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Do Concentrated Institutional Investors Really Reduce Executive Compensation Whilst Raising Incentives?*

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ABSTRACT

Hartzell and Starks (HS) (2003) report that firms with more concentrated institutional investors pay executives less, and make this pay more sensitive to performance. In an extended data set covering 1992 to 2010, we find that institutional concentration has no such effects when we control for firm size with a logarithmically transformed market-capitalization instead of HS's raw market-capitalization. This holds both in the long-run time-series and in the panel analysis. Firms that HS consider monitored do not seem to have better control of managerial compensation or performance than their unmonitored counterparts. Our results are, on the whole, inconsistent with any form of concentrated institutional monitoring.

Keywords: Executive compensation; monitoring; institutional ownership; principal-agent; incentives; concentrated ownership.

JEL Codes: G23, G32, J33

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1 Introduction

With 160 cites in Web of Science and 858 cites in Google Scholar as of October 2012, Hartzell and Starks (2003), hereafter HS, ranks among the most influential corporate finance articles of the last decade. The paper finds that firms with more concentrated institutional owners also have greater executive option incentives, lower cash-based pay, and lower direct compensation.[1] HS interpret their evidence as consistent with a view that institutional shareholders influence or monitor the firms that they hold.

Our study reexamines the evidence, and comes to very different conclusions. Our research design entertains only modest changes that seem sensible. First, and most importantly, our results suggest that it matters how one treats firm size. The HS results are so sensitive with respect to the use of the right control for size because they measure institutional holdings as a fraction of institutional share ownership, which is very low for small firms, and managerial option grants as a fraction of total market-capitalization. This means that smaller firms typically appear to have both higher institutional and executive stakes, even though institutions have a well-known preference for large firms. Yet they include only the (right-skewed) raw market-capitalization as a control instead of a log-size control which usually greatly increases the model fit. We show that when we use the log of market-capitalization, many of their key coefficients become insignificant or change signs. For example, we find that long-run changes in institutional concentration have no reliable effect on either subsequent changes in executive incentives, or executive compensation levels with a log-size control. Second, we argue that institutional concentration (influence) is measured better as

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[1] More specifically, HS (p. 2352) find that an increase of one standard deviation in institutional investor concentration is associated with a 20% increase in option grant pay-for-performance sensitivity and a 19% drop in Total Direct Compensation for the average executive within the top-5 highest paid executives.

the holdings of the top-5 institutional investors relative to all shares to reflect voting power and influence, and not relative to institutional shareholdings only. No justification is provided for this strange choice given that institutional holdings are higher in large stocks. In fact, HS (p. 2355) argue that larger institutional investors can be expected to have more influence, not less. We agree, but this means adopting a shareholding-based measure of institutional influence with influence increasing, not diminishing, in firm size. Utilizing the logician's *reductio absurdum* argument to reveal the logical flaw, if there were only five institutional shareholders holding only one share each, the HS measure would suggest perfect concentration. Third, we also look at a broader measure of executive incentives, based not only on newly granted options but also based on restricted stock grants and total share holdings. Fourthly, we examine the long-term time-series evidence on pay-levels utilizing HS methodology, whereas the HS evidence is confined to option sensitivity.

Because our interest is ultimately in the best inference given the data today, we extend the HS data-set to the period 1992 to 2010. To reconcile the differences, we show results using both the HS specifications and our modified specifications. Overall, we find that the evidence does not favor the HS hypotheses. Our research finds that firms with more concentrated institutional ownership do not seem to have higher pay-for-performance sensitivity or lower pay. Moreover, concentrated institutional ownership is significantly negatively correlated with Tobin's Q and all other performance measures adopted by HS.

Our paper now proceeds as follows. In Section 2, we lay out the data and methodology. In Section 3, we present some univariate and sort-based statistics. In Sections 4 and 5, we repeat the HS regression studies, explaining executive incentives and pay levels as a function of institutional investor influence. In Section 6, we summarize related research and put our findings in perspective. Section 7 summarizes our research findings.

2 Data and Variables

We use the term *influence* following HS as a convenient short-hand name for the three institutional holding variables. However, both HS and ourselves only look at evidence due to association, and cannot truly measure influence

as HS do not utilize any quasi-natural experiment or difference-in-difference analysis, and we simply replicate their methodology with as few changes as possible. On the face of it, our changes are trivial in nature.

This section discusses the data used in the study, the construction of variables, descriptive statistics, and the methodology. The original data set, generously made publicly available by Hartzell and Starks, covered 1,914 stocks from 1992 to 1997.[2] However, it was collected before Execu-Comp added many more stocks. Thus, our own paper uses an expanded data set covering 3,111 stocks from 1992 to 2010. We use the same sources as HS, Standard and Poor's (S&P) ExecuComp for compensation data, and Thomson Reuters CDA/Spectrum database for institutional holdings, to compute measure of institutional influence, S&P's Compustat for firm level accounting, and the Center for Research in Stock Prices (CRSP) for stock price data. Most of our variables are the same as those in HS (as will be our specifications).

We add the following three additional variables, two new dependent variables measuring executive incentives, and one additional measure of concentration: (1) the pay-for-performance sensitivity of restricted stock grants, (2) The pay-for-performance sensitivity of executive shares owned,[3] and (3) top-5 institutional ownership. The last variable differs from HS's institutional holdings measure, top-5 HSIC, insofar as it uses the shares owned by all investors instead of shares owned by all institutions, as the deflator of the sum of the shares owned by the five largest institutional investors.

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[2] With the data supplied to us by Hartzell and Starks, we are able to replicate exactly their summary data (HS, Table 1, p. 2356) for all but cash compensation but replication required the inclusion of over one hundred observations with missing stock price data such that market-capitalization is recorded as zero.

[3] Like new option grants, restricted stock grants are directly amenable to board control and measurable *ex ante*. They are also both flow measures rather than stock measures, once again enhancing direct board control. The second new measure, pay-for-performance sensitivity of executive shares owned, is a stock rather than a flow. Moreover, it is by no means certain that firms contract directly with executives over the level of stock ownership despite the fact that it is by far the largest source of pay-for-performance sensitivity. There are two views: (1) if concentrated monitoring is important and effective as HS maintains, boards responsive to concentrated institutions would have adopted adequate controls over this important source of incentives due to institutional influence, and (2) it is unreasonable to presume that HS's role for concentrated institutional influence extends to share ownership.

Market-Cap Market-capitalization is the number of shares on issue at the end of the year balance sheet date times the stock price. Source: CRSP.

Inst Hold Total Institutional Holdings is the shares held by all 13-f institutional investors relative to the total number of shares outstanding. Source of Institutional Data: Thomson Reuters.

top-5 HSIC The Hartzell-Starks Institutional Concentration (HSIC) are shares owned by the institutions with the five largest holdings divided by the shares held by all institutions and represents the HS measure.

Inst Herf Q4 The Herfindahl Index of institutional concentration is based on percentages of institutional holdings by all 13-f institutions. Following HS, we use the quartile index of this variable.

top-5 Institutional top-5 Ownership are the proportion of shares outstanding held by the institutions with the five largest holdings. It differs from HSIC in the denominator.

Cash Comp Cash compensation is the manager's salary plus bonus for the year for the top-5 most highly paid managers. Source of Executive Compensation Data: Execucomp.

Total Comp Total Direct Compensation is the sum of the manager's salary plus bonus plus restricted stock and option grants plus all other direct compensation.

PPS-OptionGrants The pay-for-performance sensitivity of option grants shows the change in executive wealth due to a $1,000 change in shareholder wealth and is computed utilizing the Black-Scholes formula and method set of by Yermack (1995).

PPS-StockGrants The pay-for-performance sensitivity of restricted stock grants computed from ExecuComp shows the value of restricted stock grants relative to the closing value of shares on issue and is multiplied by 1,000 to make it comparable to the option grant sensitivity.

