *go up* in proportion to the stock options they are granted (in Black-Scholes values). The effect is small (an increase of 9'500 US \$ in basic salary for one million in stock options), but nevertheless statistically highly significant ($t=20.0$). Second, even if other components of pay

would be adjusted downwards, managers could apply hedging strategies against a possible drop in share prices or other forms of risk (Bettis et al. 1999, Osterloh 1999, p. 190, Perry and Zenner 2000). Third, hedging is often not even necessary. If share prices remain below the exercise price of the issued options, many firms undertake a repricing of their stock options or issue additional options with a lower exercise price, a practice used e.g. by Microsoft after a sharp drop in its share prices in April 2000. Of course, this eliminates most of the remaining downside risk that managers might face (and it tends to be against the interest of shareholders, see e.g. Brenner et al. 2000, Chance et al. 2000).

Stock options offer a number of advantages that can explain the managers' interest in this kind of compensation. The first and foremost advantage lies in the lack of transparency. Although footnote disclosure is required, stock options are not listed in a firm's balance sheet and therefore give the managers an opportunity to acquire additional income in a relatively concealed way. Murphy (1999, p. 2514) puts forward a similar argument when stating that „[...] stock option compensation is essentially "free" from an accounting perspective, explaining (I believe) the popularity of "broad-base" company-wide option programs that are difficult to rationalize from an incentive standpoint.” A strong indication of such usage is the extensive lobbying activities of US firms against a new regulation by the Financial Accounting Standard Board, which would have prescribed listing the cost of option plans along with earnings. In 1995, the lobbyists successfully prevented the new standard from being implemented. Their political struggle was justified by the argument that “[...] if the cost of option schemes were treated in that way, fewer of them would be awarded, fewer people would have reason to maximize shareholder value and the economy would suffer” (Economist 7.8.1999, p. 19). In fact, according to the consulting firm Smithers & Co., if all the liabilities engaged in via option plans in 1998 were deducted from the profits made in the same year, this would have resulted in 50% lower profits (Murray 1999). Finally, stock options also offer advantages in terms of taxation practices. Murphy (1999, p. 2514) argues that „[...] in spite of the obvious incentive implications, the popularity of stock options reflects in large part their favorable tax and accounting treatment. In particular, stock options offer an attractive way to defer taxable income, and are largely invisible from corporate accounting statements.”

The reasons outlined support the idea that stock options generate strong incentives for managers to engage in activities which lead to higher stock option grants. The corresponding efforts in the

compensation process can be considered a form of rent-seeking (for the political realm, see Buchanan, Tollison and Tullock 1980), which is not in line with shareholders' interests, and which possibly decreases a corporation's value. Indeed, a large number of studies based on agency theory has only found weak empirical evidence that stock options as an incentive mechanism really raise firms' performance.

The reference studies in this respect contributed by Jensen and Murphy (1990) and Hall and Liebman (1998) find a positive link between a CEO's increase in compensation and shareholders' increase in value. However, the empirically estimated correlation and sensitivity of this link does not provide information with respect to the underlying causalities between specific monetary incentives and stock returns. Company executives who own a large number of stock options may for example decide on a retirement of shares, which are bought on the stock market with company money in order to support ailing share prices (see e.g. Fenn and Liang 1999). Over and above that, according to a large-scale survey by the consultants Pearl Meyer & Partners, financial analysts often include in their assessments the compensation schemes applied to the top executive level. Stock option plans are positively reflected in the analysts' suggestions to investors (Corporate Board 1997). Furthermore, the introduction of a stock option plan can be interpreted as a signal for the management's belief in bright prospects (Brickley, Bhagat and Lease 1985). Stock prices can also rise when dividends are cut. Lambert, Larcker and Larcker (1989) and more recently Fenn and Liang (1999) show that the higher the quota of stock options in the management's total compensation, the lower a firm's distribution of dividends. For these reasons, it is difficult to show by means of capital market data whether or not stock options work as incentives that make managers care more for their company's success. There are, however, important theoretical arguments that speak against strong incentive mechanisms. Most obvious is the public good dilemma. Each manager benefiting from company success via stock option plans faces incentives to free-ride.³

