Passive Institutional Ownership and Executive Compensation: Monitoring or Crowding Out?[*]

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ABSTRACT

By using the Russell 1000/2000 index reconstitutions to identify exogenous variations in institutional ownership, we examine the impact of passive institutions on executive compensation. Our key finding is that institutional ownership is strongly negatively associated with share ownership held by executives. In relation to this finding, we identify weaker pay-performance relationship due to reduced executive ownership. Whereas higher ownership by passive institutions tends to cause a structural change in executive pay from salary to stock options, there is no meaningful change in the level of total compensation. Our findings cannot be explained by a monitoring role of passive institutional investors. Instead, they are consistent with a crowding out effect: managerial ownership declines in response to higher ownership by institutions.

Key words: Institutional investors, executive compensation, managerial incentives

JEL: G23, G30, G34, J33

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1. Introduction

Institutional investors often hold a large portion of firms' stocks, and hence are commonly viewed as important market participants that have strong incentives to monitor the management and influence company performance (Shleifer and Vishny, 1997). For active institutional investors that have substantial stakes in the firms and actively manage their portfolios, both theory and evidence confirm that they play an important role in firms' decisions and performance (Parrino, Sias, and Starks, 2003; Hartzell and Starks, 2003; Kang, Juan, and Na, 2018). On the other hand, many institutional investors are passive in the sense that they pursue an investment strategy to deliver the return of a market index, instead of to actively manage their investments focusing on selected companies. Because such passive institutions hold highly dispersed ownership of a large number of companies and do not frequently buy or sell shares, their role and incentive in influencing the firms they invest can be very different. A few recent studies examine passive institutional ownership from the corporate governance perspective. Boone and While (2015) and Bird and Karolyi (2016) report that institutional ownership is associated with greater disclosure and enhanced information environment, and Appel, Gormley, and Keim (2016) show that passive mutual funds help improve firms' governance, leading to more independent directors, removal of takeover defenses, and more equal voting rights.

Contributing to this growing literature, in this study we examine the impact of passive institutional investors on executive compensation. This issue merits investigation for apparent reasons. As a key incentive scheme, executive compensation has been studied extensively by financial economists regarding various issues, including compensation contract mechanisms and the incentive effects on managerial decisions and performance. Hartzell and Starks (2003)

focus on large, active institutional investors and find a significant monitoring role such institutions serve in mitigating the agency problem between shareholders and managers. Then, naturally, one would ask whether passive institutional investors also serve a monitoring role in managerial compensation contracts. Implications from Boone and While (2015), Bird and Karolyi (2016) and Appel, Gormley, and Keim (2016) all imply such a role, noting that enhanced information environment, more independent board and stronger shareholder rights all require more efficient incentive contracts for managers. However, theory also points out other, more complex aspects of this issue. The nature of passive institutions' investment strategies, such as those of index mutual funds, determines that it is the performance of the overall market representing all of the index firms that is relevant. Since each institution only holds a tiny fraction of each index firm's total shares, there is a serious free-rider problem. It is not clear how such institutions are motivated to monitor, or even pay attention to, any specific company's performance.

Monitoring incentive is particularly relevant to executive compensation because incentive contracting is a complex process that is demanding for monitoring effort, involving all aspects of information collection, compensation design and performance evaluation. To empirically examine the role of institutions in managerial compensation, we face challenging endogeneity issues regarding the complex relationship between institutional ownership and executive compensation. For this reason, we follow several recent studies to use the annual Russell 1000/2000 index reconstitutions to identify exogenous variations in institutional ownership. The Russell 1000 and 2000 indexes are two value-weighted indexes of the largest thousand firms and the next two thousand largest firms listed in the U.S., respectively, which Russell Investment reconstitute each June based on the market capitalization of stocks. Since firms

cannot control or precisely manipulate small variations in ranking (Boone and While, 2015;

Crane, Michenaud, and Weston, 2016), index assignment into either the Russell 1000 index or

the Russell 2000 index is locally random around the Russell 1000/2000 cutoff. The index-

weighting mechanism determines that stocks at the top of the Russell 2000 index receive

significantly higher index portfolio weights than stocks at the bottom of the Russell 1000 index.

Since these stocks are otherwise closely comparable, the random index assignment generates

exogenous variations in institutional ownership for stocks with market capitalization rankings

around the cutoff. In particular, as both Appel, Gormley, and Keim (2016) and Crane,

Michenaud, Weston (2016) show, such exogenous variations are primary due to passively

managed institutions that track or benchmark against a large index and have diversified

holdings and low portfolio turnover.[1]

In this experimental setting, we examine executive compensation for the 500 firms

surrounding the Russell 1000/2000 cutoff, with 250 firms on each side.[2] As in Appel, Gormely

and Keim (2016), we instrument for ownership by passive institutions with an indicator for

being assigned to the Russell 2000 index in a given year. This instrument variable approach is

based on the assumption that inclusion in the Russell 2000 index is associated with an increase

in ownership by passive institutions (relevance condition) but does not directly affect executive

compensation contracts except through its impact on the institutions' ownership (exclusion

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[1] Indeed, many passive institutional investors directly track the Russell 1000/2000 indexes,
making them hold more stocks with higher index weights. In addition, under the index
performance benchmarking, active institutional investors overweight stocks with high index
weights to reduce tracking errors, which also rise to an exogenous passive element of such
institutions' ownership.

[2] We also examined our results for two alternative bandwidths, 150 and 200 firms on each
side respectively. We found that our major results are very robust to the choice of the
bandwidth although slightly stronger with the 250-firm bandwidth due to the larger sample size.

restriction condition). We confirm the relevance condition by running the first-stage regression of institutional holdings on membership in the Russell 2000 index. Intuitively, the exclusion restriction also holds. Because stock assignment between the Russell 1000 and Russell 2000 indexes is purely based on market capitalization, it is largely random for those otherwise-comparable firms near the index cutoff. Indeed, there is no feasible economic reason why index inclusion would be directly related to executive compensation contracts, after controlling for relevant compensation-related factors including company size and performance.

With this approach we find that passive institutional ownership is negatively associated with executive pay-performance relationship but largely unassociated with the level of pay. Regarding the level of pay, whereas higher ownership by institutions tends to cause a structural change in pay from salary to stock options, there is no meaningful change in total compensation. Regarding the pay-performance relationship, our key finding is that higher ownership by institutions causes a significant reduction in share ownership by corporate executives, thus weakening compensation incentives. Our results further show that these effects are largely driven by executives who have high ownership. Our results are statistically significant, economically strong, and robust to various model specifications and alternative bandwidth choices around the Russell 1000/2000 threshold.