(*Continued*)

PPS-StockOwned The pay-for-performance sensitivity of shares owned is computed from ExecuComp as the fraction of shares outstanding held by the manager at the close of the year and then multiplied by 1,000. Used only to illustrate incorrect conclusions from similar specifications in Table 6.

Stock Ret Stock return is the sum of change in the price of a share plus dividends per share over the period $t-1$ to t. Source: CRSP.

Chg ShrWealth The change in shareholder wealth is the change in the value of shares outstanding inclusive of dividends over the period from $t-1$ to t. Source: CRSP.

Tobin's Q Source: CRSP and Compustat.

Institutional Turnover (in Table 4). To derive the institutional average stock turnover rate based on the Thompson Reuters 13f filing data: For each firm year, for each manager, we calculate the total proportion of shares traded divided by the average proportion of shares held by that manager. Then we average across each firm year to get the average institutional turnover.

Table 1. Key variables.

Description: Top-5, PPS-StockGrants, and PPS-StockOwned are introduced by us. The other variables were introduced (and are defined in more detail) in HS.

Table 1 summarizes the key variables in our paper while Table 2 reports univariate statistics for most variables in our data-set. We now discuss the major features of Table 2.

Institutional ownership: Institutions owned, on average, 68.2% of firms in our data set. This is higher than the 53.1% reported by HS for their sample. In our paper, we measure institutional influence with three metrics. The first two are HS's institutional concentration (top-5 HSIC) and the Herfindahl quartile measures, respectively. The table provides statistics for both the original Herfindahl index and the quartile (Q4) measure used in the regressions. The institutions with the five largest

Variable	Mean	Median	Std. Dev.	10%	90%
Firm Size					
Market-Cap (in $MM)	7,173	1,489	22,839	218	14,571
Log Market-Cap (in $MM)	7.39	7.31	1.67	5.39	9.59
Institutional Holdings and Concentration					
Inst Hold	68.2%	70.2%	23.4%	23.4%	84.2%
Top-5 HSIC	41.1%	38.6%	13.2%	36.3%	74.4%
Inst Herf Index	2.69%	2.18%	3.50%	0.57%	4.79%
Inst Herf Index Q4	2.5	2.0	1.12	1	4
Top-5	26.8%	26.1%	10.5%	13.7%	41.1%
Compensation					
Cash Comp (in $K)	727	475	1,193	213	1,346
Total Comp (in $K)	2,540	1,120	6,652	332	5,361
Pay-for-Performance sensitivity					
PPS-OptionGrants	0.85	0.20	2.70	0.00	1.96
PPS-StockGrants	0.10	0.00	0.84	0.00	0.16
PPS-StockOwned	8.10	0.54	34.56	0.01	10.17
Performance					
Tobin's Q	1.90	1.43	1.62	1.00	3.21
Stock Ret	16.7%	10.0%	65.6%	−38.2%	68.3%
Chg ShrWealth (in $MM)	445	84	7,236	–821	2,171

Table 2. Summary statistics, univariate analysis, and correlations.

Description: The variables are defined in Table 1. Following HS, subsequent regressions use the quartile of the institutional concentration Herfindahl index. This table also reports statistics of the raw Herfindahl index. The data are all 136,880 firm-years from the 1992–2010 period with sufficient data.

holdings account for 41.1% of institutional ownership while HS report 44.0%, and the Herfindahl index is above 2.

The third measure of institutional influence changes the denominator of HS's Institutional Concentration measure (top-5 HSIC) from institutional shares held by the top-5 institutional investors to total

shares outstanding. We name this variable top-5 (omitting HSIC). The institutions with the five largest holdings owned on average 26.8% (22.3% in the HS sample[4]) of shares outstanding in a firm.

Overall Compensation: The HS Total Direct Compensation measure that includes salary, bonus, long-term incentive plan pay-outs, restricted stock, and option grants[5] shows that the average executive earned $2.54 million (not inflation adjusted), the median executive earned $1.1 million. The HS mean of $1.25 million, computed on the same basis, was lower. This reflects the continued growth in nominal and real executive compensation after 1997. Direct compensation, consisting of salary and bonus, was $727,000 on average.

Pay-For-Performance Sensitivity: Following HS, we compute the pay-for-performance sensitivity of option grants using Yermack's (1995) *ex-ante* approach. This involves calculating the option delta using the Black and Scholes (1973) formula for European call options, adjusted by Merton (1973) to incorporate dividends.[6] The option delta is multiplied by the number of shares represented by the award of options times 1000, and then divided by the diluted number of shares outstanding at the beginning of the year. In Table 1, the pay-for-performance sensitivity of options grants has a mean of $0.85, similar to but below HS's at $0.98. The standard deviation of $2.77 compares with HS's at $3.15.

Our first new sensitivity variable, the pay-for-performance sensitivity of restricted stock grants, multiplies the value of shares issued relative to the value of shares outstanding (that is, market-capitalization) by 1000. It has a lower sensitivity at $0.10 than do option grants, with fewer firms providing such grants. Our second new variable, the pay-for-performance sensitivity of shares owned, multiplies the ratio of shares held by each manager by 1000 relative to shares outstanding (i.e., (shares owned$*$1000)/(shares on

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[4] We had to compute this metric from HS' database, because HS did not actually make use of it.

[5] The ExecuComp database reports several raw measures of executive compensation for the top-5 executives (where available) including total salary, bonus, long-term incentives, restricted stock grants, and the number of option grants. In addition, it reports the shares owned by each executive included in their sample, and the number of shares outstanding. For some firms, ExecuComp reports many more executives than the top-5 but for comparability with HS we restrict our sample to the top-5.

[6] When there is more than one grant during the year, a weighted average delta is used.

issue). Thus, its units are comparable to the pay-for-performance sensitivity of option grants, as are the units of the restricted stock grants.[7,8]

However, unlike new options, which are a change variable, shareholdings are a levels variable. To the extent that managers care about performance, a levels variable measures their incentives better. Also, to the extent that institutional shareholders can change the compensation of managers, a change variable measures this effect better.

The average pay-for-performance sensitivity of shares owned is \$8.10, which is about ten times the sensitivity of option grants and many times the sensitivity of restricted stock grants. The standard deviation of \$34.56 is also by far the highest of the three sensitivity measures.

3 Size-Based Classifications

3.1 Univariate Analysis by Firm Size

Table 3 shows basic statistics for the largest and smallest market-capitalization quartiles, each consisting of 34222 firm-years. The right-skewed nature of firm size is visible in the two orders of magnitude difference in market-capitalization, with the large quintile mean double that of the median. Small firms have lower institutional holdings at 55.0% than large firms at 68.9%, indicating the need to adopt a measure of institutional influence that does not bias institutional preferences in the direction of small firms due to their strong preference for large firms.

A second indication that size control can be important appears in the next rows consisting of top-5 HSIC, Inst Herf, and our plain-vanilla measure, top-5. The Herfindahl index and top-5 measures suggest that institutional influence is similar for small and large firms. The Herfindahl index is only modestly higher in small firms and the plain-vanilla top-5 measure suggests that institutional influence is similar for small and large firms. However, the top-5 HSIC measure does not share this implication. Large firms

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[7] Since more executive shares are purchased on the open market rather than allocated as restricted stock, stock dilution is not such a major issue as it can be for options granted.

[8] As an example, suppose the executive owns 5 shares of the 1,000 shares outstanding at the beginning of the year and purchases a net additional 10 during the year. Hence, the closing number of shares on issue remains constant at 1,000. The manager's pay-for-performance sensitivity of shares owned rises from $[(5 * 1,000)/1,000] = 5$ at the beginning of the year to $[((5 + 10) * 1,000)/1,000] = 15$ at the end.

