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THE GROWTH OF EXECUTIVE PAY

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This paper examines both empirically and theoretically the growth of US executive pay during the period 1993–2003. During this period, pay has grown much beyond the increase that could be explained by changes in firm size, performance, and industry classification. Had the relationship of compensation to size, performance, and industry classification remained the same in 2003 as it was in 1993, mean compensation in 2003 would have been only about half of its actual size. During the 1993–2003 period, equity-based compensation has increased considerably in both new-economy and old-economy firms, but this growth has not been accompanied by a substitution effect, i.e. a reduction in non-equity compensation. The aggregate compensation paid by public companies to their top-five executives during the considered period added up to about $350 billion, and the ratio of this aggregate top-five compensation to the aggregate earnings of these firms increased from 5 per cent in 1993–5 to about 10 per cent in 2001–3. After presenting evidence about the growth of pay, we discuss alternative explanations for it. We examine how this growth could be explained under either the arm's-length bargaining model of executive compensation or the managerial-power model. Among other things, we discuss the relevance of the parallel rise in market capitalizations and in the use of equity-based compensation.

I. INTRODUCTION

The growth in executive pay over the past decade has increased the attention given to the subject of executive compensation. There is now a heated debate about the quality of the pay-setting process in publicly traded companies and the compensation arrangements that it produces (see, for example, Bebchuk and Fried, 2003, 2004; Hall and Murphy, 2003; Jensen *et al*., 2004). This paper seeks to contribute to the ongoing assessment of the executive-pay landscape by examining, both empirically and theoretically, the growth of pay during the period 1993–2003.

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Section II begins by describing the growth in pay during the considered period and then proceeds to examine the extent to which the pay growth can be explained by changes in firm size, performance, and industry mix. We find that compensation has grown by far more than could be explained by such changes. Had the relation of compensation to these attributes remained the same, mean compensation in 2003 would have been only about half of its actual size. During the period under investigation, the relation between pay and firm size and performance has changed, with pay at the end of the period being considerably higher for companies of a given size, performance, and industry classification.

Section III examines the growth of equity-based compensation during 1993–2003. The fraction of equity-based compensation has grown across the board—in large firms, mid-size firms, and small firms, as well as in both new-economy and old-economy firms. Although the fraction of non-equity (cash) compensation to total compensation has declined during this period, the amounts spent on cash compensation have not declined, but rather increased. Furthermore, cash compensation has grown somewhat more than could be explained by the changes in size, performance, and industry mix during the considered period.

Section IV examines the changes in the economic significance of executive pay. We find that executive pay has been economically meaningful. The aggregate compensation paid by public firms to top-five executives during the period 1993–2003 added up to about $350 billion. This aggregate top-five compensation accounted for 6.6 per cent of the aggregate earnings (net income) of these firms during the period under consideration. Furthermore, the economic significance of executive pay has increased during this period. The aggregate compensation paid by public firms to their top-five executives was 9.8 per cent of the aggregate earnings of these firms during 2001–3, up from 5 per cent during 1993–5.

Section V discusses how the growth of executive pay could be explained. We discuss this question both from the perspective of the arm's-length bargaining model of executive compensation and from the perspective of the managerial-power model. We discuss and evaluate alternative explanations. We do not find that, by itself, the increase in executive-pay levels can resolve the debate on the extent to which executive pay is shaped by managers' influence on boards. Our findings, however, highlight the importance of this debate.

II. THE GROWTH OF PAY

(i) The Large Increase in Pay Levels

We use compensation information from the standard ExecuComp database, which includes information about executive compensation in public US companies from 1993 onwards. The dataset includes all the S&P 500, Mid-Cap 400, and Small-Cap 600 companies. Together, these firms (also known as the S&P 1500) constitute more than 80 per cent of the total market capitalization of US public firms. We report below findings on the period 1993–2003, because 2003 was the last year for which there was compensation information about the lion's share of companies in the dataset.

Throughout our analysis, we define as annual compensation the (grant-date) value of the compensation package in the year in which it was given. In particular, following a standard definition of the total grant-date value of annual compensation reported in the ExecuComp database, we define an executive's total compensation in a given year as the sum of the executive's salary, bonuses, long-term incentive plans, the grant-date value of restricted stock awards, and the (grant-date) Black–Scholes value of granted options. To adjust for inflation, we translate all monetary figures to 2002 dollars.

It is worth noting that the ExecuComp database does not include information about the value of executives' pension plans because firms are not required to place and disclose a dollar value for these plans. As a result, research on executive pay has largely ignored the value of such plans (and the annual increase in their value). There is evidence, however, that the value of pension plans commonly comprises a major component of executives' compensation (Bebchuk and Jackson, 2005). Thus, like much of the literature, the annual compensation figures we use do not include a significant source of additional compensation for many executives.

Table 1
Mean Compensation Levels ($m), 1993–2003

	CEO			Top five executives		
Year	S&P500	Mid-Cap400	Small-Cap600	S&P500	Mid-Cap400	Small-Cap600
1993	3.7	2.2	1.3	9.5	5.8	3.2
1994	4.4	2.6	1.6	10.7	6.4	3.9
1995	4.8	2.9	1.5	11.9	6.8	4.0
1996	7.0	3.3	1.9	15.8	8.1	5.0
1997	9.1	4.2	2.2	20.0	9.9	5.4
1998	10.7	4.6	2.4	23.7	10.4	5.6
1999	12.7	5.1	2.3	28.3	11.4	5.7
2000	17.4	5.1	2.5	36.6	12.1	5.9
2001	14.3	4.7	2.6	31.9	10.6	5.7
2002	10.3	4.7	2.2	23.5	10.3	5.2
2003	9.1	4.0	2.0	21.4	9.4	4.7

Notes: The table displays mean compensation levels for CEOs and top-five executives in firms that belong to the S&P 500, Mid-Cap 400, and Small-Cap 600 indices. All figures are adjusted for inflation and are in 2002 dollars. Compensation in any given year is defined as the sum of salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black–Scholes), long-term incentive pay-outs, and other compensation. Top-five compensation is the sum of the five largest compensation packages that the firm gives to its managers in a given year.

In the early 1990s, some observers viewed executive compensation as quite high (see, for example, Crystal, 1991). Since then, however, compensation levels have climbed considerably. Table 1 displays the mean compensation levels of the chief executive officer (CEO) and of the top-five executives during 1993–2003. Among S&P 500 firms, average CEO compensation climbed from $3.7m in 1993 to $9.1m in 2003 (an increase of 146 per cent), and average compensation to top-five executives increased from $9.5m in 1993 to $21.4m in 2003 (an increase of 125 per cent). We observe similar upward trends in both CEO pay and top-five executive pay among Mid-Cap firms and Small-Cap firms.

The magnitude of the increase was somewhat higher in S&P 500 firms than in Mid-Cap and Small-Cap firms. Also, across the three size groups, the magnitude of the increase was somewhat higher for the CEO than for the top-five executives. As a result, CEO pay constituted a higher fraction of total top-five executive pay by the end of the examined period than in the beginning.

