

CEO Compensation and Real Estate Prices: Are CEOs Paid for Pure Luck?^{*}

Ben Bennett[†]

Arizona State University – W. P. Carey School of Business

Cláudia Custódio[‡]

Arizona State University – W. P. Carey School of Business

Dragana Cvijanovic[§]

University of North Carolina at Chapel Hill

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Abstract

We study the sensitivity of CEO compensation to luck using real estate prices to differentiate changes in compensation due to *pure luck* from changes in compensation due to *reactions to lucky events*. We find that that pay for luck is explained mostly by reactions to lucky events rather than pure luck. Our identification relies on the fact that changes in real estate prices affect market performance irrespective of managerial actions, while accounting performance is only affected if the manager reacts to the shock. In addition, our findings suggest that firms anticipate pay for luck associated with real estate holdings and offer less equity-based compensation, and compensation more sensitive to accounting performance to CEOs that are more exposed to the real estate market. Interestingly, our results are not explained by corporate governance. Our results are consistent with the contracting view that CEOs are not rewarded for pure luck.

Keywords: CEO compensation; pay for luck; real estate shocks.

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[†] E-mail: Dragana_Cvijanovic@kenan-flagler.unc.edu

[‡] E-mail: Claudia.Custodio@asu.edu

[§] E-mail: Benjamin-Bennett@asu.edu

1 Introduction

The managerial power hypothesis of CEO compensation is supported by evidence that CEOs are often rewarded for luck, which is consistent with rent-extraction (Bertrand and Mullainathan, 1998, Bertrand and Mullainathan, 2001, Garvey and Milbourn, 2006, and Chhaochharia & Grinstein, 2009). Pay for luck is typically defined as the compensation driven by observable lucky events that are not under the control of the CEO. Under the most standard optimal contracting framework shareholders should not compensate CEOs for observable luck (Holmstrom, 1979).¹ In this paper we make the distinction between pay for *pure luck* from pay for *reactions to luck*. We make use of real estate price shocks as lucky events to be able to disentangle the two effects. Our identification strategy relies on the fact that real estate price shocks are reflected in market performance and accounting performance in a different way. While the market value of the firm should reflect changes in its real estate market value (assuming efficient markets), under US GAAP accounting guidelines, accounting returns only reflect changes in real estate market values when there is some managerial action, such as selling property.

We start by replicating the existing literature testing for general pay for luck using real estate prices as luck variable. We follow Bertrand and Mullainathan (2001) and use an instrumental variables (IV) approach to estimate the sensitivity of CEO compensation to changes in stock market performance due to luck. We use real estate prices as an instrument for stock market performance, and then use the predicted value from the first stage to estimate the CEO pay that is solely driven by luck. We find evidence consistent with existing literature that CEOs are rewarded for lucky events. Our estimated sensitivity of CEO pay to performance suggests that a one percentage point increase in the firm market performance leads to a 0.35 percent increase in CEO pay. The sensitivity of CEO pay due lucky

¹ A number of papers have rationalized pay-for-luck: Axelson and Baliga (2009), Gopalan, Milbourn and Song (2010), Noe and Rebello (2012) and Chaigneau and Edmans (2013). See Edmans and Gabaix (2009) for a survey.

performance is of larger magnitude: for a one percentage point increase in firm market performance due to luck, CEO pay increases by 0.49 percent. These results are consistent with pay for performance being driven mainly by luck and in line with Bertrand and Mullainathan (2001).

We proceed by making the distinction between pay for pure luck from pay for reactions to luck. It might be optimal for a shareholder to reward a CEO for luck to incentivize the right responses to luck. Using real estate assets as an example, it might be advantageous to reward a CEO that experiences a positive shock in real estate prices in the location of its headquarters to relocate to a less expensive area and realize a capital gain by selling the existing headquarters. On the other hand, under a typical optimal contract framework it is not optimal to reward the CEO simply because the market value of firm's real estate has increased, and for this reason shareholder value also increased.

Our identification strategy to disentangle the effect of pure luck from reactions to luck utilizes the different reactions of stock market and accounting performance with respect to changes in the market value of the real estate of a firm. Assuming market efficiency, stock market performance reflects any change in the value of firm's real estate, irrespective of the CEO action. Accounting performance instead should only reflect changes in the value of real estate when there is a responsive action by the CEO. For instance if the CEO decides to sell existing assets it would impact net income. Therefore, we re-estimate pay for luck, using real estate prices as an instrument for both market performance and accounting performance. With this procedure, we aim to capture the effect of reactions to luck (from accounting performance) and the effect of pure luck (from market performance "net" of accounting performance).² When we instrument for both market and accounting performance our IV estimates of pay for performance are not significantly different from zero. Our results are consistent with no effect of market

² With our identification strategy we still cannot capture the ability of the CEO to forecast, and that compensating for this ability will still be considered pay for luck.

performance due to *pure luck* on CEO pay when one controls for observable CEO reactions to luck (Return on Assets - ROA).

We then test whether firms anticipate potential pay for luck due to real estate shocks and act accordingly, for instance by offering a pay structure that is less sensitive to market performance when the exposure to this market is high. The idea is that firms with more Property, Plant and Equipment (PP&E), and therefore greater exposure to real estate markets should offer compensation that is not as tied to stock market performance to, at least partially, avoid paying for lucky performance. We focus on total pay, cash vs. equity pay, and also on *delta* and *vega* measures of compensation. *Delta* measures the sensitivity of CEO pay to stock performance and *vega* measures the sensitivity of CEO pay to the stock return volatility (Core and Guay (2002)). Overall we do not find that CEOs who run firms with more tangible assets are paid more, which is our first piece of evidence against the CEOs being largely rewarded for good luck associated with real estate markets. In fact, we find that firms with more PP&E tend to pay significantly less to CEOs. These firms also offer compensation contracts that are less sensitive both to stock market return and volatility. A one standard deviation increase in firm's PP&E represents 12% less in total compensation, and 16% less in equity compensation. As a second step, we test if firms that are more exposed to real estate markets offer compensation packages that are more sensitive to accounting performance as opposed to stock market performance. We find that CEO compensation of firms that are more PP&E intensive is more sensitive to ROA. We interpret these results as firms trying to prevent pay for luck due to real estate shocks, and offering compensation contingent on alternative performance metrics to stock returns. However, we cannot exclude alternative explanations associated with endogenous CEO-firm matching. For instance, CEOs that are more risk averse might have a preference to manage more tangible assets and receive less variable compensation.