	34,222 firm-years in smallest stock quartile					34,222 firm-years in largest stock quartile				
	Mean	Median	Sd	10%	90%	Mean	Median	Sd	10%	90%
Market-Cap (in $MM)	267	267	141	72	464	24,773	11,439	40,860	5,463	53,841
Institutional Holdings										
Inst Hold	55.0%	56.1%	22.5%	23.4%	84.2%	68.9%	70.7%	16.6%	46.2%	89.0%
Top-5 HSIC	53.4%	50.8%	14.9%	36.3%	74.4%	33.5%	32.2%	9.4%	23.5%	44.1%
Inst Herf	0.0266	0.0224	0.0293	0.0057	0.0479	0.0219	0.0161	0.0446	0.0059	0.0349
Top-5	27.6%	27.2%	10.9%	13.7%	41.1%	26.8%	26.1%	10.5%	14.2%	39.8%
Compensation										
Cash Comp (in $k)	375	296	315	160	660	1,291	840	1,994	401	2,428
Total Comp (in $k)	817	528	1,082	224	1,604	5,697	3,028	11,875	982	11,919
Pay-for-Performance sensitivity										
PPS-OptionGrants	1.60	0.44	4.33	0.00	3.82	0.31	0.11	0.90	0.00	0.70
PPS-StockGrants	0.17	0.00	1.44	0.00	0.15	0.06	0.00	0.28	0.00	0.16

Table 3. By market-cap quartiles.

Description: Variables are defined in Table 1. This table shows statistics for firm-years in the largest and firm-years in the smallest firm-size quartiles. Size classification is over all firms and years.

Interpretation: (1) There are large differences across firm size quartiles in compensation and PPS (when normalized by firm market-capitalization). (2) There are large differences across firm size quartiles only for total institutional holdings and the HSIC measure (normalized by institutional shares), but not the Herfindahl index and the top-5 measure (normalized by all shares).

have less concentrated top-5 HSIC (33.5%) than small firms (53.4%). A second indication appears in the compensation measures. Executives in smaller firms receive relatively more options, restricted grants, and shares owned ($1.60 versus $0.31, $0.17 versus $0.04, and $12.53 versus $3.81). This could be because these metrics are measured relative to corporate market-capitalization and not relative to unobservable executive wealth or a variety of other explanations. The fact that large firms have both lower top-5 HSICs and lower executive grants than small firms suggests that the choice of the size control will be important when considering the association between HSIC and executive pay-for-performance sensitivities.

3.2 Tests for Differences between Extreme Monitored and Unmonitored Firms

Table 4 presents an extreme-set-intersection diagnostic. We first construct three sets of extreme-quartile-firm-year rankings for HS's top-5 HSIC, option-grant pay-for-performance sensitivity, and total direct compensation measures ranging from low to high. We then examine the differences between these two intersecting extreme sets. The two sets will drive much of the later coefficient results. There are only 19 firm-years (0.01% of all firm-years) that are in the *high monitoring group*, and they have a typical market-capitalization of under $314 million (the average is $546 million). In contrast, there are 299 firm-years (0.22%) in the *low monitoring group*, and they have a typical market-capitalization of $42.5 billion (the average is $82.6 billion). These are three orders of magnitude bigger, and again, this suggests that careful control of market-capitalization is a first-order concern.

What ought to be intensive monitoring in the small group does not buy any increase in Tobin's Q performance, nor does it seem to provide for a survival advantage as the number of observations in this category is almost zero. The significantly higher institutional stock turnover in the non-monitored group suggests that this group may be subject to more institutional monitoring via trading rather than from concentration, as is empirically investigated by Gallagher *et al.* (2013).

3.3 Pairwise Correlations

Table 5 shows the pairwise correlations between our key variables. Larger firms had lower top-5 HSIC, and they also paid their executives more. These

	Means			Medians	
	"Monitored"	"Not"	Wilcoxon-Z	"Monitored"	"Not"
Number of Firm-Years	19	299			
Market-Cap (in $MM)	546	82,628	−7.14***	314	42,498
Log Market-Cap	5.98	10.50	−7.14***	5.75	10.66
Sorting characteristics (and proxies)					
inst Hold	0.872	0.444	7.30***	0.869	0.451
top-5 HSIC	0.439	0.314	5.63***	0.435	0.301
Inst Herf Index	0.044	0.007	7.23***	0.043	0.005
top-5	0.383	0.139	7.19***	0.379	0.130
Salary (in $K)	227	696	−7.17***	224	667
Total Comp (in $K)	706	6,446	−6.87***	620	4,584
PPS-OptionGrants	1.919	0.082	7.25***	1.332	0.049
PPS-StockGrants	0.003	0.078	−3.89***	0.000	0.004
Performance					
Tobin's Q	2.03	2.15	0.56	1.82	1.78
Stock Ret	0.155	0.059	1.88*	0.238	0.074
Chg ShrWealth (in $MM)	107.1	5,974.2	−2.32**	95.3	2,172.0
Institutional Turnover	1.59	1.97	2.23**	1.20	0.98

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 4. Differences between two extreme sets representing monitored and unmonitored firms.

Description: The sample consists of 136,880 firm-years. The "Monitored" group are firm-years that are simultaneously in the extreme univariate quartiles of (a) high institutional concentration top-5 HSIC, (b) high option sensitivity, (c) low executive pay. The "Not" group are the opposite.

Interpretation: Only 19 out of 136,880 firm-years (0.0139%) fall into the HS "Monitored" group. In contrast, 299 (0.2184%) fall into the "Not monitored" group. Differences in variables between these groups will be largely responsible for much of the coefficients in later regressions. This table shows that these groups are as dissimilar as can be. "Not Monitored" firms are not only 16 times more numerous but also 151 times larger than "Monitored" firms. and are thus most likely monitored differently. While there is no significant difference in Tobin's Q performance between the two groups the "Not Monitored" group are more actively traded by institutional investors.

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Market-Cap	1											
(2)	Log Market-Cap	0.56	1										
(3)	Cash Comp	0.27	0.32	1									
(4)	Total Comp	0.28	0.31	0.42	1								
(5)	PPS-OptionGrants	−0.07	−0.19	0.02	0.20	1							
(6)	PPS-StockGrants	−0.02	−0.07	0.04	0.10	0.05	1						
(7)	PPS-StockOwned	−0.04	−0.09	0.03	0.01	0.06	0.02	1					
(8)	Inst Hold	−0.01	0.26	0.06	0.07	−0.06	−0.01	−0.11	1				
(9)	top-5 HSIC	−0.23	−0.61	−0.16	−0.15	0.15	0.05	0.08	−0.39	1			
(10)	Inst Herf Index Q4	−0.08	−0.07	−0.02	−0.03	0.01	0.01	−0.02	0.36	0.33	1		
(11)	top-5	−0.17	−0.18	−0.06	−0.05	0.03	0.02	−0.04	0.65	0.37	0.71	1	
(12)	Tobin's Q	0.14	0.19	−0.02	0.09	0.04	−0.03	0.03	0.03	−0.11	−0.04	−0.08	1

Table 5. Pairwise correlation coefficients.

Description: With the exception of column (8), rows (1) and (6) correlations, all correlations are statistically significant at the 1% level. The correlation of institutional holdings with market-capitalization is significant at the 5% level, but not at the 1% level.

Interpretation: (1) Similar to earlier tables, this table shows that market cap has a strong correlation with key variables in this study. In particular, absolute compensation is higher in larger firms, pay-for-performance sensitivity (which is normalized by shares on issue) is lower, and the HSIC measure of institutional influence is exceedingly lower. This is not as much the case for other measures of institutional influence. (2) The top-5 HSIC metric has a negative correlation with other measures of institutional influence, such as the total institutional holdings which it is divided by all shares on issue, the Herfindahl index, and top-5 itself (the holdings of the top-5 institutional investors divided by all shares). (3) The HSIC metric is significantly negatively correlated with all three performance measures (though only Tobin's Q is shown here), which suggests that it is not a measure of monitoring effectiveness.

associations are of first-order importance. Although neither is surprising, they suggest that our approach to controlling for size effects has the potential to change the results. Additionally, the HSIC measure is strongly negatively associated with institutional holdings. Presumably, this is due to the reluctance of institutions to invest in small stocks. Therefore, in firms in which institutions owned more shares, the HS measure tended to conclude that such institutions had less influence. There is also highly significant negative correlation between HS's concentration measure and all three of HS's performance measures including Tobin's Q.