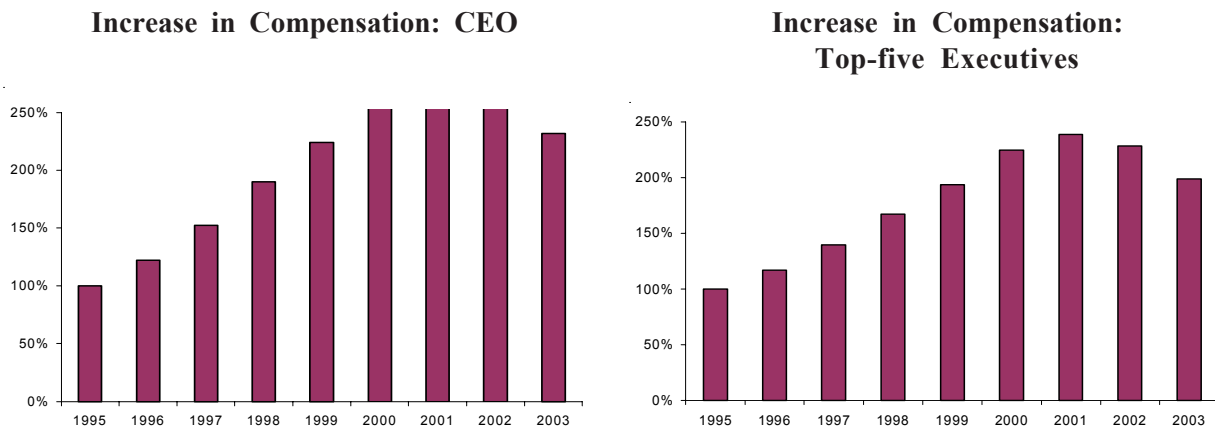
Figure 1 graphically displays the increase (relative to the beginning of the period under consideration) in the rolling 3-year average of compensation levels of CEOs and top-five executives during the considered period. The rolling average of a firm's compensation level in any given year is defined as the average of its compensation level in that year and the preceding 2 years. As the figure indicates, the rolling average of compensation levels of both CEOs and top-five executives has been increasing steadily. There is a slight drop in 2002 and 2003, but the levels stay quite high relative to the beginning of the period under consideration.

(ii) Can the Growth in Pay be Explained by Changes in Firm Variables?

Compensation levels can be expected to increase with firm size and performance, and to vary across industries. It is, therefore, important to understand to what extent the rise in compensation levels during the period under consideration is simply a product of the changes in firm size, performance, and industry mix during this period.

Between 1993 and 2003, firm size increased considerably. The average size of the S&P 500 firms, as

Figure 1
Changes in Rolling Average of CEO and Top-five Compensation, 1993–2003



Notes: The figure displays the changes in rolling average compensation among firms that belong to the S&P 500, Mid-Cap 400, and Small-Cap 600 indices. For each firm, the firm-level compensation is defined as the average of the compensation in the year under consideration and the preceding 2 years. The firm-level compensation is then averaged across firms. The year 1995 is the reference point (100 per cent). All figures are adjusted for inflation and are in 2002 dollars.

measured by sales, increased by 40 per cent (inflation-adjusted) from 1993–5 to 2001–3. During the same period, the average size of the Mid-Cap 400 firms increased by 30 per cent and of the Small-Cap 600 firms by 51 per cent. Furthermore, during the considered period, the incidence of new economy firms, where compensation has been somewhat higher, has increased. These changes in size and industry classification might account for some of the growth in compensation figures.

Our next step is, therefore, to analyse the extent to which compensation levels changed during the examined period after controlling for changes in firm characteristics. To this end, we first estimate the following regression for firms in our panel:

$$Log(compensation_{i,t}) = a_0 + a_1 Log(sales_{i,t-1}) + a_2 Log(1 + ROA_{i,t-1}) + a_3 Log(1 + Return_{i,t-1}) + a_4 Log(1 + Return_{i,t-2}) + Year\,dummies(1994 - 2003) + f_i + \varepsilon_{i,t}. \quad (1)$$

ROA denotes the ratio of operating income to book value of assets, $Return_{i,t}$ is the market return of the firm *i*'s stock in year *t*, and f_i is firm fixed effects. Following the literature (e.g. Core *et al*., 1999), we use sales to control for size and we use *ROA* and past returns to control for performance. The year dummies indicate how much, holding firm attributes fixed, log compensation went up relative to 1993. We ran one regression using CEO pay as the dependent variable and one using top-five compensation as the dependent variable.

Table 2 displays the results of these regressions. As the results indicate, compensation levels increased far beyond what can be attributed to changes in size and performance. The year dummy variables monotonically increase until 2000. They subsequently decline a bit but remain higher than in 1999 (and all prior years). The second column of Table 2 indicates that the results are quite similar when we regress the compensation of the top five executives on size and performance using firm fixed effects. Again, the year dummy variables steadily increase throughout the period 1993–2000, and then decline a bit but remain above their level in (or prior to) 1999.

We can translate the increases in log compensation reflected in the year dummies into increases in compensation by taking the exponent of the estimated coefficients. Figure 2 plots the increases in compensation associated with this transformation. As the figure indicates, controlling for firm size and performance (i.e. for a firm with the same size and performance), the levels of the CEO compensation increased by 96 per cent between 1993 and 2003,

Table 2
Growth Unexplained by Size and Performance: Fixed-effect Regression

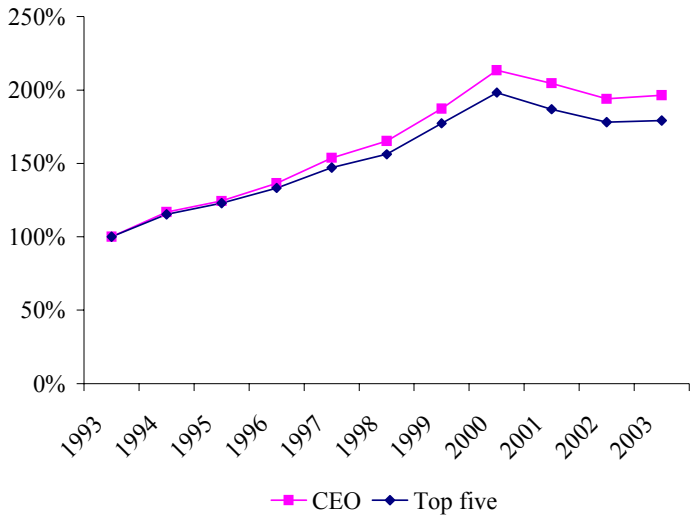
	Dependent variable: Log(total CEO compensation)	Dependent variable: Log(total top-5 compensation)
Log(Sales (*t*–1))	0.138***	0.171***
	(0.014)	(0.009)
Log(1+Firm *ROA*(*t*–1))	0.110*	0.108
	(0.062)	(0.007)
Log(1+Firm return (*t*–1))	0.128***	0.024***
	(0.012)	(0.007)
Log(1+Firm return (*t*–2))	0.016	0.015
	(0.012)	(0.043)
1994	0.059***	0.058***
	(0.022)	(0.014)
1995	0.132***	0.123***
	(0.022)	(0.014)
1996	0.147***	0.127***
	(0.023)	(0.015)
1997	0.239***	0.207***
	(0.023)	(0.015)
1998	0.228***	0.202***
	(0.024)	(0.015)
1999	0.288***	0.261***
	(0.024)	(0.015)
2000	0.316***	0.300***
	(0.025)	(0.016)
2001	0.245***	0.212***
	(0.025)	(0.016)
2002	0.352***	0.283***
	(0.026)	(0.016)
2003	0.450***	0.370***
	(0.026)	(0.017)
Observations	15,397	14,154
Adjusted R^2	56%	74%

Note: The sample includes all S&P 1500 firms from the ExecuComp database. *ROA* is the income before interest, taxes, depreciation, and amortization in year *t*–1, divided by the book value of asset in year *t*–1. Firm return is the firm's stock return. All data used are adjusted for inflation and stated in 2002 dollars. Standard errors appear below the coefficient estimate, and *** indicates significance at the 1 per cent level.

and the levels of the top-five executives increased by 76 per cent. The figure also shows an almost monotonic increase in CEO and top-five compensation throughout the years.