Finally we examine cross sectional variation at the firm level using corporate governance proxies. We aim to test whether CEO compensation in firms with better corporate governance is less sensitive to lucky performance. We use the g-index, and institutional ownership as proxies for corporate governance. We do not find significant pay for luck differences across firms with different levels of corporate governance, which suggests our previous results are not solely driven by well governed firms.

Overall our results are consistent with pay for luck being mainly explained by reactions of the CEO to lucky events instead of pure luck. Firms seem to anticipate potential pay for luck by offering contracts to CEOs that are less contingent on stock market performance when the exposure to real estate prices is high.

We contribute to the literature on CEO compensation by providing new insights on pay for luck. We also contribute to the open debate between the managerial power and competitive market views of CEO compensation. There is evidence supporting both views, but neither of the views is fully supported (Frydman and Jenter, 2010). Pay for luck is typically used as an argument in favor of the managerial power hypothesis as pay for luck occurs mostly in badly governed firms (Bertrand and Mullainathan, 2001, Harford and Li, 2007, Chhaochharia and Grinstein, 2009, and Garvey and Milbourn, 2006). We provide a setting where pay for luck is associated to managerial actions and not necessarily evidence of rent extracting by the CEO. Our paper is also related to the recent literature that links real estate shocks to corporate outcomes (Chaney, Sraer and Thesmar, 2011, Cvijanovic, 2013).

The remainder of the paper is organized as follows. Section 2 presents the identification and empirical methodology. Section 3 shows the data and sample description. Section 4 presents the main empirical results. Section 5 shows additional cross sectional results and presents robustness tests and section 6 concludes.

2 Identification and Empirical Methodology

The question whether CEOs are rewarded for lucky events has been widely addressed in the literature with no clear consensus. The standard approach by Bertrand Mullainathan (2001) consists of estimating the general sensitivity of CEO compensation to changes in firm performance with the sensitivity of CEO compensation to performance driven by luck. However, when estimating the sensitivity of compensation to lucky performance in the Bertrand Mullianathan framework, one cannot reject the possibility that the CEO reacted in some way to the lucky event. In other words, one cannot disentangle the sensitivity of pay to luck, from the sensitivity of pay to reactions to luck.

By using real estate market shocks we are able to make this distinction. Shocks to the value of a firm real estate are reflected in its market and accounting performance in different ways. When the value of a firm's real estate changes, for instance due to a positive shock in real estate prices in the location of the firm's headquarters, this change in firm value should get reflected in its market capitalization (and therefore in its stock market performance). However, the exact same shock should not be reflected in accounting performance according to US GAAP. Accounting performance is only affected by real estate shocks when the firm takes some action, for instance, when it decides to sell the real estate and then realizes a capital gain (or loss).

We explore the fact that accounting performance is not affected by real estate shocks unless there is an action by the firm to better estimate the sensitivity of CEO pay to luck. We proceed in three steps. In the first step we follow Bertrand and Mullainathan (2001) and we estimate pay for luck using market value of shareholder's equity as a performance measure, and real estate prices as luck variable. We start by estimating the general sensitivity of pay to performance using standard Ordinary Least Squares (OLS) model to estimate the following equation:

$$y_{it} = \beta * perf_{it} + \alpha_x * X_{it} + \gamma_i + \chi_t + +\varepsilon_{it} \quad (1)$$

Where y_{it} is total CEO compensation in firm i at time t , $perf_{it}$ is a performance measure, X_{it} are firm and CEO-specific controls, γ_i are firm fixed effects, and χ_t are year fixed effects. The coefficient β captures the general sensitivity of pay to performance.

We then estimate the sensitivity of pay to luck using Instrumental Variables (IV) where real estate prices are the instrument for firm performance. In the first stage we estimate the following equation:

$$perf_{it} = b * hpi_{it} * ppe_i + \alpha_X * X_{it} + g_i + c_t + e_{it} \quad (2)$$

Where $hpi_{it} * ppe_i$ represents the luck measure, in this case the level of the House Price Index (HPI)³ at the location of firm i at time t interacted with the value property plant and equipment for firm i at the beginning of the sample period, i.e, 1992. From this estimate we obtain firm performance that is solely driven by luck. In the second stage we estimate the sensitivity of pay to changes in predicted firm performance due to luck using the following equation:

$$y_{it} = \beta_{Luck} * \widehat{perf}_{it} + \alpha_X * X_{it} + \gamma_i + \chi_t + \varepsilon_{it} \quad (3)$$

The coefficient β_{Luck} captures the sensitivity of pay to changes in performance due to luck, in this case to changes in real estate prices. When β_{Luck} is significantly different from zero it means that a CEO tends to be rewarded for a lucky event.

As a last step, we estimate the sensitivity of pay to luck using market performance while also controlling for accounting performance. To do this, we instrument for both market performance and accounting performance using ROA, where the role of ROA is to capture any action taken by the CEO in reaction to the real estate shocks. By controlling for ROA, we are in fact controlling for reactions to lucky events and

³ Ideally we would use commercial property prices as a luck variable, however, this data is not available at the MSA/State level.

we are able to disentangle the sensitivity of CEO pay for “pure luck” from the sensitivity to “reactions to luck”.