Thus, even if a small positive relationship between stock option grants and firm value should exist, it seems difficult to justify the current levels of stock option compensation on pay-for-performance grounds alone. There seems to be room for alternative explanations that depart from an optimal contracting view. If stock option grants reflect, at least partly, rent-seeking activities

³ Moreover, senior executives are themselves quite skeptical with regard to the expected positive motivation effects of bonuses and stock option plans (see e.g. the survey conducted by Beer and Katz 2000).

by top managers, it can be expected that institutional restrictions systematically influence the relative success of these activities. In the following, three restrictions on the managers' behavior are investigated: the influence of the board of directors, the ownership structure and the extent of competition on the respective product market. We empirically estimate the effects of these institutional controls on stock option compensation, and put the results in the context of other studies that employ different measures or approaches.

3. Institutional Determinants of Stock Option Plans

Before developing and discussing the hypotheses, we present the data on executive compensation used for the empirical analysis, and give some descriptive statistics on the trends in absolute terms as well as in the variation of stock option grants for the period 1992-1997.

3.1. Data and Descriptive Statistics

Our sample is based on Standard & Poor's "Executive Compensation" data set. ExecuComp contains detailed information on the amount and composition of top executive compensation for up to five top executives from a large number of firms traded on US stock exchanges. We restrict our analysis to the 500 US Blue Chips combined in the S&P 500 index.⁴ Data is available since the SEC changed proxy disclosure rules; i.e. we use data for the period from 1992 to 1997. In addition to compensation data, ExecuComp provides information about the executives' function and some extra information about the firms they work for. As the institutional setting, as well as the performance of the firms, is of crucial importance for our study, we have added selected data on the firms from Standard and Poor's "Compustat"⁵, and data on market concentration from the US-Bureau of Census. The resulting data set contains a theoretical number of roughly 15'000 observations for the six years being analyzed. However, important information is missing for a substantial number of managers, and with respect to the institutional variables employed also for some of the firms. This lowers the number of observations fit for evaluation to roughly 12'250 manager years and 422 firms.

⁴ The firms incorporated into the S&P 500 are selected on the basis of their market capitalization, liquidity of the title and the sector as a whole, and thus represent a good overview of US firms.

A first inspection of the data reveals the well known trends in executive compensation in the 90's. Table 1 gives descriptive statistics on average total compensation and average stock option compensation for the years from 1992 to 1997. Average total compensation for S&P500 top managers rose from 1.4 million US \$ in 1992 to 3.3 million US \$ in 1997. The absolute amount of stock options the managers received grew from roughly an average of 720'000 US \$ in the year 1992 to over 2.2 million US \$ in 1997. It is remarkable that the proportion of stock option compensation has risen from about 36 percent of total compensation in 1992 to over 49 percent in 1997. However, a look at the standard deviations indicates that there is also growing variation in stock option grants over the period considered. Thus, managers have benefitted to quite different extents from the general increasing trend in stock option compensation. In the cross section time series analysis, we will try to link these differences to varying intensities of institutional controls.

**Table 1: Trends in absolute levels and variation of executive compensation,
S&P 500 managers, 1992-1997, in thousands US\$**

Variable	sample means (std. dev.)					
	1992	1993	1994	1995	1996	1997
total compensation	1431 (2046)	1529 (1898)	1758 (2529)	1903 (2313)	2495 (3613)	3343 (7966)
stock option grants	720 (1807)	753 (1413)	926 (2031)	1021 (1845)	1510 (3067)	2271 (7531)
proportion of stock option grants to total compensation	0.36	0.36	0.38	0.40	0.45	0.49
number of observations	1486	2105	2143	2176	2178	2153

Source: Own calculations based on Standard & Poor's „Executive Compensation“

Apart from the institutional setting, a large number of other factors may play an important role in the degree to which stock options are used. We include three types of control variables in our

⁵ „Compustat“ is a database, primarily used by financial analysts, providing detailed information on firm performance and ownership structure of quoted US-firms.

sample: (i) personal characteristics of the managers; (ii) size and growth rate of the company; and (iii) financial success of the firm. Table 2 lists summary statistics for these variables.

