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Journal of Labor Economics, Vol. 11, No. 4 (Oct., 1993), 606-628.

Stable URL:
http://links.jstor.org/sici?sici=0734-306X%28199310%2911%3A4%3C606%3ATEPTOT%3E2.0.CO%3B2-G

Journal of Labor Economics is currently published by The University of Chicago Press.

Top Executive Pay: Tournament or Teamwork?

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Tournament mechanisms suggest the need for ever larger rewards to motivate those at the highest organizational levels. But arguments for the efficiency of executive pay compression have also been made. This study reports the results of an empirical investigation of executive compensation using over two-hundred firms and in excess of two thousand executives per year over a 5-year period. Results are consistent with the operation of tournaments but fail to find support for the empirical importance of considerations of pay equity at the top of corporations.

I. Introduction

Work by Jensen and Murphy (1990) and others has focused attention on the impact of performance pay on top management incentives. This article examines the role played by the distribution of pay among the top-management team. Recent developments in economic theory have produced two apparently contradictory explanations of the structure of pay among top executives. On the one hand, tournament theory, as developed by Lazear and Rosen (1981), suggests that the salary of a corporation's top executive may well exceed any measure of his marginal product and yet

be economically efficient. Efficiency is secured by the generous top salary acting as an incentive to those lower down the corporate ladder who, in accepting wages at less than their own expected marginal product, willingly enter into a self-financing quasi lottery (rank-order tournament), where the main prize is the top executive's job. One message offered by this theory is that, in order to provide adequate incentives, it may be necessary to engineer extremely large salary differences among the top executive ranks of a corporation.

On the other hand, theoretical considerations by Milgrom and Roberts (1988) and by Lazear (1989) of the impact on economic efficiency of attempts by workers to influence their own advancement within the organization suggest that a compressed executive salary structure may be most efficient. The types of influence activities encompassed by such considerations range from attempts at self-promotion through office politics to the out-and-out sabotage of the endeavors of rival fellow workers. Such models portray the importance of pay equity as varying with the nature of the work and the personalities of the workers involved.[1] But the essential conclusion of this line of analysis is that arguments for both pay compression and equity can be made on strict efficiency grounds.

What emerges from these developments is not so much a theoretical inconsistency as a tension between two potentially applicable theories. The extent to which the attractions of pay equity dominate those of pay for relative performance can be informed only by empirical observation. The purpose of this article is to provide some empirical analysis of these issues, using detailed information on the pay of the top executive team with extensive data on executive compensation from a sample of over two hundred U.S. corporations from 1980 to 1984. In Section II of this article, a direct test of the tournament model is offered. This test examines the size of the total increment in earning power brought about by promotion to chief executive officer (CEO) for evidence that would suggest the predominance of a tournament structure in executive pay. Section III focuses on the impact on corporate performance of the compression of pay levels among the executive team. The final section of the article contains our conclusions regarding the empirical importance of pay for relative performance versus wage compression among the top executives in the sample.

II. The Tournament Model

There has been considerably more theoretical discussion of the original Lazear and Rosen (1981) model of the rank-order tournament than there has been empirical testing of the notion. Green and Stokey (1983) dem-

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[1] Lazear (1989) concludes that pay for performance is more of a problem at the higher echelons of the organization as individuals here are likely to be particularly competitive in nature ("hawks" in Lazear's typology).

onstrate that when individual productivity within the organization is subject to a sufficiently diffuse common shock, then using the optimal tournament dominates other forms of remuneration. Malcomson (1984) argues for the superiority of rank-order remuneration systems in an even wider set of circumstances. By examining a situation where, owing to asymmetric information, employees cannot authenticate the employer's observation of their performance, Malcomson shows that use of rank orderings leads to enforceable contracts, even when a wage directly dependent on individual performance would not be viable.

Whereas Green and Stokey (1983) and Malcomson (1984) concentrate on proving that rank-order (i.e., tournament) compensation arrangements are viable and superior to other forms of remuneration, O'Keeffe, Viscusi, and Zeckhauser (1984) take the general form as given but ask how tournaments should be designed to produce the optimal outcome. They demonstrate that, by the appropriate design of prize structure, it is possible to keep out the wrong type of people. This is true whether the wrong type consists of those of superior ability who might enter low-ability contests (slummers) or those of inferior ability who might enter high-ability contests (climbers). In a similar vein, Rosen (1986) argues that, within the context of a tournament, contestants proceeding through the various rounds of the contest require ever-larger proportional prizes to motivate survivors— the average ability of whom is rising as the contest proceeds. This suggests that if the notion of a tournament is applicable in the context of executive compensation, then it should most clearly manifest itself in the relative salaries at the very top of the organization.