3 Data and Sample Description

This section describes data sources and presents summary statistics.

Our initial sample consists of a panel of CEO-firm-years of firms Standard and Poor’s (S&P) 1,500 firms drawn from the Execucomp database. We then match this sample to CRSP and Compustat databases to obtain stock returns and accounting data, and to the Federal Housing Finance Association’s (FHFA) database to obtain house price data. Following previous literature, we exclude firms in the financial and utilities industries.

We use Execucomp to obtain or calculate the following compensation variables used in our analysis: *cash compensation*, *equity compensation*, *total compensation*, *delta*, *vega*, *tenure*, and *age*. We follow Core and Guay (2002) to calculate stock option portfolio values and their sensitivities to price and volatility.

The real estate exposure variable is defined using the variable PPENT from Compustat which is the total (net) plant, property, and equipment (PP&E) assets of the firm. That variable is scaled by total assets to get the portion of the firm’s assets which are related to its real estate holdings. We calculate this variable at a fixed point in time, 1992, and on a rolling basis. The fixed PP&E variable controls for the CEO’s future real estate dealings. PP&E in place in 1992 is not affected by future actions of the CEO having to do with buying or selling assets related to real estate.

House price data is obtained from the Federal Housing Finance Association’s (FHFA). They are calculated at the level of a Core Based Statistical Area (CBSA). A CBSA is a geographic area defined by the Office of Management and Budget (OMB) based around an urban center of at least 10,000 people and adjacent

areas. CBSAs largely overlap with Metropolitan Statistical Areas (MSA) also defined by the OMB. The data contains a quarterly CBSA-level house-price index for 369 CBSAs from 1986 to 2012. The CEO-firm year data is merged to the house price data by linking each firm's headquarters zip code (from Compustat) with its particular CSBA using data from US Department of Housing and Urban Development (HUD) database. HUD provides HUD-USPS crosswalk files which allocate zip codes to CBSAs.

Our primary dependent variable is total pay, which consists of salary, bonus, value of restricted stock granted, value of options granted, long-term incentive payout, and other compensation (Execucomp item TDC1). In our regressions we control for firm size using the logarithm of firm revenue, firm growth opportunities using Tobin's q , accounting profitability, using ROA, stock return and stock price volatility. Following Bertrand and Mullainathan (2001) we also control for CEO age, CEO age squared, CEO tenure, CEO tenure squared, year quadratic and firm fixed effects.

The final dataset includes 16,998 CEO-firm year observations from 1992-2011. All variables are winsorized at the 1th and 99th percentile values. Table A.1 in the Appendix provides variable definitions and data sources.

Table 1 reports summary statistics of CEO compensation, firm characteristics, and real estate market variables. The average CEO in this sample has a total compensation of 4.5 million dollars. The average cash component is 1.2 million while the average equity component corresponds to 3.2 million. These numbers are in line with the literature on CEO compensation using similar data (Chhaochharia and Grinstein, 2009, Fahlenbrach, 2009, and Gopalan, Milbourn, Song, and Thakor, 2013). The average real estate holdings as a percentage of assets, has fallen during the sample period. It was 36% in 1992 while the sample average is 33%.

Tables 2 breaks the data into 2 groups: high and low real estate exposure. A firm is defined to have high (low) real estate exposure if PP&E/assets is above (below) the yearly median PP&E/assets. In this

univariate setting we find that total compensation is significantly higher for firms that have low real estate exposure. This result is mainly driven by the equity component of compensation that is also significantly higher for these firms. In line with these results we also find that the sensitivity of compensation to equity prices (delta), to volatility (vega), and equity compensation as a percent of total compensation are significantly higher for the low PP&E group.

4 Results

This section presents the main results. Table 3 presents our initial test of the effect of real estate prices on CEO pay. We follow the methodology described in Section 2. Column 1 shows the first stage of the Instrumental variable (IV) estimator, where real estate prices interacted with the exposure to real estate markets ($PP\&E * HPI$) are the instrument for market performance ($Log MVE$). The dependent variable in Columns 2 and 3 is the logarithm of total compensation, where total compensation includes salary, bonus, other incentive payment and the value of options granted in that year. Following Bertrand and Mullainathan (2001), all regressions include firm fixed effects and year quadratics to allow for the positive trend in CEO pay over the sample period. We also include age and tenure quadratic terms and control for Tobin's q , stock volatility and firm past performance. All standard errors are adjusted for heteroscedasticity and within-firm correlation using clustered standard errors.

Column 2 shows the results of the OLS estimation of the sensitivity of total CEO pay to general change in the market performance, as measured by log (market value of equity). The estimated coefficient is 0.34, which suggests that a one percentage point increase in the firm market performance leads to a 0.34 percent increase in CEO pay. Examination of other commonly used firm- and CEO-level characteristics affecting CEO pay indicates that pay is positively associated with stock return volatility and with CEO age. The coefficient on the age quadratic is negative indicating a concave age profile of the CEO pay.

Firm tangibility, as measured by PP&E is negatively associated with CEO pay, suggesting that firms with greater exposure to real estate markets pay less to their CEOs.

Column 3 shows the results of the IV estimation of sensitivity of pay to luck. As discussed in the previous section, we instrument for performance (measured by log (market value of equity)) using MSA-level real estate prices and their interaction with a measure of a firm's real estate holdings, PP&E. The coefficient in Column 2 is 0.48, suggesting that for a one percentage point increase in firm market performance due to luck, pay increases by 0.48 percent. These results are in line with Bertrand and Mullainathan (2001), who show that pay is as sensitive for general performance as it is for lucky performance.

