S&P 500 Index Addition Events and Excess Executive Compensation

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Abstract

We document a significant jump in a firm's executive compensation after it is added to the S&P 500 Index. This increase cannot be fully explained by firm performance or weak corporate governance. We posit that such an increase might result from the benchmarking practices that boards use when determining executive compensation. In support of this hypothesis, we find that once a firm is added to the S&P 500 index, it includes more other S&P 500 members with high executive compensation in its compensation peer group. In addition, we find that once a firm joins the S&P 500 Index, more other firms include this firm in their executive compensation benchmark groups. Finally, we show that a firm's addition to the index can generate a "ripple effect" in compensation levels among other firms in the same industry. Overall, this paper uncovers the hidden role of S&P 500 membership in inducing an economy-wide artificial increase in executives' compensation.

JEL classification: G34; J31; J33

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Introduction

Many studies in finance have sought to understand the causes of the rapid increase in CEOs' compensation in recent decades. Some have suggested that this pay increase is consistent with arm's-length bargaining by executives for their managerial skills (Gabaix and Landier, 2008; Edmans, Gabaix, and Landier, 2009; Albuquerque, De Franco, and Verdi, 2013). Others, however, have claimed that many compensation packages are flawed and result from the self-serving behavior of entrenched executives (Bebchuk and Fried, 2003, 2004, and 2005; Faulkender and Yang, 2010, 2013). We contribute to this debate by examining a firm's addition to the S&P 500 Index as an exogenous event unrelated to the executive labor market condition. [2] We find that this event could lead to a significant jump in executive compensation that cannot be fully explained by performance. We also explore the possible mechanisms through which the S&P 500 addition events increase executive compensation, and investigate their economy-wide consequence.

While in general CEO compensation is subject to the same market forces that drive employee wages in a typical firm (e.g., supply and demand for their labor skills), many recent explanations in the literature focus on the pay-setting mechanisms that involve competitive benchmarking (e.g., Bizjak, Lemmon, and Naveen, 2008). It is a common practice among firms' boards of directors to use peer groups when determining proper compensation for their CEOs and other executives (Faulkender and Yang, 2010; Bizjak, Lemmon, and Nguyen, 2011). Holmstrom and Kaplan (2003) and Albuquerque, De Franco, and Verdi (2013) argue that such competitive pay-setting mechanism is an effective tool to improve managerial incentives in favor of firm shareholders. Bebchuk and Fried (2004), Bizjak, Lemmon, and Nguyen (2011), and

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[2] According to the Standard & Poor's, "… company additions to and deletions from the S&P equity indexes do not in any way reflect an opinion on the investment merits of the company …" (Bos and Ruotolo, 2000).

Faulkender and Yang (2010, 2013), in turn, claim that the peers are chosen opportunistically and that such manipulations of peer groups have become more common in recent years. We also examine the peer-based pay setting mechanism around the S&P 500 Index addition events. Unlike previous studies, however, instead of emphasizing the executives' self-dealing behaviors, we specifically investigate the role of S&P 500 membership in peer selection, and demonstrate that using S&P 500 membership as an important criterion in selecting peers can result in a non-fundamentals driven increase in executive total compensation.

We start by focusing on 327 event firms that are added to the S&P 500 Index during the period of 1992–2010. We document a significant increase in these firms' executive compensation after they join the index. Specifically, the average total compensation of these firms' CEOs increases by about $0.7 million from the year before the addition to the year after. The result becomes more significant if we extend our test window to three years. For instance, the three-year average total CEO compensation of these event firms increases by about $2.5 million after joining the S&P 500 Index. The pay increase associated with the S&P 500 addition mainly takes the form of increased granted options, although the base compensation (salary and bonus) also increases. Moreover, this effect is not limited to the CEOs. The average total compensation of other top executives of event firms also grows significantly after the addition event.

The pay rise associated with the S&P 500 addition event might reflect the general increase in executive compensation observed among the largest firms in the economy. To rule out this possibility, we compare the pay growth of event firms to that of other S&P 500 firms around the addition event. We find that the three-year average compensation of an event firm's CEO grows by 87% after joining the S&P 500, substantially higher than the average pay growth

rate of 48% enjoyed by non-event S&P 500 firms over the same period. It is also possible the documented pay effect might result from event firms' improved performance or other fundamental changes around the S&P 500 addition. We use the matching estimators to address this concern. Specifically, we match each event firm with one control firm that has the closest firm fundamentals such as the market capitalization, the stock price appreciation, operating performance, industry, and year. We find the pay raise associated with the S&P 500 addition event remains significant high after controlling for these confounding factors.

In addition, our multivariate regression analyses (using a set of control variables suggested by Hartzell and Starks, 2003; Bizjak, Lemmon, and Naveen, 2008; and Bereskin and Cicero, 2013) imply that the S&P 500 addition induced pay increase can hardly be viewed as a one-time bonus rewarded by the board to a CEO for getting the firm to be included in a well-publicized index. The index addition's positive impact on executives' total compensation is long lasting and persists into the post-addition period. In the long run, joining the S&P 500 index can permanently increase a CEO's total compensation by about 1 million dollars per year. These results are robust to endogeneity concerns; they are confirmed by using a robust multivariate Abadie and Imbens (2006) matching estimator.[3]

A recent study by Bereskin and Cicero (2013) finds that CEO compensation of Delaware firms increases after Delaware passed an anti-takeover law in 1995. Furthermore, they find that such pay raise mainly occurs among firms with weak governance. We thus investigate whether our findings are driven by the event firms with weak governance. We introduce various proxies for governance quality such as a dummy indicating whether the CEO is also the chairperson of

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[3] Firms that are selected into the S&P 500 Index are chosen for reasons that might not be effectively addressed in our regression analysis. Therefore, we use the Abadie and Imbens' (2006) matching estimator to deal with the potential endogeneity biases (see Çolak and Whited, 2007; and Roberts and Whited, 2012). Among many other advantages, this estimator corrects for any bias resulting from imperfect matching among the control variables. See Appendix B for further details about this estimation technique.

the board, the ratio of independent directors in the board, and the ratio of intensive directors in the board. We, however, find that the S&P 500 addition driven compensation increase occurs among both firms with strong governance and those with weak governance.

We then explore whether the results can be explained by the peer-based executive compensation setting mechanism. So, we collect detailed peer information for all S&P 1500 firms during the period between 2006 and 2010, and investigate whether event firms experience systematic reshuffling of compensation peers around the S&P 500 addition events.[4] We find that once a firm is added to the S&P 500 Index, it more frequently selects other S&P 500 Index firms into its compensation peer group than before. In particular, on average, the proportion of S&P 500 firms in an event firm's peer group increases from 39% two years before the addition to about 55% two years after. Furthermore, these newly selected S&P 500 peers have significantly higher compensation levels than the peers they replace. These results strongly suggest that the observed pay increase after the S&P 500 addition event might partially result from the event firms' inclination for adding more and more high-paying S&P 500 firms into their compensation peer groups.

Finally, we show that the aforementioned pay raise for executives of the newly added index members is not an inconsequential event confined to these firms. We find that many firms select these event firms as their compensation peers. And more firms do so after the event firm formally joins the S&P 500 Index. For example, two years prior to the addition, on average, there are about eight S&P 1500 firms that include an event firm in their compensation peer groups. Two years after addition, the number of firms that benchmark on this event firm increases by more than 60% to thirteen. The fact that more firms include a newly added index member to their peer groups points to a possible compensation "contagion" effect from event firms to other firms.

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[4] The compensation peer information became publicly available in 2006.

Consistent with this conjecture, we find that when more than 10% of all firms in an industry are added to the S&P 500 Index, the average executive compensation of other firms in the same industry increases significantly in the following years.

Overall, the above findings contribute to our understanding of the possible sources of inefficiencies in executive pay-setting process. They reveal the unintended consequences of relying on the S&P 500 membership as a criterion to select peer groups while determining an executive's reservation wage. An event that is seemingly unrelated to the executive labor market, such as addition to a stock index, could change firms' compensation structure and lead to a non-performance-related pay inflation. One might argue that the pay increase is partially justified by the improved performance associated with the S&P 500 addition (Denis, McConnell, Ovtchinnikov, and Yu, 2003) or as a one-time reward for the management team's success in making the firm more visible with the index membership (Chen, Noronha, and Singal, 2004). Yet, such claims are not supported by our empirical analysis. Instead, this study reveals a new pay-inflating mechanism. That is, firms' tendency to choose as peers other firms that are perceived to be more successful and more visible such as the S&P 500 members, can distort the price of general executive talent.

The rest of our study is organized as follows. The next section elaborates on our data sources and the variables we use in our estimations. Section 3 analyzes the changes in executive compensation around a firm's inclusion into the S&P 500 Index. Section 4 looks for explanations of this pay increase. Section 5 investigates the market-wide consequences of this phenomenon. Section 6 concludes the study.

1. Data and Variables

2.1. Sample

In creating our sample, we start by including all firms covered by the ExecuComp database, which reports detailed compensation information for the highest-paid executives of both current and previous S&P 1500 firms. We drop those firms that cannot be matched with both the CRSP and Compustat datasets because they lack complete information on the variables in our baseline regression. Our initial sample period is from 1992 to 2010.

2.2. S&P 500 Addition Firms

We focus on S&P 500 additions occurred between 1993, the year after the executive pay information becomes available in ExecuComp, and 2009, the year before our sample period ends.[5] We initially identify 471 index addition events. We remove six "back-and-forth" cases, which were added, then dropped, and later added back to the index again.[6] We further require that all newly added index firms have complete financial information necessary for baseline empirical analysis. Finally, to ensure a meaningful before-and-after analysis, we also require an event firm in our sample to have at least one year of compensation information from ExecuComp before it is added to the S&P 500 Index. We find that seventy-eight event firms are not a member of either the S&P 400 or the S&P 600 indices before joining the S&P 500 Index, and thus do not have any pre-addition compensation information in ExecuComp. These event firms are excluded from our analysis. We finally obtain 327 unique S&P 500 addition event firms satisfying the above criteria. Throughout the paper we will refer to these firms as our sample "event firms."

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[5] This approach ensures that each event firm has at least one year of compensation data both before and after the addition.

[6] Removing these stocks allows us to better examine the S&P 500 addition–related pay effect, particularly a long-term one. In a robustness check, we also include these stocks in our analysis, and the results remain unchanged.

Table 1 reports the event firm selection process and the distribution of the sample event firms throughout our sample period.

2.3. Variables

The variables of interest include both CEOs' and non-CEO top executives' compensation obtained from ExecuComp. We focus on both the total compensation (*TDC1*) and various detailed compensation components such as salary, bonus, executive options, and so on. To better analyze the effect of S&P 500 additions on executives' compensation structure, we further aggregate the itemized compensation variables into two major parts: *Base Pay* (Salary + Bonus) and *Incentive Pay* (TDC1 – Base Pay).