To get a better sense of the proportion of the unexplained increase, we re-ran regression (1) using only firms that existed throughout the period. Average CEO compensation in these firms increased from 1993 to 2003 by 166 per cent. The coefficient in 2003 of the fixed-effect regression is 0.69, suggesting that the increase in compensation unexplained by changes in size and performance was 100 per cent. This implies that changes in firm size and performance can explain only 66 per cent of the total 166 per cent increase, or about 40 per cent of the total increase, with 60 per cent of the total increase remaining unexplained.

Figure 2
Increase in Compensation after Controlling for Size, Performance, and Fixed Effects



Notes: The figure displays the changes in compensation to CEOs and top-five executives among firms that belong to the ExecuComp database after controlling for size, performance, and fixed effects. The year 1993 is the reference point (100 per cent). All variables used to generate the figure were first adjusted for inflation.

Doing similar calculations for the top-five executives in firms that existed throughout the considered period, we find that top-five compensation increased on average by 98 per cent, and that, controlling for firm size and performance, compensation increased by 78 per cent. Thus, changes in size and performance can account for only about 20 per cent of the actual increase in top-five pay, leaving 80 per cent of the actual increase unexplained by such changes.

Thus far we have focused on panel regressions with firm fixed effects and thus on the set of firms that appear in our data in different years. Another way to identify the increase in compensation unexplained by changes in firm variables is to compare actual 2003 compensation levels with those that would have existed if the relation between compensation and firm variables had remained the same as in 1993. We ran the following regression to identify how 1993 compensation depended on firm characteristics.

$$Log(compensation_{i,t}) = a_0 + a_1 Log(sales_{i,t-1}) + a_2 Log(1 + ROA_{i,t-1}) + a_3 Log(1 + Return_{i,t-1}) + a_4 Log(1 + Return_{i,t-2}) + a_5 STD\_RET_{i,t-1} + NEW\_ECONOMY_{i,t-1} + INDUSTRY_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

In this regression, we add to the controls we used in the fixed-firm-effects regression some firm characteristics that might explain cross-sectional variation in compensation. In particular, we add a new-economy dummy, which takes a value of 1 for new-economy firms and 0 otherwise, and industry dummies. In classifying firms as new-economy firms, we use throughout the definition of Murphy (2003), and we use 48 industry dummies classified by Fama and French (1997).[2] Following prior empirical and theoretical work (e.g. Core *et al*., 1999; Aggarwal and Samwick, 1999; Cyert *et al*., 2002), we also add a measure of firm risk, using the standard deviation of the firm's monthly returns in the 48 months prior to the compensation year. Regressions such as (2) are widely used in the literature in capturing the

[2] Murphy (2003) defines new-economy firms as firms which belong to the following industry groups: producers of computer and office equipment and computer wholesalers (SIC codes 3570, 3571, 3572, 3576, 5045); telecom companies (SIC codes 3661, 4812, 4813); producers of semiconductor and related devices (SIC code 3674); mail order/Internet (SIC code 5961); and software companies (SIC codes 7370, 7371, 7372, 7373).

Table 3
Pay Growth Unexplained by Changes in Size, Performance, and Industry Mix

	CEO	Top five
Mean compensation 2003 ($m)	4.9	11.8
Predicted compensation based on the 1993 regression results ($m)	2.1	6.0
Mean difference between predicted and actual compensation ($m)	2.8***	5.8***
Mean actual compensation as a percentage of predicted	215***	179***

Notes: The table compares actual 2003 compensation levels with those that would exist if the relationship between compensation, firm size, and industry remained the same as in 1993. For each firm we predict the average compensation in 2003 with the coefficients of the cross-sectional regression run over the year 1993. We use the regression specification in equation (2). All figures used were translated to 2002 dollars. Standard errors appear below the coefficient estimate, and *** indicates significance at the 1 per cent level.

effect of size, performance, and risk on managerial compensation. We ran one regression using CEO pay as the dependent variable and one regression using top-five compensation as the dependent variable.

We then forecast the compensation levels that firms existing in 2003 would have had using the coefficients from the 1993 regression—that is, we estimate what 2003 compensation levels would have been assuming that the relation of pay to firm characteristics would have been the same in 2003 as in 1993. Table 3 displays the results of our calculations.

As Table 3 indicates, compensation levels in 2003 were much higher than they would have been had the relation of compensation to firm size, performance, and industry remained the same as in 1993. The 2003 CEO levels exceeded by 115 per cent the levels predicted by the 1993 regression, and the top-five compensation levels exceeded by 79 per cent the levels predicted by the 1993 regression. These increases are statistically significant at the 1 per cent level. We thus conclude that the relationship between pay and firm attributes has changed substantially during the period under consideration.

III. THE GROWTH OF EQUITY-BASED COMPENSATION

One source of the increase in compensation documented in the previous section is the increase in equity-based compensation. Equity-based compensation is comprised of the options and the restricted stock that top executives commonly receive as part of their compensation. In this section we examine separately the growth of the equity-based portion and the non-equity based portion of CEO and top-five executive compensation.

Table 4 shows the increase in the fraction of total compensation made by equity-based compensation in all types of firms. Whereas equity-based compensation was 37 per cent of the total compensation to top-five executives of the S&P 500 firms in 1993, its fraction of total compensation increased to 55 per cent by 2003. The fraction of total top-five compensation made in equity-based compensation increased from 41 to 51 per cent for Mid-Cap companies and from 34 to 41 per cent for Small-Cap companies. We observe a similar trend in CEO compensation.

Table 4 also shows that the fraction of compensation made in equity was higher throughout the period for new-economy firms than for other firms. However, the increased use of equity-based compensation was not merely due to the increase in the incidence of new economy firms. The use of equity-based compensation increased in both new-economy firms and those not classified as new economy. The fraction of total top-five compensation made in equity increased from 50 per cent in 1993 to 69 per cent in 2003 for new-economy firms, and increased from 36 per cent in 1993 to 50 per cent in 2003 for other firms. Again, the trend in the composition of CEO compensation is similar.