Columns 4 and 5 show the estimates of similar regression using the log of cash compensation as dependent variable. The coefficient in Column 4 is 0.15, suggesting that CEO cash compensation positively reacts to increases in general market performance. As shown in Column 5, there seems to be no sensitivity of cash compensation to luck, as measured by real estate prices. This result is consistent with the idea that pay for luck associated with real estate prices should come through equity pay. The market value of the firm should react to changes in the market value of its real estate assets and equity pay, which is directly linked to stock market returns, should react accordingly. This is not necessarily the case of cash compensation as it might not be directly link to market performance.

Columns 5 and 6 repeat the same exercises for log (equity compensation). The performance coefficient of 0.51 in Column 5 suggests that for a one percent increase in firm market performance, equity compensation increases by 0.51 percent. The IV estimate in Column 6 of 1.25 suggests that for a one percent increase in firm market performance due to luck, CEO equity compensation increases by 1.25 percent. As expected, pay for luck occurs mainly in equity compensation. In fact, equity pay seems to be even more sensitive to lucky performance associated with real estate prices than to general performance.

Table 4 examines the effect of luck on CEO pay while controlling for the observable CEO reactions to luck. We control for CEO reaction to luck using ROA, as described in the previous section.

Columns 1 and 2 show the first stage of the IV estimate where we instrument for both market and accounting performance (measured by log (market value of equity) and ROA respectively) using MSA-level real estate prices and their interaction with a measure of a firm's real estate holdings, PP&E.

Column 3 shows the results of the OLS estimates of sensitivity of pay to market performance, controlling for ROA. The estimated coefficient of market performance is 0.34, which is similar to the one in Table 4. However, as indicated in Column 4, where the IV estimate is not significant, there seems to be no significant effect of market performance due to luck on CEO pay when one controls for observable CEO reactions to luck (ROA). All common firm- and CEO-level characteristics enter the specification with expected signs.

Columns 5 and 6 retell a similar pattern for log(cash compensation). The OLS estimate in Column 5 (0.14) is significant, however, the IV estimate of market performance due to luck, when controlling for ROA, in Column 5, is not. A similar pattern is observed in Columns 7 and 8 for log (equity compensation).

The results in Table 4 indicate that when properly taking into account CEO actions in response to lucky events, there seems to be no sensitivity of pay to firm market performance due to pure luck, as measured by increases in the value of its real estate holdings. Overall these results seem to suggest that pay for luck associated with the market value of real estate assets of the firm is mainly driven by CEOs reactions to lucky events.

4.1 CEO Pay, Compensation Structure, and Anticipation of Pay for Luck

Our next question is to test whether firms anticipate potential pay for luck due to real estate shocks and structure the compensation contracts in such a way that makes them less sensitive to market performance when the exposure to this market is high. The idea is that firms with more PP&E, and therefore greater exposure to real estate markets should offer compensation that is less tied to stock market performance to avoid paying for lucky performance. In order to incentivize managers, firms might offer compensation that is more dependent on accounting performance instead.

The results of estimating the sensitivity of total compensation with respect to firm real estate holdings, as measured by its PP&E scaled by total assets are shown in Table 5. In all specifications we control for year and industry dummies, as well as the commonly used controls in the CEO compensation literature. As we can see in column (1), the estimated coefficient on PP&E (as a fraction of total assets), as measured in 1992, is -0.21 and it is significant. The point estimate suggests that a CEO of a firm with a 1% higher fraction of PP&E in total assets, *ex ante* (i.e. prior to the estimation sample), has a 0.21% lower total compensation *ex post*. The negative and highly significant point estimate of -0.44 on contemporaneous PP&E scaled by total assets in column (2) indicates that a CEO of a firm with a 1% higher fraction of PP&E in total assets contemporaneously has a 0.44% lower total compensation (i.e. when both PP&E scaled by total assets and total compensation are measured at the same time t). Regressions in columns (1) and (2) include year*industry dummies, which controls for the unobserved heterogeneity that is affecting a given industry at a given time. Progressively saturating the regression by adding firm fixed-effects in column (3) does not change the point estimate (-0.47), which has a similar interpretation. In columns (4)-(9) we show the results of estimating similar specifications, with the dependent variable being cash (4)-(6) and equity compensation (7)-(9). As we can see from column (4), the estimated coefficient on PP&E scaled by total assets, as measured in 1992, is negative and significant at 10%, with a point estimated of -0.12. This suggests that a CEO of a firm with *ex ante* 1% higher fraction of PP&E in its asset base, will have a 0.12% lower cash compensation *ex post*. Similarly, as seen

in column (5), a CEO of a firm with 1% higher fraction of PP&E in its asset base, will have a 0.18% lower cash compensation *contemporaneously*. We obtain similar estimates when we control for firm fixed effect, as in column (6).

In columns (7)-(9), we show the results of estimating the sensitivity of equity compensation to firm real estate holdings. As we can see from column (7), the point estimate on the *ex ante* measure of PP&E (scaled by total assets) is negative, -0.08, however not significant. At the same time, the point estimate on the contemporaneous measure of PP&E (scaled by total assets), in column (8), is -0.53 and highly significant, suggesting that a CEO of a firm with 1% higher fraction of PP&E in its assets base, will have a 0.53% lower equity compensation *contemporaneously*. This is more than twice the magnitude of the sensitivity of cash compensation to real estate holdings. The same pattern is observed when we include firm fixed effects. These results suggest that firms can anticipate the sensitivity of CEO pay to lucky events and structure their compensation contracts in such a way that CEOs are in a position to extract smaller rents from such lucky events. Certainly, we cannot yet rule out an alternative explanation of endogenous firm-CEO matching, for example, more talented CEOs chose firms that are less exposed to real estate markets.

Next, in Table 6, we examine the relationship between real estate holdings and CEO compensation stock price sensitivity, as measured by delta, CEO compensation stock price volatility sensitivity, as measured by vega, and the fraction of equity related compensation in CEO total pay.