Data on firm characteristics are extracted from multiple databases including CRSP, Compustat, Thomson-Reuters Institutional Holdings (13F), and RiskMetrics. Following Hartzell and Starks(2003), Bizjak, Lemmon, and Naveen (2008), and Bereskin and Cicero (2013), we include firm market capitalization (*Size*), the change in firm market capitalization, accounting performance (*ROA*), growth potential (*Tobin's Q*), financial debt–asset ratio (*Leverage*), institutional ownership (*IO*), and the concentration of institutional ownership (*IO_Hindex*) as controls in our baseline empirical analysis. We also utilize the scaled wealth-performance sensitivity (*WPS*) measure constructed by Edmans, Gabaix, and Landier (2009), a dummy variable indicating whether the CEO is the board chair (CEO_Chair), the ratio of independent directors to total directors (*Indp_Ratio*), and the ratio of intensive monitoring directors to total directors (*Intense_Ratio*) as additional controls in our empirical tests. We note, however, that not all sample firms have data on these additional controls. Please refer to Appendix A for the

detailed definitions of these variables. Throughout the paper, all variables used in the analysis are winsorized at the 1st and 99th percentiles.

Table 2 reports the descriptive statistics of these variables. Panel A displays selected characteristics for all sample firms, including both the event firms and non-event firms covered by ExecuComp. For the period from 1992 through 2010, the average annual total CEO compensation is about \$4.17 million. The median, however, is a more modest \$2.24 million. Furthermore, a large portion of a CEO's compensation is in the form of equity and options. A typical non-CEO top executive, on the other hand, receives total compensation of approximately \$1.57 million, much lower than the aforementioned average total compensation received by a typical CEO. The proportion of equity and options among non-CEO executives' total compensation, however, is quite comparable to that of the CEOs.

Panel B of Table 2 further compares event firms with other non-event sample firms, including most S&P 400 and S&P 600 firms, as well as firms that have been an S&P 500 member since 1992. Unsurprisingly, we find that event firms are larger than non-event sample firms. Consequently, these firms' compensation for both their CEOs and other top executives is also much higher than the compensation of a typical non-event firm. In addition, we also find that event firms have much higher Tobin's Q and greater wealth-performance sensitivity (WPS) than non-event firms. On the other hand, both groups of firms have quite comparable financial characteristics such as operating performance (ROA) and financial leverage, as well as similar governance characteristics such as institutional ownership, *CEO_Chair* dummy, independent director ratio, and intensive director ratio.

3. Documenting the S&P 500 Addition–Induced Pay Change

3.1. Event Firms around the S&P 500 Addition Event

We first investigate how various executive compensation measures change around the S&P 500 Index addition event. We denote the year of addition as $T = 0$ and the year before (after) as $T = -1$ ($T = +1$) and so on. To examine whether the pay increase around S&P 500 addition is temporary, we also extend our test window from years $T = -3$ to $+3$ (in brief, $[-3;$ $+3]$). We examine the following executive compensation measures: total compensation (*TDC1*), *Salary*, *Bonus*, *OABV* (options-granted Black–Scholes value), *OAN* (number of options granted), *RSTKGRNT* (the value of restricted stock granted during the year), and *LTIP* (amount paid under the long-term incentive plan). To facilitate our main analysis, we further aggregate these compensation details into two variables: *BASE_PAY* (*Salary + Bonus)* and *INCENTIVE_PAY*. (*TDC1 − BASE_PAY*). Because our analysis spans multiple years, we convert all dollar amounts into 2000 year-end U.S. dollars using the annual Consumer Price Index (CPI) data obtained from the Federal Reserve Bank of St. Louis Federal Reserve Economic Data (FRED).

Table 3 first reports the average level of event firms' various compensation variables for both CEOs (Panel A) and other top executives (Panel B) between $T = -1$ and $T = +1$. Overall, we find that corporate executives enjoy a significant raise in total compensation after their firm is added to the S&P 500. In particular, the CEO's total compensation jumps from $7.17 million at $T = -1$ to $7.88 million at $T = 1$, whereas for other top executives their average total compensation increases from $2.44 million to $2.96 million during the same period.

Results in Table 3 also show that the pay jump comes mainly from three key components of executive compensation: salary, granted stock and options. On average, the salary of event firms' CEOs increases from $0.67 million one year before the addition to approximately $0.72

million one year after. The total value of options granted to the CEO, meanwhile, increases by about $0.35 million from the year before joining the S&P 500 Index to the year after. The average number of options granted to the CEO also increases significantly, from 254.60 thousands to 291.18 thousands, suggesting that the growth in the value of granted options cannot be fully explained by the potential appreciation in stock price or increased return volatility of event firms after the addition. Restricted stock grants (*RSTKGRNT*) also experience a significant growth after the addition. On the other hand, we find that the amount of bonus for a CEO barely change. Other top executives' compensation follows a similar pattern.

Finally, Table 3 also suggests that the compensation jump associated with the S&P 500 addition event is not temporary. In particular, we extend the examination window to [−3, 3] and compute the average level of each pay variable for three years before ([−3, −1]) and for three years after ([+1, +3]) the addition event. We find that the post-addition average compensation is significantly higher, both economically and statistically. For example, a CEO's three-year average total compensation increases from $5.9 million before the addition to $8.4 million after. That of non-CEO executives also increases significantly, from $2.2 million to approximately $3.0 million. The magnitude of both increases is substantially greater than that observed in the window of [−1, 1]. Furthermore, for both CEOs and other top executives, the post-addition pay raises mainly take the form of the increased option grants. Finally, it is worth repeating that the observed rise does not result from potential inflation during our sample period, because all compensation amounts are denominated in year 2000 dollars.

3.2. Event Firms vs. Control Firms

Although intuitive and informative, the above analysis does not account for the general upward trend in executive compensation during our sampling period. Neither does it control for the impact of changes in firm fundamentals around the S&P 500 addition. For example, the pay change documented above may result from other changes associated with a firm being included in the S&P 500 Index, such as improved performance (Denis, McConnell, Ovtchinnikov, and Yu, 2003) and/or increased visibility (Chen, et al., 2004).

We address these concerns in Table 4. For brevity, this table limits the discussion to three major compensation variables: the total compensation, base pay, and incentive pay. [7] Furthermore, to facilitate comparison, instead of using the dollar amount, it focuses on the growth rate of executive compensation, that is, the net ratio of three-year average executive compensation after the S&P 500 addition to the three-year average executive compensation before the S&P 500 addition. Panel A of Table 4 examines whether the previous results can be explained by the general growth trend of the executive compensation observed in last two decades. In particular, in this panel, we compare the mean growth rate of various pay variables of event firms to that of other non-event S&P 500 firms of the same period. For a typical event firm, the net growth rate of its CEO's total compensation around the addition is 86.48%. On the other hand, a typical S&P 500 firm CEO's total compensation grows about 47.74% over the same period. The difference between these two groups of firms is both economically and statistically significant. In other words, the growth of event firm CEO's total compensations is too high to be justified by the general pay growth patterns of S&P 500 firms. Similar results are found for CEOs' base pay, incentive pay, and non-CEO executives' compensation measures.

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[7] Results for other, more-detailed pay variables such as salary, bonus, restricted stocks granted, and options granted are quite similar to Table 3. These results are available upon request.

Panel B of Table 4 analyzes whether the observed pay increase of the event firms can be explained by their improved fundamentals. In this panel, we compare event firms to a group of control firms that are similar in terms of the following dimensions: market capitalization, change in market capitalization, operating profitability (ROA), industry, and year. In particular, we adopt two matching approaches to form these control firms. The first is simple nearest neighbor matching method (or simple matching), in which for each event firm we select one among all non-event S&P 1500 firms that has the smallest distance to this event firm in the space defined by size, change in size, operating performance, industry, and year. The second is propensity score matching, in which we run a logistic regression for the sample of all S&P 1500 firms for each year, with a dummy variable indicating whether a firm is added to the S&P 500 Index in that year as the dependent variable, and the four firm characteristics mentioned above as the independent variables. For each event firm, the non-event firm that has the closest propensity score is selected as its control firm.

Panel B of Table 4 reports the mean difference in growth rates in three-year average executive compensation measures between the event firms and the control firms. Regardless of the matching method used, the total compensation of event firms' CEOs and other executives exhibits significantly higher growth rates than the top executives of the control firms. For example, under the simple matching method, the mean growth rate of total compensation of the event CEOs is 35.38% greater than that of control firm CEOs. Under the propensity score matching, the difference is enlarged to 39.04%. The results become less striking, however, when we investigate the growth rates of *Base Pay* and *Incentive Pay*. Although we find the mean growth rates of these two pay components of event firm CEOs' are generally higher than those of control firms, on occasion, their statistical significances are weaker.

Overall, the results in Table 4 show that the S&P 500 addition related executive pay increase, in particularly the growth of total compensation, is too high to be justified either by the general trend of executive compensation growth, or by firm size and performance.

3.3. The Long-term Pay Effect of S&P 500 Addition

The previous subsection shows that a significant spike in executives' pay occurs as a result of the S&P 500 addition within the [–3, 3] window. In this section, we further analyze whether the S&P 500 addition event has a long-lasting effect on event firms' executive compensation using the following regression model for a sample of S&P 1500 firms:

$$Y_{i,t} = \alpha + \gamma X_{i,t-1} + \delta_1 ADDITION\_EVENT_i + \delta_2 SP500_{i,t} + \delta_3 AFTER\_ADDITION_{i,t} + \beta_t + \varepsilon_{i,t} \quad (1)$$

where i indicates the firm, t indicates the year, and β captures the time fixed effect. $X_{i,t-1}$ is a vector of firm-specific controls associated with executive compensation. The independent variable *ADDITION_EVENT* is a dummy indicating whether the firm is an event firm that is added to the S&P 500 during the 1993–2009 period. It captures the general pay difference between the event firms and the other S&P 1500 firms. Dummy *SP500* takes the value of one if a firm was an S&P 500 member at the beginning of our sample period (in 1992) and zero otherwise. It captures the general pay difference between the S&P 500 member firms and the non–S&P 500 firms. The key independent variable of interest in this analysis is *AFTER_ADDITION*, a dummy that takes the value of one if (1) firm i is an event firm and (2) the sample year t is in the post-addition period. This variable captures the long-term pay effect associated with being included in the S&P 500 Index, after controlling for other variables that influence the level of a firm's executive compensation.

In addition, we also use a firm fixed effects model as follows:

$$Y_{i,t} = \alpha_i + \gamma X_{i,t-1_i} + \delta_2 SP500_{i,t} + \delta_3 AFTER\_ADDITION_{i,t} + \beta_t + \varepsilon_{i,t} \qquad (2)$$

The dummy variable *ADDITION_EVENT* included in Model (1) is dropped in this specification because it is fully subsumed by the firm fixed effects.[8]

We analyze *Total Pay* (TDC1) and its two components, *Base Pay* (Salary + Bonus) and *Incentive Pay* (Total Pay – Salary – Bonus), of both the CEO and non-CEO executives respectively. Because the inflation factor can be effectively absorbed in the year fixed effect, the executive compensation variables in this analysis are in nominal U.S. dollars. We add the following baseline variables as controls because literature suggests that they could influence executives' compensation (Hartzell and Starks, 2003; Bizjak, Lemmon, and Naveen, 2008; Bereskin and Cicero, 2013): *Size* (market capitalization in millions of dollars); *Size_Change* (the difference in market capitalization between this year and previous year); *Leverage* (the ratio of debt to assets); *Q* (Tobin's Q); *ROA* (return on assets); *CEO Tenure*; *IO* (institutional ownership); and *IO_Hindex* (the concentration of institutional ownership). Finally, we also add a variable *Trend* (Year minus 1991) to capture the general increasing trend of executive compensation during our sample period. All these controls, other than the size change, take their values at the end of previous year. Please refer to Appendix A for detailed definitions of these variables.