As Lazear (1991) points out, there has been little in the way of empirical testing of the tournament model in the context of real firms. It is possible, however, to find some supporting evidence. Antle and Smith (1986) find that executive pay is significantly related to the corporation's performance relative to the industry average. This emphasis on relative performance is potentially consistent with the notion of tournaments. Leonard (1990), using the same data base as that employed here, finds that the pay gradient among senior executives is steeper in corporations where the promotion rate is lower, suggesting the possibility of a tournament. While this finding is consistent with tournament theory, it is also consistent with Adam Smith's (1976) explanation of compensating wage differentials as a function of the probability of success in an occupation.[2] As such, with or without tournaments, the level of top executive pay would be influenced by the

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[2] In book I, chap. 10, of *The Wealth of Nations,* Smith gives five reasons for wage differentials, the fifth being that "the wages of labour in different employments vary according to the probability or improbability of success in them" (1976, p. 118).

organizational structure adopted and, hence, the observed probability of promotion.[3]

Using data from golf tournaments, Ehrenberg and Bognanno (1990) demonstrate that performance in terms of low scores per hole is better when the prize money is more skewed toward relatively large prizes for the winner. This evidence supports the basic premise of tournament theory, namely, that superior effort, and hence performance, can be elicited by greater rewards for relatively good performers.[4] In addition, a direct confirmation of the efficacy of tournaments has been produced in a laboratory setting by Bull, Schotter, and Weigelt (1987). These experimenters found that teams of students very quickly adapted to a tournament prize structure, producing effort levels that were consistent with the theory, albeit with higher variances compared with an alternative piece rate structure.

Commentators on tournament theory have not, however, been uniformly enthusiastic. Dye (1984) provides a comprehensive critique of the notion, raising doubts about several features including the feasibility of constructing appropriate handicaps, the instability of the tournament system (with its identified losers) alongside alternative individual-based payment systems, the difficulty of judging multidimensional performance scores even in an ordinal sense, and the problems of collusion and sabotage among contestants under such arrangements. Arguably the most telling of these criticisms concerns the collusion/sabotage reactions that tournament schemes run the risk of provoking. It will be seen in Section III of this article that in attempting to confront this issue Lazear (1989) has arrived at a theory of wage compression.

At a more general level, Baker, Jensen, and Murphy (1988) question the wisdom of using promotions as an incentive device. They point to the costs of such an arrangement in the context of failing to match the skills of the promoted person with the skills required in the promoted post. There are clear overtones here of the Peter Principle. Baker et al. (1988) also raise doubts concerning the extent to which the board can truly be viewed as representing the principals and, hence, raise doubts about the probability of the board's imposing any sort of optimal compensation contract on the top executives. These doubts receive some empirical support in O'Reilly, Main, and Crystal (1988), where, after controlling for size, corporate performance, and so forth, top executive pay is found to be influenced by the level of pay that the outside directors on the board receive from their own companies. Lazear (1991) attempts to explain this finding with the observation that large corporations tend to have the highest paying directorships. But, given that O'Reilly et al. (1988) control for the most obvious factors that influence executive compensation, including size

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[3] The top hierarchy of any organization being variously flat to steep.
[4] See Rosen (1986) and Lazear (1991) for further discussion.

of corporation, it is difficult to understand the reported influence of the
pay outside directors receive from their home corporations—unless one
resorts to a nonoptimizing story such as one involving social comparisons.

O'Reilly et al. (1988) also fail to find a positive relationship between
the level of CEO pay, given the average pay of senior vice-presidents
(VPs), and the number of VPs. If the number of VPs can be taken as a
measure of those involved in the tournament, then, other things being
equal, tournament theory would predict that the prize (the level of CEO
pay relative to that of the VPs) should increase with the number of con-
testants and, hence, the number of VPs.[5] This finding is, therefore, at odds
with the predictions of tournament theory.[6] Results that are consistent
with tournament theory and that are based on measurements internal to
the firm are presented in Lambert, Larcker, and Weigelt (1990). They
argue that empirical comparisons among competing theories of executive
compensation are needed. In the following sections we present a test of
the tournament model of executive compensation and compare it with
more recent arguments about the efficacy of wage compression. Based on
these empirical results, we suggest a different interpretation for the level
and dispersion of executive pay.

The availability of survey data on the pay for the years 1980–84 of the
top executives in over two hundred publicly held corporations allows us
to conduct a more detailed empirical examination of these tournament
issues than was previously possible.[7] Table 1 records, for each year from
1980 to 1984, the ratio of average pay (base salary and bonus) between
the top levels of the corporation. The measure of level utilized here is
reporting level. Level 1 is, therefore, the CEO, and in table 1 it can be
seen that for 1980 these individuals enjoyed a level of pay (base plus bonus)
that was some 141% greater than that enjoyed by those in level 2. This
ratio is reasonably constant over all 5 years and is only slightly lower in

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[5] The number of VPs is measured in O'Reilly et al. (1988) both as the number
of VPs in the company and as the number of VPs qualified under the Securities
and Exchange Commission (SEC) reporting rules.

[6] Lazear (1984) has made it clear that the variation in wages under a tournament
system may be no greater (even less) than the variation in output. There seems to
be no doubt, however, that a tournament incentive scheme adds variability to
wages. McLaughlin (1988, p. 240) demonstrates the need for a larger prize spread
(wage spread) as the number of tournament players increases.

[7] The data were made available by a major consulting company. While that
company attempted to secure a wide and representative coverage of companies,
any detailed discussion of sampling and coverage is prohibited here in the interest
of maintaining confidentiality. These data provide base and bonus compensation
only. No valuation long-term incentives were available. For the time frame con-
sidered here, some evidence is available that suggests that the distribution of long-
term compensation is distributed proportionately to short term (Jensen and Murphy
1990).