In contrast to most previous studies, our findings are inconsistent with a presumed monitoring role by passive institutions. In theory, increased monitoring by institutional investors necessarily leads to more efficient compensation contracts for managers, which would manifest in curbing the level of managerial pay and strengthening the pay-performance relationship. For example, Hartzell and Starks (2003) document evidence on the monitoring role for active institutions by showing that institutional ownership concentration has a positive

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relation to the pay-performance sensitivity, and a negative relation to the level, of executive compensation. For passive institutions, however, because their investments involve the whole index and they face possibly serious free-rider problems due to diffused ownership, their lack of monitoring seems both intuitive and plausible. Moreover, without playing a beneficial monitoring role, the presence of passive institutional ownership could be detrimental. Consistent with this implication, Schmidt and Fahlenbrach (2017) report that passive institutional ownership in their sample leads to worsen corporate governance structure and managerial decisions, thus causing reduction of corporate value.

Lack of monitoring by passive institutional investors does not necessarily mean they have no impact on executive compensation. When a notable difference in passive institutional ownership attracts the attention of insiders, they may have a reason to respond, even voluntarily. In line with this possibility, we tend to explain our findings as a response initiated by corporate executives. Indeed, our findings are highly consistent with a crowding-out effect of passive institutional ownership: managerial ownership declines in response to higher demand for the stock by institutional investors. This crowding-out effect is surprisingly strong. In our sample, an executive's share ownership in the Russell 2000 index (the high institutional ownership group) is 0.18 to 0.30 percentage points lower than his counterpart in the Russell 1000 index (the low institutional ownership group). This difference is compared to the average ownership of 0.60 percent held by executives in the Russell 1000 index. In relation to this effect, the evidence indicates an offsetting pattern of compensation structural change from salary to stock options. Although the level of total compensation does not seem to change, the pay-performance sensitivity from executives' total wealth, including equity holdings, is reduced due to crowded-out ownership. For the top one-third high ownership executives, the

pay-performance sensitivity is about $60 change in executive wealth for every $1,000 change in shareholder value for the Russell 1000 index firms but declines to $47 for the Russell 2000 index firms.

We view our findings as evidence of the crowding-out effect caused by passive institutional ownership. In the absence of monitoring by institutions, this effect can occur when executives are attempted to reduce stock holdings when facing high demand for shares by institutions and, in particular, high ownership by their own. As the firm's top managers, executives can effectively negotiate with the firm for more stock options in exchange for less cash payment in their compensation, at least partially, to offset their reduced equity holdings. Unlike monitoring, which is intentional and actively imposed by institutions, a voluntary response of managers is unintentional on the part of institutional investors. Therefore, the resulting effect of such a crowding-out effect may or may not be in the interest of the firm's shareholders, which passive institutional investors may not even realize or pay sufficient attention to.

The remainder of this paper is organized as follows. Section I describes the data and sample we use in this study. Section II presents the empirical framework. Empirical results are reported in Section III. After a discussion of robustness and related issues in Section IV, conclusions are provided in Section V.

I. Data and Sample

Our data sources include Russell Investment, Thompson Reuters, and Standard & Poor's COMPUSTAT and ExcuComp. Firstly, we obtain data from Russell Investment on the annual Russell 3000 index for index membership, ticker, and index weight for the period spanning from 1984 to 2006. Starting from 1984, Russell Investment ranks all U.S. listed firms based on

market capitalization at the end of May each year,[3] and select the 3000 largest firms to form

the Russell 3000 index. Of the index firms, the 1000 largest ones based on the float-adjusted

market capitalization at the end of June is further selected to form the Russell 1000 index, and

the next 2000 largest firms to form the Russel 2000 index. Because both indexes are value

weighted, this index formation mechanism creates a discontinuity in index weights for firms

around the Russell 1000/2000 cutoff (i.e., the 1000th): those near the bottom of the Russell

1000 index receive the lowest weights while those near the top of the Russell 2000 index

receive the highest weights in their respective index portfolio. Fig. 1 shows the discontinuity in

the index weight between the two sides around the threshold ranking in the middle.

This difference in index weight translates into a difference in index firms' ownership by

institutional investors, whose portfolios either passively track the Russell indexes or whose

managers are motivated to reduce tracking error with respect to the indexes. Because the

variation in institutional ownership arising from this setting does not suffer from a selection

problem and firms close to the threshold are comparable, it is considered reasonably exogenous

and thus has been widely used in recent studies with respect to various effects of passive

institutional investors (e.g., Boone and White, 2015; Chang, Hong, and Liskovich, 2015; Appel,

Gormley and Keim, 2016; Bird and Karolyi, 2016; Crane, Michenaud and Weston, 2016;

Schmidt and Fahlenbrach, 2017; Lin, Mao, and Wang, 2018). In particular, Appel, Gormley,

and Keim (2016) show that such exogenous ownership variations are primary due to passively

managed institutions that track or benchmark against a large index and have diversified

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[3] End-of May market capitalization is used to determine membership. However, index weight, which is more relevant for institutional investors, is determined by end-of-June float adjusted market capitalization. We receive neither market capitalization data from Russell investment. End-of-May market capitalization can be calculated directly using CRSP data while float-adjustment formula is proprietary information of Russell Investment.

holdings and low portfolio turnover.

Following this literature, we use this setting to obtain exogenous variations in ownership by passive institutions to examine the role of such institutions on executive compensation. Depending on the issues under investigation, different bandwidths are used in previous studies, among which 200 or 250 firms on each side of the Russell 1000/2000 cutoff are common. We focus on the bandwidth of 250 firms on each side to ensure a sufficiently large sample size, which is typical for studies of executive compensation. As we will discuss below, we also examined alternative bandwidths and verified that our results do not change materially with the bandwidth choice.

We obtain institutional ownership data from Thomson Reuters, which tracks the 13-F filings of institutional investors for those who exercise investment discretion over $100 million or more and who are thus required to report their stock holdings on a quarterly basis with the Securities and Exchange Commission (SEC). We calculate all shares held by institutional investors for each firm and scaled it by the firm's total outstanding shares to obtain the fractional institutional ownership for each quarter and then to compute the annual average. Based on portfolio turnover, diversification, and expected investment horizon, Bushee (2001) classify institutions as three different types: "dedicated", "transient", and "quasi-index" institutions. The first type has large, long-term holdings in a small number of firms and hence are active institutional investors. The ownership by this type is unlikely to be strongly affected by largely unaffected by Russell index reconstitutions. Conversely, the third type, which includes passive index funds and some actively managed diversified mutual funds, has diversified holdings and low portfolio turnover, closely mimics a particular index, hence are typically considered as passive institutional investors. The second type, transient investors, is

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less unambiguous. They tend to have small holdings in a large number of firms for short periods. Appel, Gormley, and Keim (2016) consider the transient type as active institutional investors. Others, including Boone and White (2015) and Crane, Michenaud, and Weston (2016), highlight their passive nature in terms of monitoring incentives given their short investment horizon and diversified portfolios benchmarking performance against indices. As our results show below, this type of institutional ownership exhibits a similar pattern of the discontinuity as the third type.