Table 5 reports the estimation results. Panel A examines CEO compensation. The dependent variable in Columns (1) through (3) is the total CEO compensation; in Columns (4) through (6), the total base pay (Salary + Bonus); and in Columns (7) through (9), the total incentive pay (TDC1 – base pay). Overall, results show that the S&P 500 Index induced pay

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[8] On the other hand, the dummy variable *SP500* stays because some firms that were S&P 500 members at the beginning of 1992 were removed from the index later on, resulting in a variation over time that cannot be fully subsumed by the time-invariant firm fixed effects. Nonetheless, the interpretation of this dummy remains similar.

increase is long-lasting. Take the CEO's total compensation level, for example. In Column (1), which does not control for the firm fixed effects, we find the estimated coefficient of *AFTER_ADDITION* is 1,642.35, statistically significant at any conventional level. In other words, a CEO's average annual total compensation increases permanently by about $1.6 million after the firm becomes an S&P 500 member. If we translate this dollar amount into the growth rate, this implies that the index addition permanently increases the CEO's annual compensation by about 27% (using the average pre-addition three-year average total compensation as the base).

The results remain strong after we include the firm fixed effects in Column (2) to account for possible omitted variables in analysis. Specifically, the estimated coefficient of *AFTER_ADDITION* in this specification is 1,042.75, suggesting that after a firm joins the S&P 500 Index, its CEO's annual total compensation will increase by about $1 million. This result is slightly smaller than that in Column (1), yet it remains economically and statistically significant. In Column (3), we further add a new control variable, WPS (Edmans, Gabaix, and Landier, 2009),[9] which measures the sensitivity of a CEO's total wealth to performance as of the beginning of the year. Because not all sample firms have available data for this variable, the sample size is substantially reduced. Consistent with prior findings, we find that WPS is negatively related to a CEO's total compensation. More importantly, after controlling for this variable, the S&P 500 addition–induced long-term pay effect remains significantly positive.

Results for both CEO *Base_Pay* and *Incentive_Pay* also show a positive S&P 500 addition effect, although the effect on *Incentive_Pay* seems much greater than that on *Base_Pay*. For example, the estimated coefficient of *AFTER_ADDITION* for CEO *Base_Pay* without (with) the firm fixed effects is 149.44 (176.28), whereas that for CEO *Incentive_Pay* without (with) the firm fixed effects is 1472.52 (877.91). In other words, after joining the S&P 500 Index, a firm

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[9] We thank Alex Edmans for making this data available online.

CEO's annual base pay increases permanently by about $0.15 million; and his or her annual incentive pay increases by about $0.88 million.

In Panel B, we extend our investigation to non-CEO top executives' compensation with the same model specifications discussed earlier. After a firm is added to the S&P 500 Index, the average annual total compensation of its other top executives, such as the chief financial officer and the president, increases permanently by about $0.43 million (based on the model with firm fixed effects). Of this pay raise, most are stock and option-based.

Finally, Table 5 confirms several findings documented by previous studies. For example, consistent with Gabaix and Landier (2008), we find that both firm size and change in firm size are positively related to the CEO's and other executives' compensation. We also find that the S&P 500 dummy is highly significant, indicating that, *ceteris paribus*, an S&P 500 member firm enjoys much higher executive compensation than other firms. Third, consistent with Hartzell and Starks (2003), we find that institutional ownership is positively related to executive compensation, yet the concentration of institutional investors—a variable reflecting whether a firm has one or more major block shareholders—is negatively associated with executive compensation. Finally, we document a strong positive time trend in executive compensation.[10]

3.4. Addressing the Potential Endogeneity Issue

A firm is not randomly selected into the S&P 500 Index. Although we try our best to control for most fundamentals that affect compensation and use the firm fixed effects to account for omitted variables, the OLS approach might not fully address all the endogeneity concerns. To estimate the index inclusion's long-term effect free of endogeneity biases and other confounding

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[10] We also look into the possible pay effect of being removed from the S&P 500 events. We find that once a firm is removed from the S&P 500 Index, its executive total compensation significantly declines. To save space the results are not tabulated, but are available upon request.

factors, we need to impute what the increase in compensation would have been had the firm not been added to the S&P 500 Index. We adopt Abadie and Imbens (2006) bias-corrected matching estimator (AI estimator) to achieve this goal.

Abadie and Imbens (2006) technique uses a nonparametric approach to estimate the unobservable differences between the "treated firms" (or event firms in this article) and the comparable control firms (other S&P 1500 firms in this article). Appendix B offers a detailed discussion regarding the technical details of the AI estimator.[11] To extract the pay increase resulting only from being added to the index, we use AI estimator to match an event firm with one or more non-event control firms on the following dimensions: firm's market size, change in market size (stock performance), Tobin's *q*, operating performance, leverage, institutional holdings, the Herfindahl index of institutional holdings (following Hartzell and Starks, 2003), and the CEO's tenure. In addition, we also require exact matching with regard to *Year*. In our estimations, we allow for more than one nearest-neighbor matching firm (*m* = 2 or 3) and for matching with replacement. Our "treatment variable" is *AFTER_ADDITION*, a dummy variable that takes the value of one if the firm is an event firm and the year is in the post-addition period. We conduct our estimations relative to two control groups (the pool of firms from which we draw our matching firms). The first control sample consists of all non-event S&P 500 firms. The second one includes all the S&P 1500 firms other than our "treated sample."

Table 6 presents the estimated differential increase between the treated and the control firms using the AI matching method. Regardless of the control sample used (non-event S&P 500

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[11] Compared to estimators based on regression adjustment without matching, bias-corrected matching estimators have the advantage of an additional layer of robustness. Advanced matching techniques (such as AI estimator) ensure consistency in any given value of the smoothing parameters, even if close approximations to either the regression function or the propensity score are not available (Abadie and Imbens, 2006).

or S&P 1500) or the number of matching firms employed (2 or 3 firms[12]), we find that the difference in executives' compensation between event firms and control firms increases significantly after the S&P 500 addition event. For example, when using 2 matching firms, we find that in the post-addition period, the difference in the total compensation of an event firm's CEO relative to its control firm's CEO (chosen from the S&P 1500 firms) is about $2.52 million higher than the same difference in the pre-addition period. If we compare events firms with non-event S&P 500 firms, the difference-in-difference value of CEO's total compensation is about $1.5 million per year. Both of these results are economically significant. For the non-CEO top executives, the differential increase in total compensation is about $0.77 million (relative to the controls drawn from the non-event S&P 1500 firms), or $0.70 million (relative to the controls drawn from the non-event S&P 500 firms). This figure is lower than that for CEOs but still quite substantial. We find a similar type of differences, among executive base pay and incentive pay measures regardless of whether m=2 or m=3.

3.5. Robustness Checks

We conduct a set of robustness checks. First, we exclude those S&P 500 events that have a very short pre-addition history in our dataset. Specifically, we require that an event firm have compensation information available for at least three years before it is added to the index, instead of one year required in the baseline sample. This requirement is motivated by the concern that many event firms could have too few pre-addition data points from ExecuComp to allow for an effective before-and-after estimation. Our qualitative conclusions remain unchanged after excluding event firms that lack at least three years of pre-addition pay information.

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[12] These conclusions hold also if we use one or four matching firms ($m = 1$ or $m = 4$). For brevity, we do not report these results here, but they are available on request.

Second, we split the sample into two periods, 1992 through 2000 and 2001 through 2010, to examine whether our results persist in each subsample period. Both sets of results are qualitatively similar; although we find that results in 1990s are stronger than those in 2001–2010, mainly because of the significant effect of the 2008 credit crisis on executive compensation. Third, we notice that some sample firms change their CEOs over the sample period. Considering that the CEO change is typically associated with a sharp pay increase, our results might be driven by these cases. To examine whether this is the case, we remove those firm-years in which a CEO turnover occurs and find our results are unaffected.[13]

4. Why Index Additions Increase Executive Compensation

The above-documented rise in executives' compensation associated with S&P 500 Index membership is clearly unusual because it cannot be explained by such firm fundamentals as firm size or performance. In this section, we consider two possible explanations. We first investigate whether the results can be explained by poor corporate governance of event firms. We then examine whether the prevalent benchmarking practice that tilts toward S&P 500 members (when selecting peer group for compensation setting purposes) could contribute to our understanding of this phenomenon.

4.1 Does the Pay Increase Result from Poor Governance?

Although we have controlled for various firm characteristics and firm fixed effects to rule out the possibility that the documented executive pay increase results from systematic changes experienced by these firms after being added to the S&P 500 Index, we have not yet considered the role of corporate governance. Brisker, Çolak, and Peterson (2013) find that once a firm is

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[13] For brevity, we do not tabulate these robustness results in the paper. Results are available on request.

added to the S&P 500 Index, its governance indicators seem to weaken (managerial entrenchment increases). Furthermore, Bereskin and Cicero (2013) find that firms with weak governance are more likely to increase executive compensation.

To examine whether our findings are driven by firms with weak corporate governance, we introduce four dummy variables associated with managerial entrenchment or corporate governance quality as follows: *Long_Tenure*, a dummy equals one if a CEO's tenure is above the S&P 1500 firms' sample median and zero otherwise; *CEO_Chair*, a dummy equals one if a CEO is also the board chairperson and zero otherwise; *Indp_Board*, a dummy equals one if a firm's ratio of independent board members (*Indp_Ratio*) is above the sample median and zero otherwise; and *Intensive_Board*, a dummy equals one if the majority of independent directors serve on at least two out of the three principal monitoring committees (auditing, compensation, and nominating) and zero otherwise.

Table 7 reports our regression results. For brevity, we focus mainly on executive total compensation. Columns (1) through (5) examine the CEO's total compensation. In Column (1), we include all four governance quality variables to examine whether the governance variables can directly subsume the pay effect associated with S&P 500 addition. In Columns (2) through (5), we further interact each governance dummy variable with the key independent variable *AFTER_ADDITION* to examine whether the long-lasting pay effect associated with S&P 500 addition occurs mostly in firms with weak governance quality. Finally, in Columns (6) through (10) of Table 7, we examine non-CEO top executives' total compensation with similar model specifications.

Results can be summarized as follows. First, we find that among these four governance variables, only *Long_Tenure* is significantly positively associated with executive compensation,

suggesting that CEOs with longer tenure tend to earn more than others. Including this variable, however, does not explain away the estimated pay effect related to the S&P 500 addition. Second, and more importantly, we find that none of the interactive terms between *AFTER_ADDITION* and governance quality dummies are statistically significant, suggesting that the S&P 500 addition related pay effect is present in both firms with strong governance quality and those with weak one. In other words, governance quality cannot fully explain away the aforementioned executive pay jump associated with the S&P 500 addition event.