Table 4
Equity-based Compensation as a Percentage of Total Compensation

(*a*) CEO

Year	S&P500	Mid-Cap400	Small-Cap600	New economy	Firms not classified as new economy
1993	41	46	47	58	42
1994	48	53	53	63	49
1995	49	48	48	72	44
1996	56	55	52	76	51
1997	63	60	55	77	58
1998	70	66	61	86	63
1999	71	70	56	87	63
2000	78	67	57	92	66
2001	76	66	58	86	66
2002	67	59	53	83	59
2003	59	54	44	76	53

(*b*) Top-five executives

Year	S&P500	Mid-Cap400	Small-Cap600	New economy	Firms not classified as new economy
1993	37	41	34	50	36
1994	42	45	43	57	41
1995	42	42	40	62	38
1996	50	49	46	69	45
1997	57	54	49	72	52
1998	63	58	52	80	55
1999	65	63	50	82	58
2000	72	63	50	87	60
2001	72	60	52	83	63
2002	62	54	48	77	54
2003	55	51	41	69	50

Notes: The table displays the percentage of equity-based compensation out of the aggregate total compensation for CEOs and top-five executives in firms that belong to the S&P 500, Mid-Cap 400, and Small-Cap 600 indices. Equity-based compensation is defined as the total value of restricted stock granted and total value of stock options granted (using Black–Scholes). Top-five executive compensation is the sum of the five largest compensation packages that a firm gives to its managers in a given year.

It is worth noting that the fraction of equity-based compensation 'peaked' in 2000–1 and declined considerably afterwards. From 2001 to 2003, the fraction of top-five compensation based on equity decreased from 72 per cent to 55 per cent for S&P 500 companies, from 60 per cent to 52 per cent for Mid-Cap companies and from 52 per cent to 41 per cent for Small-Cap companies. We observe a similar trend in both new economy firms and other firms, as well as in CEO compensation in all types of firms. However, with respect to both top-five compensation and CEO compensation, and in all categories of firms, the fraction of 2003 compensation that was equity-based was still considerably higher

than in the beginning of the period under consideration.

With both total compensation levels and the fraction of equity-based compensation going up during the examined period, the levels of equity-based compensation clearly had to go up during this period. But the question remains as to whether cash-based compensation levels went up or down. The increase in total compensation could have come wholly from the increase in equity-based compensation, and cash compensation could have remained stable or even declined to 'substitute' for the increased equity-based pay.

Figure 3 depicts the relative increase in the value of both components of compensation during the considered period. As the figure shows, not only equity-based compensation levels increased during this period, roughly tripling between 1993 and 2003, but cash compensation also increased by almost 40 per cent between 1993 and 2003. Thus, we do not discern a clear substitution effect of reductions in cash compensation accompanying the increase in equity-based compensation.

To examine this issue more systematically, we ran regressions for both the equity portion and the non-equity portion of the compensation, using the fixed-effect regression specified in equation (1). The coefficients of the yearly dummy variables in these regressions capture the changes in compensation over time in isolation from changes in firm attributes.

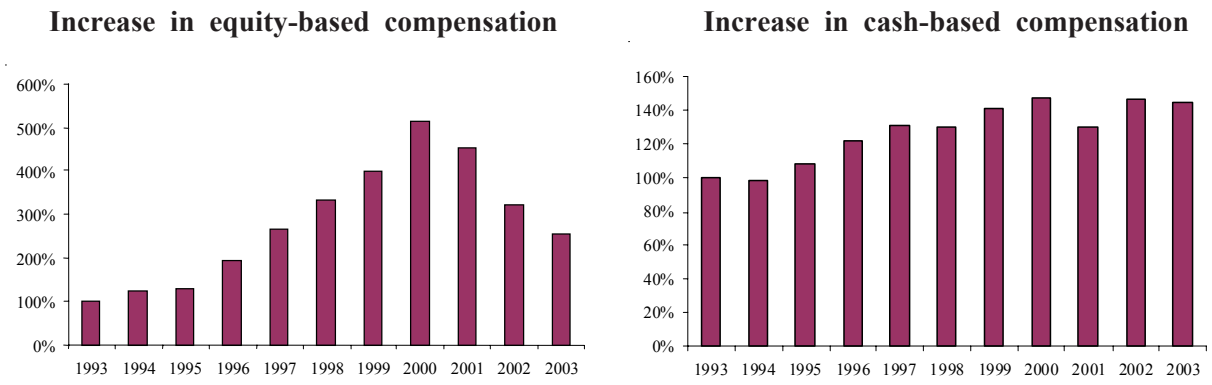
The results of the equity-based compensation, shown in Table 5, suggest that, controlling for changes in firm size and performance, and using firm fixed effects (i.e. looking at the same firms), equity-based compensation increased during the period under consideration. With respect to both top-five compensation and CEO compensation, the coefficients of the yearly dummy variables in the equity-based compensation increase monotonically from 1993 to 2001 and then decrease but remain much higher than in the beginning of the period. The 2003 coefficients indicate that, controlling for changes in firm size and performance, log of equity-based compensation increased by 1.347 for the CEO and by 1.468 for the top-five executives.

Again, we can translate the increase in log compensation to increase in compensation by taking the exponent of the estimated coefficients. Figure 4 plots the increases in compensation associated with this transformation. Figure 4 shows that, controlling for firm size and performance, the levels of CEO equity compensation increased by 285 per cent between 1993 and 2003, and the levels of equity-based compensation given to top-five executives increased by 334 per cent. The level of equity-based compensation for a firm with given size and performance peaked in 2000 and declined in the last 3 years of the examined period.

The results of the fixed-effect regression for the non-equity based compensation are displayed in Table 6. The coefficients of the yearly dummies increase not only between 1993 and 2000 but also between 2000 and 2003. These coefficients indicate that the log of CEO cash compensation increased during 1993–2003 by 0.45 more than could be accounted for by changes in size and performance, and that the log of cash compensation paid to top-five executives increased by 0.37 beyond what could be accounted for by such changes.

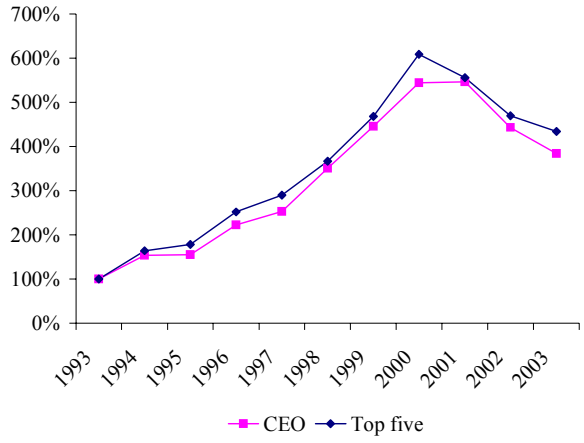
After translating increases in log compensation to increases in actual compensation, we present in Figure 5 the increases in cash-based compensation during the considered period, controlling for firm size and performance. Figure 5 shows that, holding firm attributes constant, the levels of CEO cash-based compensation increased by 56 per cent between 1993 and 2003, and the levels of the cash-based compensation paid to top-five executives increased by 45 per cent during this period. Thus, we do not find evidence that increases in equity-based compensation were accompanied by companies' reduction in cash-based compensation. Finally, it is worth noting that, while equity-based compensation peaked in 2000 and declined afterwards, cash-based compensation trended upwards throughout the examined period, and its growth pace even picked up after 2000.

Figure 3
Relative Increase in Equity-based and Non-equity-based CEO Compensation



Note: The figure displays the changes in CEO equity-based compensation in firms that belong to the S&P500, Mid-Cap 400, and Small-Cap 600 indices.