Executive compensation, firm characteristics and stock data are obtained from ExecuComp, COMPUSTAT and CRSP, respectively. Executive compensation data contain detailed information on all components of pay, including base salary, annual bonus, grants of stock options and restricted stock, and total remuneration. Information is also available on executives' equity holdings in stock shares and unexercised stock options. Our sample period spans from 1993 to 2006, which is covered by both the Russell index membership information and Standard & Poor's ExecuComp database.

As in previous studies, we require a firm to have at least $100 million in total assets and an executive to have at least $10,000 in salary to be included in the sample. To mitigate potential outlier effects, we exclude 1% extreme values for all relevant variables. Our final sample has 2,217 firm-year observations for the bottom 250 firms in the Russell 1000 index and 2,533 firm-year observations for the top 250 firms in the Russell 2000 indexes. Each firm-year is associated with up to five executives whose compensation information is disclosed.

Table 1 presents the summary statistics for selected firm and executive compensation variables. Institutional ownership is reported for each of the three types of institutions and the total. As expected, ownership by typical passive institutions (the quasi-index investors) is

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significantly higher for firms in the Russell 2000 index than in the Russell 1000 index, while

the ownership by active institutions (the dedicated investors) does not show a meaningful

difference between the two indexes. Ownership by transient institutions shows a difference

between the two indexes that is similar to, and equally strong as, that by quasi-index

institutions, also showing the passive nature of transient institutional investors.

It is worth noting the difference in company size between the two groups of firms, which

is evident with our relatively wide bandwidth of 250 firms on each side. Because of this

difference, it is not surprising that executive compensation components are mostly higher for

executives in the Russell 1000 index than in the Russell 2000 index. These differences,

although notably significant, are relatively modest and can be directly controlled in all our tests.

On the other hand, as our results will show, these size related differences between the two

groups (e.g., Russell 2000 index firms tend to be smaller and have lower executive

compensation) are unlikely to be a concern because they tend to weaken our results.

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II. Empirical Framework

To use the Russell index inclusion as a source of exogenous, a commonly used approach

is to estimate a two-stage regression model following Lee and Lemieux (2010). Consistent

with this literature, our first-stage model is:

(1) $\quad \text{IO} = \alpha_0 + \alpha_1 \times \text{R2000} + \alpha_2 \times \log(\text{Market cap}) + \text{Year fixed effects}$

where the dependent variable, IO, is the percentage of a firm's outstanding shares owned by an

institution and the key independent variable is R2000, a dummy variable that equals one if the

firm is in the Russell 2000 index at the end of June and zero otherwise. The logarithm value of

the firm's market capitalization (in a polynomial order of up to 3) is used to capture the size effect. We examined the size control in different polynomial orders but found no material difference in the estimates. Year fixed effects are included in the model to remove potential intertemporal trends.

Our second-stage model is:

(2) $\qquad Y = \beta_0 + \beta_1 \times \widehat{IO} + \text{Control variables} + \text{Firm \& year fixed effects}$

where the dependent variable, Y, is the outcome variable of our interest, which will be an executive compensation variable, executive ownership, or change in executive wealth. The key independent variable is $\widehat{IO}$, the estimated IO from the first-stage estimation. In their study of the impact of passive institutional ownership on corporate governance, Appel, Gormley and Keim (2016) discusses in detail that the estimated IO could still suffer from endogeneity because of missing, unobserved control variables, and argue that an inclusion indicator presents superior instrument for passive institutional ownership. In our second-stage estimation we follow this study and use a dummy variable for the Russell 2000 index inclusion to instrument for ownership by passive institutions. As a robustness check, we also obtained our second-stage results using the continuous variable of the estimated IO.

This two-stage framework is standard in the existing literature, which we also use as our based model. An important assumption behind this model is that firms around the Russell 1000/2000 cutoff have closely comparable, though not necessarily identical, firm characteristics. A sufficiently narrow bandwidth helps limit firm heterogeneity and support this assumption. However, it is still concerned that firms are still different between the two sides and the relative rankings also matter. The usual approach to addressing this concern is to

carefully control for firm and ranking variables in the first-stage model. Appel, Gormley and Keim (2016) argue that this approach is not superior to the use of a dummy variable for Russell 2000 index firms in the second-stage model. To further deal with this problem, we improve upon the base model by identifying a group of pseudo firms: These firms have a relationship with our base group (the bottom Russell 1000 firms), in terms of index ranking, that is in contrast to the relationship of our treatment group (the top Russell 2000 firms) with the base group; on the other hand, these firms are not subject to any ownership discontinuity effects. Therefore, if there are any uncontrolled firm characteristics or ranking effects, they should apply to all index firms; and when such effects are largely symmetric within a limited span over the index ranking, they can be captured by the pseudo firms. Specifically, we consider the bottom 250 firms in the Russell 1000 index (rank between 751 to 1000) as the base group, the top 250 firms in the Russell 2000 index (rank between 1001 to 1250) as the treatment group, and the 250 firms in the Russell 1000 index with rankings immediately above the base group as the group of pseudo firms (rank between 501 to 750). Figure 2 shows the relationships between these three groups of firms. Whereas a switch from the base group to the pseudo group does not involve the ownership discontinuity at rank 1000, the overall ranking changes precisely in the opposite direction as that from the base group to the treatment group.
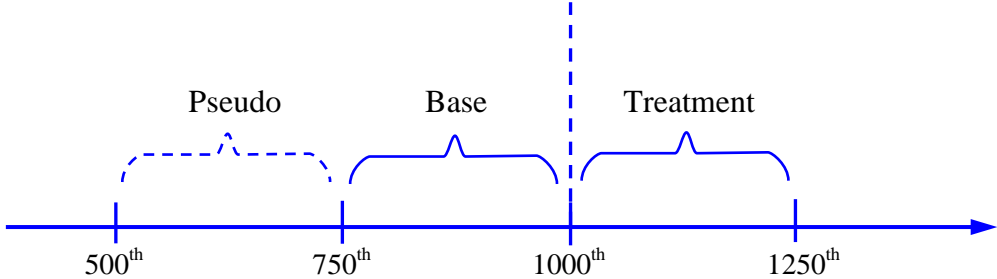

Fig. 2. Index ranking around the Russell 1000/2000 cutoff

In this approach, we revise the second-stage model as the followings:

(3) $Y = \beta_0 + \beta_1 \times \widehat{IO} + \beta_{PS} \times PSEUDO + Other\ controls$

$= \beta_0 + (\beta_{IO} - \beta_{PS}) \times R2000 + \beta_{PS} \times PSEUDO + Other\ controls$

$= \beta_0 + \beta_{IO} \times R2000 + \beta_{PS} \times (PSEUDO - R2000) + Other\ controls$

where we have replaced $\widehat{IO}$ with the instrumental dummy variable R2000 (which equals one if a firm is in the Russell 2000 index and zero otherwise) and used the condition $\beta_1 = \beta_{IO} - \beta_{PS}$. With this condition, the observed overall effect on R2000, β_1, is decomposed into two components: the institutional ownership effect, β_{IO}, and the effect of uncontrolled factors, β_{PS}. The first component is our focus and the second component is picked up by the reorganized control variable, $PSEUDO - R2000$, where PSEUDO is a dummy variable for the pseudo firms. Both year and industry fixed effects are controlled in the model.