4.2 Peer-Based Compensation Setting and the S&P 500 Addition Related Pay Increase

A growing literature suggests that flawed peer-based compensation setting mechanisms might be responsible for the drastic increase in executive compensation (see for example, Faulkender et al., 2010, 2013; Bizjak, et al., 2011). Thus, in this sub-section, we investigate whether firms' peer-based benchmarking practices contribute to the observed index related pay effect. To this end, we first hand-collect data on S&P 1500 firms' actual peers that are selected for setting their executives' compensation (or compensation peers) from 2006 to 2010. We start in 2006 because starting that year the Securities and Exchange Commission (SEC) required all public firms to disclose in their proxy statements the peer groups that they use to set managerial compensation (compensation peers) as long as the use of peer group is material.[14] These peer firms can be found in the Compensation Discussion and Analysis (CD&A) section of the proxy statements (DEF 14A filings). In this study, we consider only those peers that are covered by both Compustat and CRSP.[15]

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[14] Prior to this SEC rule, proxy disclosure on the details of peer use was voluntary.
[15] Among all the S&P 1500 firms in 2010 about 63% of them report well-defined compensation peers. These firms report 82,791 peer-years that have basic financial information such as ROA and stock returns necessary for the empirical analysis.

4.2.1 Cross-Benchmarking Practices among S&P 500 Members

We first investigate the origin of compensation peers selected by each S&P 1500 firm based on whether they belong to S&P 500, 400, or 600 Indices. The results are reported in Table 8. We first find a strong cross-benchmarking tendency among S&P 500 members. Specifically, for a typical S&P 500 firm, about 68% of its compensation peers are other S&P 500 firms. This finding is consistent with Bizjak et al.(2011) and Faulkender et al. (2010) which also find that firms in the S&P 500 are more likely to choose peers that are also in the S&P 500. In contrast, the tendency to select their own index members as compensation peers is much less pronounced for the S&P 400, or the S&P 600 firms. For example, only about 28% (28%) of compensation peers are from the same index for the S&P 400 (S&P 600) firms.

It is also worth noting that the mid-cap firms in the S&P 400 Index select disproportionately more the large-cap firms from the S&P 500 Index into their compensation peer groups, whereas the reverse is not true. For example, for mid-cap S&P 400 firms, about one-quarter of their compensation peers are from the S&P 500 Index. On the other hand, S&P 600 firms seem less prone to select S&P 500 firms as their compensation peers. Instead, most of their peers are from S&P 600 members or non S&P 1500 firms.

These facts have two important implications for this study. First, because S&P 500 firms tend to select other S&P 500 firms as their compensation peers (the cross-benchmarking practice of S&P 500 members), it is possible that once a firm joins the S&P 500 Index, it will include more other S&P 500 firms into its peer group. Second, because S&P 500 firms are a popular choice of compensation peers by other firms (such as S&P 400 firms), any structural change in the executive compensation of S&P 500 firms has the potential to affect other firms'

compensation structures through interconnected benchmarking practices. We investigate these two implications in the following analysis.

4.2.2 Peer Changes around the S&P 500 Addition

In this section we empirically examine the first implication, that is, whether a firm includes more S&P 500 members in its compensation peer group once it joins the S&P 500 Index. In particular, we calculate the proportion of S&P 500 members in each event firm's peer group during the two years before and the two years after its addition to the index. Due to data limitations, this analysis only focuses on those addition events that occurred between 2007 and 2009.[16]

Panel A of Table 9 reports the cross-sectional summary statistics of this key variable. Event Year 0 is the year in which the addition event occurred. The table shows that once a firm joins the S&P 500 Index, it steadily increases the presence of S&P 500 firms in its compensation peer group. Specifically, two years before a firm is added to the S&P 500 Index, on average less than half of its compensation peers (about 39%) are S&P 500 members. Two years after addition, the proportion of peers from the S&P 500 Index increases to 55%. In other words, the number of S&P 500 peers increases by more than 50% within two years of joining the index. Considering that firms tend to use median peer compensation as a benchmark to set their executives' compensation, this also implies that once a firm is added to the S&P 500 Index, its executives' compensation becomes more closely benchmarked with its S&P 500 peers. Cross-sectional median statistics in Panel A show a similar pattern.

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[16] Although we have peer data from 2006 to 2010, addition events occurred in 2006 or 2010 cannot be used because these events either do not have peer information before or peer information after the addition.

It is likely that the increasing presence of S&P 500 firms among its compensation peers reflects the fact that this firm becomes more like other S&P 500 firms in terms of firm fundamentals, such as firm size or industry. We, however, find no significant evidence showing that event firms' market capitalization increases significantly during this period. Their industry classifications also remain unchanged. It is also likely that the observed tendency of adding more S&P 500 firms to the compensation peer group is a common phenomenon among all firms. To examine whether this is the case, for each event firm, we obtain a control firm based on the propensity score matching method (used in Table 4). The matching is conducted by firm size, change in firm size, operating profitability, industry, and year. The firm that has the closest propensity score to an event firm is selected as the control firm for this event firm.

Table 9 reports the mean and median percentage of S&P 500 firms in the control firms' compensation peer group during the same event window. Among these comparable firms, we do not find any clear upward trend of having more S&P 500 firms as their peers. Specifically, the percentage of S&P 500 firms in these firms' compensation peers ranges between 26% and 31% but remains relatively stable. This finding suggests that the documented systematic change in event firms' compensation peers cannot result from a common trend for all firms during the same period.

4.2.3. From Peer Change to Compensation Change

This section offers more detail about the systematic change in event firms' peer group from the perspective of compensation level changes. In particular, we first identify two types of compensation peers: (1) firms that used to be an event firm's compensation peers in previous year but are dropped in the current year (*the replaced peers)*, and (2) firms that are newly added

to an event firm's compensation peer group and that also belong to the S&P 500 Index (*the new peers*). We compare these two groups of firms' total executive compensation and report the results in Panel B of Table 9. If the S&P 500 addition induced peer change is at least partially responsible for the eventual executive pay raise, we should expect that the mean compensation level of these newly added peers should be significantly higher than that of those peers replaced. This prediction is indeed confirmed by our analysis. Specifically, two years before the addition event, the difference in the executive compensation between the new peers and the replaced peers is not statistically significant. In the year of the addition (event year 0), however, we find that the new peers tend to pay much higher executive compensation than the replaced ones. For instance, the average total compensation paid to the CEOs of the new peers is about $10 million, almost twice the average total compensation paid to the CEOs of the replaced peer firms. One year after the addition (event year 1), the pay difference between the newly added peers and the replaced peers becomes even higher. Similar patterns can also be observed for the total compensation paid to the non-CEO top executives.

Overall, the results in Table 9 show strong evidence that a firm tends to systematically reshuffle its compensation peers after it becomes an S&P 500 member. A board might select more S&P 500 firms into peer group because it views other S&P 500 firms as more successful and more visible than the firm itself. Another possible behavioral explanation is categorical thinking (Mullainathan, 2002; Barberis and Shleifer, 2003). The board of directors of event firms might think that S&P 500 membership per se is an important dimension defining its relationship to other stocks. Once a firm joins the S&P 500 Index, it might view other firms in the index as more alike. Although the exact motivation of this behavior remains unclear, one thing is certain:

that is, this behavior can further raise this firm's compensation benchmark levels and contribute to the above-documented pay effect around the S&P 500 addition event.

5. The Ripple Effect of S&P 500 Index Additions

In this section, we explore further evidence suggesting that inflating compensation might not stop with the new index members. We first investigate how many firms include the event firms in their compensation peer groups, in particular after these event firms join the S&P 500 Index. We then show some evidence that an index addition event can create a "ripple effect" in executive compensation levels for other firms in the same industry through this cross-benchmarking practice.

To start, for each event firm that is added to the S&P 500 Index during the 2007-2009 period, we count the number of S&P 1500 firms that include this firm in their own compensation peer groups. Table 10 reports the summary statistics for this variable. Two years prior to an event firm being added to the S&P 500 Index, on average, about eight S&P 1500 firms include it in their compensation peer groups. Two years after the addition, the number of S&P 1500 firms that benchmark this event stock to set their executives' compensation, on average, increased by 62.5% to thirteen. Results based on medians are similar.

Panel A of Table 10 also reports the number of S&P 1500 firms that are from the same (or different) SIC2 industry classification as the event firms and include the event firms to their compensation peer group. On average, two years before an event firm is listed in the S&P 500 Index, about five same-industry firms benchmark the event firm when setting executive compensation. Two years after, the number of the same-industry firms benchmarking this event firm increases by about 40% to seven. We observe a similar pattern for firms that are in different

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industries. In particular, two years before the addition event, about four firms from other industries include the event firm in their peer groups. Two years after, the number increases to six.[17]

Recall from Table 1 that there are about 102 firms added to the S&P 500 Index over this period. Given that each of them on average is benchmarked by eleven other firms, the total number of firms that include these event firms in their compensation peer groups can be more than one thousand. Furthermore, more than half of them are from the same-industry.[18]

Finally, Table 10 reports the number of firms that include a control firm[19] (a matching firm that has similar characteristics to an event firm) in their compensation peer groups. Two clear patterns emerge. First, the number of firms that select event firms as their compensation peers is much greater than the number of firms that select the control firms for the same purpose. This is particularly true after the event firm becomes an S&P 500 member. Second, the number of firms that select a control firm as a compensation peer is relatively stable, whereas the number of firms that select an event firm grows significantly after the event firms becomes an S&P 500 member. These results again highlight the systematic influence of S&P 500 membership on a firm's chance of being selected by other firms as a compensation peer.

The fact that many firms include newly added index members into their own pay peer groups suggests a possible "pay contagion effect" or a "ripple effect." In particular, the significant executive pay raise of event firms induced by the S&P 500 addition can further increase the average level of other firms ' executive compensation through the peer-based

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[17] On average, an S&P 1500 firm is benchmarked by approximately 4.2 (median = 3) firms from the same industry and 3.9 (median = 2) firms from other industries.

[18] We would also like to note that because of prohibitive data collecting costs, this analysis does not cover non-S&P 1500 firms. Were these firms included in this analysis, the number of firms that include event firms in their compensation peer groups could be even greater. Hence, the potential for "a contagion" from an event firm to other firms is even larger.

[19] The control firms are again determined using the propensity score method from Table 4.

compensation setting mechanism. These firms' increased executive compensation could further indirectly influence the executive compensation of other firms that are connected to these affected firms through other dimensions that affect peer choices. For example, in addition to the S&P 500 membership, industry is another important dimension in constructing the compensation peer group. Bizjak et al. (2011) show that approximately half of the compensation peers of a typical firm are from the same SIC2 industry. One testable implication is therefore whether the pay effect induced by the S&P 500 addition event can further propagate to the firms in the same industry, regardless of whether these firms are part of the index or not.