Table 2: Summary statistics

Variable	sample mean	std. dev.
<i>Individual characteristics</i>		
CEO	0.17	
Female	0.02	
<i>Size of company</i>		
Sales (in millions)	7'738	14'098
Employees	35'994	60'449
Assets (in millions)	14'662	30'540
<i>Profitability</i>		
Return on assets	5.46	5.75
Earnings per share	2.16	2.89
Dividends per share	0.95	1.45
P/E-ratio	24.07	158.85
<i>Hypotheses</i>		
Manager is member of the board of directors	0.43	
Number of managers sitting on their companies' board	2.31	1.14
Shareholder concentration	0.00014	0.00027
Market concentration (CR4)	35.54	17.53
Number of observations	12'243	

Source: Standard & Poor's „Executive Compensation“ and „Compustat“ as well as CR4 data from the US Bureau of Census.

Individual characteristics of the managers: “Executive Compensation” offers little information on the managers themselves. Only two factors potentially influencing the amount of option-based pay are provided: whether the respective manager is CEO of the firm, and the manager's gender. Approximately 15 percent of the managers in the data are CEOs and only slightly more than two percent are women.

Size and growth rate of the company: An array of studies demonstrates that the size of a company is a relevant factor in determining the level of salaries and compensation (see e. g. Tosi et al.

2000, Brown and Medoff 1989, Rosen 1982). On average, large firms pay higher wages. Company size is portrayed by three factors: sales, number of employees and total assets.

Financial success of the company: A company's success should constitute a major factor in the level of compensation granted to managers. We attempt to capture it by using four types of measures: return on assets, profits per share, dividends per share and the P/E-ratio as an indicator of the respective firm's evaluation by the financial market.

3.2. Hypotheses and operationalization

The relevance of three institutional control mechanisms for stock option compensation and their operationalization for the empirical analysis are discussed in turn: the structure of the board of directors, the ownership structure of a firm, and product market competition.

Board structure

The board of directors represents the shareholders as the authority in charge of controlling management and is usually responsible for deciding on management compensation schemes. In the USA, this function is performed by compensation committees. Those committees are constituted by the board of directors and may only consist of external members. It is their task to prepare a proposal for compensation schemes, which has to be ratified by the board in corpore. In many cases, however, the decision process on the specific question of management compensation is much more informal. Usually, the compensation committee receives for revision and/or ratification the suggestions for compensation plans worked out by the management of the human resources department. That is followed by an extensive process involving compromises and bargaining activities between the various stakeholders from top executives to the human resources department to compensation committee and board of directors, which may in the end result in high costs for the shareholders (see e.g. Crystal 1991, Conyon and Peck 1998, Daily et al. 1998, Finkelstein and Boyd 1998, Perry and Zenner 2000). Even advocates of stock option plans concede: “[t]here is no doubt, however, that CEOs and other top managers exert at least some influence on both the level and the structure of their pay” (Murphy 1999, p. 2517).

It is well understood that the structure and composition of the board affects executive compensation (see e.g. Hermalin and Weisbach 2001, Core et. al. 1999, Mehran 1995, Finkelstein and Hambrick 1989, Yermack 1996). As a general result these studies show that managers find it easier to pursue their own goals when they face weak corporate governance

structures. Determinants examined include variables such as the fraction of outside vs. inside directors, the size of the board, the composition of the compensation committee, whether the CEO himself sits on the compensation committee, whether the CEO also serves as chairman of the board, or the fraction of the board appointed by the CEO. In the empirical analysis, we intend to replicate the finding that there are negative effects of entanglement between the board of directors and the management with respect to stock option compensation. We include two variables on board composition that can be derived from ExecuComp: (i) a dummy variable indicating whether a manager is also a *member of the board of directors*; (ii) a variable indicating the *absolute number of managers who are sitting on their companies' board* in a given year.