The revised specification, (3), is essentially a difference-in-difference model regarding the ranking effect. It is different from the approach in Crane, Michenaud, and Weston's (2016) that uses a ranking distance variable to describe firms' relative ranking in the Russell indexes. Their approach works for within sample effects that can be directly controlled by a variable, our approach resorts to the use of pseudo firms to mitigate uncontrolled factors. Schmidt and Fahlenbrach(2017) focus on firms that switched between the Russell 1000 and the Russell 2000 indexes. This approach is also subject to endogeneity concerns. One the one hand, firms can switch for random reasons, which is the justification for Schmidt and Fahlenbrach(2017). Such switches are unpredictable and can occur back and forth without any regularity. Precisely because of this nature of such switches, firms may not have strong reasons to change their major decisions accordingly and frequently. On the other hand, firms also switch due to

systematic, fundamental reasons; for example, poorly performing firms switch from the Russell 1000 index down to, and stay in, the Russell 2000 index. Such switches are apparently not random and can be driven by fundamental corporate governance factors.

III. Results

Table 2 presents the results for our first-stage estimation, where the regression is run for ownership held by institutions: all institutions and each of the three types of institutional investors, respectively. For "quasi-index" and "transient" institutions, which are passive ones, the regressions show that their ownership is significantly positively related to membership in the Russell 2000 index. This result confirms the relevance condition for using R000 as the instrumental variable for ownership by passive institutions. One the other hand, for "dedicated" institutions, which are active ones, their inclusion in the Russell 2000 has no meaningful association with their ownership.

Table 3-5 report our major results from the second-stage estimation. Table 3 presents the results of our regression analysis for the level of executive compensation and compensation components. Panel A reports the base model regressions and Panel B reports the revised model regressions that use the pseudo group to control for uncontrolled, relative ranking related effects. The dependent variable is total compensation or one of the four major compensation components: base salary, annual bonus, stock option grants (in the Black-Scholes value), and restricted stock award. In all of the regressions, the key independent variable is the dummy variable for the top Russell 2000 firms, R2000. The coefficient on R2000 estimates the effect of passive institutional ownership on the compensation variables. The control variables include firm size (the logarithm value of market capitalization), ROA (which is computed as the

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operating income before depreciation scaled by the year-beginning total assets), stock return volatility (which is the standard deviation of monthly stock returns, using the previous 24 months of stock return data), Tobin's Q (which is the book value of debt plus the market value of equity scaled by the book value of total assets), and leverage (which is the book-value ratio of total debt over assets). A dummy variable for the chief executive officer (CEO) is also included. Year fixed effects and industry fixed effects for the Fama-French 12 industry categories are included in all regressions.

The regressions in both Panels A and B show an effect of institutional ownership on the compensation structure: higher ownership by passive institutions is associated with more stock option grants and base bonus but lower base salary. After including the pseudo firms to mitigate potential effects of uncontrolled factors, the effect on salary and bonus become insignificant whereas the effect on stock options remains statistically significant. On the other hand, however, the overall effect on the total amount of executive compensation is mixed, though it tends to be positive.[4] Two points are worth noting here. First, as our test from executive share ownership will show, the compensation structural change toward stock options can be related to a negative effect of passive institutions on the share ownership by managers. Second, because the Russell 2000 firms are smaller and those executives otherwise receive lower pay, the consistent (though insignificant) positive coefficient on the R2000 dummy tends to suggest a positive effect of institutional ownership on executive total compensation.

Executive share ownership and unexercised stock options are usually considered as key factors that determine managerial incentive strength (Hall and Liebman, 1998; Core and Guay, 1999). Table 4 presents the results of our regression analysis for executive equity holdings. The

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[4] Appel, Gormley, and Keim (2016) briefly mention that they also checked executive compensation and find no effect of passive institutional ownership.

first column presents the regressions for executive stock ownership as a percentage of the firm's total outstanding shares. Firm size, stock return volatility (as a measure of stock total risk) and Tobin's Q (as a proxy for growth potential) are considered to be important factors that affect managerial ownership and thus included in the model as controls. The second column presents the regressions for executive equity holdings in unexercised (exercisable and unexercisable) stock options.

The coefficient on the R2000 dummy is negative and statistically highly significant in the regressions from both the base model and the revised model. The magnitude of the coefficient is even greater after including the control of pseudo firms. The coefficient estimates indicate an unusually strong negative relationship between institutional ownership and executive ownership. With our sample, the average share ownership by executives in the Russell 2000 index is 0.18 to 0.30 percentage points lower than his counterpart in the Russell 1000 index. This difference is compared to the average ownership of 0.60 percent held by executives in the Russell 1000 index firms. Noting that there is typically a strong negative relationship between firm size and managerial ownership (for which one would otherwise expect significantly higher executive ownership for the Russell 2000 firms), this large difference is unlikely to be driven by other factors than higher holdings of passive institutions. …

This observation presents a key finding of this study. Although it is difficult to identify the precise mechanism behind this effect, it is intuitively consistent with a crowding out effect of passive institutional ownership: When there is high demand for the stock by long-term institutional investors, some top managers may have an incentive to reduce their own holdings accordingly. Such incentives are stronger for executives who have high levels of ownership. This implication is confirmed below by the results from our subsample analysis.

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As a result of reduced share ownership, executives may at the same time be willing to accept more stock options in order to maintain a desirable or equilibrium level of total equity holdings. This conjecture finds strong support from the results reported in Table 3, where the regressions show a significant positive effect of institutional ownership on stock option grants to executives. The regression results in the second column of Table 4 are also consistent with this conjecture, where the coefficient on the R2000 dummy is positive in both regressions although it becomes insignificant after the pseudo firms are controlled.

A more fundamental question here is: Are the above effects on the compensation structure and equity holdings in the best interest of shareholders? One way to answer this question is to examine the pay-performance relationship. Table 5 presents the results of our regression analysis of this relationship based on the method of Jensen and Murphy (1990). In both the base model (Panel A) and the revised model (Panel B) regressions, the dependent variable in the first column is the yearly change in an executive's total compensation, and in the second column is yearly change in the executive's total wealth (which consists of his compensation and the value of equity holdings). Change in SW is the yearly change in the firm's shareholder wealth computed as the total shareholder return. The coefficient on "Change in SW" estimates the pay-performance sensitivity for the base group and the coefficient on the interaction term "Change in SW $\times$ R2000" estimates the effect of passive institutional ownership on the sensitivity. The interaction term "Change in SW$\times$ log(sales)" estimates the effect of company size on the sensitivity.