4 Executive Incentives as a Function of Institutional Investor Influence

Our regression specifications largely mimic those of HS, including the sequencing of tables. We include the same controls, typically the change in shareholder wealth, Tobin's Q, a dummy for whether the executive is the CEO, two-digit Standard Industry Classification (SIC) dummies, and year-fixed-effects. We do entertain use of logged market-capitalization instead of the raw market-capitalization and occasionally show that our results also hold with specifications in which all positive and continuous variables are logged. Option grant, restricted stock grant, and share ownership sensitivity are Tobit due to non-negativity constraints, other compensation regressions are standard Generalised Linear Model (GLMs). Again, our specifications are almost identical to those in HS, which has the advantages that we can defend them based on prior use, and that the reader can find more justification for the exact specification in the original HS paper.

This section presents the results for the effect of institutional influence on observed option-grant, restricted stock grant, and share-ownership pay-for-performance sensitivity, together with sensitivity measures computed directly from changes in pay. We utilize both panel and long-run change data representing time-series analysis.

4.1 Option Grant, Restricted Stock Grants, and Share Ownership Pay-for-Performance Sensitivity

In their Table 2, HS investigate option-grant pay-for-performance sensitivity in panel data sets. Model (1) in our Table 6 replicates the HS's specification

Independent Variables	Dependent Variable: PPS-OptionGrants					
	(1)	(2)	(3)	(4)	(5)	(6)
Chg ShrWealth	−0.93	1.43	−1.62	0.64	−1.98	0.69
	(0.71)	(1.10)	(1.23)	(0.49)	(1.51)	(0.53)
Lag Chg ShrWealth	−2.98**	−2.80**	−2.57*	−0.85	−2.49*	−1.00
	(2.14)	(2.09)	(1.84)	(0.63)	(1.78)	(0.75)
Lag top-5 HSIC	1.77***	0.79***				
	(21.85)	(8.57)				
Lag Inst Herf Q4			0.16***	0.02		
			(13.62)	(1.27)		
Lag top-5					1.34***	−0.31**
					(10.04)	(2.12)
Lag Inst Hold	0.46***	0.60***	−0.67***	0.38***	−0.47***	0.56***
	(7.93)	(10.45)	(9.66)	(4.75)	(7.01)	(7.43)
Lag Tobin's Q	0.04***	0.06***	0.03***	0.06***	0.03***	0.06***
	(6.76)	(10.47)	(5.75)	(10.28)	(5.65)	(10.23)
Lag Market-Cap	−3.12***		−4.07***		−4.65***	
	(6.40)		(8.32)		(9.57)	
Log Lag Market-Cap		−0.18***		−0.21***		−0.22***
		(22.81)		(27.83)		(29.79)
CEO Dummy	1.18***	1.17***	1.18***	1.17***	1.18***	1.17***
	(50.66)	(50.73)	(50.59)	(50.69)	(50.58)	(50.69)
2-Digit industry and year controls — included but not reported						
Log Likelihood	–274,736	–274,498	–274,881	–274,535	–274,923	–274,533
N = 135,343 Firm Years						

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 6. Tobit analysis of pay-for-performance sensitivity of option grants as a function of institutional influence (HS, Table II).

Description: Models (1) and (3) repeat the Tobit specifications in HS (Table-II, 2003), predicting the PPS of option grants. Models (2) and (4) replace the market-capitalization control with its natural log. Models (5) and (6) are similar to (1) and (2) but normalize the top-5 institutional holdings by total shares outstanding, not by institutional shares outstanding.

Interpretation: Only the HSIC variable retains its positive significance when the size control is changed. Its significance halves. The Herfindahl measure loses its significance. The top-5 ownership variable switches sign. The higher log-likelihood values in models (2), (4) and (6) indicate a better fit according to Likelihood Ratio Chi-Square tests.

in our extended data set. Our coefficient of 1.77 on HS's institutional concentration measure is similar to their coefficient of 1.36, and both are statistically significant. Our Herfindahl measure in model (3) has a coefficient of 0.16, which is less than HS's 1.61. Our alternative measure of top-5 institutional ownership is divided by all shares rather than institutionally-owned shares, and has a coefficient of 1.34. All the concentration measures are statistically significant.

In models (2), (4), and (6), the only change is the use of the natural logarithm of market-capitalization instead of the raw level of market-capitalization. The log-market-capitalization in (2) and (4) has three times the explanatory power of the raw market-capitalization in models (1) and (3), and the overall regression fit improves in terms of a less negative log likelihood ratio. More importantly, this change divides the coefficient of the HS institutional concentration measure in half,[9] eliminates the effect of the Herfindahl quartile, and reverses the sign on the still significant top-5 HSIC institutional ownership variable. The fact that the latter variable, which measures the top-5 holdings among all shareholdings, has no (or actually negative) marginal impact is the strongest suggestion for us that institutions do not greatly associate with option-granting activity. Of course, the HS regressions are not based on a natural quasi-experiment but are simply associations. Other variables or logarithmic transformations could well restore or further reduce the effect of concentration.

In Table 7, we push the HS hypothesis in an admittedly extreme direction by analyzing the sensitivity of restricted stock grants. The question that we pose is: are institutions associated with firms in which executives are not only receiving more option grants but are also better incentivized? In specifications that mimic those of HS, the data suggests that firms that have more institutional oversight also have executives that are less incentivized in terms of a lower sensitivity of restricted stock grants. This could even be why these firms hand out more new options. However, concluding from this evidence that institutions are responsible for or prefer investing in firms with poorer managerial incentives seems absurd. Yet this conclusion could arise from the same logic and empirical evidence that led to the HS conclusion

[9] The significance disappears in the original 1991 to 1997 data set, but reappears here because our expanded data set is much larger.

	Dependent Variable: PPS-StockGrants		
Independent Variable	(1)	(2)	(3)
Chg ShrWealth	1.44	1.90*	1.72*
	(1.47)	(1.95)	(1.76)
Lag Chg ShrWealth	0.38	0.12	0.21
	(0.37)	(0.12)	(0.21)
Lag Top-5 HSIC	−0.78***		
	(12.66)		
Lag Inst Herf Q4		−0.03***	
		(3.94)	
Lag Top-5			−0.95***
			(9.84)
Lag Inst Hold	0.66***	0.99***	1.15***
	(15.10)	(19.36)	(23.28)
Lag Tobin's Q	−0.21***	−0.20***	−0.20***
	(31.96)	(30.88)	(31.63)
Lag Market Cap	1.41***	2.06***	1.75***
	(4.43)	−6.52	(5.57)
CEO Dummy	0.41***	0.41***	0.41***
	(24.98)	(24.94)	(24.95)
2-Digit industry and year controls — included but not reported			
Log Likelihood Function	–129,700	–129,773	–129,732
N = 135,343 firm-years			

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 7. Pay-for-performance sensitivity of restricted stock grants (not in HS).

Description: This table is similar to the previous one, except that the dependent variable are new stock grants rather than new option grants. Logging the Market Cap control yields similar results. Combining Tables 6 and 7 by adding together option grant and stock grant sensitivity yields similar results to Table 6 in the sense that logged size controls greatly reduces or removes the HS finding that sensitivity increases in concentration.