Table 1
Average % Increase in Compensation over Next Lowest Level

Reporting Level	1980 (N = 147)		1981 (N = 170)		1982 (N = 155)		1983 (N = 149)		1984 (N = 147)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
A. Base plus bonus:										
1	1.41	.629	1.49	.706	1.47	.616	1.34	.529	1.42	.646
2	.748	.375	.753	.384	.740	.403	.828	.369	.828	.361
3	.438	.299	.431	.261	.414	.229	.413	.235	.430	.237
4	.284	.213	.277	.192	.262	.185	.282	.190	.292	.215
B. Base only:										
1	1.27	.583	1.31	.568	1.33	.492	1.22	.471	1.27	.501
2	.620	.300	.620	.307	.619	.285	.705	.286	.696	.297
3	.355	.243	.351	.215	.351	.196	.348	.191	.347	.193
4	.229	.174	.219	.134	.210	.145	.229	.149	.234	.159

the second part of the table, panel B, where the comparison is restricted to base pay only.

Table 1 also shows that the ratio of pay between levels seems to increase markedly as one moves up the corporate hierarchy. This contradicts the well-known model of executive compensation devised by Simon (1957), which proposed the ratio between the salary of one executive and his immediate subordinate to be relatively stable within the organization.[8] The results of table 1 do, however, offer some support for the tournament theory of Lazear and Rosen (1981) in that there is an increasing ratio of pay as one moves up the final rungs of the corporate ladder. Table 1 suggests that in 1980, vice-presidents who are promoted from level 4 to level 3 of the hierarchy receive, on average, a 44% increase in compensation, whereas those going from level 3 to 2 get a 75% raise. This is consistent with Rosen (1986, p. 713), who argues that "extra weight on top-ranking prizes is required to induce competitors to aspire to higher goals independent of past achievements." The clear ramification of this is that for tournaments to be operating, one would expect to see increasing gaps between salary levels as one approaches the organization's pinnacle. Such an observation is also consistent with Lazear and Rosen (1981, p. 847), who argue: "It appears as though the salary of, say, the vice-president of a particular corporation is substantially below that of the president of the same cor-

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[8] Simon (1957, p. 33) did allow that the ratio "undoubtedly varies from situation to situation, but one can find figures quoted in the range of 1.25 to 2." His model assumes the ratio is constant within the organization, and in his numerical example he sets it proportional to the span of control such that a ratio 1.5 implied a span of control of 3 and lower ratios implied a lower span of control.

poration. Yet presidents are often chosen from the ranks of vice-presidents. On the day that a given individual is promoted from vice-president to president, his salary may triple. It is difficult to argue that his skills have tripled in that 1-day period."

This stylized wage increase when moving from vice-president to president is reduced to 50% in Lazear (1991, p. 93). The data in table 1 are certainly consistent with the basic thrust of the Lazear and Rosen (1981) argument, in that the wage increment upon promotion to the top position in the firm is large enough to be justifiably regarded as the prize in a tournament.

However, Murphy (1985, p. 28) uses data on actual promotions to suggest an average figure of 20.9% for promotions of vice-president to president (and of 42.9% when a vice-president is promoted to CEO). Table 2 attempts to produce a similar estimate by examining the data for "winners," that is, those occupants of the CEO's job during the period 1981–84 who were promoted into the position from within the firm (level 2).[9] The average pay increase realized in moving into the top job is consistent with Murphy's estimates. This figure varies from 10.9% to 22.4%, depending on the year. To avoid the possibility that in the year of promotion part of the reported pay pertains to the unpromoted job, the second part of table 2 presents the increase for the first complete year after promotion. Although markedly larger (ranging from 22% to 37.2% for a 2-year period), the overall picture is hardly definitive. One could argue that a tournament is possible, based on increasing ratios of pay across levels as shown in table 1. Or, as shown in table 2, winners are rewarded with healthy but not unexpectedly large increases, consistent with the regular progression of successful executives through a series of standard pay grades. Although not shown in table 2, the average pay increase for vice-presidents (level 2) who were not promoted to CEO averaged around 6%. Thus, "winners" clearly receive a substantial increase (11%–22%) that may be consistent with the tournament notion, but this increase is not so large, at least initially, as originally suggested.

But, of course, the pay differentials presented in tables 1 and 2 are very partial observations of the prize of winning any tournament, as they refer to 1 year only. For the typical VP, the result of winning the tournament and becoming CEO is to enjoy an increased salary over that of a VP for as long as he subsequently remains CEO. A more reasonable measure of the tournament prize would, therefore, involve quantifying the expected present value of this income differential.

Using data provided by a consulting firm engaged in executive compensation consulting, it was possible to estimate this differential. Data

[9] Only executives who have been with the corporation for at least 2 years are included in this analysis.

Table 2
Compensation for Tournament Winners (Executives Promoted to CEO, 1980–84)

Winners by Year	VP to CEO, Year 1						VP to CEO, Year 2				
	Previous Average Salary as VP ($)	CEO Average Salary ($)	Average Percentage Increase	Minimum Percentage Increase	Maximum Percentage Increase	N	CEO Average Salary ($)	Average Percentage Increase	Minimum Percentage Increase	Maximum Percentage Increase	N
1981	346,364	388,641	22.4	−24.0	63.4	7	486,222	22.0	−15.0	88.0	5
1982	390,634	417,798	10.9	−8.2	43.0	8	508,891	36.3	−22.0	108.0	7
1983	353,717	418,404	17.1	−4.4	33.9	6	547,464	37.2	−7.7	61.5	5
1984	414,108	488,435	20.7	−3.5	39.1	7					

were provided by each of over two hundred corporations, including individual characteristics for all senior executives (pay plus bonus, education, age, total work experience, experience in the firm, and tenure in the job) as well as firm data on size (sales), return on assets, and industry code. A stock market-based measure of performance was computed, in the form of the annual return to holding the stock, by using data from Compustat.