Figure 4
Increase in Equity-based Compensation after Controlling for Size, Performance, and Fixed Effects



Notes: The figure displays the changes in equity-based compensation to CEOs and top-five executives among firms that belong to the ExecuComp database, after controlling for size, performance, and fixed-effects. The year 1993 is the reference point (100 per cent). All variables used to generate the figure were first adjusted for inflation and translated into 2002 dollars.

Table 5
Equity-based Compensation Fixed-effect Regression

	Dependent variable: Log(CEO equity-based compensation)	Dependent variable: Log(Top-5 equity-based compensation)
Log(Sales (*t*–1))	0.305***	0.407***
	(0.055)	(0.054)
Log(1+Firm *ROA*(*t*–1))	0.672***	0.316***
	(0.250)	(0.044)
Log(1+Firm return (*t*–1))	0.324***	0.298***
	(0.047)	(0.045)
Log(1+Firm return (*t*–2))	0.308***	0.663***
	(0.047)	(0.258)
1994	0.428***	0.497***
	(0.090)	(0.085)
1995	0.440***	0.576***
	(0.091)	(0.086)
1996	0.799***	0.925***
	(0.093)	(0.088)
1997	0.929***	1.066***
	(0.094)	(0.088)
1998	1.256***	1.300***
	(0.096)	(0.090)
1999	1.494***	1.543***
	(0.097)	(0.091)
2000	1.694***	1.807***
	(0.100)	(0.093)
2001	1.698***	1.715***
	(0.102)	(0.095)
2002	1.489***	1.547***
	(0.103)	(0.096)
2003	1.346***	1.468***
	(0.107)	(0.099)
Observations	15,421	14,154
Adjusted R^2	29%	35%

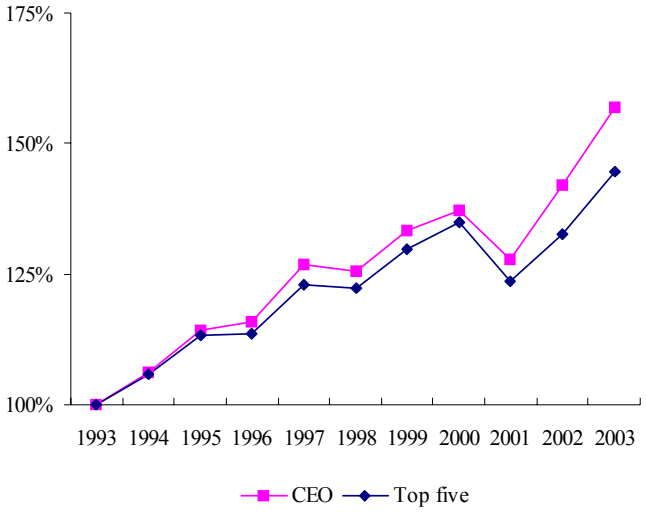
Notes: The sample includes all S&P 1500 firms from the ExecuComp database. *ROA* is the income before interest, taxes, depreciation and amortization in year *t*–1, divided by the book value of asset in year *t*–1. Firm return is the market return of the firm's stock. All figures used were adjusted to inflation and stated in 2002 dollars. Standard errors appear below the coefficient estimate, and *** indicates significance at the 1 per cent level.

Table 6
Non-equity-based Compensation Fixed-effect Regression

	Dependent variable: Log(CEO non-equity compensation)	Dependent variable: Log(top-5 non-equity compensation)
Log(Sales (*t*–1))	0.214***	0.230***
	(0.014)	(0.012)
Log(1+Firm *ROA*)	0.211***	0.206***
	(0.062)	(0.010)
Log(1+Firm return (*t*–1))	0.228***	0.138***
	(0.012)	(0.010)
Log(1+Firm return (*t*–2))	0.155***	0.190***
	(0.012)	(0.059)
1994	0.155***	0.143***
	(0.022)	(0.020)
1995	0.217***	0.206***
	(0.022)	(0.020)
1996	0.311***	0.287***
	(0.023)	(0.020)
1997	0.430***	0.386***
	(0.023)	(0.020)
1998	0.502***	0.446***
	(0.024)	(0.021)
1999	0.627***	0.573***
	(0.024)	(0.021)
2000	0.758***	0.685***
	(0.025)	(0.021)
2001	0.716***	0.626***
	(0.025)	(0.022)
2002	0.662***	0.577***
	(0.026)	(0.022)
2003	0.675***	0.583***
	(0.026)	(0.023)
Observations	15,421	14,154
Adjusted R^2	66%	71%

Notes: The sample includes all S&P 1500 firms from the ExecuComp database. *ROA* is the income before interest, taxes, depreciation, and amortization in year *t*–1, divided by the book value of asset in year *t*–1. Firm return is the market return of the firm's stock. All figures used were adjusted for inflation by translation to 2002 dollars. Standard errors appear below the coefficient estimate, and *** indicates significance at the 1 per cent level.

Figure 5
Increase in Non-equity Compensation after Controlling for Size, Performance, and Fixed Effects



Notes: The figure displays the changes in non equity-based compensation to CEOs and top-five executives among firms that belong to the ExecuComp database, after controlling for size, performance, and fixed effects. The year 1993 is the reference point (100 per cent). All figures used were adjusted for inflation and translated to 2002 dollars.

IV. THE INCREASE IN THE ECONOMIC SIGNIFICANCE OF EXECUTIVE PAY

In this section, we turn to the growing economic significance of executive pay during the period under consideration. We examine the changes during this period in the aggregate top-five compensation paid by public firms both in absolute terms and relative to aggregate earnings.

Table 7 displays figures regarding aggregate executive compensation during the examined period. We start by adding up the compensation of the five most highly paid executives of all the firms in the ExecuComp database, excluding only the small number of firms for which we do not have income information, as well as real estate investment trusts, mutual funds, and other investment funds (SIC codes 67xx).[3] When a firm has information about fewer executives than five, we add up the compensation given to the executives whose compensation was disclosed, and we use this sum (which is by definition lower than the top-five compensation in these firms) as the top-five compensation. As the first column of Table 7 indicates, the aggregate compensation paid to top-five executives of ExecuComp firms was about $212 billion in the period under consideration. (As before, all dollar figures in this section are in 2002 dollars.) During the last 5 years, 1999–2003, aggregate compensation was about $122 billion, whereas during the previous 5 years, 1993–7, aggregate compensation was about $68 billion.

Much of the recent research on executive compensation has been based on the ExecuComp database used above (see, for example, Core *et al.*, 2003; Murphy, 1999). However, because pay does not grow proportionately with size, small firms are likely to pay a larger fraction of total executive pay in the economy than is suggested by their fraction of total stock-market capitalization. Therefore, in any assessment of the economic significance of such pay, it is important to take into account the large number of mid-cap and small-cap firms outside the ExecuComp database.

We estimate aggregate compensation for COMPUSTAT firms, which provide data about

[3] In such companies, management is largely done by an outside management entity and the management costs come in the form of the fees paid to these entity.