Interpretation: Measures of institutional ownership have a negative influence on restricted stock grants.

about the association between institutional holdings and new option grants.[10]

To illustrate how it matters that smaller firms have more incentives when quoted as a function of the entire firm value, consider an even more aggressive definition of executive incentives that uses the executive's entire shareholdings, not just the new option or restricted stock grants. These shareholdings are considerably larger in magnitude than new option grants, and are thus more likely to be reflective of how incentivized managers are. Table 8 shows that the same specification as in HS would again yield the inference that firms with more institutional control have more incentives. However, this vanishes with log-size instead of size as a control, leaving the rather strange conclusion that share ownership sensitivity behaves exactly like option grant sensitivity. This behavior is only strange if in fact share ownership lies outside the control of the board, unlike option and restricted stock grants. Perhaps the best interpretation of our results is that concentrated institutional investors have no effect on all three forms of incentives.

4.2 Institutional Monitoring and Long-Run Changes in Compensation Structures

In their Table-III, HS find that long-run increases in ownership concentration in the first half of their time-series data set gave rise to long-run increases in incentive compensation in the second half. Utilizing their six-year sample period, HS lose more than half their number of firm-change observations since fewer than half their firms remain in the sample for the maximum period. Adopting the same method, with our 19-year sample period we lose over 90% of all firm-change observations. Hence, we modify the HS method to preserve all eligible firms that satisfy the minimum required period of a four-year continuous presence in the data set, replacing the sample start and end dates with the corresponding firm dates. With a maximum of one observation per firm, the dependent variable is now the pay-for-performance sensitivity of option grants averaged over the five highest paid managers in each firm and averaged over each year in the second half of each individual firm's sample period minus the same average pay-for-performance sensitivity of option grants per firm averaged over the years, making up the first

[10] When market-capitalization is logged, the magnitudes of these incentive-reducing effects are reduced but not eliminated, except for the Herfindahl influence measure (these results are not reported).

Independent Variables	Dependent Variable: PPS-StockOwned			
	(1)	(2)	(3)	(4)
Chg ShrWealth	−7.57	10.87	−9.21	10.78
	(0.58)	(0.83)	(0.70)	(0.82)
Lag Chg ShrWealth	36.62***	11.94	38.03***	12.31
	(2.62)	(0.89)	(2.72)	(0.91)
Lag top-5 HSIC	2.92***	−0.31		
	(3.56)	(0.33)		
Lag Inst Herf Q4			0.44***	0.06
			(3.64)	(0.44)
Lag Inst Hold	−23.31***	−22.16***	−25.81***	−22.34***
	(39.73)	(38.01)	(36.94)	(27.71)
Lag Tobin's Q	0.41***	0.49***	0.41***	0.49***
	(6.84)	(7.96)	(6.79)	(7.97)
Lag Market-Cap	−43.81***		−44.21***	
	(9.20)		(9.30)	
Log Lag Market-Cap		−0.80***		−0.77***
		(10.17)		(10.19)
CEO Dummy	24.05***	24.03***	24.05***	24.03***
	(102.76)	(102.71)	(102.77)	(102.72)
2-Digit industry and year controls — included but not reported				
Log Likelihood Function	–631,684	–631,674	–631,683	–631,674
N = 135,343 Firm-Years				

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 8. Pay-for-performance sensitivity of shares owned (not in HS).

Description: This table is similar to the two previous ones, except that the dependent variable are the shares owned by executives, not options or shares newly granted to executives.

Interpretation: Following the HS specifications would lead us to conclude that institutions can even influence the total level of executive ownership. However, the change to a log-size control again either reverses the sign or eliminates all significance.

half of the sample period for that particular firm. Apart from correcting a flaw in HS's methodology, we stress that our method exactly captures the spirit of the HS method that is dependent on utilizing the entire sample in the definition of the period to be utilized for their time-series analysis, while reliably reflecting our much longer time series. Splitting up the time-series

analysis into shorter periods would serve no useful purpose and would be unlikely to affect the results. The main independent variable of interest is the change in various measures of concentrated institutional monitoring over the first half of the presence of the particular firm (midpoint year minus the initial year). One can disagree over whether the long-term time-series effects are more powerful than the panel effects but without time series effects panel data results are most likely due to the cross-section.[11]

In Table 9, models (1) and (3) replicate the HS specifications for the change in option grant sensitivity in our data set. As in the HS study, the change in HSIC's in the first half of each firm's presence is a positive and significant predictor of the option-grant sensitivity change in the second half. The coefficient is 2.48 similar to the 3.93 reported in HS. With fewer observations than the panel regressions, the statistical significance of the coefficients is naturally more modest (t's of 2.25 and 2.72, for ours and HS's respectively). However, the change in the Herfindahl influence is no longer significant in our sample with the HS controls in model (2). Similarly, top-5 institutional ownership is not significant either with raw controls or log-modified controls (which are not shown). When the long-run change in restricted stock grant sensitivity replaces option grant sensitivity in model (5) with HS's concentration measure and HS controls the coefficient is also insignificant, as is also the case with the other two measures of institutional influence or when size controls are logged (this is not reported). Models (2), (4), and (6) replace HS's raw firm size and change in shareholder wealth controls with averages of the logged values. In all cases, institutional influence has no effect on incentive levels. To enable the change in shareholder wealth to be logged it is defined as $(1 + r_t) \cdot \text{MCap}_{t-1}$.

4.3 Pay-for-Performance Sensitivity due to Pay Changes

In their Table-IV, HS regress either the changes in salary and bonus compensation (in models (1) and (2)), and the changes in total direct

[11] Additionally, HS include three other size controls taking the form of the change in shareholder wealth for 1992, 1993, and 1994. Taking the logarithm of shareholder wealth, that is, the product of (1 plus the firm's stock return) and the opening market-capitalization$_{t-1}$), so that the change in shareholder wealth controls more effectively for size, and also taking the logarithm of shareholder wealth in 1994, reduces to insignificance both of HS's concentration measures (which is not shown).

	Dependent Variable: Long-Run Subsequent PPS Difference via Grants					
	PPS-Options$_{T/2...T}$				PPS-Stock$_{T/2...T}$	
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
top-5 HSIC$_{T/2}$ — top-5 HSIC$_1$	2.48**	1.80			−0.32	
	(2.25)	(1.62)			(0.62)	
Inst Herf Q4$_{T/2}$ — Inst Herf Q4$_1$			3.65	1.78		−1.29
			(0.66)	(0.32)		(0.50)
Inst Hold$_{T/2}$ — Inst Hold$_1$	−1.14	−1.14	−2.07**	−1.75*	−0.22*	−0.05
	(1.24)	(1.25)	(2.22)	(1.88)	(0.52)	(0.12)
First Half (1 to T/2) Averages						
Tobin's Q	−0.36***		−0.38***		−0.04	
	(3.12)		(3.35)		(0.84)	
Log(Tobin's Q)		−1.25***		−1.34***		−0.10
		(3.12)		(3.36)		(0.59)
Market-Cap	0.02		0.03		−0.00	−0.00
	(1.25)		(1.50)		(0.23)	(0.26)
Log Market-Cap		−6.66***		−7.14***		
		(3.40)		(3.67)		
Chg ShrWealth	−0.02		−0.02		−0.00	−0.00
	(0.13)		(0.21)		(1.01)	(1.00)
Log Chg ShrWealth		7.05***		7.44***		
		(3.62)		(3.84)		
2-Digit industry — included but not reported						
Adjusted R^2	0.0189	0.0274	0.0168	0.0262	0.0154	0.0154
N = **2,238** Firms						

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 9. Long-run change in institutional investor concentration (holdings) and subsequent change in option-grant sensitivity (and stock-grant sensitivity) (HS, Table-III).

Description: Models (1) and (3) predict the long-run change in option grant sensitivity as in HS. Models (2) and (4) replace raw control with log controls. Models (5) and (6) replace the option grant sensitivity with restricted stock grant sensitivity.

Because our sample contains three times as many years as HS, each firm has its own T. A firm must appear in the data set for a minimum of four consecutive years in order to be included.