As we can see from column (1), the estimated coefficient on PP&E scaled by total assets is -0.002, suggesting that a CEO of a firm with 1% higher fraction of PP&E in its total assets base *ex ante*, will have a 0.002 percent less stock price sensitive compensation *ex post*. The same magnitudes are obtained when using a contemporaneous measure of real estate holdings, in columns (2) and (3). Furthermore, as we can see from column (4), the estimated coefficient on PP&E scaled by total assets is -0.028,

suggesting that a CEO of a firm with 1% of additional PP&E in its total asset base *ex ante*, will have a 0.028 percent less sensitive compensation to stock price volatility *ex post*. A similar coefficient is obtained for the contemporaneous measure of PP&E in columns (5) and (6). Finally, as we can see from column (8), the estimated coefficient on PP&E scaled by total assets is -0.07, suggesting that a CEO of a firm with 1% of additional PP&E in its total asset base, will contemporaneously have a 0.07 percent smaller fraction of equity-related compensation in her total pay package. These results confirm our intuition that firms with high fractions of real estate holdings will attempt to structure CEO compensation contract so as they are less sensitive to stock market performance. In other words, shareholders, having observed the amount of fixed assets that a firm has, structure compensation packages in such a way to prevent CEOs from benefiting from lucky increases in the value of the firm's real estate holdings, those not driven by CEO actions, but rather by the serendipitous appreciation in the value of a firm's real estate due to its location.

We then test whether firms with different exposure to the real estate markets have different sensitivity of total pay to accounting and market returns. The idea is that if firms anticipate pay for pure luck due to real estate market exposure they might decide to tie the compensation of the CEO to accounting performance instead (or on top) of market performance. Even though accounting performance might be more susceptible to be manipulated than market performance, for firms with more real estate assets this might be a way to minimize pay for luck. As previously stated, changes in accounting performance due to changes in real estate prices should only occur if the manager takes some action. Table 7 shows the results. The dependent variable in all regressions is total compensation. The independent variables of interest are the interaction terms between *High PP&E* and firm performance measured by *ROA* or *market return*. Under the null hypothesis there is no difference between the two groups of firms (high and low PP&E), and these coefficients are zero. This is not what we find, particularly for accounting performance. CEO compensation is more sensitive to accounting performance in *high PP&E* firms, that

is, in firms with more exposure to real estate markets. This result is robust to using OLS and firm fixed effects regressions to estimate the coefficient, and also to using historical (columns 1-3) and contemporaneous (columns 4-6) PP&E levels to define the two groups. The coefficient of accounting performance is negative and significant and ranges between -0.45 and -0.37 when estimated using OLS (columns 1,2,4, and 5), and it is not statistically different from zero when estimated using firm fixed effects (columns 3 and 6). These results suggest that the sensitivity of CEO pay to accounting performance is inexistent (or even negative) for *low PP&E* firms. The interaction term between *ROA* and *high PP&E* is positive and significant in all specifications, and always greater than the coefficient of *ROA* in absolute value (the point estimate ranges between 0.39 and 0.63). This suggests that the sensitivity of CEO compensation to accounting returns in *high PP&E* firms is positive, and greater than for *low PP&E* firms.

Overall, our results are consistent with the notion that firms anticipate possible pay for luck due to real estate markets exposure and offer their CEOs contracts that prevent such possibility. Not only is their total compensation less sensitive to stock prices as measured by delta and vega, but also more sensitive to accounting returns.

4.2 Corporate Governance and Pay for Luck

In this subsection we explore the heterogeneity of sensitivity of CEO pay to real estate prices with respect to firm corporate governance characteristics. In particular, we want to see if there is a differential sensitivity of CEO pay to real estate market related luck with respect to certain firm characteristics pertaining to how well governed they are.

In Table 8 we explore the heterogeneity of real estate related pay for luck with respect to different measures of corporate governance: the G-index, and institutional ownership. Gompers, Ishii and Metrick (2003) constructed the G-Index from data compiled by the Investor Responsibility Research Center ("IRRC"). A firm's score is based on the number of shareholder rights-decreasing provisions a firm has, such as: poison pills, golden parachutes, supermajority rules to approve mergers, staggered boards, limitations of shareholders' ability to call special meeting. The index ranges from a feasible low of 0 to a high of 24. A high G-Score is associated with weak shareholder rights, that is, poor corporate governance. There seems to be no significant difference in how CEOs' compensation from low G-index firms, that is well-governed firms and CEOs' compensation (Panel A) from high G-index firms, that is poorly-governed firms (Panel B), is associated to real estate related pay for luck. There is borderline evidence of real estate pay for luck for well governed firms (Panel A, column 2), as measured by the G-index, which seems to disappear once we control for CEO reactions to luck, as measured by the ROA in the second stage of the IV estimation (Panel A, column 4). On the other hand, for poorly governed firms, as measure by high values of G-index, there seems to be no significant pay for luck to begin with (Panel B, column 2).

Finally, we explore the pay for luck sensitivity in the cross-section with respect to levels of institutional ownership (Panels B and C). The results indicate that there seems to be significant differential effects among firms with high versus low institutional ownership. The previous results indicating that pay for luck is mainly driven by reactions to luck do not seem to be associated to a specific group of firms based on their corporate governance.

5 Robustness

In this section we present several robustness tests to our main results and discuss some of the concerns with the previous analysis.

5.1. Instrumenting for real estate prices using land supply elasticity

A major concern with the previous analysis is the validity of real estate prices as an instrument for firm performance. For real estate prices to be a valid instrument they must be correlated with CEO compensation only through the value of the firm's real estate and not through other channels, for instance, an aggregate demand shock. To account for this possibility, we instrument for MSA real estate prices HPI using the interaction of land supply elasticity and National Case-Schiller house price index. Results are shown in Table 9.