Table 7
Aggregate Top-five Executive Compensation 1993–2003 ($ billion)

Period	All ExecuComp firms	Non-ExecuComp firms	All firms
1993–2003	212	139	351
1993–7	68	55	123
1999–2003	122	70	192

Notes: The table shows aggregate compensation paid by a large set of public firms to their top-five executives. The set of firms includes all ExecuComp firms and Compustat firms with market cap larger than $50m except for firms for which there is no net income information in COMPUSTAT, as well as real estate investment trusts, mutual funds, and other investment funds (SIC codes 67xx). All figures are in 2002 dollars. For ExecuComp firms, when a firm has information about fewer executives than five in the ExecuComp database, we added up the compensation given to the executives whose compensation was disclosed, and we use this sum as the top-five compensation. The compensation to non-ExecuComp firms is estimated using the coefficients of the following annual regressions on all small-cap and mid-cap firms in ExecuComp:

$$Log(compensation_{i,t}) = a_0 + a_1 Log(sales_{i,t-1}) + a_2 Log(1 + ROA_{i,t-1}) + a_3 Log(1 + \mathrm{Re}turn_{i,t-1}) + NEW\_ECONOMY_{i,t-1} + INDUSTRY_{i,t-1} + \varepsilon_{i,t}.$$

As to Compustat firms for which some of the data needed for this estimation are missing, their top-five compensation was estimated using the coefficients of annual regressions of Log(compensation) on Log(market cap), industry dummies, and new-economy dummy, run on all small-cap and mid-cap companies in ExecuComp.

most of the exchange-traded firms in the USA, but are not included in ExecuComp. We exclude firms for which there are no income figures, as well as real estate investment trusts, mutual funds, and other investment funds (SIC codes 67xx). We also exclude all firms with market capitalization below $50m because ExecuComp, which provides the basis for our estimation of compensation in non-ExecuComp firms, includes very few firms with market cap below that level. After excluding all these firms, we remain with about 2,500–3,500 non-ExecuComp firms in each year.

We estimate the levels of top-five compensation by non-ExecuComp firms in the following way. For every year in our sample, we first estimate the coefficients of regression (2) for small-cap and mid-cap firms in the ExecuComp database.[4] This regression explains more than 50 per cent of the variation in compensation among such firms in the ExecuComp database. We then use the estimated coefficients to predict the compensation levels for firms in our set of non-ExecuComp firms. For the firms for which we do not have data in Compustat that enable us to make such a prediction we use a procedure that is less demanding in terms of data needs: we first estimate the coefficients of a regression of log(compensation) on log(market cap) and industry dummies on all small-cap and mid-cap firms in the ExecuComp database and then we use the obtained coefficients to predict compensation for non-ExecuComp firms whose compensation we could not predict using the first procedure.[5]

To verify that our methodology does not produce an overestimate of aggregate compensation levels for

[4] To be able to include firms that exist less than 3 years in our database, we do not include in regression (2) the standard deviation and the 2-year lagged return variables. Adding these variables does not significantly change our results.

[5] Because the non-ExecuComp firms whose compensation we seek to estimate would fall within the small-cap and mid-cap categories if they were included in ExecuComp, we base these estimates on regressions that are first run on all the small-cap and mid-cap firms in ExecuComp but not the S&P 500 companies. We also repeated the procedure described in this paragraph using the coefficients of regression on all ExecuComp firms and obtained a larger estimate of aggregate compensation than the one produced by the procedure we follow.

Table 8
Compensation and Corporate Earnings

Period		Aggregate top-five compensation to aggregate earnings (%)
3-year periods:	1993–5	5.0
	1994–6	4.9
	1995–7	5.2
	1996–8	5.5
	1997–9	6.0
	1998–2000	6.5
	1999–2001	8.6
	2000–2	12.8
	2001–3	9.8
5-year periods:	1993–7	5.2
	1999–2003	8.1
Full period:	1993–2003	6.6

Notes: The table shows the ratio of the sum of compensation to top-five executives paid by a large set of pubic firms to their aggregate earnings (net income). The set of firms includes all ExecuComp firms and Compustat firms with market cap larger than $50m except for firms for which there is no income information in Compustat, as well as real estate investment trusts, mutual funds, and other investment funds. Income information is obtained from Compustat, and the estimates of aggregate top-five compensation are calculated in the same way as in Table 7.

firms outside the ExecuComp database, we compared the results from our estimation method with actual compensation figures that we obtained for about 750 firms outside the ExecuComp database.[6] We found that our estimate of the aggregate top-five compensation in these firms was about 20 per cent lower than their actual aggregate compensation. Table 7, column 2 displays our estimates of aggregate top-five compensation in the firms in our set of non-ExecuComp firms. Although the aggregate market capitalization of these firms was less than one-quarter of the market capitalization of ExecuComp firms throughout the examined period, the aggregate top-five compensation among these firms is about two-thirds of the aggregate compensation among ExecuComp firms.

Column 3 of Table 7 displays the aggregate top-five compensation for all the ExecuComp firms for which we have actual compensation figures, as well as all the non-ExecuComp firms whose top-five compensation we estimated. We estimate that the aggregate compensation of all these firms was about $351 billion during the 11-year period of 1993–2003, with about $192 billion of this amount paid during the 5-year period 1999–2003.

To assess the significance of executive pay, we also compared our estimate of the aggregate top-five compensation paid by our ExecuComp and non-ExecuComp firms to the aggregate earnings (net income) of these firms. Table 8 displays the results of our calculations. As the last row of this table indicates, we estimate that the aggregate top-five compensation of public firms during 1993–2003 comprised about 6.6 per cent of the aggregate earnings of these firms.

We also examined changes in the ratio of aggregate executive compensation to aggregate earnings during the examined period. Table 8 displays the evolution during this period of the ratio of aggregate top-five compensation to the aggregate earnings of public firms. We find that the ratio has been trending upwards, increasing from 5 per cent during 1993–5 to 9.8 per cent during 2001–3.

[6] We are grateful to the shareholder advisory firm Glass, Lewis & Co. for providing us with these data.

V. EXPLAINING THE GROWTH OF PAY

We now turn to discussing possible explanations for the growth of executive pay.[7] In discussing possible explanations, it is useful to distinguish between two models of the pay-setting process: the arm's-length bargaining model and the managerial-power model (Bebchuk and Fried, 2003, 2004). These two models use different premises concerning the incentives of directors setting pay arrangements. Under the arm's-length bargaining model, which is the focus of subsection V(i), boards making pay arrangements with executives are assumed to focus on the interests of shareholders. In contrast, under the managerial-power view, which is the focus of subsection V(ii), directors have incentives and inclinations to favour executives within the constraints imposed on them by market forces and outsiders' reactions.

Because the growth of pay levels during the considered period paralleled the growth of stock-market capitalization levels, and because compensation levels also grew in tandem with the levels of stock-market capitalization in the preceding two decades (Frydman and Saks, 2004; Jensen *et al*., 2004), it is natural to consider what could explain this connection. As discussed below, both the arm's-length bargaining model and the managerial-power model provide reasons for expecting such a correlation between compensation and market capitalization. Both models also suggest reasons why the increased acceptability and use of option-based pay could have contributed to the rise in compensation levels. Finally, both models suggest that it is worthwhile to pay some attention to changes in the structure of the market for executives and governance arrangements during the considered period.