The dependent variable is the change in option-grant sensitivity, i.e., the difference between the firm's average option-grant sensitivity summed over each firm-year during the second half of the firm's presence in the data base and the average sensitivity summed over each firm-year during the first half.

Option grant sensitivity in year t is the share equivalent of options granted, which is then multiplied by 1,000 and expressed relative to the total closing number of shares outstanding. Similarly, restricted stock sensitivity is the number of restricted shares granted relative to the closing number of shares and multiplied by 1,000.

Interpretation: Only the top-5 HSIC variable seems to have explanatory power. It drops just below conventional statistical significance levels if control variables are logged. There is no significance when the independent variable is the Herfindahl Q4 or the dependent variable is the stockgrant-based PPS.

compensation (in models (3) to (6)) on changes in shareholder wealth, and changes in shareholder wealth interacted with lagged institutional concentration variables and controls.

We entertain two reasonable changes. First, we follow the HS interpretation of the Jensen and Murphy (1990) definition of pay for performance in their Table-VI: the sum of slope coefficients for a regression of changes in *total direct compensation* on current and lagged changes in shareholder wealth. Presumably, executive salaries increase not only concurrently when the firm does well but also with some delay, that is, when a firm did well in the prior year. Second, it is common to include institutional concentration by itself, and not only as an interaction variable (for example, Greene (2000, p. 326)).

Table 10 replicates the HS-Table-IV test. Models (1) to (3) show that the interacted institutional concentration variable is positive. Their top-5 HSIC had a coefficient of 0.035, our extended coefficient is 0.04. Their Herfindahl coefficient had a coefficient of 0.001 that is insignificant, our's is 0.008 and highly significant. Their surprising non-result is simply due to their slip in failing to interact with the change in shareholder wealth that they claimed to do. When we do this in their data supplied by HS we get approximately our result. Model (3) adds the top-5 institutional ownership influence measure not mentioned by HS to once again get a positive and significant sign.

Models (4) to (6) add the lagged shareholder wealth interaction and intercept interactions. The coefficients on lagged shareholder wealth interaction with the top-5 HSIC are negative. This suggests that firms with more institutional concentration decrease bonus and salary if stock performance was positive one year prior. It means that an executive who increases shareholder wealth can expect more of an increase in salary and bonus in the same year, followed by more of an equally large decrease in salary and bonus the following year. Over a two-year interval, the compensation of an executive who raised shareholder wealth does not increase more in firms with more institutional concentration.

Unlike the institutional concentration and the top-5 HSIC variables, the summed Herfindahl quartile measure remains slightly positive. It is however only one quarter as large. Finally, the measure that we argue is best, the top-5 holdings divided by all outstanding shares, similarly loses its positive coefficient and significance over a two-year horizon.

5 Institutional Investor Influence and the Level of Executive Compensation

HS (p. 2365) argue that if concentrated institutions monitor, then firms with greater concentrations of institutional ownership should effectively have lower pay after controlling for a variety of influences such as size and performance. We disagree as their line of argument is difficult to reconcile with their claimed finding that concentrated monitoring is associated with much higher levels of pay-for-performance sensitivity, and thus levels of managerial effort. If it were true that incentives were higher, giving rise to greater effort, we would expect managers to be rewarded in the form of higher pay for their efforts.

Given the intuition that pay should rise with effort, a surprising feature of their analysis is the huge — we think implausible — magnitude of the pay reductions with a one standard deviation increase in top-5 HSIC that is associated with a drop in *total direct compensation*, which is 19% (37%) of the mean (median). Furthermore, it is surprising to us that HS present only the one basic table without the long-run time series robustness checks that they perform on sensitivity grounds.

5.1 Pay Levels as Functions of Institutional Investor Influence

Adopting HS's Table-V approach (p. 2367), two measures of compensation are examined salary and total direct compensation. Table 11 examines the effect of institutional influence on the level of salary and total direct compensation. In models (1) and (3) for salary, and (5) and (7) for total direct compensation, we use HS's specification to obtain almost identical results. In model (1), the coefficient on top-5 HSIC measure is (negative) −$299,200. This is only slightly more negative than (negative) −$247,967 in HS (Table-V). Both are highly significant. In model (2) we make a single change: we use the natural logarithm of market-capitalization. This single change reverses the sign of the top-5 HSIC, with the coefficient still being significant at the 1% level and large in magnitude at $122,130. In models (3) and (4), we measure institutional influence using HS's Herfindahl quartile. In model (3), with HS's specification, one gets almost precisely their result, −$42,550, which is similar to their finding of −$36,692. When taking the logarithm of market-capitalization in model (4), we obtain increases in salary at the rate of $8,820 in the Herfindahl quartile Q4. Despite the

	Dependent variable: (Salary + Bonus)					(Indep = 2-Yr ΔW)	
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Chg ShrWealth	0.002***	0.002***	0.002***	0.02***	0.006***	0.01***	
	(4.21)	(4.59)	(4.83)	(9.22)	(6.27)	(9.25)	
Chg ShrWealth				−0.003	0.002**	−0.00009	
				(1.42)	(2.45)	(0.07)	
Lag Chg ShrWealth × Lag top-5 HSIC				−0.07***			−0.007
				(8.50)			(1.24)
Chg ShrWealth × Lag top-5 HSIC	0.04***			0.05***			
	(21.98)			(5.94)			
Lag top-5 HSIC				83.96***			
				(3.00)			
Lag Chg ShrWealth × Lag Inst Herf Q4					−0.004***		0.002
					(4.77)		(2.90)
Chg ShrWealth × Lag Inst Herf Q4		0.008***			0.006***		
		(22.84)			(8.07)		
Lag Inst Herf Q4					12.39***		
					(3.09)		
Lag Chg ShrWealth × Lag top-5						−0.06***	0.00
						(8.06)	(0.00)
Chg ShrWealth × Lag top-5			0.06***			0.06***	
			(22.76)			(7.39)	
Lag top-5						117.46***	
						(2.60)	

(*Continued*)

	Dependent variable: (Salary + Bonus)					(Indep = 2-Yr ΔW)	
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Inst Hold	29.73*	18.60	22.02	57.88***	−19.59	−6.31	
	(1.66)	(1.04)	(1.23)	(2.94)	(0.84)	(0.28)	
Lag Tobin's Q	−2.43	−2.01	−2.09	0.25	−0.42	−0.16	
	(1.19)	(0.98)	(1.03)	(0.12)	(0.20)	(0.08)	
Lag Market-Cap	−0.0007***	−0.0007***	−0.0007***	−0.0006***	−0.0006***	−0.0006***	
	(4.51)	(4.58)	(4.36)	(3.85)	(3.75)	(3.84)	
CEO Dummy	49.97***	49.93***	49.92***	49.84***	49.89***	49.79***	
	(6.89)	(6.89)	(6.89)	(6.88)	(6.88)	(6.87)	
2-digit industry and year controls — included but not reported							
Adjusted R^2	0.0376	0.0380	0.0379	0.0383	0.0383	0.0386	
N = 102,756 Firm-Years							

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 10. Pay-for-performance sensitivity of cash pay as a function of institutional influence (HS Table-IV).

Description: Models (1) through (3) repeat the specifications in HS (2003, Table IV), explaining cash pay. Models (4) through (6) add the institutional influence variable itself (Jensen and Murphy (1990)), plus one-further lag of shareholder wealth change in the interaction. Column 7 summarizes the coefficient from equivalent regressions in which the change in shareholder wealth is replaced with the sum of the change in shareholder wealth and lagged shareholder wealth, thus measuring the two-year net effect. (HS accidently slipped when failing to interact their Institutional Herfindahl Quartile with the change in shareholder wealth, making their coefficient insignificant. It becomes positive and significant using HS's original data in the specification that HS intended to use.)