To test this "ripple effect" hypothesis, we follow the methodology of Bereskin and Cicero (2013) and use the following regression model for all non-event firms covered by ExecuComp:

$$Y_{i,t} = \alpha + \gamma X_{i,t-1} + \delta_1 AffectedInd_i + \delta_2 AffectedInd\_After_{i,t} + \beta_t + \varepsilon_{i,t} \tag{3}$$

where $X_{i,t}$ is a set of control variables discussed in Section 3 and Y refers to either CEO's or non-CEO executives' compensation. The dummy variable *AffectedInd* takes the value of one if (1) the firm i is not an event firm in any year between 1992 and 2010 and (2) more than 10%[20] of firms from firm i's two-digit SIC industry are added to the S&P 500 Index in any year during the 1992–2010 period;[21] it takes the value of zero otherwise. We introduce this dummy to address the concern that an industry in which more than 10% of member firms are added to the S&P 500 has much higher growing potential, or is in general more economically productive than other

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[20] In untabulated robustness tests, we redefine the affected industry as the one in which at least 20% of its firms are added to the S&P 500 Index in one year. The conclusion remains unchanged.
[21] One two-digit SIC industry could have more than 10% of member firms being added to the S&P 500 index during multiple years of our sampling period. For these cases, we use the first year this occurs as the industry event year. In unreported robustness checks, we either use the last year as the industry event year or simply remove these industries from our analysis. The results remain unchanged.

industries. Such an industry may offer relatively higher compensation to its executives. The key independent variable of this analysis is *AffectedInd_After*, a new dummy variable designed to capture the industry-wide contagion effect triggered by the S&P 500 addition event. It takes the value of one if (1) *AffectedInd* is equal to one and (2) the year t is equal to or greater than the year in which more than 10% of firm i's two-digit SIC industry-group is added to the S&P 500 Index.

Table 11 reports the results. In Columns (1) and (2), the dependent variable is the CEO's total compensation, whereas in Columns (3) and (4), the dependent variable is other top executives' average total compensation. For each dependent variable, we present results both with and without firm fixed effects. We find strong and consistent evidence that a compensation increase for an event firm's CEO will subsequently affect the CEO pay of other firms in the same industry. In particular, the estimated coefficient of *AffectedInd_After* is a staggering $3.3 million per year, highly significant both economically and statistically. The results become even stronger after we include the firm fixed effects in Column 2. In other words, when more than 10% of firms in an industry are added to the S&P 500 Index, the average CEO compensation of other firms in the same industry increases by more than $3 million per year (after controlling for other firm characteristics associated with the pay-setting process).

This ripple effect seems much greater than the one associated with the Delaware anti-takeover rulings documented by Bereskin and Cicero (2013), partially because the S&P 500 pay effect is itself substantially greater than the pay effect linked to the Delaware antitakeover rulings. Also, we adopt a much wider sample period (spanning from 1992 to 2010, whereas the aforementioned study is mainly limited to the 1992–2000 period), which allows a wider post-event window for testing the long-term pay effect associated with index addition events. Finally,

as we noted before, many industries have more than one year that have more than 10% of firms being added to the S&P 500 Index. For firms in such industries, the total pay increase effect documented here is better interpreted as the cumulative effect of multiple S&P 500 addition waves.

For compensation of non-CEO top executives we find the ripple effect to be much smaller, or even insignificant, depending on the model specification. Specifically, without firm fixed effects, we find that a firm's non-CEO top executives' average total compensation increases by about $0.89 million after 10% of the firms in its industry are added to the S&P 500 Index (Column 3). After we include the firm fixed effects, the estimated coefficient of *AffectedInd_After* is a mere $0.09 million and statistically insignificant.

6. Conclusion

We document that addition to the S&P 500 Index leads to a significant pay increase for the executives of the newly added index firm. Furthermore, these executives' pay remains high even after the addition event has long passed. This pay increase cannot be entirely explained by improvements in the firm's operating performance and/or deterioration in corporate governance. However, event firms' tendency to select other S&P 500 firms whose executives have much higher total compensation as their compensation peers seems to contribute to this interesting phenomenon. That is, once a firm joins "a new club," it begins mimicking the compensation-setting behavior of the other "club members."

We further examine whether such alteration of compensation peer groups can serve as an important mechanism through which an event that is seemingly unrelated to the executive labor market, such as index membership, can cause an industry-wide "ripple effect" in executives' pay

levels. The "ripple" forms when a firm's top executives are rewarded with higher salary and options for becoming an S&P 500 member. The magnitude of this compensation "ripple" further amplifies when the event firm adds other high-compensation S&P 500 Index members into its peer group. The effect spreads further when other firms from the same industry begin to benchmark this new index firm as their compensation peer. The final result is a somewhat artificial non-performance-related increase in executives' reservation price observable throughout the entire industry.

We use the S&P 500 addition event as an example to show that executive compensation peer selection that emphasizes non-fundamental dimensions such as the S&P 500 Index membership can result in significant distortions in the general level of executive compensation. Overall, this study contributes to the ongoing debate on the efficiency of executive pay-setting process. It also suggests that more economically grounded and less subjective methods for choosing a firm's peers should be developed.

Appendix A. Variable Definitions

Variable	Definition
Total Pay ($000)	TDC1, from ExecuComp
Salary($000)	Executive Salary, from ExecuComp
Bonus($000)	Executive bonus, from ExecuComp. From 2006 on, this variable = BONUS + NONEQ_INCENT
OAN (000)	Number of options granted, from ExecuComp
OABV ($000)	Options granted in Black–Scholes Value, from ExecuComp. From 2006 on, this variable = OPTION_AWARDS_FV.
RSTKGRNT(($000)	The value of restricted stock granted during the year, from ExecuComp. From 2006 on, this variable = STOCK_AWARDS_FV.
Base Pay($000)	Salary + Bonus.
Incentive Pay($000)	TDC1 − (Salary + Bonus).
Non-CEO Executives' Average Pay Variables	Average pay variables such as TDC1, OAN, OABV, Base, Incentive pay of all non-CEO top executives of each firm, from ExecuComp
Size ($ Million)	Year-end market capitalization, from the CRSP
Size_Change ($ Million)	Difference in market capitalization between year t and year $t − 1$, from the CRSP
Tobin's Q	Ratio of sum of market value, liquidation value of the firm's outstanding preferred stock, and debt to total assets, from Compustat
ROA	The ratio of EBIT to total assets, from Compustat
Leverage	The ratio of debts to total assets, from Compustat
IO	Fractional outstanding shares owned by institutional investors, from 13F
IO_Hindex	The Herfindahl Index of ownership by all institutional investors, from 13F
CEO_Tenure (Year)	The number of years since the CEO has been in his position, from ExecuComp
Trend	Year − 1991, where Year ranges from 1992 to 2010
CEO_Chair	A dummy indicating whether the CEO is also the chair of the board
WPS	Scaled Wealth-Performance sensitivity, from Alex Edmans' website: http://faculty.london.edu/aedmans/data.html
Indp_Ratio	The ratio of the number of independent directors to the total number of directors
Intense_Ratio	The ratio of the number of intensive directors to the total number of directors. A director is said to be an intensive monitor if he or she is independent and serves at least two out of the three principal monitoring committees: auditing, compensation, and nominating (Faleye, Hoitash, and Hoitash, 2011).

Appendix B. The Abadie–Imbens (AI) Matching Estimator

As explained in Abadie and Imbens (2006) and Çolak and Whited (2007), the main use of this technique is to estimate the unobservable differences between the "treated firms" (what we call "event firms" in this article) and the comparable control firms. In our case, the index inclusion effect on executive compensation is not measurable (it is unobservable) for the non-treated control firms. It is observable only for treated firms (new additions to the index). To estimate the index inclusion's effect free of endogeneity biases and other factors, we need to impute what the increase in compensation would have been had the firm not been included in the S&P 500 Index. We briefly explain how this is accomplished.

Let N_T and N_L be the number of firms in the treated and the control samples, respectively. A binary variable D will indicate whether ($D = 1$) or not ($D = 0$) the firm is added into the index. $X_i(D = 1)$ denotes the executive compensation of index firm i. Similarly, $X_i(D = 0)$ denotes the same measure for the control firms (i.e., matching firms that were not included in the index). Our goal is to calculate the average compensation effect on the treated firms' sample, $\tau|_{D=1} \equiv \mathrm{E}[X_i(1) - X_i(0)|D = 1]$, which is usually estimated by the simple matching estimator $\hat{\tau}|_{D=1} = \frac{1}{N_T}\sum_{i=1}^{N_T}[X_i(1) - \hat{X}_i(0)]$. As stated above, in such an estimation the treatment effect of the treated firms' sample, $X_i(1)$, is observable; but the treatment effect of the control sample, $\hat{X}_i(0)$ has to be imputed from the estimation.

Abadie and Imbens (2006) show that this estimation technique leads to a substantial bias when the matching between the control variables is imperfect. Instead, they propose a method of removing the bias term that remains after the matching. The bias-corrected matching estimator

adjusts the difference within the matched firms for the matching discrepancies between the control variables. Thus, the bias-adjusted matching estimator for the average treatment effect on treated group is calculated as $\hat{\tau}_M^1 = \frac{1}{N_T} \sum_{i=1}^{N_T} \left[X_i(1) - \tilde{X}_i(0) \right]$, where $\tilde{X}_i(0)$ is the imputed executive compensation had the firms not joined the index. We can calculate this variable as

$$\tilde{X}_i(0) = \begin{cases} X_i & \text{if } D_i = 0 \\ \dfrac{1}{\# S_M(i)} \sum_{h \in S_M(i)} [X_k + \hat{\mu}_0(y_i) - \hat{\mu}_0(y_k)] & \text{if } D_i = 1 \end{cases}, \quad \text{where } S_M(i) \text{ denotes the set of}$$

indices for the matches for unit i that are at least as close as the Mth match (i.e., nearest M^{th} neighbor match), and $\# S_M(i)$ denotes the number of elements in $S_M(i)$. The parameters $\hat{\mu}_0(y_i)$ and $\hat{\mu}_0(y_k)$ represent the magnitude of the adjustment for the treated sample ($D = 1$) and are calculated using a regression on the control sample of the form $\hat{\mu}_{D=0}(y) = \hat{\beta}_{0,D=0} + \hat{\beta}'_{1,D=0} y$,

where $\left(\hat{\beta}_{0,D=0}, \hat{\beta}_{1,D=0} \right) = \text{argmin} \sum_{i=1}^{N_L} \left[K_M(i) \cdot (X_i - \beta_{0,D=0} - \beta_{1,D=0})^2 \right]$. y is the matrix containing the matching variables, and $K_M(i)$ is the number of times firm i is used as a match given that M matches per unit are used divided by the total number of matches. Note that $\sum_i K_M(i) = N_L$ equals the number of treated units.

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Table 1

Sample of Stocks Added to the S&P 500 Index

The table reports the number of stocks that were added to the S&P 500 Index in each year from 1993 through 2009 and those that are finally used in this study (sample event stocks). A sample event stock is the one that is added to the S&P 500 Index only once during the sample period; has complete baseline financial information used for empirical analysis; and has at least one year of executive compensation information in ExecuComp before the addition.