Although we conclude that some of the factors we discuss below are less likely than others to play a substantial role in explaining the growth of executive pay, the available evidence does not enable us to identify the exact contribution of the various factors we discuss. Our analysis, however, provides a framework for future study of this issue.

(i) The Arm's-length Bargaining Perspective

The effect of the bull market on the supply and demand of executives

Under the arm's-length bargaining model, compensation arrangements are the product of arm's-length transacting between executives selling managerial services and directors seeking to get the best deal for their shareholders. In such a market, the price can go up if (i) the value to companies of executives' services goes up (demand side), (ii) executives' reservation value (resulting in part from executives' outside options) goes up (supply side), or (iii) the job nature or requirements become more demanding or costly for executives.

Himmelberg and Hubbard (2000) and Hubbard (2005) suggest that, during a period of market booms, the demand for executives goes up and firms need to pay more in order to retain and hire executives. In the second half of the 1990s, it might be argued, executives of public companies were also attracted to opportunities in new technology start-ups, which added to the imbalance between supply and demand. In support of this argument, one could note the increase over time of the difference between pay to the executives of new-economy firms (who could be the subject of especially intense demand) and to the executives of other companies. It is unclear, however, why demand–supply imbalances produced by booms should create permanent rather than transitory increases in pay levels. That would be the case only if the supply of executives cannot, over time, respond to the increased demand for them.

Another explanation that is based on the bull market was suggested recently by Spatt (2004). He suggests that the bull market increased the wealth of executives, which in turn increased their reservation wage by increasing the monetary amount needed to induce executives to work. This explanation assumes that the major choice of executives is between working and consuming leisure. This explanation might fit better to CEOs who are older, and perhaps less to younger CEOs with a lot of money. Thus, a prediction associated with this argument worthwhile checking is that, all else equal, the

[7] In this section, we draw on the discussion in Bebchuk and Fried (2004, ch. 5).

increase should be higher for older executives than for younger executives.

Another market equilibrium explanation related to the bull market is that during booms executives need to exert more effort, and increased pay levels are needed to compensate them for the disutility involved in higher effort levels. It is not evident, however, that stock-market booms require more effort on the part of executives. One could argue that bear-market periods, when funding is more difficult to get and shareholders are less happy, require greater effort by managers and impose greater disutility on them.

Changes in executive mobility, turnover, and liability

Another market equilibrium explanation is based on the increased mobility of executives. During the past decade, hiring of CEOs from outside the firm has increased. It might be argued that, with more outside options, executives' bargaining positions have strengthened. However, the net effect that board willingness to shop outside the firm has on executives' bargaining positions is ambiguous. While firms' willingness to shop for top outside executives has increased the number of options executives have, it has similarly increased the number of options firms have, and the latter effect could operate to strengthen directors' bargaining positions.

Another aspect of the market for executives that has changed is the somewhat increased incidence of executive firing. It might be suggested that compensation levels had to go up to compensate executives for the higher risk of being fired, and Hermalin (2004), Murphy and Zabojnik (2004), and Inderst and Mueller (2005) link the increase in CEO pay to the increase in CEO turnover. However, even though the incidence of executive firing increased a bit, the risk of being fired remained quite small, hardly one that needs to be made up by a sharp increase in pay. Moreover, the financial cost of being fired has been reduced by the common contractual provisions that practically guarantee large severance payments to fired executives, and by the tendency of boards to accompany such contractual severance benefits with additional gratuitous goodbye payments (Bebchuk and Fried, 2004, chs 7 and 11).[8]

Increases in value of outside options

We have thus far discussed explanations that focus on the market for executives of public firms. Another type of market equilibrium explanation might focus on developments in other markets. In particular, during the examined period, the rewards in other types of positions to which executives of public companies could have switched might have increased, and such increases might have required public companies to increase executive pay to retain their executives. Exploring this issue fully is beyond the scope of this article, but a look at the data available from the Bureau of Labor Statistics suggests that compensation given to other high-level professionals increased at a significantly lower rate than executive compensation during the examined period.[9]

It might also be suggested that public companies had to increase executive pay during the examined period in order to prevent managers from switching to closely held start-ups. Although such an option might have been available for some of the executives of public companies in the technology and new-economy areas, it is far from clear that it was readily available to most executives of other public firms. Moreover, this option was no longer particularly attractive after the burst of the bubble, and this explanation thus cannot explain why compensation remained at levels so much higher than in the beginning of the examined period.

Increased option use: the loosening of populist constraints

Some prominent economists viewed compensation levels at the beginning of the 1990s—or at least the levels of equity-based compensation—as too low

[8] Another cost-based explanation for why pay in recent years has not come back to the pre-bull-market levels is that, after the corporate scandals, liability costs of managers have increased. However, the threat of personal legal liability remains quite limited for corporate managers (Black *et al.*, 2004). For one thing, officers and directors are often covered by insurance, and plaintiff lawyers have powerful incentives to settle their cases within the coverage provided by insurance. Accordingly, it is far from clear that the expected liability of managers requires significant increases in compensation.

[9] For example, the compensation to high-level lawyers increased during the period 1993–2003 by 15 per cent, the compensation to high-level engineers increased by 18 per cent, and that to high-level accountants increased by 3 per cent (all figures are net of inflation).

(Jensen and Murphy, 1990*a*,*b*). In their view, shareholders would have been better off if equity-based compensation increased to provide high-powered incentives. Political and populist constraints discouraged boards from raising equity-based compensation to levels that could produce high pay-offs in the event of success. Starting from this view, one could argue that the growing acceptance of incentive-based compensation among institutional investors has loosened the political constraints that kept equity-based compensation at an inefficiently low level at the beginning of the 1990s. Thus, it might be argued, the growing levels of compensation were a product of the ability of boards to serve shareholders better.

The movement in the direction of equity-based compensation is consistent with this argument. However, this explanation cannot account for the other ways in which pay has been changing during the considered period. In particular, the fact that cash compensation also increased during the period suggests that directors did not use equity-based compensation as a substitute for performance-insensitive cash compensation. Furthermore, it seems that equity-based compensation has not been designed in the most cost-effective way to provide a given level of incentives. Had boards used indexing or other means of reducing the windfalls involved in conventional options, avoided re-pricing, back-door re-pricing, and reloading, and limited executives' broad freedom to unload equity incentives, they would have been able to provide the same or better incentives at lower levels of equity-based compensation (Bebchuk and Fried, 2004, chs 11–14).

Increased option use and director misperceptions
The arm's-length bargaining model assumes that directors seek to serve shareholders well—not that they necessarily succeed in doing so. This model is thus consistent with failure by boards to serve shareholders owing to honest misperceptions and human errors. Murphy (2002) and Hall and Murphy (2003) argue that the large use of options in the considered period, which accounts for much of the increase in compensation levels during this period, is due to directors' misperceiving the true costs to shareholders of option-based compensation.

Under Hall and Murphy's 'perceived costs' hypothesis, boards have used conventional stock-option plans because they failed to perceive the true economic cost to shareholders of such options. Because boards were able to grant such options without any cash outlay and without an accounting charge, Hall and Murphy suggest, boards perceived them as inexpensive, if not free, and therefore were overly willing to grant them.