Interpretation: Although it is correct that lagged institutional influence measures increase the coefficient on how changes in shareholder wealth influence changes in executive wealth contemporaneously, the same measures decrease the coefficient on how changes in shareholder wealth influence cash and bonus one year further out. The net effect is about zero.

	Dependent Variable: Salary				Dependent Variable: Total Direct Comp				
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Chg ShrWealth	0.002***	0.0004***	0.002***	0.0004***	0.04***	0.02***	0.04***	0.02***	0.02***
	(20.96)	(4.51)	(21.49)	(4.39)	(16.45)	(7.19)	(16.50)	(7.10)	(7.10)
Lag Chg ShrWealth	−0.001***	0.0003***	−0.001***	0.0003***	0.02***	0.06***	0.02***	61307.55***	0.06***
	(13.26)	(3.08)	(13.71)	(3.34)	(8.99)	(24.20)	(8.90)	(24.36)	(24.36)
Lag top-5 HSIC	−299.20***	122.13***			−2,828.64***	2,509.63***			
	(56.94)	(22.10)			(18.98)	(14.91)			
Lag Inst Herf Q4			−42.55***	8.82***			−461.36***	158.86***	
			(55.13)	(11.23)			(21.11)	(−6.65)	
Lag Inst Hold	96.19***	−8.41**	344.54***	−70.32***	1,680.84***	−125.76	4,250.11***	−1,298.97***	
	(25.73)	(2.45)	(77.16)	(14.75)	(15.86)	(1.20)	(33.61)	(8.96)	
Lag Tobin's Q	−12.73***	−21.96***	−12.30***	−22.03***	328.15***	212.53***	329.70***	211.15***	
	(33.07)	(60.95)	(31.98)	(61.05)	(30.07)	(19.38)	(30.27)	(19.24)	
Lag Market-Cap	3,480***		3,509***		68,820***		68,568***		
	(113.96)		(115.11)		(79.49)		(79.41)		
Lag Log Market-Cap		90.33***		87.35***		1305.81***		1,238.55***	
		(195.51)		(195.77)		(92.85)		(91.26)	
CEO Dummy	315.43***	317.00***	315.30***	317.02***	3,190.92***	3,209.80***	3,190.00***	3,210.11***	
	(213.83)	(232.59)	(213.59)	(232.29)	(76.3)	(77.37)	(76.30)	(77.33)	

(*Continued*)

	Dependent Variable: Salary				Dependent Variable: Total Direct Comp			
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2-Digit Industry and Year Controls — included but not reported								
Adjusted R^2	0.41	0.50	0.41	0.50	0.16	0.17	0.16	0.17
N = 135,343 Firm-Years								

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 11. Level of executive compensation as a function of institutional influence (HS Table-V).

Description: This table builts on HS's Table V. It shows the coefficients from a regression of the change in the manager's salary (models (1) to (4)) and total direct compensation (salary plus bonus plus share and option grants and other direct payments in models (5) to (8)) on the contemporaneous and lagged change in the shareholder's wealth with percentage holdings of institutions filing 13-f reports, the lagged change in HS's top-5 institutional concentration measure based on the sum of shares held by the top-5 institutional investors relative to total institutional shareholding in models (1) and (2), and (5), (6), their Herfindahl quartile concentration measure in models (3) and (4), and (7) and (8) as measures of institutional influence. Additional controls consist of the lagged values of total institutional ownership, Tobin's Q, market capitalization, and the CEO dummy that equals 1 if the manager is CEO and zero otherwise, and a series of control dummies for the firm's two-digit SIC industry code and for the year. These control dummies are not shown. Models (1), (3), (5), and (7) have the same specification as HS's models (1), to (4) in their Table-V with similar results in the form of negative and in absolute terms, large and significant coefficients. Models (2), (4), (6), and (8) replace the HS firm size measure, lagged market capitalization, with its logarithmic value, reversing the negative signs on the two types of concentration measure into significantly positive coefficients.

Interpretation: The table shows that extending the HS sample from their 1992–1997 period to the much longer 1992-2010 period used in the present study preserves the HS conclusion in models (1), (3), (5) and (7), that concentrated institutional monitoring sizably reduces both salary and total direct compensation, so long as one continues to use HS's size control based on the level of market capitalization. When utilizing the logarithmically transformed market capitalization, their findings are reversed, as in models (2), (4), (6), and (8). Using a panel data set, institutional concentration and compensation are strongly positively associated once a more robust size control is introduced. The overall fit (Adjusted R2) improves considerably, too (from 0.41 to 0.50; and from 0.16 to 0.17).

sign change, both coefficients are significant at the 1% level. Similarly, for *total direct compensation*, HS's specification for top-5 HSIC yields a negative coefficient of nearly three million (−$2828,640) in model (5) and almost precisely reverses to a positive two and one half million ($2509,630) in model (6) with the size control now logged. HS (in model (3), Table-V) obtain a more modest fall of −$1620,658. The results for HS's Herfindahl quartile are similar, with our fall of nearly half a million (−$461,360) in model (7) compared with HS's −$258,429, with the sign turning around but remaining significant at the 1% level in model (8) with a gain of $158,860. Similar HS-style results are also obtained using our top-5 ownership measure of concentration with a similar turnaround rejecting HS when the logarithm of market-capitalization is controlled for (not shown).

The question arises, could these very strong sign turnarounds merely be a consequence of our failure to take other logarithmic transforms of variables other than market-capitalization. We test this proposition for the logarithm of salary, and for the logarithm of total direct compensation tests. Not only is the elasticity of the pay measure now positive in both models, but it is also highly significant in the case of the logarithm of total direct compensation (the results are not shown).

In every case, the introduction of a better size control improves the model's explanatory power. For example, comparing model (2) with (1), there is a 21% improvement in the R-Squared. For the (unreported) log specification, the improvement is a sizeable 230%, from 16% with HS's linear specification model (5) to 53% with the corrected log specification.

5.2 Institutional Monitoring and Long-Run Changes in Pay Levels

Just as it seems questionable that concentrated institutional monitoring sizably reduces pay when managers supposedly put in a great deal more effort, it would also be quite wrong to believe they are paid a great deal more based on our findings in Table 11 utilizing logged size controls. Do HS's findings withstand other standard robustness checks? We include firm-fixed-effects in all of Table 12's models and find that concentrated institutional influence has no significant effect on either salary or total direct compensation for any measure of influence regardless of raw or logged size controls (results not shown). The inability to withstand simple firm-fixed-effects for any size control specification indicates that HS have detected a cross-sectional effect that is unlikely to withstand HS's long-run influence change analysis employed in their Table-III.

	Dependent Variable: Long-Run Difference from $T/2$ to T for Total Comp		
Independent Variable	(1)	(2)	(3)
top-5 $\text{HSIC}_{T/2}$ — HSIC_1	–1,708 (0.85)		
Inst Herf $\text{Q4}_{T/2}$ — Herf Q4_1		–10,656 (1.05)	
top-$5_{T/2}$ — Top-5_1			–5,305 (1.59)
Inst $\text{Hold}_{T/2}$ — Inst Hold_1	1,407 (0.84)	2,554 (1.50)	3,580* (1.88)
First Half (1 to T/2) Averages			
Tobin's Q	–1,218*** (5.85)	–1,210*** (5.84)	–1,232*** (5.92)
Market-Cap	0.02 (1.25)	–344*** (10.94)	–341*** (10.85)
Chg ShareWealth	3,022*** (14.49)	3,024*** (14.51)	3,014*** (14.46)
2-Digit Industry — included but not reported			
Adjusted R^2	0.13	0.05	0.05
N = 2,238 Firms			

Note: (Absolute) T-statistics are in parentheses. One, two, and three asterisks denote statistical significance at two-sided 10%, 5%, 1% levels.

Table 12. Long-run change in institutional investor influence and subsequent change in total direct compensation (not in HS).

Description: This table uses the specification in Table 9 (HS, Table-III) on the compensation variable in our Table 11 (HS, Table-V). (Not reported: Models that include logged controls, as in our Table 3, have similar coefficients.)