Columns (1)-(3) present the first stages of the IV estimates. The dependent variable in columns (4) and (5) is the log of total compensation. In column (5) we show the IV estimate for market performance, when controlling for accounting performance. The coefficient for market performance is not statistically significant once we control for accounting performance, which is in line with our previous results. This is also the case for cash compensation (column 7) and equity compensation (column 9).

These results alleviate the concern that previous results were driven by an aggregate demand shock affecting both real estate prices and market performance of the firm.

5.2. Using debt issues as a CEO response to luck

Cvijanovic (2013) shows that there is a spillover effect of real estate markets on firm investment through the value of its collateral, which influences the debt capacity of the firm. Therefore a possible response of the CEO to the lucky event of a positive real estate shock is to issue new debt. There is also the concern that buying and selling real estate assets might not be a frequent managerial action in response to changes in real estate prices. For these reasons we use debt issues to control for CEO responses to real estate luck as an alternative to ROA. Table 10 shows the results.

Columns 1 and 2 show the first stage regressions of the IV regressions where $\log(MVE)$ and $\log(1+debt\ issues)$ are instrumented using $PP\&E * HPI$. The instrument is positively correlated with both firm performance and debt issues, which is consistent with the findings in Cvijanovic (2013) that firms that face a positive shock to the value of its collateral increase its debt capacity. The dependent variable in columns 3 and 4 is total compensation, in columns 5 and 6 is cash compensation and in columns 7 and 8 is equity compensation.

Column 3 shows the results of the OLS estimate, controlling for debt issues. We find a positive and significant coefficient for both firm performance (MVE) and debt issues. In the IV regression (column 4) where we instrument for firm performance and debt issues, the coefficient of MVE is insignificant, which suggests there is no evidence of pay for luck, once we control for CEO action associated with the real estate shock.

5.3. Other robustness tests

We test for asymmetric effects of real estate shocks on CEO compensation. We run our baseline regressions where we allow for different sensitivities of firm performance and compensation to positive and negative real estate shocks. Tables IA1 and IA2, in the internet appendix, show the results.

In Table IA1 run our baseline specification interacting $HPI * PP\&E$ with a dummy that is equal to one if there is a positive change in real estate prices and zero otherwise. With this specification we account for potential asymmetric effects of real estate shocks on firm performance when we run the first stage of the IV. However, we do not find any significant difference between positive and negative real estate shocks, which suggests that positive and negative changes in real estate prices affect firm performance with similar strength. The results in the second stage are consistent with the previous estimations for total compensation, cash compensation and equity compensation.

In Table IA2 we allow for different sensitivities of CEO compensation to positive and negative changes in real estate prices. For instance if CEOs are paid for luck when real estate prices go up, but not penalized when real estate prices go down, we should be able to capture this asymmetry. We run our baseline IV regression where we interact the instruments (*log(MVE)* and *ROA*) with a dummy variable that is equal to one for positive changes in real estate prices and zero otherwise. The second stage regressions are consistent with previous results, and do not suggest for differential effects of pay for luck for positive and negative shocks. The interaction of performance variables with the positive real estate shock dummy is not significant across all specifications.

One concern with our identification strategy is that *ROA* might be affected by real estate price changes even when the CEO takes no action. This could be the case when extreme negative changes in real estate prices occur and the firm recognizes asset impairment.⁴

In Tables IA3 and IA4 we account for the effect of extreme negative changes in real estate prices. An extreme negative shock is defined as one if the change in HPI year-over-year is in the bottom quartile and zero otherwise.. In Table IA we run our baseline regressions where we interact the instrument with a negative shock dummy. This allows us to isolate the effect of the extreme negative shocks that may lead to asset impairment on firm performance. In Table IA4 we interact the instrumented variables (*log MVE* and *ROA*) with the negative shock dummy to account for possible effects of real estate asset impairment on CEO compensation. Extremely negative real estate shocks and impairment of real estate assets do not seem to affect previous results.

In our previous tests we have used *PP&E* as a proxy for the exposure of the firm to real estate markets. However *PP&E* includes not only real estate assets but also other equipment. We run robustness tests controlling for real estate ownership in three ways. In table IA5 we estimate our IV specifications

⁴ See SFAS 121 on the impairment of real estate assets.

including in the second stage the five quintiles of ROA, five quintiles of size, five quintiles of firm age, each interacted with *HPI*. We therefore allow for different sensitivity to *HPI* by firms with different characteristics. The results in table IA5 are consistent with previous analysis. In table IA6 we identify firms as real estate net buyers: a real estate buyer is a firm which initially (in 1992) has no positive real estate assets on its balance sheet (where Real Estate Assets is the sum of FATB, FATP and FATC), and strictly positive real estate asset holdings at any later date. For this set of firms we can guarantee that there was at least one transaction related to real estate holdings. The results in table IA6 are consistent with previous analysis. In table IA7 we replicate our baseline tests using real estate holdings (Compustat items FATB, FATP and FATC) instead of *PP&E*. In order to maintain a similar sample size to previous analysis we replace missing observations for FATB, FATP and FATC with zeros. Results are consistent with previous interpretation.

In table IA8 we run our baseline specification using a state weighted *HPI* for each firm based on its real estate holdings instead of only the state of its headquarters as defined by Compustat. Since COMPUSTAT does not contain data on the location of each piece of firm's real estate holdings, we test the validity of previous results by using state-level data on firms' operations obtained from Garcia and Norli (2012). To measure the degree of firm geographic concentration, Garcia and Norli (2012) extract state name counts from annual reports filed with the SEC on Form 10 K. The 10 K statement gives information on the firm's real estate holdings, such as factories, warehouses, and sales offices. For example, firms may include sales at stores in different states, and/or list the manufacturing facilities they operate together with the city and state where they are located. The authors parsed of all 10 Ks filed with the SEC during the period 1994 through 2008, yielding a count of the number of times each 10 K mentions a U.S. state name. Based on the state name counts, we construct a relative exposure of each firm to local, state level real estate market. These relative exposures (or weights) are then interacted with corresponding state-level land prices and summed at the firm-year level, to give a weighted firm

real estate exposure to each state where it operates. Results are as shown in Table IA7. Columns 1 and 2 show the first state regressions of the IV estimation. We find a similar positive and significant relation between real estate exposure and performance as before, even though the magnitude of the effect is smaller. In the second stage of the IV estimation, firm performance does not come significant when controlling for ROA, which is consistent with our previous evidence that CEOs are not paid for pure luck once we control for CEO reactions to lucky events.