Year	Stocks Added to the S&P 500	Event Stocks That Have Complete Financial Information	Final Sample Event Stocks
1993	13	10	4
1994	18	17	11
1995	26	23	19
1996	20	18	13
1997	29	28	23
1998	37	31	26
1999	43	38	32
2000	53	48	40
2001	30	24	21
2002	23	18	15
2003	9	6	5
2004	20	16	12
2005	16	13	10
2006	32	28	18
2007	38	31	26
2008	35	31	28
2009	29	25	24
Total	471	405	327

Table 2
Summary Statistics
Our full sample includes all ExecuComp firms that overlap with the CRSP and Compustat databases. The sample period runs from 1992 through 2010. Please refer to Appendix A for the definitions of variables reported in this table. All the variables are winsorized at the 1st and 99th percentiles to eliminate extreme observations. Pooled summary statistics of each variable are reported. An event firm is a firm that is added to the S&P 500 Index only once from 1993 through 2009, has complete baseline financial information used for empirical analysis, and has at least one year of pay information in ExecuComp before being added to the S&P 500.

Panel A. Full Sample

Variables	N	Mean	S.D.	Q1	Median	Q3
CEO's						
Total Pay ($000)	27966	4167.52	5352.71	1097.32	2236.97	4887.85
Salary ($000)	28197	640.12	318.57	403	593.91	825
Bonus ($000)	28197	777.04	1172.12	92.75	400	944.25
OAN (000)	28170	152.69	274.81	0	55	172
OABV ($000)	27979	1605.66	3137.73	0	471.94	1697.35
RSTKGRNT($000)	28181	673.71	1696.76	0	0	438.13
Base Pay (Salary + Bonus) ($000)	28197	1423.07	1374.67	596.64	987.5	1725.82
Incentive Pay (Total – Base) ($000)	27966	2692.44	4389.46	266.51	1081.8	3076.89
Non-CEO Top Executives' Average						
Total Pay ($000)	28079	1568.74	1827.53	535.72	943.77	1832.99
Salary ($000)	28194	320.35	148.24	214.65	285.94	389.23
Bonus ($000)	28193	473.17	843.53	58.64	172.46	462.31
OAN (000)	28193	897.18	1058.59	311.9	514.25	987.17
OABV ($000)	28192	49.86	78.13	5.98	23.51	58.56
RSTKGRNT ($000)	28054	756.61	1376.01	17.04	235.13	809.76
Base Pay (Salary + Bonus) ($000)	28177	489.8	1304.38	0	0	231.27
Incentive Pay (Total – Base) ($000)	28042	1454.36	2442.01	168.22	528.6	1543.13
Size ($ Million)	27916	5299.37	13345.85	458.69	1217.33	3662.91
Size_Change ($ Million)	27916	403.54	3094.4	-138.2	72.99	501.29
Q	27497	1.99	1.39	1.15	1.5	2.23
ROA	27842	0.14	0.11	0.08	0.14	0.2
Leverage	28065	0.18	0.16	0.02	0.15	0.29
IO	28171	0.67	0.23	0.52	0.69	0.84
IO_Hindex	28171	0.06	0.06	0.03	0.05	0.07
CEO_Tenure (Year)	28195	3.24	3.19	1	2	5
WPS	14657	27.67	90.48	3	6.1	13.06
CEO_Chair	28197	0.33	0.47	0	0	1
Indp_Ratio	18897	0.69	0.17	0.57	0.71	0.82
Intense_Ratio	18897	0.3	0.22	0.11	0.29	0.44

Table 2 - *Continued*

Panel B. Event Firms vs. Non-Event Firms

Variables	N	Event Firms Mean	Median	N	Non-Event Firms Mean	Median
CEO's						
Total Pay ($000)	4891	6402.38	4178.04	23075	3422.11	1916.2
Salary ($000)	4916	682.61	683.1	23281	597.43	542.5
Bonus ($000)	4916	1078.61	662.36	23281	650.7	343.87
OAN (000)	4912	246.72	110	23258	132.84	50
OABV ($000)	4892	2937.07	1226.84	23087	1266.66	386.38
RSTKGRNT ($000)	4913	964.72	0	23268	515.68	0
Base Pay (Salary + Bonus) ($000)	4916	1773.63	1357.45	23281	1253.05	892.99
Incentive Pay (Total – Base) ($000)	4891	4469.61	2468.28	23075	2138.32	882.45
Non-CEO Executives' Average						
Total Pay ($000)	4900	2400.28	1718.63	23179	1294.55	802.59
Salary ($000)	4914	351.86	333.27	23280	296.08	261.5
Bonus ($000)	4914	665.66	293.89	23279	370.51	154.57
OAN (000)	4914	80.64	43.75	23278	43.36	21
OABV ($000)	4896	1330.75	614.32	23158	576.54	200.9
RSTKGRNT ($000)	4911	713	0	23266	355.21	0
Base Pay (Salary + Bonus) ($000)	4914	1125.21	688.29	23279	747.15	477.77
Incentive Pay (Total – Base) ($000)	4895	2346.92	1249.34	23147	1103.72	435.79
Size ($ Million)	4839	8206.5	4235.98	23077	4689.77	924.89
Size_Change ($ Million)	4839	726.68	438.39	23077	335.79	55.46
Q	4768	2.41	1.74	22729	1.9	1.47
ROA	4838	0.15	0.14	23004	0.14	0.13
Leverage	4866	0.17	0.13	23199	0.18	0.15
IO	4912	0.71	0.73	23259	0.67	0.68
IO_Hindex	4912	0.05	0.04	23259	0.06	0.05
CEO_Tenure (Year)	4914	3.72	3	23281	3.13	2
WPS	1996	47.48	8.3	12661	24.54	5.82
CEO_CHAIR	4916	0.32	0	23281	0.33	0
Indp_Ratio	3682	0.68	0.71	15215	0.69	0.71
Intense_Ratio	3682	0.27	0.25	15215	0.3	0.3

Table 3
Event Firms' Executive Compensation around the S&P 500 Addition

This table reports various compensation measures around the S&P 500 addition year (*T* = 0), including *Salary*, *Bonus* (calculated as *TOTAL_CURR – Salary*), *OABV* (Options granted Black–Scholes Value), *TDC1*, *OAN* (number of options granted), *LTIP* (amount paid under the long-term incentive plan), *RSTKGRNT* (the value of restricted stock granted during the year), *BASE_PAY* (*Salary + Bonus*), and *INCENTIVE_PAY* (*TDC1 – BASE*). The analysis includes only the sample event firms that are added to the S&P 500 Index during the 1993–2009 period. Panel A reports the compensation of event firms' CEOs; whereas Panel B reports the average compensation measures of non-CEO executives. All variables are in thousands of dollars (except for OAN, which is thousands of options). The dollar values are converted to year 2000 dollars using the annual CPI data obtained from the Federal Reserve Bank of St. Louis FRED tables. All variables are winsorized at 1% and 99% to eliminate extreme observations. *Avg. Before* refers to the average pay measures over the period of [–3;–1]; *Avg. After* refers to the average pay measures over the period of [+1;+3]. The *p*-values presented in the last column are obtained using two tailed *t*-tests for the difference between *Before* and *After* values of the compensation measure. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Compensation Variables around the S&P 500 Addition (for CEOs)

Compensation Variable	*T* = –1	*T* = 0	*T* = +1	Avg. Before (–3, –2, –1)	Avg. After (+1, +2, +3)	*t*-Test Before vs. After (*p*-value)
TDC1	7168.87	7740.78	7881.87	5932.53	8416.46	0.00
SALARY	665.66	694.86	718.30	638.46	736.87	0.00
BONUS	1210.26	1286.58	1212.76	1114.00	1199.30	0.55
OABV	3642.14	4049.14	3988.51	3009.01	4536.15	0.00
OAN	254.60	266.81	291.81	205.42	337.00	0.00
RSTKGRNT	715.14	879.45	928.31	571.50	852.38	0.07
BASE PAY (Salary + Bonus)	1893.57	2000.01	1952.75	1766.31	1955.34	0.22
INCENTIVE PAY	4986.28	5545.57	5651.62	3993.24	6211.89	0.00

Panel B: Compensation Variables around the S&P 500 Addition (for non-CEO executives)

Compensation Variable	*T* = –1	*T* = 0	*T* = +1	Avg. Before (–3, –2, –1)	Avg. After (+1, +2, +3)	*t*-Test Before vs. After (*p*-value)
TDC1	2440.03	2895.66	2957.18	2231.14	3028.79	0.00
SALARY	338.54	353.30	369.18	334.21	381.29	0.00
BONUS	705.55	758.67	783.45	482.22	717.22	0.01
OABV	1408.04	1729.00	1753.88	1076.57	1831.97	0.00
OAN	74.53	88.74	96.50	63.12	101.92	0.00
RSTKGRNT	544.78	613.40	689.53	278.60	656.53	0.00
BASE PAY (Salary + Bonus)	1132.98	1216.88	1268.37	834.39	1197.33	0.00
INCENTIVE PAY	2247.31	2728.30	2775.34	1537.60	2888.77	0.00

Table 4
Growth Rates of Executive Compensation around the S&P 500 Addition

Panel A presents the average growth rates of executive compensation three years before the addition event ([3,-1]) to three years after ([1,3]) for the event firms and the rest of the S&P 500 firms. In Panel B we present the estimated difference between the growth rates of the event firms and the matching sample firms using the simple nearest neighbor matching (or simple matching) and propensity score matching techniques. Matching is done by using firm market capitalization, change in market capitalization, operating profitability (ROA), industry, and year. In all panels ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, for the t- or z-tests.

Panel A. Pay Growth Rates of Event Firms and Non-Event S&P500 Firms

Compensation Variable	Event Firms' Pay Growth Rate (Avg. After$_{1,3}$/Ave Before$_{-3,-1}$)	Non-Event S&P 500 Firms' Pay Growth Rate	Dif	T-Stat.
CEOs				
TDC1	86.48%	47.74%	40.50%***	4.18
BASE PAY (Salary + Bonus)	33.61%	21.40%	12.64%**	2.29
INCENTIVE PAY	154.45%	98.90%	60.66%***	4.01
Non-CEO Executives				
TDC1	67.27%	30.49%	37.72%***	5.38
BASE PAY (Salary + Bonus)	50.16%	43.93%	7.46%	1.31
INCENTIVE PAY	172.62%	148.78%	42.07%***	2.72

Panel B. Pay Growth Rates Relative to Matching Sample

	Event Firm's Pay Growth Rate minus Matching Firm' Growth Rates (Pay Growth Rate Around Addition Year = Avg. After$_{3,1}$/Ave Before$_{-3,-1}$)			
	Simple Matching		**Propensity Score Matching**	
Compensation Variable	Difference	z-stat	Difference	z-stat
CEOs				
TDC1	35.38%	2.85***	39.04%	3.90***
BASE PAY (Salary + Bonus)	12.68%	1.81*	9.90%	1.42
INCENTIVE PAY	25.68%	1.19	34.80%	2.10**
Non-CEO Executives				
TDC1	32.09%	3.92***	36.02%	4.84***
BASE PAY (Salary + Bonus)	6.67%	1.85*	6.97%	2.13**
INCENTIVE PAY	48.33%	2.99***	38.52%	2.69**

Table 5
S&P 500 Addition's Long-Term Impact on Executive Compensation- Multivariate Regression