With the coefficient on this interaction term being insignificant in all of the regressions, the main observation from Table 5 is that institutional ownership is not meaningfully associated with executive pay-performance sensitivities. …

If the above results are indeed evidence of the proposed crowding-out effect, then it is necessary for us to verify that the results are stronger or only occur with executives of high ownership. For this reason, we divide our sample into two subsamples according to executive ownership and rerun all of the regressions for each subsample separately. Noting that managerial share ownership is highly skewed, we consider executives on the top one third of highest average ownership as the high ownership group and other executives the low ownership group.

Tables 6 to 8 present our subsample regressions, where we report the key coefficient for the same regressions from the subsamples as the corresponding ones from the total sample in Tables 3 to 5. The subsample results confirm that our findings are largely driven by executives who have high ownership. In particular, the two key observations in support of the crowding out effect, the negative effect on executive ownership and the positive effect on stock option grants, become considerably stronger for those executives. For other executives, on the other hand, both effects disappear.

Another important result from the subsample results is that there is a significant negative effect of institutional ownership on the pay-performance sensitivity. This effect does not show up in the total sample regressions. This effect is significant statistically and economically. With the high ownership executives, the pay-performance sensitivity is about $60 change in executive wealth for every $1,000 change in shareholder value for the Russell 1000 index firms but declines to $47 for the Russell 2000 index firms. Noting that smaller firms are otherwise associated with higher pay-performance sensitivities (which is also shown in Table 5), this finding is unlikely to be an effect of uncontrolled factors.

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In summary, we find that high institutional ownership is associated with low share ownership by corporate executives; and in relation to this finding, higher institutional ownership leads to increased option grants to executives but, as a result of reduced executive ownership, weakened compensation incentives. Our results further show that these effects are largely driven by executives who have high ownership.

IV. Rustness and Discussion

For our above results, we performed various robustness checks. In addition to compare the base model results and those from the revised model, we examined alternative specifications for key variables (firm size in particular, which is directly associated with the Russell index assignment), subsample regressions, and alternative bandwidth choices. All examinations show that our findings are consistent and robust.

It is worth noting that Appel, Gormley and Keim (2016) indicate that they also briefly examined the effect of passive fund ownership on executive compensation but found no meaningful effect either on the level of compensation or on the pay-performance sensitivity. Although we are unable to make a direct comparison between our results and theirs, one possibility is that they focused on the total sample effect. As we discuss above, our key results are largely associated with the subsample of executives who have high ownership, which may not show up clearly or strongly with the total sample of all executives.

An important implication of our results is that passive institutional investors do not play an active role in monitoring, at least in managerial compensation contracts. While this implication does not necessarily conflict the findings by previous studies regarding passive institutions' role in corporate governance and corporate decisions, our results point out a potential alternative mechanism that may also account for their findings. That is, passive

institutional ownership can exert an influence in a passive manner: In the absence of active monitoring by such institutions, managers may respond voluntarily to adjust the structure of personal wealth in order to enhance their welfare. However, the implication of this mechanism is that it can be costly to the shareholders, of which Schmidt and Fahlenbrach (2017) provide an example.

V. Conclusions

By using the Russell index reconstitutions to obtain exogenous variations in passive institutional ownership, in this study we have shown evidence on a possible crowding out effect of passive institutional ownership. This effect substantially reduces managerial ownership and consequently weakens the pay-performance relationship. Existing studies of institutional ownership have focused on the active monitory role of institutional investors. We provide evidence on an influence of passive institutional investors that is consistent with a passive role of such investors. Then a more fundamental question is: Do investors ultimately benefit or suffer from the crowding out effect? Although it is difficult to directly document the effect on investors' welfare, the general conclusion is that a weakened pay-performance relationship means more severe agency problems, other things being equal, thus is more costly to the firm and its investors. On the other hand, we also note that the crowding out effect only occurs with executives of high ownership. Financial economists have shown that high insider ownership facilitates entrenchment (Morck, Shleifer, and Vishny, 1988). If executives who hold more of their company's shares are more likely to be entrenched, then a reduction in their ownership can be a good thing. Hence, although the crowding out effect is unintended by passive institutional investors, it can be beneficial to the firm's investors.

Another related question is whether there is also a crowding out effect of ownership by

active institutional investors? Intuitively, a manager's consideration regarding his personal wealth is the same when facing high demand for the shares by institutions, no matter whether the institutions tend to be active or passive in monitoring. That is, there should be a similar crowding out effect associated with the ownership by active institutions. The problem however is that it is more difficult to identify such an effect because of the endogenous nature of active institutional ownership.

References

Almazan, Andres, Jay C. Hartzell, and Laura T. Starks, 2005, Active institutional shareholders and costs of monitoring: Evidence from executive compensation, Financial Management Winter: 5-34.

Appel, Ian R., Todd A. Gormley, and Donald B. Keim, Passive investors, not passive owners, Journal of Financial Economics 121, 111-141.

Bird, Andrew, and Stephen A. Karolyi, 2016, Do institutional investors demand public disclosure? Review of Financial Studies 29, 3245-3277.

Boone, Audra L., and Joshua T. White, 2015, The effect of institutional ownership on firm transparency and information production, Journal of Financial Economics 117, 508-533.

Brown, Keith C., and Bryce A. Brooke, 1993, Institutional demand and security price pressure, Financial Analysts Journal 49, 53-63.

Burkart, Mike, Denis Gromb, and Fausto Panunzi, 1997, Large shareholders, monitoring, and the value of the firm, Quarterly Journal of Economics 112, 693-728.

Bushee, Brian, and Christopher Noe, 2000, Corporate disclosure practices, institutional investors, and stock return volatility, Journal of Accounting Research 38, 171-202.

Bushee, Brian, 2001, Do institutional investors prefer near-term earnings over long-run value? Contemporary Accounting Research 18, 207-246.

Crane, Alan D., Sebastien Michenaud, and James P. Weston, 2016, The effect of institutional ownership on payout policy: evidence from index thresholds, Review of Financial Studies 29, 1377-1408.

Chang, Yen-Cheng, Harrison Hong, and Inessa Liskovich, 2015, Regression discontinuity and the price effects of stock market indexing, Review of Financial Studies 28, 212-246.

Coles, J. L., Daniel, N. D., and Naveen, L., 2006. Managerial Incentives and Risk-Taking, Journal of Financial Economics 79, 431-468.