The top executive team for each corporation is identified by taking all those identified for SEC reporting as officers of the company ("officers").[10] Officers include executives who are identified as sitting on either the board of the parent company or a subsidiary or who were specifically designated as officers of the company. These individuals will be differentiated from the CEO in the discussion below by using the label VP, which, while not technically wholly accurate, captures their elevated but subsidiary position. There are 210 firms with up to five annual observations (1980–84) on the top executive team giving 13,347 individual observations and 769 firm-year observations. All nominal dollar variables are deflated to 1980 using the gross national product deflator.

As indicated above, the data base utilized in this article contains information on the age and tenure in office to date of each CEO. Assuming a retirement age of 65 and ignoring the prospect of premature termination, it is possible to utilize the observed pay gap between CEOs and VPs to compute an estimate of the present value of the total prize enjoyed by the CEO. Such an estimate will, of course, be imperfect, but it will be dimensionally more sensible than a single-year salary differential.

The procedure adopted involves estimating a dollar wage gap for each incumbent CEO, both for the years that he has served to date as CEO and for the years that he has yet to serve until retirement. For each company-year observation in our sample, the gap between the CEO's pay and the average VP's pay was computed. Using company- and industry-specific dummy variables, this was then estimated in a regression as a function of the personal characteristics of the CEO, including the length of time he had been, respectively, in the job, with the company, and in employment. The company size was captured in terms of its sales, a variable that Rosen (1990) has argued displays a robust and near-universal relationship to executive pay.

The regression results of this procedure are presented in table 3. In the sample, the mean annual gap observed between CEO pay and the average VP's pay is some $325,000. The average CEO has been in office for 5.8

[10] In O'Reilly et al. (1988) the number of VPs who could be thought of as being in the tournament was defined either as the total number of VPs in the company or as the number of VPs qualified under SEC reporting rules. In the present test only those corporations where we can identify at least six members in the top executive team are included.

Table 3
Estimating the Gap in Base Salary Plus Bonus
between the CEO and the Average VP
Dependent Variable = Log of the Pay Gap

Independent Variable[a]	Estimated Coefficient
Log of sales	.4234*
	(.0533)
Education	−.0206
	(.0152)
Work experience	.1207*
	(.0210)
(Work experience)^2	−.0015*
	(.0003)
Firm tenure	.0017
	(.0064)
(Firm tenure)^2	−.0002
	(.0001)
Job tenure	.0306*
	(.0074)
(Job tenure)^2	−.0013*
	(.0003)
Mean dependent variable	12.54
Adjusted R^2	.86
F-statistic	22.04
N	769

NOTE.—Standard errors are shown in parentheses.
[a] The regression included a constant and 209 firm-specific and
7 industry-specific dummy variables.
* Significant at alpha < .05.

years, has worked for the firm for 22.0 years, and has been in the labor
market for 34 years. He has an average of 17 years of education and, in
1984, was of an average age of 57 years. Table 3 shows that the pay gap
is significantly influenced by the size of the company (sales) and by the
work force experience and time in office of the CEO. Education and time
with the firm do not seem to exert a significant influence.

    Given the tenure in job of a CEO in a given year (say, 1984), it is
possible to calculate his length of time in the work force and length of
time with the company for every year that he has been CEO and for each
year that he can look forward to being CEO. Using the estimates from
table 3 in conjunction with these recreated career profiles, it is possible to
compute for every year in that career path the pay gap enjoyed relative to
the average VP. Thus, for each year from becoming CEO through retire-
ment at age 65, the CEO's job tenure, time with the firm, and work ex-
perience are incremented by 1 year, and a new wage gap is computed. In
this exercise, between-firm differences are fixed in terms of the estimated
firm- and industry-specific dummy variables and the 1984 sales level. Then,
using a discount rate of 3%, the expected present value as of 1984 of the
expected stream of income differentials to be enjoyed by the CEO from

the time of his appointment to the age of 65 is computed.[11] The resulting estimate of the average present value of the prize being enjoyed by the CEOs in post in our sample in 1984 is a computed $4.6 million.

One problem arises owing to the fact that the detailed data source concerning executive pay to which we have access covers current compensation (base pay plus bonus) only. This does not allow for the impact of long-term compensation devices such as stock options, restricted stock, and so forth. To make some allowance for this, we have been able to utilize data for 1989 on some 777 firms drawn from the United Shareholders Association data base on executive pay (see Crystal 1990).[12] For the top five officers of each company, SEC proxy disclosure regulations allow the current pay and long-term compensation components (value of stock options, restricted stock, and so forth granted in the period) to be calculated. Using those officers in positions 2–5 of the corporate pay hierarchy to represent the typical VP, the gap in total compensation between CEOs and VPs can be modeled as a function of the gap in current compensation. It was also possible to use CEO job tenure, CEO firm tenure, and firm sales as descriptors in a regression that expresses the gap between the total compensation of the CEO versus that of his VPs and the gap between the current compensation of the CEO versus that of his VPs.