The first variable (*member of the board*) serves as a measure for entanglement on an individual level. Managers who have themselves been appointed members of the board are, in actual fact, responsible for controlling themselves. Compared to managers not sitting on the board, they have larger possibilities to influence their own compensation. Hence, we expect a higher amount of option-based pay for these managers. In fact, managers who are members of the board of directors (43 percent of the managers in our data set) earn on average 2.4 million US \$ in stock option grants, while those who are not members get only a third of that amount (roughly 0.8 million US \$). Such differences captured by the variable *member of the board*, however, overestimate or insufficiently measure individual rent seeking. Managers sitting on the board tend to be the highest, most responsible in the firm, and are therefore paid more than junior executives who don't sit on the board. Certainly, the variable *member of the board* partly reflects such differences in individual productivity of the managers. We therefore include a second variable on board composition in the analysis that estimates entanglement effects irrespective of individual productivity.

The variable *number of managers on the firms' board* indicates the absolute number of executive directors for each firm and each year, i.e. the number of a firms' top managers who are sitting on their own companies' board. If the management of a firm is strongly represented on the board of directors, the controlling function of the board is undermined, and rent seeking activities can be expected to be more successful. We thus hypothesize that the larger the absolute number of executive directors is, the larger are stock option grants for the managers in a firm. In the data set used, there are on average 2.31 managers sitting on their companies' board.

Ownership structure

What structure in the group of shareholders leads to optimal control in a firm? Is a wide distribution of the shares preferable to a single major shareholder? In the more recent literature on corporate governance, the rather differentiated answer is given that neither of the two polar cases of ownership structure is optimal (La Porta et al. 2000, Claessens et al. 1999, Morck et al. 1988, Shleifer and Vishny 1986). Dispersed ownership with a low degree of concentration of shares cannot grant effective supervision, which has the quality of a public good. None of the many minor shareholders finds sufficient incentive to participate in the supervision process and therefore the interests of those dispersed shareholders are difficult to coordinate. On the other hand, for a single major shareholder, supervision constitutes a private good directly connected with the value of his or her stocks. This positive incentive to supervise, however, is partly offset by an *entrenchment*-effect (Morck et al. 1988). Major shareholders join forces with the management or appoint executives according to their tastes, in order to derive rents from the company other than through an increased value (i. e. at the expense of minor shareholders). They can induce the firm to engage in sponsoring sports or cultural events, or have the firm pay non-market prices for goods or services provided by other firms in which the major shareholder has a controlling interest. Finally, a major shareholder may allow a number of selected managers excessive compensation in order to enable them to put their own visions and ideas into practice. Such measures serve the self-interest of the major shareholder (and the managers) rather than focussing on increasing the total value of the company.

The higher the concentration of shares is, the higher are thus in general the incentives for the shareholders to engage in an effective supervision of the management. We hence expect that the higher the concentration of shares among the shareholders is, the lower is the amount of stock options granted to managers. At high levels of concentration, the relationship may be weakened and eventually even be reversed because of the countervailing entrenchment-effect.

In the empirical analysis, we operationalize concentration of ownership by the proportion of outstanding stock an average shareholder owns. In the firms composing the data set, the average shareholder holds 0.014 percent of the total capital stock. From 1992 to 1997, the average share of a stockholder decreased from 0.04 to 0.001 percent. We are aware that the average proportion of the stock capital owned by one shareholder might only insufficiently reflect the restrictions emerging from differing ownership structures. The leeway of the board of directors and the

managers is of course also determined by whom the shares are owned (institutional investors, banks, ...) and by how exactly those shares are dispersed. However, changes in the share of the total capital stock an average shareholder holds can still indicate variation in the strength of block holders. Thus, the average share gives a rough measure on how pronounced the free-rider problem is among firm owners.

Extent of competition in the firm's product market

The market concentration on the target market of a firm constitutes one of the major restrictions on management. Competitive pressure forces the companies not only to take the preferences of the customers more into account, but also induces them to produce in a more cost efficient way. Managers subjected to fierce competition find it more difficult to pursue matters of self-interest than a management in a monopoly situation. We thus expect firms that are operating in contested markets to award their managers with *ceteris paribus* less option-based compensation in order to remain competitive in such an environment. However, a countervailing effect can also be expected mitigating such a relationship. Firms in contested markets have an increased demand for talented managers, as only those can guarantee success in complex and demanding environments (see Finkelstein and Boyd 1998, p. 183). Those managerial talents will earn more than their peers of lesser talent. It is difficult to theoretically predict which of the two effects will prevail. We assume, however, that up to a certain degree of competition the restrictive force of competition dominates. Thus, we expect that the higher the stress of competition (or the smaller the market concentration) on the target market of a firm is, the smaller is the amount of stock options granted to managers. This relationship weakens and may eventually even be reversed with increasing competition.