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

Core, J., Guay, W., 2002, Estimating the value of employee stock option portfolios and their sensitivities to price and volatility, Journal of Accounting Research 40, 613-630.

Gillan, Stuart, and Laura Starks, 2000, Corporate governance proposals and shareholder activism: The role of institutional investors, Journal of Financial Economics 57, 275-305.

Hall, Brian J., and Jeffrey B. Liebman, 1998, Are CEOs really paid like bureaucrats? Quarterly Journal of Economics 113, 653-691.

Hartzell, Jay C., and Laura T. Starks, 2003, Institutional investors and executive compensation, Journal of Finance 58, 2351-2374.

Jensen, Michael, and Kevin Murphy, 1990, Performance pay and top -management incentives, Journal of Political Economy 98, 225-264.

Kang, Jun-Koo, Juan Luo, and Hyun Seung Na, 2018, Are institutional investors with multiple blockholdings effective monitors? Journal of Financial Economics 128, 576-602.

Kahn, Charles, and Andrew Winton, 1998, Ownership structure, speculation, and shareholder intervention, Journal of Finance 53, 99-129.

Lee, D, and T. Lemieux, 2010, Regression discontinuity designs in economics, Journal of Economic Literature 48, 281-355.

Lin, Yupeng, Ying Mao, and Zheng Wang, 2018, Institutional ownership, peer pressure and voluntary disclosures, Accounting Review (forthcoming).

Morck, Randall, Andrei Shleifer, and Robert W Vishny, 1988, Management ownership and market valuation: An empirical analysis, Journal of Financial Economics 20, 293-315.

Murphy, Kevin, 1998, Executive compensation, in Orley Ashenfelter, David Card, eds.: Handbook of Labor EconomicsYol. 3 (North Holland, Amsterdam).

Ofek, Eli, and David Yermack, 2000, Taking stock: Equity-based compensation and the evolution of managerial ownership, Journal of Finance 55, 1367-1384.

Parrino, Robert, Richard W. Sias, and Laura T. Starks, 2003, Voting with their feet: institutional investors and forced CEO turnover, Journal of Financial Economics 68, 3-46.

Schmidt, Cornelius, and Rudiger Fahlenbrach, 2017, Do exogenous changes in passive institutional ownership affect corporate governance and firm value? Journal of Financial Economics 124, 285-306.

Shleifer, Andrei, and Robert Vishny, 1986, Large shareholders and corporate control, Journal of Political Economy 94, 461-488.

Shleifer, Andrei, and Robert Vishny, 1997, A Survey of Corporate Governance, Journal of Finance 52, 737-783.

Smith, Michael, 1996, Shareholder activism by institutional investors: Evidence from CalPERS, Journal of Finance 51, 227-252.

Useem, Michael, 1996, Investor Capitalism: How money managers are changing the face of
corporate America (New York: Basic Books).

Wahal, Sunil, and John J. McConnell, 2000. Do institutional investors exacerbate managerial
myopia, Journal of Corporate Finance 6, 307-329.

Yermack, David, 1995, Do corporations award CEO stock options effectively? Journal of
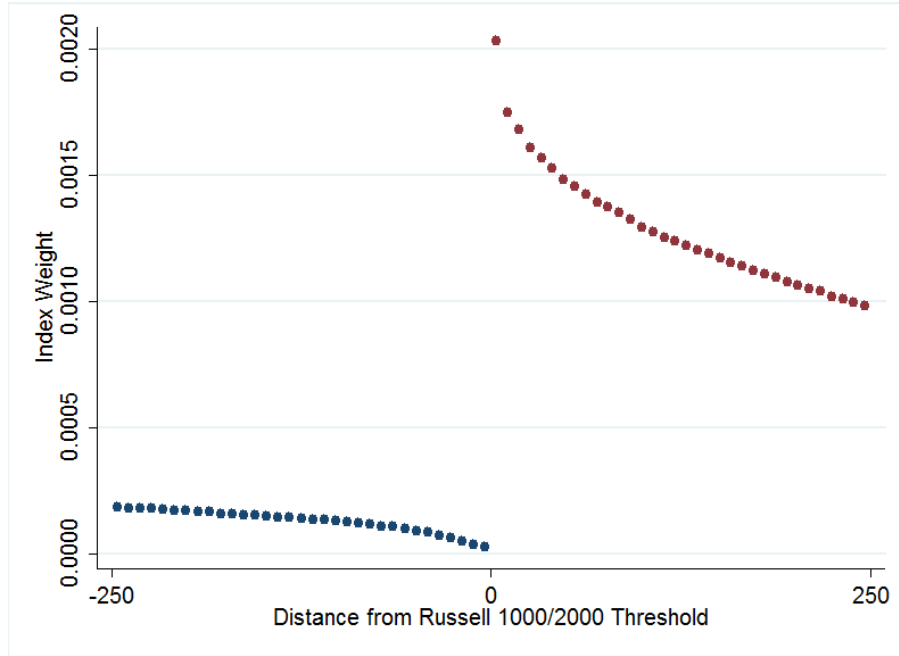Financial Economics 39, 237-269.

Fig. 1. Index weights in the Russell 1000 and 2000 indexes around the index cutoff ranking. This figure displays the portfolio weights of the bottom 250 firms in the Russell 1000 index and the top 250 firms in the Russell 2000 index for the sample period from 1992 to 2006.

Table 1. Summary Statistics

This table presents the summary statistics for selected firm and executive compensation variables. Our sample is obtained from Russell Investment, which consists of the bottom 250 firms in the Russell 1000 index and the top 250 firms in the Russell 2000 index, covering the period from 1992 to 2006. We obtain institutional ownership data from Thompson Reuters, firm characteristics data from Standard & Poor's COMPUSTAT, and executive compensation data from ExcuComp. Option holdings are executives' unexercised stock options as a percentage of the firm's total outstanding shares. Stock ownership is the percentage of outstanding shares held by executives. Institutional ownership presents the percentage of outstanding shares owned by all institutions, which is further reported for the three types of institutions as classified by Bushee (2001), respectively: "quasi-index" institutions, "dedicated" institutions, and "transient" institutions. We exclude firms with total assets less than $100 million and executives with salaries lower than $10,000. Each firm-year is associated with up to five executives whose compensation information is disclosed. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Russell 1000				Russell 2000				Difference in Mean
	Mean	Median	Std dev	Obs.	Mean	Median	Std dev	Obs.	
Firm Variable									
Sales ($million)	2,087.62	1,223.73	2,498.73	2,212	1,310.33	857.61	1,514.69	2,528	777.29***
Market Capitalization ($million)	2,023.74	1,690.33	1,449.12	2,212	1,250.09	1,068.78	966.23	2,528	773.65***
Institutional Ownership (%)	62.69	64.25	21.77	2,185	67.41	68.87	21.53	2,488	-4.72***
Quasi-Indexer (%)	38.41	37.84	15.11	2,185	41.75	41.70	14.63	2,488	-3.34***
Transient (%)	14.58	12.62	10.09	2,185	16.67	15.01	10.47	2,488	-2.09***
Dedicated (%)	8.65	7.01	7.22	2,185	8.44	7.00	6.90	2,488	0.21
Executive Pay Variable									
Salary ($thousand)	367.23	310.00	193.91	11,387	324.39	277.50	165.96	13,099	42.84***
Bonus ($thousand)	221.98	126.00	300.93	11,525	185.91	101.62	262.55	13,242	36.07***
Option (B-S value; $thousand)	536.86	201.80	948.03	9,320	463.92	165.76	846.10	10,903	72.94***
Restricted Stock ($thousand)	69.65	0.00	218.76	10,163	70.57	0.00	218.76	11,871	-0.92
Total Compensation ($thousand)	1,545.50	1,012.12	1,596.41	10,538	1,291.97	830.64	1,392.31	12,094	253.53***
Option Holding (%)	0.44	0.25	0.57	10,464	0.51	0.30	0.62	12,005	-0.07***
Stock Ownership (%)	0.60	0.06	1.92	9,806	0.45	0.07	1.35	11,415	0.15***