The results obtained allow a firm-specific adjustment to be made to the current-compensation prize computed as described above, thus transforming it into a total-compensation prize.[13] This adjustment changed the estimate of the average prize being enjoyed by those 142 CEOs in our sample who were in post in 1984 from $4.6 million in current compensation terms to $6.2 million in total compensation terms. The difference is not as dra-

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[11] In Jensen and Murphy (1990, p. 232) a discount rate of 3% is also used, as is an assumed retirement age of 65.

[12] The original size of the data base is some 1,000 companies, but distinct data on total direct compensation (TDC) and total cash compensation (TCC) are only available on a subset of these companies. Data availability on the other descriptors utilized reduces the usable sample to some 777 of these companies.

[13] Where JTEN is tenure as CEO, FTEN is the CEO's tenure with the firm, LSALES is log of sales (in millions of dollars), TCCGAP is the log of the dollar gap in current pay between the CEO and the average VP, and TDCGAP is the log of the dollar gap in total compensation between the CEO and the average VP, then,

$$TDCGAP = 0.0043 \text{ JTEN} - .0076 \text{ FTEN} + .0642 \text{ LSALES}$$
$$(.0023) \qquad\qquad (.0016) \qquad\qquad (0.0145)$$

$$+ .9482 \text{ TCCGAP} + .6062,$$
$$(.0246) \qquad\qquad (.2726)$$

$$F\text{-statistic} = 108.15, \quad N = 777, \quad R^2 = 0.75.$$

matic as might be expected by reference to the more extreme cases of
executive enrichment through stock options, but it is a representative figure
of the average experience across all 142 executives in our sample. The value
of the long-term component of pay is valued at the time of issue, not at
maturity. Some CEOs would undoubtedly "score big" at the end of the
day while others would find their issued stock options and so on to be
worthless. Our estimates capture the average or expected value at the time
of issue. It should also be remembered that this is not the present value of
total compensation as CEO but merely the present value of the extra pay
earned by being CEO as opposed to a VP. As such, $4.6 million already
represents a sizable price (the range was from a minimum of $686,000 to
a maximum of $14.7 million).

As a test for the presence of a tournament, table 4 follows O'Reilly et
al. (1988). In this case, an argument is made that if a self-financing tour-
nament is operating, then the more players there are the larger the expected
present value of the CEO-VP pay differential; that is, the more participants
in the lottery, the larger the grand prize. The computed prizes (derived as
described above) are regressed on the number of VPs (officers of the com-
pany excluding the CEO) in each of the 142 companies. This number is
taken as a proxy for those who could be considered to be active in any
tournament and who must, therefore, be incented by a large prize. The
number of VPs ranges from 5 to 38 and has a sample average of 16.

Table 4 shows that, in terms of both the current pay measure (col. 1)
and the total compensation measure (col. 2), the number of VPs is positively
related to the size of the prize. It looks as if for each extra competitor
(VP) in the tournament the size of the prize increases by some 3%. Measured
at the mean prize size of $4.6 million in current pay terms, this amounts
to some $138,000. And in total compensation terms where the mean prize
is $6.2 million this becomes $186,000 per VP.

Table 4
Testing Tournament Theory
Dependent Variable = Log of Present Value of Pay Gap

	Total Cash Compensation (Base Plus Bonus) (1)	Total Direct Compensation (Including Stock Options) (2)
Intercept	14.6862*	14.9351*
	(.1205)	(.1280)
Number of VPs	.0280*	.0300*
	(.0069)	(.0073)
Mean dependent variable	15.1211	15.3984
Adjusted R^2	.10	.10
F-statistic	16.42	16.53
N	142	142

NOTE.—Standard errors are shown in parentheses.
* Significant at alpha < .05.

Thus, the evidence from table 4 is broadly supportive of the notion of a tournament at work in the higher reaches of the corporation. Results in table 1 suggest that there are increasing levels of rewards associated with promotions at the highest levels of the corporation. On an annual basis, the magnitude of these rewards (e.g., in 1980 a 1.41 increment in level 1 salary over level 2 salary) is greatly attenuated for identified recent "winners" (table 2) and probably not of the magnitude suggested by tournament theory. However, when individual-specific prizes are computed in terms of the present value of the career increment in pay as a consequence of promotion to CEO versus continuation as a VP, the numbers involved begin to look dimensionally consistent with the notion of a tournament. Using results from table 3, average "prizes" of $4.6 million in terms of cash compensation and $6.2 million in terms of total compensation are estimated. Furthermore, the regression of these estimated prizes on the number in the tournament (proxied by the number of officers in the company) produces in table 4 a result that is consistent with tournament theory. Namely, the size of the prize increases with the number of contestants. And the size of the increment (some $138,000–$186,000 per additional contestant) is empirically large enough to be taken seriously.

Given these results, it seems important to consider Lazear's (1989) alternative suggestion that other compensation regimes, such as pay compression, may be moderating the wage differentials that would emerge under an unadulterated tournament.

III. The Effects of Wage Compression

Inspection of table 2 and the results discussed above on identified promotions in Murphy (1985) suggests that wage variation among the top executive team is not always as great as might be suggested by tournament theory. This would come as no surprise to students of organizational behavior who have long stressed the importance of equity and social comparison processes (e.g., Adams 1965; Deutsch 1985; Folger 1986; Greenberg 1987; O'Reilly 1991).