Although it is well understood that market competition plays an important role in shaping management behavior, its effects on the level of stock option grants have not yet been studied. Finkelstein and Boyd (1998) is the first study to present empirical findings on the related topic of the influence of the market environment on the discretionary leeway of the management. The authors include several factors of the market environment in order to construct a measure for discretion of the management: market concentration, intensity of regulation, market growth, R&D-intensity and capital intensity. The derived measure for discretion is positively correlated with the absolute level of managerial compensation. Managers earn more if they operate in a market environment that is less restrictive on their (self-interested) behavior. Other authors have

focussed on the interplay between strategic competition in a firm's product market and the extent to which relative performance evaluation in the form of indexed stock options is used (Aggrawal and Samwick 1999, Keddia 1987). However, these studies do not study the controlling effect of product market competition on discretionary behavior by managers.

The competitive environment on the product market in the various sectors is assessed on a regular basis by the US-Bureau of Census. The so-called "concentration ratio 4" (CR4), i. e. the proportion of total sector turnover the four largest companies generate, is considered a primary indicator for the market power of a company. We use the CR4 data on the level of the four-digit Standard Industrial Classification (SIC). The average market share of the four largest companies is 35.6 percent, with a relatively large standard deviation of 17.5 percent. CR4 is only rarely reassessed for all sectors concerned. The data used stems from 1992 and can be downloaded from the internet page of the US Department of Justice.⁶ As data is only available for one year, no statements can be made on trends over time. A high CR4 corresponds to low pressure from competition, i.e. a weak market restriction on the board and on the management; high income thus bears less negative consequences, as its cost can more easily be handed on to consumers. Moreover, less competition also means that higher returns can be obtained in general, which can then be appropriated (at least in part) by the managers.

3.3. Empirical Results

We assess the relationship between varying intensities of institutional controls and stock option grants in a cross section time series analysis. Table 3 presents the results of an OLS panel regression for the sample of top managers of the S&P 500 firms and the years from 1992 to 1997. The estimation includes fixed effects for each firm as well as dummy variables for every year (except the base year 1992). This procedure allows to capture any firm specific or industry specific determinants of stock option compensation by the firm fixed effects, and time trends or year effects by the year dummies. Thus, these influences do not bias the coefficients we estimate for the institutional determinants.

As the index for market concentration applied in this paper exhibits no variance over time, and as the firms considered do not switch market sectors, this measure cannot be included in an estimate

⁶ <http://www.census.gov/epcd/www/concentration.html>, 28 September, 2000.

with firm specific fixed effects. Therefore, in a first step a firm fixed-effects regression excluding market concentration data is run (table 3). In a second step, the firm specific fixed effects are regressed on market concentration and its square (table 4).

The following regression equations are estimated:

$$\begin{aligned}
 \text{Value of stock option grants} = & \beta_0 + \beta_1 \text{member of board of directors} + \beta_2 \text{number of} \\
 & \text{managers on the board} + \beta_3 \text{concentration of shareholders} \quad (1) \\
 & + \beta_4 \text{concentration of shareholders}^2 + \sum_{i=5}^{15} \beta_i \text{control variables} + \varepsilon
 \end{aligned}$$

$$\text{Firm fixed effects} = \beta_{16} + \beta_{17} \text{market concentration} + \beta_{18} \text{market concentration}^2 + \mu \quad (2)$$

Based on the hypotheses advanced, we expect the following (algebraic) signs: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_{17} > 0$ and $\beta_{18} < 0$. We discuss regression results given in tables 3 and 4 for each of these variables in turn.

Table 3: The effect of external restrictions on the extent of options granted to S&P 500 managers, 1992-1997; OLS panel regression with firm fixed effects.