Table 2. Index assignment and institutional ownership

This table presents the results for our first-stage estimation. The dependent variable is the percentage of the firm's total outstanding shares owned by all institutions, or by each of the three types of institutions as classified by Bushee (2001), respectively: "quasi-index" institutions, "dedicated" institutions, and "transient" institutions. R2000 is a dummy variable that equals one if a stock is in the Russell 2000 index at the end of June. Market cap is the CRSP market value of a firm's equity measured at the end of May. Firm fixed effects are included. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

| | Institutional Ownership (in %) | | | |
	Dedicated	Transient	Quasi Indexer	All Institutions
R2000	-0.000	0.033***	0.019***	0.051***
	(0.992)	(0.000)	(0.000)	(0.000)
log(Market Cap)	0.022	-0.294**	0.469***	0.184
	(0.885)	(0.025)	(0.004)	(0.527)
$[\,\log(\text{Market Cap})\,]^2$	-0.007	0.042**	-0.052**	-0.016
	(0.741)	(0.026)	(0.020)	(0.698)
$[\,\log(\text{Market Cap})\,]^3$	0.001	-0.002**	0.002	0.000
	(0.574)	(0.048)	(0.109)	(0.848)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,113	5,113	5,113	5,113
Adjusted R2	0.018	0.103	0.249	0.231

Table 3. Level of Executive Compensation

This table presents the results of our regression analysis for the level of executive pay. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. The dependent variable is a major component or the total of an executive's compensation: base salary, annual bonus, the Black-Scholes value of stock option grants, or the value of restricted stock award (in thousand dollars). R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. PSEUDO is a dummy variable for the 250 firms in the Russell 1000 index of rankings between the 501st to the 750th. Market capitalization, return on assets (ROA), stock return volatility, Tobin's Q, leverage and CEO dummy are included as usual controls in the regression for executive compensation. Year fixed effects and industry fixed effects are included. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Log(Component of Executive Pay)				
	Salary	Bonus	Option	Restricted Stock	Total Compensation
A. Base Model					
R2000	-0.045***	0.311***	0.199*	0.079	0.024
	(0.000)	(0.000)	(0.053)	(0.361)	(0.246)
log(Market Cap)	0.156***	1.108***	0.511***	0.316***	0.440***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.096	2.909***	0.456	-0.544	0.316**
	(0.165)	(0.000)	(0.413)	(0.289)	(0.023)
Stock Return Volatility	0.222	-2.296**	4.114***	-1.261	2.416***
	(0.121)	(0.015)	(0.002)	(0.204)	(0.000)
Tobin's Q	-0.075***	-0.250***	-0.064	-0.156***	-0.096***
	(0.000)	(0.000)	(0.270)	(0.001)	(0.000)
Leverage	0.083*	-0.161	-0.030	0.539*	0.198**
	(0.089)	(0.516)	(0.930)	(0.070)	(0.013)
CEO	0.378***	0.345***	0.575***	0.267***	0.569***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	yes	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes	yes
Observations	20,421	20,654	16,846	18,329	18,871
Adjusted R2	0.254	0.256	0.098	0.100	0.283
B. Revised Model					
R2000	-0.024	0.104	0.387**	0.178	0.048
	(0.262)	(0.378)	(0.025)	(0.227)	(0.166)
PSEUDO - R2000	0.021	-0.196***	0.200*	0.130	0.030
	(0.103)	(0.005)	(0.054)	(0.158)	(0.151)
log(Market Cap)	0.155***	1.082***	0.467***	0.232***	0.426***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
ROA	-0.072	3.149***	-0.129	-0.191	0.278**
	(0.232)	(0.000)	(0.799)	(0.662)	(0.029)
Stock Return Volatility	0.159	-2.426***	3.907***	-1.715*	2.341***
	(0.192)	(0.002)	(0.000)	(0.054)	(0.000)
Tobin's Q	-0.075***	-0.249***	-0.019	-0.183***	-0.089***
	(0.000)	(0.000)	(0.727)	(0.000)	(0.000)
Leverage	0.108**	-0.320	-0.074	0.756**	0.208***
	(0.012)	(0.125)	(0.814)	(0.011)	(0.004)
CEO	0.384***	0.326***	0.630***	0.235***	0.572***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	yes	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes	yes
Observations	32,990	33,302	27,033	29,573	30,393
Adjusted R2	0.259	0.275	0.102	0.096	0.290

Table 4. Executive Equity Holdings

This table presents the results of our regression analysis for executive stock ownership and unexercised options, respectively, measured as the percentage of the firm's total outstanding shares. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. PSEUDO is a dummy variable for the 250 firms in the Russell 1000 index of rankings between the 501st to the 750th. Control variables include market capitalization, stock return volatility, Tobin's Q, and CEO dummy. Year fixed effects and industry fixed effects are included. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Stock Ownership	Option Holdings
A. Base Model		
R2000	-0.181***	0.036***
	(0.000)	(0.009)
log(market cap)	-0.124***	-0.069***
	(0.001)	(0.000)
Stock volatility	-0.446	0.423**
	(0.392)	(0.018)
Tobin's Q	0.110***	0.020**
	(0.001)	(0.023)
CEO	0.791***	0.468***
	(0.000)	(0.000)
Year effects	yes	yes
Industry effects	yes	yes
Observations	17,870	18,929
Adjusted R2	0.041	0.119
B. Revised Model		
R2000	-0.302***	0.023
	(0.003)	(0.314)
PSEUDO - R2000	-0.137**	-0.011
	(0.019)	(0.427)
log(market cap)	-0.068**	-0.071***
	(0.036)	(0.000)
Stock volatility	0.195	0.506***
	(0.658)	(0.001)
Tobin's Q	0.099***	0.020***
	(0.000)	(0.006)
CEO	0.726***	0.438***
	(0.000)	(0.000)
Year effects	yes	yes
Industry effects	yes	yes
Observations	29,043	30,661
Adjusted R2	0.040	0.121