This idea can be traced to the work of Festinger (1954), who argued that individuals place great importance on the comparison of the rewards they receive for a given input with the treatment of others with whom they compare themselves. This propensity to make social comparisons is increased when groups are highly interdependent and conscious of status differences, both of which may apply to top executive teams. If, as Tversky and Kahneman (1974) argue, individuals who make social comparisons often anchor their judgments in their own experience, it follows that the likelihood of a group being satisfied with their pay is increased if there is less rather than more wage dispersion. From this increased satisfaction, an argument can then be made that greater productivity will follow. Pfeffer and Langton (1989), for instance, show that wage dispersion in academic

departments uniformly decreases satisfaction. Departments with more dispersed salaries are also associated with less work-related interaction.

Pfeffer (1990) starts from this last point, the link to productivity, to draw a distinction between equity theory and a more recent argument for wage compression as espoused by Deutsch (1985), Milgrom and Roberts (1988), and Lazear (1989). The distinguishing feature is that this new work emphasizes the importance of social relations in the workplace. These social relations have a direct impact on output. This can result from either the output-reducing office politics by which individuals attempt to secure influence (Kipnis and Schmidt 1988; Milgrom and Roberts 1988) or the sabotage of a co-worker's productivity in an attempt to attain a career advantage (Lazear 1989). Such activities are likely to be diminished in the face of muted wage differentials. Wage compression can, therefore, be seen as output enhancing, although it may be more often the case that the enhancement comes from minimizing what would otherwise be a debilitating loss of productivity in a situation where there is a high amount of interdependence among economic agents.[14] Absent a good degree of cooperation, owing to overly competitive interagent rivalry, value added will suffer.

While these new theories end up at much the same place as traditional equity theory, they differ in having "an efficiency argument at the heart of the analysis," to paraphrase Lazear (1989, p. 563). Concern over equity is raised in importance when close collaboration among workers is desirable and when the personalities of the workers suggest that they might be prone to aggressive self-promotion at the cost of others (Lazear's "hawks"). Pay equity has less impact on economic efficiency when output is more individual based and when the individuals in question are personally more restrained (Lazear's "doves"). Thus, under the new view, wage dispersion is basically a good idea, but it must be moderated in the direction of pay equity owing to the negative effects of competitiveness, such as the lack of cooperation, that are induced by excessive wage dispersion.

At the level of the top management team, it can be argued that the nature of the work requires a large amount of task interdependence; hence, significant cooperation among executives is necessary for organizational success and social comparison processes are heightened (e.g., Hambrick and Mason 1984; Hambrick 1988). Unlike the atomistic nature of self-contained tasks sometimes found at lower organizational levels, the top executive

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[14] Milgrom and Roberts (1988) stress alternative means of diminishing the deleterious effects on output of influence-seeking activity. They suggest that opportunities for such behavior be reduced by limiting access or that it can be made clear that information derived from such activities will not be used. There is an echo here of the O'Keeffe et al. (1984) idea of adding noise (monitoring imprecision) to the choice of the tournament winner.

levels of an organization typically require substantial teamwork and co-ordination. As Lazear (1989, p. 566) notes, "It is not sensible to create rivalry by setting up implicit promotion contests between workers whose cooperation is important to the firm." It may also be the case that the members of this team could, under some circumstances, more likely be hawks rather than doves. Lazear (1989, p. 577) argues this directly: "If winning is necessary for a promotion, then the higher levels in the hierarchy will tend to be somewhat hawk intensive." For these reasons, pay compression may dominate the pay-for-relative-performance notions that come from tournament theory. It should be noted, however, that both of these are theoretical propositions whose validity can be examined only in empirical tests.

The notion that compression in executive pay levels may be necessary for efficiency in hawk-intensive environments leads to two testable propositions. First, after controlling for variations in firm size, industry, year, and the average pay of the top executive team, then Lazear's notions of industrial politics suggest that firm performance, measured here as return on assets (ROA) and as shareholder return, should be lower when wage compression indicates an organization vulnerable to hawkish behavior. Thus, for a given level of expenditure per head on executives, less productivity is forthcoming in firms with a low coefficient of variation in executive team salary. Of course, as it stands this proposition is observationally equivalent to the notion that tournaments (greater dispersion in earnings) lead to increased economic efficiency. To distinguish between the two, we introduce a measure of executive team interdependence. With high team interdependence, wide variations in executive team salaries are likely to induce more disruptive interagent rivalry than in work situations that can be structured to avoid such interdependence. Notions of industrial politics would then predict that the interaction of executive team wage dispersion and team interdependence should lead to a significant negative effect on productivity.

To construct a measure of executive team interdependence, we utilize the job titles of the executive team. In particular, we focus on the proportion of the executive team that holds jobs with a "profit-center head" title.[15] This is consistent with the notion of the multidivisional enterprise as examined by Chandler (1962) and Williamson (1970) but implemented here at a more micro- or job-design level than in terms of the formal organizational structure. Across the companies in the sample, the mean proportion of executives holding such titles was 0.276. The interquartile range was

[15] A total of 189 executive job titles were available. Five of these involved profit-center-head positions, namely, multiprofit center head, single profit-center head, single profit-center chief operating officer, top multiprofit center head, and multiprofit center chief operating officer.

0.169–0.375, the minimum was 0.0, and the maximum was 0.813. This variation suggests that the measure possesses the scope to discriminate between interdependent management teams (those with a low proportion of profit-center heads) and noninterdependent teams (those with a high proportion). Notions of pay compression suggest that high values of wage dispersion (high coefficient of variation) combined with a low degree of interdependence (high proportion of profit-center heads) should lead to a high level of productivity.