Dependent variable: value of stock option grants

Variable	Coefficient	t-value
Constant	-823.55**	-3.62
<i>Hypotheses</i>		
Member of the board of directors	735.17**	9.26
Number of managers on the board	200.21**	3.39
Shareholder concentration	-3.26e ^{+6**}	-5.18
Shareholder concentration ²	9.46e ^{+3**}	4.41
<i>Personal characteristics</i>		
CEO	1291.16**	13.47
Female	-593.11**	-3.94
<i>Size of company</i>		
Sales (in millions)	0.12**	6.32
Employees (in thousands)	4.39	1.44
Assets (in millions)	4.22e ⁻³	0.08
<i>Profitability</i>		
Return on assets	-35.68**	-3.43
Earnings per share	16.64	1.08
Dividends per share	131.86**	4.63
P/E-ratio	1.73**	8.04
<i>Firm fixed effects</i>	<i>Yes</i>	
<i>Year effects</i>	<i>Yes</i>	
Number of observations		12'243
adjusted R ²		0.08

Remarks: The results shown are of an OLS regression with fixed effects for each firm and dummies for each year (except the base year 1992).

* and ** denote statistical significance on the 95- and 99- significance level, respectively.

Source: Own calculations based on Standard & Poor's „Executive Compensation“ and „Compustat“.

Table 4: Regression of firm fixed effects on market concentration

Dependent variable: firm fixed effects

Variable	Coefficient	t-value
Constant	236.22*	2.60
<i>Hypothesis</i>		
Market concentration (CR4)	15.81**	3.39
Market concentration ²	-0.05**	-10.04
Number of observations		422
adjusted R ²		0.06

Remarks: The results shown are of an OLS regression relating firm fixed effects to the market concentration.

* and ** denote statistical significance on the 95- and 99- significance level, respectively.

Source: Own calculations based on Standard & Poor's „Executive Compensation“ and „Compustat“, as well as CR4 data from the US Bureau of Census.

Board structure

Entanglement between the management and the board of directors leads to higher stock option grants, *ceteris paribus*. We find a positive and statistically significant relationship for both variables on board structure. On an individual level, membership on the board of directors raises the amount of income paid in stock options by approximately 735'000 US \$. Over and above that, every additional manager sitting on the company's board results in an increase in stock option compensation of roughly 200'000 US \$. Whereas for the first variable considered, the individual membership on the board of directors, it can be argued that the estimate partly reflects differences in the managers productivity, this is not likely to matter for the second variable, the number of managers on the companies' board. The estimate for the latter variable indicates rent seeking activities of significant size. The more managers are appointed members of the board, and thus are essentially responsible for controlling themselves, the higher the amounts of option-based pay. We replicate the well established finding that the structure of the board affects executive compensation, here with respect to stock option grants.

The absolute numbers given, however, should be considered with care. Standard and Poors uses non-standard modifications to the classical Black-Scholes definition of option value calculation for its ExecuComp data set. Moreover, it has been convincingly argued that stock option grants have less than Black-Scholes value for the managers who get them, because they are undiversified (Hall and Murphy 2000). Interesting is therefore not the absolute value as such, but the result that variation in the entanglement between the board of directors and the management causes significant differences in stock option compensation.

Concentration of shareholders

A higher concentration of shareholders significantly lowers the amount of money paid in stock options. Since the estimate for the squared term is positive, the relationship becomes weaker as the concentration of shareholders increases and eventually the slope becomes even negative. The shape of the curve thus exactly matches the theoretical expectations. However, the squared term only becomes predominant if an average single shareholder owns more than 0.17 per cent of the total stocks, which is the case for less than one percent of the firms included in the data set. The

concentration of shareholders has a considerable impact: in absolute terms, an increase in the proportion held by the average shareholder by half a standard deviation lowers the managers' income in stock options by approximately 420'000 US \$.

Although the accuracy of the measure employed is to some extent questionable, we derive results fully consistent with those found in related studies. In a recent study, Hartzell and Starks (2000) analyze the impact of institutional investors on executive compensation. They find a significant negative relationship between the concentration of institutional ownership and the level of stock option compensation in a firm, suggesting that a stronger presence of institutional investors results in a more effective control of the managers' rent seeking activities.