Table 5. Executive Pay-Performance Sensitivity

This table presents the results of our regression analysis for pay-performance sensitivity. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. The dependent variable in the first column is yearly change in executive total compensation and, in the second column, is yearly change in executive total wealth measured as total compensation plus market value of stock ownership and unexercised stock options (in thousand dollars). Change in SW is yearly change in the firm's shareholder wealth computed as the total shareholder return (in million dollars). R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. PSEUDO is a dummy variable for the 250 firms in the Russell 1000 index of rankings between the 501st to the 750th. The coefficient on "Change in SW" estimates the pay-performance sensitivity for the bottom 250 firms in the Russell 1000 index, and the coefficient on the interaction term "Change in SW × R2000" estimates the effect of passive institutional ownership on the sensitivity. The interaction term "Change in SW× log(Sales)" controls for the firm size effect on the sensitivity. CEO dummy, year fixed effects and industry fixed effects are included to control for differences in compensation change. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Change in Executive Pay or Wealth	
	Total Compensation	Total Wealth
A. Base Model		
Change in SW	0.163	33.680***
	(0.506)	(0.000)
Change in SW × R2000	0.081	0.913
	(0.193)	(0.457)
Change in SW × log(Sales)	0.013	-2.490***
	(0.676)	(0.000)
CEO	142.739***	5,137.055***
	(0.000)	(0.000)
Year Fixed Effects	yes	yes
Industry Fixed Effects	yes	yes
Observations	19,314	16,303
Adjusted R2	0.025	0.215
B. Revised Model		
Change in SW	0.151	30.788***
	(0.342)	(0.000)
Change in SW × R2000	0.013	-2.099
	(0.896)	(0.262)
Change in SW × (PSEUDO - R2000)	-0.068	-3.093***
	(0.172)	(0.001)
Change in SW × log(Sales)	0.013	-2.108***
	(0.498)	(0.000)
CEO	135.691***	5,648.883***
	(0.000)	(0.000)
Year Fixed Effects	yes	yes
Industry Fixed Effects	yes	yes
Observations	30,990	26,093
Adjusted R2	0.020	0.221

Table 6. Level of Executive Compensation: Subsamples by Executive Ownership

This table presents the results of our subsample analysis for the level of executive pay. We divide executives into high ownership (for the top one-third stock holders) and low ownership (for the remaining two-thirds stock holders) groups and run the same regressions as in Table 3 for the two groups separately. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. All other control variables are defined as in Table 3. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(High Ownership Executives)					(Low Ownership Executives)				
	Salary	Bonus	Option	Restricted Stock	Total Compensation	Salary	Bonus	Option	Restricted Stock	Total Compensation
A. Base Model										
R2000	-0.056***	0.403***	0.447***	0.176	0.033	-0.043***	0.277***	0.073	0.069	0.014
	(0.006)	(0.000)	(0.002)	(0.139)	(0.320)	(0.000)	(0.000)	(0.481)	(0.471)	(0.535)
Other Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	5,544	5,584	4,859	4,836	5,521	12,014	12,118	10,524	10,622	11,947
Adjusted R2	0.252	0.253	0.061	0.112	0.256	0.300	0.280	0.139	0.097	0.325
B. Revised Model										
R2000	-0.058	0.194	0.918***	0.351	0.057	-0.012	0.090	0.150	0.156	0.037
	(0.139)	(0.300)	(0.000)	(0.103)	(0.281)	(0.556)	(0.469)	(0.383)	(0.325)	(0.292)
Other Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	8,912	9,001	7,820	7,814	8,892	19,468	19,584	16,989	17,170	19,343
Adjusted R2	0.259	0.277	0.056	0.111	0.262	0.305	0.303	0.146	0.095	0.335

Table 7. Executive Equity Holdings: Subsamples by Executive Ownership

This table presents the results of our subsample analysis for executive stock ownership and unexercised options, respectively. We divide executives into high ownership (for the top one-third stock holders) and low ownership (for the remaining two-thirds stock holders) groups and run the same regressions as in Table 4 for the two groups separately. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. All other control variables are defined as in Table 4. t-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

| | (High Ownership Executives) | | (Low Ownership Executives) | |
	Stock Ownership	Option Holdings	Stock Ownership	Option Holdings
A. Base model				
R2000	-0.592***	0.050	0.002*	0.020*
	(0.000)	(0.100)	(0.094)	(0.099)
Other Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,706	5,540	12,164	12,103
Adjusted R2	0.061	0.100	0.044	0.133
B. Revised model				
R2000	-1.046***	0.044	0.003	0.000
	(0.000)	(0.370)	(0.172)	(0.984)
Other Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	9,294	9,063	19,749	19,668
Adjusted R2	0.051	0.097	0.042	0.135

Table 8. Executive Pay-Performance Sensitivity: Subsamples by Executive Ownership

This table presents results of our subsample analysis for pay-performance sensitivity. We divide executives into high ownership (for the top one-third stock holders) and low ownership (for the remaining two-thirds stock holders) groups and run the same regressions as in Table 5 for the two groups separately. Panel A reports the base model regressions and Panel B reports the revised model regressions that include a pseudo group of firms unaffected by the institutional ownership discontinuity. R2000 is a dummy variable that equals one if a firm is in the Russell 2000 index at the end of June, and zero otherwise. As in Appel, Gormley and Keim (2016), we use this variable to instrument for ownership by passive institutions. All other control variables are defined as in Table 5. *t*-statistics are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(High Ownership Executives)		(Low Ownership Executives)	
	Total Compensation	Total Wealth	Total Compensation	Total Wealth
A. Base Model				
Change in SW	0.040	64.260***	0.164	19.433***
	(0.932)	(0.000)	(0.454)	(0.000)
Change in SW × R2000	-0.059	-6.192**	0.124*	1.449
	(0.604)	(0.011)	(0.051)	(0.190)
Other Controls	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes
Observations	6,391	5,812	11,584	10,491
Adjusted R2	0.038	0.347	0.025	0.327
B. Revised Model				
Change in SW	0.025	57.428***	0.166	17.073***
	(0.932)	(0.000)	(0.276)	(0.000)
Change in SW × R2000	-0.189	-13.489***	0.081	-0.418
	(0.300)	(0.000)	(0.405)	(0.775)
Other Controls	yes	yes	yes	yes
Year Fixed Effects	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes
Observations	10,314	9,340	18,618	16,753
Adjusted R2	0.033	0.361	0.018	0.331