This explanation raises several questions. First, it implies that members of compensation committees—most of whom are current or former executives or other individuals with business sophistication—have systematically failed to recognize that options are costly to shareholders. This explanation also raises the question of why compensation consultants, assuming they have not been under the influence of executives, have not educated boards about the costs of options. Furthermore, one could expect boards to become over time better aware of the costs of options to shareholders. However, despite substantial public discussion of the costs of options to shareholders, the growth in option use and compensation levels has continued throughout the examined period.

(ii) The Managerial-power Perspective

The managerial-power perspective does not assume that directors seek to get the best deal for shareholders. Rather, directors are willing to go along with compensation arrangements more favourable to executives. How far executives and directors will stray from shareholder interests will depend on the market penalties and social costs that they will have to bear when adopting arrangements favourable to executives. Both market penalties and social cost depend on how such arrangements are perceived by relevant outsiders. Under the managerial-power model, changes in compensation levels can be expected when the constraints that executives and directors face change.

The bull market and the outrage constraint
Bebchuk and Fried (2004, ch. 5) argue that the stock-market boom has increased the pay levels that are defensible and acceptable to outsiders without triggering significant outrage. Under this view, a rising stock market, which affects even the market caps of poorly performing companies, provides most firms with a convenient justification for substantial pay increases. Furthermore, investors

and other outsiders are generally less bothered by excessive and distorted pay arrangements when markets are rising rapidly.

According to this explanation, the bull market of the 1990s—the biggest bull market since the Depression—weakened the outrage constraint, giving managers and boards more latitude to boost executive pay. Conversely, shareholders who have seen the value of their investments decline precipitously are more prone to scrutinize managerial behaviour and less likely to be forgiving of what they perceive (correctly or incorrectly) to be managerial overreaching, which is consistent with the fact that pay did not continue to escalate during 2000–2.

Like the market equilibrium explanations discussed above, this explanation predicts a general correlation over time between stock-market levels and compensation levels. How one can disentangle which explanation underlies this correlation is an interesting question for future research.

The bull market and the market for corporate control

A related explanation is that increases in market cap levels bring about an increase in the absolute amounts that executives can extract without triggering a control contest. Suppose that the market value of a firm can fall by a fixed percentage from its 'full' value without triggering takeover bids. In such a case, the amount of private benefits that executives can extract will go up proportionately with increases in market capitalization.

A problem with this explanation, however, is that it assumes that the market for corporate control is the binding constraint on executive pay. Instead, however, because of the costs of takeovers and management's power to use defensive tactics, the corporate control market does not appear to be the binding constraint. Compensation levels appear to fall substantially below the level that would be sufficient to trigger a hostile bid.

Increased use of equity-based compensation and the outrage constraint

In the early 1990s, institutional investors and federal regulators, with the support of financial economists, embraced the idea that performance-based compensation can serve shareholders by improving incentives. Bebchuk and Fried (2004, ch. 5) argue that outsiders' enthusiasm for incentive-based compensation provided executives and directors with opportunities to raise pay levels substantially in ways that would appear acceptable to outsiders.

Under this explanation, executives were able to take advantage of investors' enthusiasm for incentive-based compensation in several ways. First, they were able to obtain substantial additional option pay without having to bear a corresponding downward adjustment in cash compensation. Furthermore, executives used their influence to make the design of option plans advantageous to them. The use of conventional options, broad freedom to unload equity incentives, and back-door repricing increased the amount and reduced the performance-sensitivity of option-based compensation, enabling executives to obtain much larger amounts of compensation than more cost-effective option plans would have provided.

In addition, because option compensation offers the possibility of improved incentives, the use of options made more defensible very large compensation amounts that would have triggered prohibitive outrage had they been solely in cash. While Apple CEO Steve Jobs was able to obtain an option package worth more than half a billion dollars, cash compensation of this magnitude is still inconceivable. Firms could have used better-designed option plans that would have provided the same incentives for significantly less cost. However, the large windfall elements of the option plans that firms did use were not sufficiently clear and transparent to make these plans blatantly unjustifiable. Thus, under this explanation, managers were able to get substantial increases in pay levels by using shareholders' interest in increasing the performance-sensitivity of pay and the fact that option pay is easier to defend and legitimize, even when the pay is based on flawed schemes.

This explanation could be questioned by asking why risk-averse managers would not use their influence to get higher cash salaries rather than more options. A response might be that managers seeking to increase their pay during the 1990s did not have a choice between additional option compensation and

additional cash compensation with the same expected value. Instead, outsiders' enthusiasm for equity-based compensation created an opportunity for managers to obtain additional option compensation without offsetting reductions in their cash compensation.

Changes in entrenchment levels

To the extent that the market for corporate control is a meaningful constraint on executives and directors, it might be suggested that this constraint has weakened since the early 1990s. The adoption of state anti-takeover statutes, the development of Delaware law permitting managers to use the 'just say no' defence, and the adoption of firm-level anti-takeover arrangements provided managers with more protection from hostile takeovers at the end of the considered period than the beginning (Bebchuk *et al*., 2004). Executives and directors might have used the greater protection from takeovers to raise pay levels.

In addition, managers' greater ability to block acquisitions has been used as a justification for, and has made acceptable to shareholders, the use of golden parachutes and other arrangements that provide managers with large payments in the event of an acquisition. During the considered period, the incidence of firms with golden parachute arrangements increased considerably (Bebchuk *et al*., 2004). This practice could also have contributed to the increase in compensation levels during this period.

In contrast to this explanation, Hall and Murphy (2003) rely on changes in governance arrangements during the considered period to argue that the managerial-power model is inconsistent with the growth of pay during this period. In particular, they rely on the fact that the incidence of independent directors increased during the considered period.[10] Assuming that increased use of independent directors reduces managerial power, Hall and Murphy suggest, the managerial-power model should have predicted declines in pay rather than pay increases during the considered period. However, Bebchuk and Fried (2004, ch. 2) argue that independent directors have been quite willing to go along with pay arrangements favourable to executives. In this view, the increased incidence of independent directors has been a less important development than the increased insulation of both executives and directors from hostile takeovers.

VI. CONCLUSION

This paper has considered the growth of executive compensation during 1993–2003. During this period, compensation increased considerably. The analysis indicates that the growth in pay levels has gone far beyond what could be explained by the changes in market cap and industry mix during the examined period. The growth of pay involved a substantial rise in the compensation paid to the executives of firms of a given market cap and industry classification. Although equity-based compensation has grown the most, its growth has not been accompanied by a reduction in cash compensation.

The analysis has also highlighted the economic significance of the changes in compensation levels. During 2001–3, the aggregate compensation paid to top-five executives of public firms amounted to $92 billion and 10.3 per cent of the aggregate corporate earnings of these firms. Thus, the potential costs of flawed compensation arrangements—if such flaws exist—could be quite meaningful for investors.

This paper has also examined alternative accounts of the causes of the growth in pay. Both the arm's-length model and the managerial-power model of executive compensation provide insight into factors that could have contributed to the escalation of pay. The escalation of pay that we document cannot by itself resolve the debate concerning the extent to which managerial influence shapes the market for executive pay. The rise of pay, however, does increase the importance of this debate and the questions it raises. The stakes are large.

[10] For a study of the growing incidence of independent directors, see Chhaochharia and Grinstein (2004).

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