A possible concern with the previous analysis is a reverse causality argument, where large firms are able to affect real estate prices in given geographical areas. In this case real estate prices would not be a valid instrument for firm performance. To account for this possibility we exclude larger firms operating in small geographical areas and run the same tests as in table 4. More precisely, we restrict our sample to firms belonging to the bottom three quartiles of the size distribution, whose headquarters are located in one of the top 20 MSAs based on the MSA rank by population as of July 1, 2012, as estimated by the United States Census Bureau. Results are shown in table IA9, and are similar in nature and magnitudes to the ones in Table 4.

6 Conclusion

In this paper we disentangle the sensitivity of CEO pay to luck into *pure luck* and *reactions to lucky events*. We propose a novel identification strategy that relies on the different exposure of firms to real estate shocks and on the fact that market and accounting performance do not reflect the changes in the value of real estate in the same way. While stock market returns should promptly reflect any changes in the value of real estate assets of the firm, accounting returns should not, unless some action is taken by the manager. When we explore this difference we find that CEOs are being rewarded mostly for their reactions to luck and not purely to lucky events, at least when it comes to luck associated with the real estate market.

Our findings also support the idea that firms, in anticipation of potential pay for luck associated with high exposure to real estate markets, offer a different compensation contract to their CEOs. Our results suggest that firms with high real estate exposure make less use of equity-based pay, which results in a compensation package that is less sensitive to both stock prices returns and volatility as measured by *delta* and *vega*.

This paper brings a new perspective on the topic of *pay for luck*, and contributes to the active debate on CEO compensation. We show how pay for luck might not necessarily be consistent with the hypothesis of rent extracting by the CEO, when the CEO is being rewarded for his reaction to luck.

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Table 1. Summary Statistics

This table presents summary statistics for CEO compensation and firm characteristics. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and Hpi data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. Variable definitions are as defined in the Appendix.

Variable	Mean	Median	St Deviation	Min	Max	Obs
<i>Total compensation</i>	4,486.450	2,510.208	5,493.490	168.405	33,228.690	17,000
<i>Cash compensation</i>	1,208.881	908.702	1,045.250	3.000	7,000.000	17,000
<i>Equity compensation</i>	3,247.309	1,380.440	4,864.092	0.000	29,424.730	17,000
<i>Delta</i>	0.004	0.002	0.006	0.000	0.042	12,382
<i>Vega</i>	0.077	0.038	0.104	0.001	0.635	12,382
<i>Equity compensation pct</i>	0.538	0.589	0.284	0.000	0.981	16,977
<i>Log sales</i>	7.362	7.278	1.568	3.161	11.014	17,000
<i>Market value of equity</i>	6,752.601	1,477.633	15,786.260	22.895	96,326.570	17,000
<i>Tobins q</i>	1.906	1.509	1.217	0.749	8.345	17,000
<i>ROA</i>	0.038	0.049	0.104	-0.567	0.265	17,000
<i>EBIT</i>	623.773	134.572	1,493.267	-286.200	10,381.000	16,829
<i>Stock volatility</i>	0.111	0.096	0.063	0.030	0.387	17,000
<i>Stock return</i>	0.134	0.081	0.479	-0.831	2.368	17,000
<i>PP&E fixed (1992)</i>	0.366	0.313	0.237	0.000	0.964	17,000
<i>PP&E</i>	0.325	0.261	0.231	0.002	0.879	17,000
<i>HPI</i>	157.261	145.915	51.686	85.310	363.430	17,000

Table 2. CEO compensation and PP&E intensity: Mean Differences

This table presents mean differences for CEO compensation variables between CEOs whose firms have above median PP&E holdings and those who have below median PP&E holdings. All variables are winsorized at the 1th and 99th percentile values. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

Variable	Low PP&E	High PP&E	Difference	t-stat	Significance
<i>Total compensation</i>	4,768.185	4,261.306	506.879	6.096	***
<i>Cash compensation</i>	1,210.907	1,207.263	3.644	0.407	
<i>Equity compensation</i>	3,508.190	3,038.831	469.359	6.325	***
<i>Delta</i>	0.005	0.004	0.002	14.118	***
<i>Vega</i>	0.089	0.066	0.023	12.566	***
<i>Equity compensation pct</i>	0.555	0.524	0.031	7.099	***

Table 3. Pay for Luck

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on the logarithm of the market value of firm equity (MVE) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate the logarithm of MVE, following Bertrand and Mullainathan (2001). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