This table reports the multivariate regression results regarding the long-term effect of the S&P 500 addition on executive compensation measures. The sample includes all ExecuComp firms that have complete financial information for the empirical analysis. The sample period runs from 1996 through 2010 because the information on governance variables is available from RiskMetrics from 1996 onward. The dependent variables are either CEO pay in various forms (Panel A) or non-CEO top executives' average pay in various forms (Panel B). The key independent variable $AFTER\_ADDITION_t$ equals one if (1) a stock i was added to the S&P 500 Index during the 1993–2009 period and (2) year t is the addition year or the year after the stock was added, and zero otherwise. Dummy $ADDITION\_EVENT_i$ takes the value of one if a stock was added to the S&P 500 Index during the 1993–2009 period and zero otherwise. Dummy $SP500_{i,t}$ takes the value of one if a stock was an S&P 500 member at the beginning of 1993 and remained so in year t, and zero otherwise. All variables are winsorized at the 1st and 99th percentiles. All controls are lagged by one year. Please refer to Appendix A for the definitions of these controls. t-statistics reported in parentheses are based on the robust standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5- Continued

Panel A. CEO Compensation

	CEO Total Pay (TDC1)			CEO Base Pay (Salary + Bonus)			CEO Non-base Pay		
	1	2	3	4	5	6	7	8	9
ADDITION_EVENT	1,788.67***			502.30***			1,208.47***		
	(13.95)			(16.45)			(11.10)		
AFTER_ADDITION	1,642.35***	1,042.75***	803.91***	149.44***	176.28***	165.13***	1,472.52***	877.91***	698.12***
	(8.90)	(5.63)	(3.70)	(3.45)	(4.37)	(2.98)	(9.32)	(5.26)	(3.72)
SIZE	0.16***	0.16***	0.15***	0.04***	0.03***	0.03***	0.12***	0.12***	0.11***
	(33.66)	(18.23)	(15.62)	(29.52)	(15.51)	(13.84)	(29.47)	(15.92)	(13.24)
SIZE_CHANGE	0.14***	0.14***	0.11***	0.06***	0.06***	0.06***	0.07***	0.08***	0.05***
	(7.39)	(8.28)	(5.71)	(14.37)	(15.47)	(13.20)	(4.56)	(5.05)	(2.85)
Q	201.21***	354.86***	326.88***	-121.72***	-28.02***	-49.59***	312.96***	365.57***	382.75***
	(6.05)	(7.55)	(3.86)	(-22.56)	(-3.96)	(-3.03)	(10.49)	(8.54)	(4.98)
ROA	-1,796.86***	1,650.88***	2,322.49***	472.19***	1,020.19***	1,619.56***	-2,186.60***	630.82	471.77
	(-5.91)	(3.46)	(3.12)	(7.53)	(10.78)	(8.18)	(-8.11)	(1.50)	(0.75)
LEVERAGE	1,489.60***	-825.88***	-974.30**	374.05***	-67.98	-83.57	1,090.24***	-687.31***	-808.77**
	(8.69)	(-2.86)	(-2.37)	(8.44)	(-1.08)	(-0.80)	(7.37)	(-2.64)	(-2.21)
IO	2,538.93***	512.42**	149.68	512.48***	57.10	20.19	1,999.66***	547.47***	210.72
	(20.45)	(2.50)	(0.49)	(14.95)	(1.15)	(0.25)	(19.03)	(3.01)	(0.80)
IO_HINDEX	-1,384.89***	-2,393.73***	-2,147.95***	-353.74**	-1,090.38***	-898.56***	-1,053.39***	-1,185.02**	-1,163.74*
	(-3.21)	(-4.05)	(-2.96)	(-2.38)	(-7.74)	(-3.93)	(-3.28)	(-2.25)	(-1.85)
CEO_TENURE	36.32***	3.69	27.53*	32.78***	21.63***	30.12***	4.11	-15.82	-0.52
	(3.56)	(0.34)	(1.96)	(11.58)	(7.83)	(8.10)	(0.48)	(-1.62)	(-0.04)
TREND	163.31***	241.68***	272.38***	55.95***	75.19***	79.74***	105.26***	161.02***	187.22***
	(16.17)	(19.02)	(17.39)	(16.32)	(23.45)	(18.71)	(12.59)	(14.23)	(13.46)
SP500	2,275.85***	457.08**	782.48***	722.74***	24.62	141.59***	1,569.14***	437.08**	636.42***
	(23.87)	(2.32)	(4.68)	(29.92)	(0.49)	(3.12)	(19.35)	(2.51)	(4.36)
WPS			-0.00***			-0.00***			-0.00***
			(-3.03)			(-4.27)			(-2.67)
CONSTANT	-2,151.97***	-911.19***	-776.69***	179.40***	449.09***	489.72***	-2,261.15***	-1,352.86***	-1,265.56***
	(-12.69)	(-3.90)	(-2.65)	(3.29)	(8.48)	(6.81)	(-15.99)	(-6.46)	(-4.84)
YEAR F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FIRM F.E.	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	26,849	26,849	14,182	27,067	27,067	14,298	26,849	26,849	14,182
R-squared	0.37	0.62	0.63	0.38	0.70	0.69	0.31	0.53	0.54

Table 5- Continued

Panel B. Non-CEO Executives' Average Compensation

	Non- CEO Ave. Total Pay (TDC1)		Non-CEO Ave. Base Pay (Salary + Bonus)		Non-CEO Ave. Non-base Pay	
	1	2	3	4	5	6
ADDITION_EVENT	591.77***		318.27***		618.95***	
	(14.76)		(18.33)		(13.42)	
AFTER_ADDITION	663.16***	425.09***	173.81***	150.82***	888.26***	536.64***
	(11.47)	(7.62)	(6.24)	(5.00)	(11.95)	(6.26)
SIZE	0.07***	0.06***	0.02***	0.02***	0.07***	0.08***
	(41.57)	(22.67)	(25.85)	(16.13)	(31.57)	(20.26)
SIZE_CHANGE	0.06***	0.05***	0.03***	0.03***	0.03***	0.04***
	(9.21)	(9.48)	(8.75)	(10.15)	(3.66)	(4.60)
Q	115.75***	166.05***	-66.84***	-11.82**	149.16***	158.65***
	(10.19)	(11.10)	(-17.88)	(-2.40)	(10.16)	(7.72)
ROA	-1,186.71***	1.72	270.53***	680.41***	-1,086.33***	567.70***
	(-11.33)	(0.01)	(5.81)	(10.32)	(-7.54)	(2.61)
LEVERAGE	317.40***	-119.61	288.60***	94.51**	778.73***	-5.01
	(5.68)	(-1.36)	(9.39)	(2.04)	(9.76)	(-0.04)
IO	814.90***	116.97**	244.45***	-183.09***	962.26***	-174.37*
	(21.43)	(1.97)	(10.40)	(-4.99)	(17.82)	(-1.81)
IO_HINDEX	-489.27***	-781.79***	-12.41	-605.56***	-155.24	-274.87
	(-4.00)	(-4.88)	(-0.13)	(-5.98)	(-0.80)	(-1.00)
CEO_TENURE	7.75**	9.52***	12.84***	-2.49	1.65	-20.39***
	(2.50)	(2.91)	(6.04)	(-1.13)	(0.32)	(-3.51)
TREND	45.78***	67.81***	89.18***	107.88***	135.70***	172.50***
	(12.19)	(15.39)	(35.94)	(43.64)	(25.17)	(26.75)
SP500	643.34***	122.16**	394.19***	-6.26	745.01***	186.38*
	(21.07)	(2.15)	(23.37)	(-0.15)	(17.86)	(1.91)
CONSTANT	-413.16***	-50.08	-51.31	176.50***	-1,296.77***	-580.77***
	(-6.50)	(-0.66)	(-1.61)	(4.95)	(-17.70)	(-5.82)
YEAR F. E.	Yes	Yes	Yes	Yes	Yes	Yes
FIRM F.E.	No	Yes	No	Yes	No	Yes
N	26,954	26,954	27,063	27,063	26,922	26,922
R-squared	0.46	0.72	0.48	0.71	0.40	0.60

Table 6
Addressing the Endogeneity: Abadie–Imbens Matching

The table presents the endogeneity corrected results. It shows the average difference in the CEO's or the non-CEO executives' compensation measures (*TOTAL_PAY*, *BASE_PAY* and *INCENTIVE_PAY*, in thousands of year 2000 dollars) between the treated sample (newly added S&P 500 firms) and the control samples (the non-event S&P 1500 firms or, alternatively, the existing S&P 500 firms). The sample period runs from 1992 through 2010. Matching is done using the Abadie and Imbens (2006) bias-corrected matching method with replacement. Each firmyear of the event firm is matched with *m* different firmyears of the control firms (*m* = 1, 2, or 3), and the difference in their compensation is calculated in each firm-year. Then, this difference is averaged for the firm-years in the post-addition period (*AfterAddition* = 1) and for the firm-years in the pre-addition period (*AfterAddition* = 0), and the difference between the two averages is reported. The matching is done using exact matching with *Year* variable and the nearest-neighbor matching with *size, change in size, Tobin's q, ROA, leverage, institutional ownership, institutional ownership's Herfindahl index, CEO's tenure,* and *Trend* variables. All variables are winsorized at the 1st and 99th percentiles. The treatment effect (difference-in-difference in pay) is shown by "DIP," which is measured in thousands of dollars. The *p*-values are calculated using heteroskedastic-robust standard errors and reported in the parentheses under the estimated difference in pay (DIP). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Difference-in-Pay (DIP) Abadie–Imbens Matching

Executive Type	*m* matches	Control Sample					
		All S&P 1500 Firms			Other S&P 500 Firms		
		TOTAL	BASE	INCENTIVE	TOTAL	BASE	INCENTIVE
CEO	*m* = 1	2,296.91***	148.70**	2,151.04***	1,308.44***	103.48	1,175.09***
		(0.00)	(0.04)	(0.00)	(0.00)	(0.11)	(0.00)
CEO	*m* = 2	2,517.88***	172.13***	2,346.88***	1,520.24***	110.15*	1,407.20***
		(0.00)	(0.01)	(0.00)	(0.00)	(0.06)	(0.00)
CEO	*m* = 3	2,691.39***	191.35***	2,502.48***	1,550.72***	119.14*	1,472.76***
		(0.00)	(0.01)	(0.00)	(0.00)	(0.08)	(0.00)
Non-CEO	*m* = 1	676.89***	101.16***	587.12***	649.83***	37.97*	635.29***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.09)	(0.00)
Non-CEO	*m* = 2	765.56***	105.87***	665.79***	704.40***	48.32***	737.59***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Non-CEO	*m* = 3	809.38***	108.90***	687.40***	714.12***	53.20***	763.29***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)

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Table 7
Corporate Governance and S&P 500 Related Pay Effect