Market concentration

The more a market is dominated by a few large firms, the less competition exists in this sector and the less the consequences are felt when (excessively) high salaries are paid. Following this hypothesis, market concentration exerts a positive influence on compensation in the form of stock options. The results in table 2 show that the higher the product market concentration, i. e. the less competition there is, the higher the amount of stock options granted to managers. According to the theoretical prediction, the effect weakens with increasing market concentration, as is evident in the negative squared term. The theoretical predictions are exactly matched by the empirical results. However, the squared term dominates only with a market concentration of more than 100 percent, and is hence of no relevance for the sectors analyzed here. The size of the effect is again significant: an increase in the market concentration by half a standard deviation increases the average income in stock options by roughly 135'000 US \$.

Control variables

For the control variables, we find results consistent with previous research. CEOs receive more stock options, women receive less stock options and large companies pay more in stock options, as do successful companies. The positive relationship between profitability and stock option compensation we find well supports the agency-theory view on executive compensation. However, causality again remains unclear. For successful companies, for example, reversed causality may be assumed as their stock prices usually show stronger growth, thereby generating

a disproportionate increase in the value of stock options granted. Nevertheless, it is important to control for measures of profitability in the regression. This assures the result that *ceteris paribus* *equally successful* managers are granted more stock options when there is less control in a firm's institutional environment.

Sensitivity tests

The robustness of the results is tested using two alternative procedures. Firstly, the *proportion* of income paid in stock options is considered as a dependent variable instead of the absolute value of stock options. This accounts for the influence of the institutional environment on the *composition* of total compensation, rather than the absolute amount. Secondly, we use the natural logarithm of the absolute value of option grants as a dependent variable. Results are reported in tables 5 and 6.

Table 5: The effect of external restrictions on the extent of options granted to S&P 500 managers, 1992-1997; OLS panel regression with firm fixed effects.
Dependent variables: (1) stock option grants as a percentage of total income
(2) ln (value of stock option grants)

Variable	Model (1)		Model (2)	
	Coeff.	t-value	Coeff.	t-value
Constant	34.01**	27.15	5.04**	46.24
<i>Hypotheses</i>				
Member of the board of directors	2.92**	6.68	0.70**	18.49
Number of managers on the board	0.47	1.45	-0.07*	-2.48
Shareholder concentration	-16.61e ^{3**}	-4.78	-1.07e ^{3**}	-3.54
Shareholder concentration ²	4.28e ^{+6**}	3.63	0.24e ^{+6*}	2.36
<i>Personal characteristics</i>				
CEO	3.46**	6.56	0.47**	10.29
Female	-2.89*	2.00	-0.46**	-3.72
<i>Size of company</i>				
Sales (in millions)	3.7e ^{-3**}	3.52	0.01e ⁻³	1.25
Employees (in thousands)	0.02	1.13	5.05e ^{-3**}	3.44
Assets (in millions)	-1.5e ^{-3**}	-5.18	-5.70e ^{-6*}	-2.32
<i>Profitability</i>				
Return on assets	-0.27**	-4.72	-0.01**	-3.28
Earnings per share	0.13	1.53	0.03**	4.16
Dividends per share	1.05**	6.71	0.06**	4.49
P/E-ratio	2.1e ⁻²	1.79	0.07e ⁻³	0.69
<i>Firm fixed effects</i>	Yes		Yes	
<i>Time effects</i>	Yes		Yes	
Number of observations		12'243		12'243
adjusted R ²		0.08		0.11

Remarks: The results shown are of an OLS regression with firm fixed effects and dummies for each year (except the base year 1992).

* and ** denote statistical significance on the 95- and 99- significance level.

Source: Own calculations based on Standard & Poor's „Executive Compensation“ and „Compustat“.

Table 6: Regression of firm fixed effects on market concentration
Dependent variable: firm fixed effects

Variable	Model (1)		Model (2)	
	Coeff.	t-statistic	Coeff.	t-statistic
Constant	-7.84**	-13.22	-0.74**	-14.66
<i>Hypothesis</i>				
Market concentration (CR4)	0.39**	13.06	0.04**	13.87
Market concentration ²	-4.28e ^{-3**}	-12.38	-0.35e ^{-3**}	-12.11
Number of observations		422		422
adjusted R ²		0.02		0.02

Remarks: The results shown are of an OLS regression relating firm fixed effects to the market concentration.