Interpretation: Long-run changes in institutional influence variables do not predict long-run changes in executive compensation. Institutions do not seem to have any influence on long-run total direct compensation.

Can HS explain huge increases in pay levels based on falling institutional concentration? The mean value of total direct compensation has doubled in our data base compared with theirs due to this rising trend but concentration has hardly altered. Table 12 applies HS's Table III long-run methodology to long-term increases in compensation levels. The specifications are identical to our Table 9 above except for the change in the dependent variable. Unlike Table 9, reporting of results is confined to just the HS specification with the three influence measures and unlogged size and change in market wealth controls. As with the firm fixed effect results, none of the long-run changes in the three influence measures has any significant effect on long-run changes in pay levels. The same results hold once various size-related controls are logged (unreported).

In summary, in the panel data set we are able to replicate HS's results using HS's raw size controls. Utilizing comprehensive logged controls, HS's finding of sizeable and highly statistically significant pay changes are reversed with pay implausibly increasing massively in measures of concentration. These implausible findings disappear with the use of firm-fixed-effects. We find no support for HS's finding that concentrated institutional monitoring lowers, or for that matter, raises, total direct compensation when applying HS's long-run change analysis.

6 Previous Research

Given that firm size is a well-known and important determinant of executive compensation, selecting the correct functional form for firm size is a vexing and important issue that lies at the heart of HS and our comment. Many estimates, including those of Murphy (1985), Rosen (1992), Gibbons and Murphy (1992), Huson, Parrino, and Starks (2001), Baker and Hall (2004), Gabaix and Landier (2008), Edmans, Gabaix, and Landier (2009), Babenko (2009), and Aggarwal, Erel, Ferreira, and Matos (2011), use a logarithmic specification with the elasticity between firm size and total executive pay in the range of 0.3 and 0.4. HS seems inadvertently to employ a firm size measure in levels (as well as alternative firm size measures also measured in levels) and consequently their estimates do not yield a suitable elasticity value that is capable of realistically explaining the data. Institutional monitoring coefficient signs typically reverse or become insignificant when the log of firm size is employed. At the same time, there are sizeable gains

in explanatory power with the use of logarithmically transformed market-capitalization that are well-known.

HSs findings have often been interpreted as evidence suggesting that firms without monitors overpay executives, as in the rent-extraction view of executive compensation maintains (for example, Bertrand and Mullainathan, 2001; Bebchuk *et al.*, 2002; Bebchuk and Fried, 2003, 2004; Chhaochharia and Grinstein, 2009; Morse *et al.*, 2011). Chhaochharia and Grinstein (2009) find that more stringent board requirements, in particular the requirement to have a majority of independent directors, reduces CEO pay. Guthrie *et al.* (2012), however, reexamine this question, and find that Chhaochharia and Grinstein (2009)s results are fragile with respect to two outliers. Morse *et al.* (2011) find that powerful CEOs rig performance measures to increase their pay, and that these firms then underperform, but see the critique by Wan (2014), and the rebuttal, Morse *et al.* (2013).

The primary argument in our study is that HS's use of the lagged value of the level of raw market-capitalization as the size control in their main regressions (p. 2359), rather than the lagged logarithm of market-capitalization, distorts the coefficient of their measures of the influence of institutional concentration.[12] Moreover, HS make no attempt to justify their main measure of influence, which paradoxically falls as size of the institutional investor increases. A number of authors have drawn attention to significant declines in pay-for-performance sensitivities as firm size increases (for example, Jensen and Murphy, 1990; Garen, 1994; Hadlock and Lumer, 1997; Schaefer, 1998; Murphy, 1999; Jin, 2002; Cichello, 2005), and hence the literature makes clear the need to have effective size controls. HS's artificial measure of influence that is large in small firms combined with the very well-known findings that small firms have both low pay and high pay-for-performance sensitivity guarantees HS's main findings, conditional on the use of a weak firm-size control. Earlier discussion on size differences, highlighted by the extreme quartile analysis display of huge size differences, reinforces this point. Moreover, adoption of more robust size controls substantially improves the overall statistical fit, both using their original data set (which we do not report) and in our extended data set.

[12] HS (p. 2357) also use net assets and total assets as controls but, in keeping with the use of raw capitalization, retain them in their raw form without taking logarithms as the conventional method to account for extremes in firm size heterogeneity together with severe skewness in firm-size data.

Prior research fails to address the fragility of HS's results and to achieve a satisfactory model fit. Almazan *et al.* (2005) replicate HS's findings, for both incentives and pay levels, using the same data set as HS with the same definition of institutional concentration and raw market-capitalization size controls but with the inclusion of more variables. Cadman *et al.* (2010, Table 6) set out with the limited aim to replicate HS's Table-II model of option grant pay-for-performance sensitivity when they compare a data set of ExecuComp and non-ExecuComp firms for the period 2000 to 2007. Their ExecuComp data set results for this sample period are quite similar to our panel data results for the 1992 to 2010 period for the same specification, after controlling for the logarithm of market-capitalization. They do not regard these results as in any sense a test of HS as their focus is entirely on comparing one limited measure of option-grant sensitivity for the two groups of stocks. Nor do they investigate the impact of concentration on either salary or total direct compensation, carry out long-term time-series tests, or investigate the far more important share ownership sensitivity. Kang and Liu (2008) examine pay-performance sensitivity using a version of HS's institutional concentration measure as a control variable in a different framework, in which the emphasis is on monitoring by informed traders, that is derived from Holmstrom and Tirole (1993). Dikolli *et al.* (2009) argue that firms with transient ownership will issue relatively more equity incentives to counter short-termism, with their results robust to the inclusion of HS's concentration variable. Lastly, one possible source of supportive evidence for HS's findings is mutual proxy voting behavior but evidence from actual mutual fund proxy voting records suggests that most oppose reductions in CEO pay, and, overall, the evidence is mixed.[13]

7 Conclusions

HS appeared to document an effective role for institutional investors. Institutional presence seemed to significantly lower executive compensation

[13] Davis and Kim (2007) examine proxy votes of mutual funds for 2004 to find that for a sample of Fortune 1000 proxy contests, in 45 cases that attempted to limit executive pay, mutual funds were unanimously opposed to such attempts. Rothberg and Lilien (2006) also examine proxy-voting data and find that mutual funds voted 66% of the time in management's favor on issues of executive compensation. Ertimur *et al.* (2011) find that institutional investors lack sophistication in that they do not target excessively paid CEOs relative to CEOs with high predicted-pay based on economic determinants but exert a moderating influence — a $2.3 million reduction for those they deem excessively paid CEOs. We do acknowledge that HS's results are for all institutional investors while transparency with respect to proxy voting applies only to mutual funds.

levels, and raise option-grant pay-for-performance sensitivity. Our study reexamines the issue of concentrated institutional monitoring with the benefit of an additional decade of data and research. Our study shows how some HS design choices, especially weak firm-size controls and the adoption of their main influence measure that falls in firm size, contributed to their findings. Taking the logarithm of market-capitalization, instead of raw market-capitalization, reverses, removes, or ameliorates the effect of various measures of concentrated institutional ownership presence on pay levels and incentives. Defining institutional influence as the top-5 holders relative to all shareholders instead of relative to institutional shareholders further played a role. We can detect only a very modest positive influence of institutional shareholders in some option-grant sensitivity specification, and no effect in most of our tests. A fair characterization of our results is that they are inconsistent with concentrated institutional monitoring.

Our results do not shed light on the rent-seeking hypothesis. They should not be interpreted to support the view that firms pay executives either correctly or too much. The fact that we cannot detect that institutional shareholdings are associated with executive pay can be because firms always monitor perfectly (and pay correctly), because heterogenity in monitoring is elsewhere (for example, the corporate board), or because firms are never able to monitor effectively (and overpay).

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