The dependent variables are either CEO total compensation or non-CEO top executives' average total compensation. The sample includes all ExecuComp firms that have complete financial information for empirical analysis. The sample period is 1992–2010. The key independent variable *AFTER_ADDITION*$_{i,t}$ equals one if (1) a stock *i* was added to the S&P 500 Index between 1993 and 2009 and (2) year *t* is the addition year or the year after the stock was added, and zero otherwise. Dummy *Long_tenure* equals one if a CEO's tenure is above the sample median, and zero otherwise. Dummy *CEO-Chair* equals one if a CEO is also the board chairperson, and zero otherwise. Dummy *Independent_Board* equals one if a firm's ratio of independent board members is above the sample median, and zero otherwise. Dummy *Intensive_Board* equals one if the majority of independent directors serve on at least two out of the three principal monitoring committees: auditing, compensation, and nominating; and zero otherwise. All other controls are included in regression analysis but not reported in this table. Please refer to Appendix A for the definitions of these controls. All variables are winsorized at the 1st and 99th percentiles. *t*-statistics reported in parentheses are based on the robust standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	CEO Total Pay					Non-CEO Average Total Pay				
	1	2	3	4	5	6	7	8	9	10
AFTER_ADDITION	711.40***	743.34**	744.46***	855.66***	859.08***	303.30***	218.95**	323.21***	324.08***	294.68***
	(2.90)	(2.26)	(2.87)	(2.92)	(3.00)	(4.18)	(2.35)	(4.19)	(3.77)	(3.61)
Long_Tenure	164.74*	169.08*	163.26*	165.39*	164.18*	8.46	−2.95	7.58	8.55	8.50
	(1.86)	(1.94)	(1.85)	(1.87)	(1.86)	(0.33)	(−0.12)	(0.30)	(0.34)	(0.33)
CEO_Chair	−27.50	−27.56	−8.79	−24.48	−27.31	−36.32	−36.16	−25.06	−35.88	−36.33
	(−0.24)	(−0.24)	(−0.08)	(−0.22)	(−0.24)	(−1.09)	(−1.08)	(−0.76)	(−1.07)	(−1.09)
Independent Board	−35.24	−34.87	−33.75	6.95	−35.77	−7.95	−8.94	−7.07	−1.89	−7.92
	(−0.38)	(−0.38)	(−0.37)	(0.08)	(−0.39)	(−0.31)	(−0.34)	(−0.27)	(−0.07)	(−0.30)
Intensive Board	−61.07	−61.18	−61.39	−63.23	−15.67	−19.97	−19.70	−20.16	−20.28	−22.62
	(−0.75)	(−0.75)	(−0.75)	(−0.77)	(−0.20)	(−0.87)	(−0.86)	(−0.88)	(−0.89)	(−1.02)
AFTER_ADDITION *Long_Tenure		−46.08					121.75			
		(−0.16)					(1.46)			
AFTER_ADDITION *CEO_Chair			−144.95					−87.32		
			(−0.48)					(−0.89)		
AFTER_ADDITION *Indp_Board				−309.38					−44.56	
				(−0.93)					(−0.48)	
AFTER_ADDITION *Intensive Board					−332.62					19.42
					(−1.08)					(0.22)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	18,088	18,088	18,088	18,088	18,088	18,134	18,134	18,134	18,134	18,134
R-squared	0.64	0.64	0.64	0.64	0.64	0.74	0.74	0.74	0.74	0.74

Table 8
The Composition of Peer Groups

This table reports the composition of peer groups of a typical firm from various indices, such as S&P 500, S&P 400, S&P 600, and non–S&P 1500 firms. For example, the first row reports the percentage of an average S&P 500 member's compensation peers chosen from the S&P 500, S&P 400, S&P 600, and non-S&P 1500 samples. Information on compensation peers is extracted from the SEC's EDGAR database. The sample period is 2006 through 2010.

	S&P 500	S&P 400	S&P 600	Non S&P 1500	Total
Mean Percentage of Compensation Peers from (%)					
S&P 500 Firms	68	12	3	17	100
S&P 400 Firms	25	28	15	32	100
S&P 600 Firms	7	17	28	48	100
Median Percentage of Compensation Peers from (%)					
S&P 500 Firms	72	6	0	22	100
S&P 400 Firms	23	27	13	37	100
S&P 600 Firms	0	15	25	60	100

Table 9
Compensation Peer Changes around the S&P 500 Addition Events

Panel A reports the cross-sectional mean, standard deviation, median, and other related statistical summary of the percentage of S&P 500 firms in both event firms' and control firms' compensation peer groups around the addition event. The sample period is 2006 through 2010. Compensation peer information is hand-collected from firms' proxy statements. This information became publicly available after 2006. Event Year 0 is the reference year in which the event stock was added to the S&P 500 Index. For each event firm, its control firm is an S&P 1500 firm that has the closest propensity score with the event firm (propensity scores are obtained from the logistic regressions where the dependent variable is whether a firm is an event firm, and the independent variables are firm size, change in size, ROA, and industry). Panel B reports the total compensations (TDC1) of CEOs and Non-CEO top executives of those firms that are dropped from event firms' compensation peers and those S&P 500 firms that are newly added to event firms' peer groups.

Panel A. Percentage of S&P 500 Firms in Event & Control Firms' Compositions Peers around the Addition Event

		Event Firms (%)			
Event Year	Mean	Std. Dev	25th Percentile	Median	75th Percentile
–2	39	22	19	44	58
–1	42	23	21	42	57
0	46	23	30	47	58
1	51	21	35	50	70
2	55	20	40	56	68

		Control Firms (%)			
Event Year	Mean	Std. Dev	25th Percentile	Median	75th Percentile
–2	31	37	0	18	75
–1	26	33	0	12	46
0	31	36	0	12	56
1	29	34	0	14	46
2	29	34	0	19	50

Panel B. Executive Pay Difference between the Replaced Peers and the Newly Added Peers that are S&P 500 Members

	CEO Total Compensation ($000)				Non-CEO Executives' Total Compensation ($000)			
Event Year	Replaced Peers	Newly Added S&P 500 Peers	DIF	*t*-stat	Replaced Peers	Newly Added S&P 500 Peers	DIF	*t*-stat
–2	4,099.55	9,095.96	6,251.54	1.55	2,024.42	2,769.92	1,089.33	1.29
–1	7,890.56	8,550.77	751.93	1.12	2,730.79	3,534.75	934.07	1.61
0	5,008.41	10,038.25	4,574.31**	2.28	2,213.94	3,253.63	1,318.18**	2.31
1	6,791.58	10,760.61	4,947.10***	3.15	2,732.93	3,354.41	1,229.05***	2.91
2	8,663.41	9,373.62	1,787.81	0.41	3,243.54	3,507.41	136.68	0.08

Table 10

Number of S&P 1500 Firms that Include Event Firms in Their Peer Groups

This table reports the cross-sectional mean and median number of S&P 1500 firms that include an event firm in their compensation peer groups around the S&P 500 addition events. It also reports the number of S&P 1500 firms that are from the same SIC2 industry (versus those from a different SIC2 industry) as the event firm and include the event firm in their compensation peer groups. Compensation peer information is hand-collected from firms' proxy statements. This information became publicly available after 2006. Event Year 0 is the reference year in which the event stock was added to the S&P 500 Index. For each event firm, its control firm is an S&P 1500 firm that has the closest propensity score with the event firm (propensity scores are obtained from the logistic regressions where the dependent variable is whether a firm is an event firm, and the independent variables are firm size, change in size, ROA, and industry).

Event Year	Mean	Std. Dev.	Q3	Median	Q1
Total Number of S&P 1500 Firms That Benchmark Event Firms					
−2	8	5	10	7	4
−1	9	6	12	8	4
0	10	6	13	9	5
1	11	7	14	11	6
2	13	8	17	11	7
Number of Same-Industry S&P 1500 Firms That Benchmark Event Firms					
−2	5	4	8	4	2
−1	6	4	8	4	2
0	6	4	8	5	3
1	7	5	10	5	3
2	7	5	12	6	3
Number of Different-Industry S&P 1500 Firms That Benchmark Event Firms					
−2	4	3	5	3	2
−1	4	4	6	3	2
0	5	4	6	4	2
1	5	4	7	5	3
2	6	5	8	4	3
Total Number of S&P 1500 Firms That Benchmark Control Firms					
−2	7	11	8	4	1
−1	7	9	8	5	2
0	8	9	10	5	3
1	9	9	12	6	2
2	7	7	10	5	2

Table 11
Contagion Effect of Pay Increase Caused by the S&P 500 Addition

Our sample includes all ExecuComp firms that have complete financial information for empirical analysis but excludes firms that were added to the S&P 500 Index from 1993 through 2009. The sample period is 1992 through 2010. The dependent variables are either CEO total compensation (TDC1) or Non-CEO top executives' total compensation. The independent variable *AffectedInd$_{i,t}$* takes the value of one if the SIC2 industry to which stock i belongs has at least 10% firms added to the S&P500 Index in any year for the 1993–2009 period, and zero otherwise. The key independent variable *AffectedInd_After$_{i,t}$* takes the value of one if (1) the SIC2 industry to which stock i belongs has at least 10% of its firms added to the S&P 500 Index in year T during the 1993–2009 period and (2) the sample year t is greater than T, and zero otherwise. All variables are winsorized at the 1st and 99th percentiles. All controls are lagged by one year. Please refer to Appendix A for the definitions of these controls. t-statistics reported in parentheses are based on the robust standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	CEO Total Compensation		Non-CEO Executives' Total Compensation	
	(1)	(2)	(3)	(4)
AffectedInd	594.56***	−596.48	244.43***	−194.37
	(6.59)	(−1.33)	(8.63)	(−1.60)
AffectedInd_After	3,332.86***	4,063.28***	888.52***	92.64
	(4.03)	(2.86)	(4.34)	(0.35)
SIZE	0.16***	0.16***	0.06***	0.06***
	(33.12)	(16.28)	(36.90)	(18.73)
SIZE_CHANGE	0.13***	0.12***	0.06***	0.05***
	(6.39)	(5.95)	(8.47)	(8.02)
Q	234.47***	274.61***	122.08***	139.94***
	(7.14)	(5.81)	(10.65)	(9.08)
ROA	−1,330.00***	2,365.16***	−1,010.40***	297.20**
	(−4.48)	(4.86)	(−9.61)	(2.00)
LEVERAGE	1,409.14***	−498.90*	364.46***	8.14
	(8.63)	(−1.83)	(6.70)	(0.10)
IO	2,362.02***	580.56***	766.96***	167.40***
	(19.98)	(3.07)	(21.09)	(3.02)
IO_HINDEX	−1,441.03***	−1,731.54***	−545.73***	−624.25***
	(−3.34)	(−3.20)	(−4.48)	(−3.97)
CEO_TENURE	55.34***	9.14	9.39***	5.37
	(5.44)	(0.82)	(3.07)	(1.61)
SP500	2,071.85***	479.95**	635.08***	142.94**
	(22.85)	(2.43)	(21.34)	(2.51)
Trend	151.62***	245.65***	44.38***	71.45***
	(15.02)	(18.9)	(11.92)	(16.09)
Constant	−1,961.73***	−1,140.94***	−385.31***	−159.32**
	(−11.54)	(−4.79)	(−6.09)	(−2.12)
Year F.E.	Yes	Yes	Yes	Yes
Firm F.E.	No	Yes	No	Yes
N	26,849	26,849	26,954	26,954
R-squared	0.38	0.62	0.44	0.71