* and ** denote statistical significance on the 95- and 99- significance level, respectively.

Source: Own calculations based on Standard & Poor's „Executive Compensation“ and „Compustat“, as well as CR4 data from the US Bureau of Census.

The sensitivity tests reported in Tables 5 and 6 indicate that the results remain basically unchanged when estimating alternative specifications. The sizes of the coefficients change to some extent, but the variables of interest in general show the same signs and remain statistically significant at the 99 percent level. This result holds independently of whether one examines the proportion of total compensation paid in stock options or the natural logarithm of the absolute amount of stock options granted as the dependent variable. Only the estimates for the variable *number of managers on the board* seem to be quite sensitive. Whereas we find the expected positive sign with respect to the proportion paid in stock options (at the border of statistical significance), the relationship is reversed when considering the natural logarithm of option grants. One reason for this might be that the logarithmic specification gives lower weights to very high option grants than the regressions using the absolute value or the proportion of stock option compensation. It is interesting to note that such very high option grants seem to be specifically correlated with the number of managers on the board and not with other variables.

In general, the findings presented are robust. Institutional restrictions for top executives indeed are likely to matter for the amount of pay the managers receive in stock options, as well as for the composition of their compensation.

4. Conclusions

Stock option grants to top managers have largely contributed to the dramatic increase in US executive pay in recent years. In this paper, it has been argued that stock options, compared to other forms of compensation, provide managers with strong incentives to engage in lobbying activities for higher compensation. This process is facilitated by the fact that option-based pay can be justified by its assumed property to be a positive performance incentive. However, the empirical evidence on the relationship between ‘pay for performance’ and share return is rather weak and the direction of causality is unclear. Thus, there is room for alternative explanations of current levels of stock option compensation. We focus on institutional determinants of stock option grants. It is argued, and empirical evidence is offered, that weak institutional restrictions have allowed top managers to skim rents in the form of stock option payments in a bullish stock market environment. Three institutional restrictions are analyzed: the composition of the board of directors, the concentration of shareholders and market competition. The empirical results

presented for the S&P 500 firms and the years from 1992 to 1997 show that the more managers are exposed to control, the less compensation they receive in stock options in absolute value, as well as in proportion of total income.

The study has some shortcomings that further research should improve upon. First, it would be desirable to have a better and more complete set of measures on the institutional environment that controls management behavior. The measures we employ are to some extent open to criticism and do not reflect control mechanisms as precisely as one would like. However, in our view the three institutional measures as a whole offer convincing support for the hypotheses advanced. The results correspond well with findings of other studies that study the impact of corporate governance structures on executive compensation. Second, it would be interesting to analyze stock option grants in a declining stock market environment, i.e. for more recent data from the period after 2000. One might suspect that stock options no longer seem as attractive to managers as they used to, and consequently stock option grants have decreased – although principals providing ‘optimal’ pay for performance incentives would not do so.

5. Literature

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6. Appendix

Table A: The Interaction between base salary and the extent of options granted to S&P 500 managers, 1992-1997

Dependent variable: base salary

Variable	Coefficient	t-value
Constant	312.074**	39.7
<i>Hypothesis</i>		
Amount of stock options granted	0.010**	20.0
<i>Personal Characteristics</i>		
CEO	245.808**	56.3
Female	-115.465**	-8.5
<i>Size of Company</i>		
Sales	0.005**	5.1
Employees	0.007	0.0
Assets	0.001	0.7
<i>Profitability</i>		
Return on Assets	1.035	1.9
Earnings per Share	1.669*	2.1
Dividends per Share	-1.980	-1.3
P/E-Ratio	-0.007	-0.6
<i>Firm fixed effects</i>	<i>Yes</i>	
<i>Year effects</i>	<i>Yes</i>	
Number of Observations		12'461
adjusted R ²		0.51

Remarks: The results shown are of an OLS regression with firm fixed effects and dummies for each year (except the base year 1992).

* and ** denote statistical significance on the 95- and 99- significance level, respectively.

Source: Own calculations on the basis of Standard & Poors' „Executive Compensation“ and „Compustat“.