A second implication of industrial politics, also suggested by Lazear (1989, p. 578), is that, owing to the impact of interpersonal competition on productivity and the desirability of compressed wage structures among competitive individuals, "the average wage is lower in firms that have more compressed wage structures." Once again, some measure of interdependence is needed if such an outcome is to be distinguished empirically from the incentive-inducing effects of high pay variation. Lazear's pay compression argument suggests that the effect should become more pronounced in the presence of greater interdependence (lower proportion of profit-center heads in our measure).

Table 5, discussed in detail below, reports the regressions of firm performance on a set of control variables and executive team wage dispersion (the coefficient of variation), and table 6 analyzes the association between average executive wage levels and wage compression. Both analyses include

Table 5
Regression of Stock Market Return and Return on Assets (ROA) on Wage Compression within the Top Management Team

Independent Variable[a]	Stock Market Return	ROA
Log of sales	−.2176*	.0624**
	(.1047)	(.0114)
Log of average executive team salary (AVET)	.5001*	.0663**
	(.1384)	(.0151)
Coefficient of variation executive team (CVET)	.0031	.0011*
	(.0046)	(.0005)
Proportion who are profit-center heads (PPCH)	.2011	.0690
	(.8651)	(.0943)
Interaction of CVET and PPCH	−.0129	−.0015
	(.0140)	(.0015)
Constant	2.8867	−1.4625**
	(1.8683)	(.2037)
Adjusted R^2	.08	.42
F-statistic	1.299	3.444
Mean dependent variable	.1210	.0586
N	769	769

NOTE.—Standard errors are shown in parentheses.

[a] 209 firm-specific, 7 industry-specific, and 4 year-specific dummy variables were included, but their coefficients are not reported here.

* $p < .05$.
** $p < .01$.

Table 6
Regression of Log of Mean Salary of Top Management
Team on Wage Dispersion

Independent Variable[a]	
Log of sales	.1849**
	(.0315)
Coefficient of variation executive team salary (CVET)	.0042**
	(.0014)
Proportion who are profit-center heads (PPCH)	−.0755
	(.2680)
Interaction of CVET and PPCH	.0036
	(.0043)
Constant	9.3387**
	(.4180)
Adjusted R^2	.88
F-statistic	25.515
Mean of dependent variable	12.0278
N	769

NOTE.—Standard errors are shown in parentheses.
** $p < .01$.
[a] 209 firm-specific, 7 industry-specific, and 4 year-specific dummy variables were included, but their coefficients are not reported here.

our measure of team interdependence and its interaction with the coefficient of variation in executive team pay.

Results in table 5 show that there is a statistically significant association between a firm's performance, as measured by both stock market return and return on assets, and the average compensation level of the top executive team. As expected, firms with higher performance also have higher average top management compensation. Additionally, the expected significant positive association between wage dispersion and ROA is also found. Although, in the case of stock market return, the estimated coefficient has the expected positive sign, it is not statistically significant. This may be due to the greater variability in stock market returns compared to the accounting-based ROA. But, the results in table 5 do at least suggest that greater variance in top level compensation is positively related to firm performance. Or, expressed the other way round, for a given average level of pay the more compressed is compensation in the top levels of the organization, the lower is the level of economic performance. But, in terms of distinguishing between incentive-inducing wage dispersion (e.g., tournaments) and the importance of holding industrial politics in check, the lack of significance on the measure of executive interdependence (PPCH) and its interaction with the coefficient of variation suggests that there is little empirical evidence to support the importance of such concerns at this level of the corporation. Under Lazear's wage compression story, the interaction term would be expected to be significantly positive as measured

here. Overall, then, the results offer little empirical support for Lazear's view of the rationale for executive wage compression.

The second prediction from Lazear (1989, p. 578) was that the average wage (productivity) of top executives would be lower in corporations where there are more compressed wage structures. Results of a test of this hypothesis are shown in table 6, where the mean salary of the top executive team is regressed on a set of basic firm descriptors, such as sales, industry, and year, and also on a measure of wage dispersion (the coefficient of variation), on our measure of executive interdependence, and its interaction with wage dispersion. The estimated coefficient on the coefficient of variation is significantly positive, which is consistent with Lazear's prediction: that is, lower mean levels of executive pay are associated with reduced variance in compensation within the top management team. But the lack of significance on the executive interdependence terms, once again, fails to offer any empirical support to suggest that "hawks and doves," or excessive interexecutive rivalry, is a serious problem at the top of the corporation. From that perspective, given that a high proportion of profit-center heads suggests a strongly multidivisional-form type of organization and one immune to industrial politics, the predicted sign on the interaction term is positive. But the resulting sign is insignificant.

The basic thrust of Lazear's (1989) argument is, on the one hand, that wage compression may be an important way to suppress unwanted uncooperative behavior among hawks. On the other hand, firms that are less susceptible to hawkish behavior can motivate workers by the unrestrained use of wage dispersion. The results obtained in tables 5 and 6 suggest that wage dispersion allows incentive effects that result in higher performance. But there is little evidence that the nature of interexecutive cooperation required at the top of a company results in a need to compress the distribution of wages in any marked way. This empirical outcome may be due to the imprecision of the measure by which we have attempted to gauge interdependence. It may also speak to the fact that at the top of the company interdependence is important, but the nature of the agents who find themselves there is so hawkish that it is unlikely to be moderated by any amount of wage compression.

IV. Conclusions

The purpose of this study was to explore two somewhat contradictory explanations of the structure of compensation among top executives. On the one hand, tournament theory approaches (e.g., Lazear and Rosen 1981; Rosen 1986) suggest the need for substantial variations in compensation among executives at the top levels of an organization. Alternatively, arguments can also be made that comparatively compressed wages are more efficient since they reduce sabotage and promote cooperation and teamwork (Milgrom and Roberts 1988; Lazear 1989). Theoretically, both positions

have been rigorously presented and are plausible. In the end, however, the answer to the question is an empirical one. And what is the answer?

First, the evidence for the operation of tournaments is positive. If one accepts the metaphor of a tournament and the need for ever-larger prizes at the top of the hierarchy in order to motivate participants, one would expect substantial dispersion in compensation. The evidence, however, suggests that "winners," once identified and promoted, move from the high end of one pay grade to the low end of the next. Results from table 2 suggest a pay increase of roughly 10%–20%, hardly the magnitude suggested by a tournament. But the cumulative impact over a successful career as CEO is one of a substantial prize—some $4.6 million–$6.2 million in total. And table 4 supports the prediction of tournament theory that the size of the prize should increase with the number of contestants.

But, from a psychological viewpoint, the assumptions underlying the unadorned tournament appear implausible in several respects. First, there is evidence that senior management in a firm operates as a team (Hambrick 1988). The work is often highly interdependent. Hence, a compensation scheme that rewards independent accomplishment may be inappropriate. Taken at face value, if a tournament were to operate at senior levels, firms would find it difficult to motivate losers; that is, the tournament notion pays close attention to how to keep winners motivated but largely ignores the implication of having an organization filled with losers of past tournaments (Dye 1984). The possibility remains of having ongoing sequential tournaments to maintain incentives. This would be similar to the notions of strategic innovation surveyed by Beath, Katsoulacos, and Ulph (1988).

Second, an implicit assumption of the tournament approach is that money is the sole motivator of top executives. While few would dispute the importance of money, it is the status derived from it that may be most important, and this is known through a process of social comparison. Chester Barnard, writing over 50 years ago (1938, p. 145), noted that "the real value of differences of money reward lies in the recognition or distinction assumed to be conferred thereby." A modern version of this view can be found in Frank (1984). In the *Theory of Wages,* Hicks (1963, p. 317) makes a similar point: "The labor market is . . . a very special kind of market which is likely to develop 'social' as well as purely economic aspects. . . . For the purely economic correspondence between the wages paid to a particular worker and his value to the employer is not a sufficient condition of efficiency: it is also necessary that there should not be strong feelings of injustice about the relative treatment of employees since these would diminish the efficiency of the team."

What of the alternative—the use of executive wage compression in situations when interpersonal rivalries place in jeopardy the efficiency of the entire enterprise? Here the empirical evidence is less supportive. Wage dispersion is positively, if weakly, associated with firm performance (table

5) and, in line with Lazear (1989), positively associated with the mean salary of top management (table 6). While not definitive, these findings offer support for arguments in favor of the efficiency of wage compression in certain work environments. But these empirical findings are also consistent with the use of wage-dispersing incentive structures such as tournaments to enhance economic performance. When a measure of executive interdependence is introduced (percentage of job titles specifying profit-center head) the results fail to support the notion of wage compression as an empirically important consideration at the top of the corporation.

What, then, can we make of these results? "Winners" appear to be chosen from the higher levels of the lower pay grade (Rosenbaum 1984). Promotion brings a raise, but not immediately on the order that would be expected if a simple lottery or tournament were operating. Instead, the appropriate analogy seems to be that of a relay race. Executives compete, with winners being rewarded with incremental raises and periodic promotions. Overtaking or leapfrogging remains a possibility for the duration of the race. Evidence from studies of both motivation and intraorganizational mobility are consistent with this view (Useem and Karabel 1986; Folger and Konovsky 1989). First, psychologically it seems more efficacious to motivate people with smaller, more frequent raises and promotions rather than relying on larger, less frequent reinforcements. This view is also consistent with Tversky and Kahneman's (1974) logic of framing, which shows that subjects appear to prefer a more certain chance of winning a small prize in the short term than a riskier chance of a large one in the future. Indeed, at the highest levels of a corporate hierarchy, a contestant's time frame is, of necessity, much shorter than younger players with longer careers ahead. In this circumstance, smaller, more frequent signals that they are still in the race are likely to be more motivating than the promise of a single, large reward.

This view is also consistent with a large number of studies of intraorganizational mobility (Rosenbaum 1979; Forbes 1987) that show that "stars" in organizations are often identified early and follow steeper career trajectories than average performers. Again, when those stars reach the highest level of the organization, having been rewarded frequently throughout their careers, it seems unlikely that the adoption of a new regime of reinforcement with longer waits will be sound. Thus, rather than a single elimination tournament, top management compensation seems to rely on continuous small raises and promotions rather than large, uncertain payoffs. None of this denies the existence of tournament structures within managerial career paths, but it does suggest that any tournaments are likely to be of a sequential nature. Winning at one stage leads to pay rewards and enhanced promotion prospects. But losing still permits the loser to try again, with even the prospect of "leapfrogging" earlier winners. Such a model, while lacking the elegance and parsimony of either tournaments

or industrial politics, seems consistent with both the data and a large body of sociological and psychological research on pay.

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