	Total Compensation		Cash Compensation		Equity Compensation		
	1st: Log MVE	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Log MVE</i>		0.344*** [20.781]	0.480*** [2.837]	0.153*** [11.309]	0.067 [0.489]	0.508*** [13.747]	1.246** [2.432]
<i>HPI (t-1)</i>	0.001 [1.091]						
<i>PP&E*HPI (t-1)</i>	0.003*** [3.387]						
<i>PP&E</i>	-0.800*** [-4.623]	-0.363*** [-2.990]	-0.296** [-2.127]	-0.245*** [-3.033]	-0.287*** [-2.632]	-0.418 [-1.413]	-0.055 [-0.133]
<i>Tobins q</i>	0.298*** [20.422]	-0.004 [-0.270]	-0.044 [-0.854]	0.007 [0.767]	0.033 [0.787]	-0.018 [-0.607]	-0.239 [-1.537]
<i>Stock volatility</i>	-2.439*** [-12.085]	0.534*** [3.325]	0.869** [1.966]	-0.230** [-2.177]	-0.441 [-1.255]	0.853** [2.173]	2.673** [2.032]
<i>Stock return (t-1)</i>	0.090*** [7.921]	0.082*** [6.297]	0.070*** [3.422]	0.057*** [6.982]	0.065*** [4.391]	0.061* [1.801]	-0.003 [-0.059]
<i>ROA (t-1)</i>	1.188*** [13.239]	0.019 [0.231]	-0.140 [-0.662]	-0.160*** [-2.715]	-0.059 [-0.347]	0.154 [0.708]	-0.712 [-1.110]
<i>Ceo age</i>	0.028 [1.305]	0.035* [1.731]	0.031 [1.514]	0.035** [2.245]	0.038** [2.282]	0.091* [1.854]	0.068 [1.339]
<i>Ceo age squared</i>	-0.000 [-1.293]	-0.000** [-1.970]	-0.000* [-1.754]	-0.000** [-2.071]	-0.000** [-2.120]	-0.001** [-2.165]	-0.001* [-1.659]
<i>Ceo tenure</i>	0.000 [1.321]	0.000 [1.495]	0.000 [1.232]	0.000*** [3.423]	0.000*** [3.463]	-0.000 [-0.417]	-0.000 [-0.746]
<i>Ceo tenure squared</i>	0.000 [0.324]	-0.000 [-1.019]	-0.000 [-1.047]	-0.000 [-1.323]	-0.000 [-1.268]	-0.000 [-0.774]	-0.000 [-0.816]
<i>Observations</i>	14,096	14,096	14,096	14,060	14,060	14,109	14,109
<i>R-squared</i>	0.420	0.306	0.296	0.232	0.223	0.197	0.146
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year * MSA FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Pay for Pure Luck

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Log MVE</i>			0.344*** [20.332]	-0.019 [-0.063]	0.139*** [9.930]	-0.271 [-1.131]	0.520*** [13.857]	0.599 [0.929]
<i>ROA</i>			0.039 [0.447]	7.326*** [2.615]	0.411*** [6.290]	5.089** [2.243]	-0.218 [-1.046]	10.321* [1.938]
<i>HPI (t-1)</i>	0.000 [0.916]	-0.000*** [-3.357]						
<i>PP&E*HPI (t-1)</i>	0.003*** [3.385]	0.000*** [4.756]						
<i>PP&E</i>	-0.798*** [-4.612]	-0.098*** [-5.308]	-0.362*** [-2.976]	-0.158 [-0.810]	-0.231*** [-2.867]	-0.193 [-1.218]	-0.425 [-1.436]	0.176 [0.408]
<i>Tobins q</i>	0.298*** [20.469]	0.019*** [11.388]	-0.005 [-0.373]	-0.038 [-0.530]	0.003 [0.329]	0.035 [0.619]	-0.019 [-0.637]	-0.249 [-1.487]
<i>Stock volatility</i>	-2.436*** [-12.073]	-0.306*** [-10.855]	0.538*** [3.378]	1.806** [2.389]	-0.148 [-1.412]	0.237 [0.406]	0.797** [2.030]	4.135** [2.546]
<i>Stock return (t-1)</i>	0.090*** [7.893]	0.025*** [12.974]	0.081*** [6.170]	-0.070 [-1.122]	0.048*** [5.839]	-0.035 [-0.719]	0.066* [1.931]	-0.206* [-1.676]
<i>ROA (t-1)</i>	1.188*** [13.296]	0.169*** [7.908]	0.011 [0.131]	-0.795* [-1.907]	-0.212*** [-3.763]	-0.506 [-1.580]	0.172 [0.805]	-1.700** [-1.979]
<i>Ceo age</i>	0.028 [1.322]	0.002 [0.878]	0.035* [1.698]	0.032 [1.248]	0.035** [2.207]	0.037* [1.865]	0.090* [1.826]	0.067 [1.246]
<i>Ceo age squared</i>	-0.000 [-1.318]	-0.000 [-1.024]	-0.000* [-1.928]	-0.000 [-1.370]	-0.000** [-2.019]	-0.000* [-1.696]	-0.001** [-2.128]	-0.001 [-1.472]
<i>Ceo tenure</i>	0.000 [1.386]	0.000 [0.829]	0.000 [1.427]	0.000 [1.081]	0.000*** [3.339]	0.000*** [2.790]	-0.000 [-0.483]	-0.000 [-0.749]
<i>Ceo tenure squared</i>	0.000 [0.307]	0.000 [0.803]	-0.000 [-1.007]	-0.000 [-1.310]	-0.000 [-1.359]	-0.000 [-1.511]	-0.000 [-0.757]	-0.000 [-1.039]
<i>Observations</i>	14,096	14,096	14,096	14,096	14,060	14,060	14,109	14,109
<i>R-squared</i>	0.420	0.199	0.306	-0.294	0.237	-0.424	0.198	-0.057
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year * MSA FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5. Compensation

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on floating and fixed PP&E as a percentage of assets and other CEO and firm level control variables. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

	Total Compensation			Cash Compensation			Equity Compensation		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>PP&E fixed (1992)</i>	-0.210** [-2.096]			-0.120* [-1.735]			-0.081 [-0.401]		
<i>PP&E</i>		-0.444*** [-4.651]	-0.465*** [-3.661]		-0.184*** [-2.976]	-0.221*** [-2.769]		-0.533*** [-2.619]	-0.602** [-2.001]
<i>Log sales</i>	0.470*** [37.050]	0.468*** [36.629]	0.348*** [13.743]	0.296*** [35.283]	0.295*** [35.736]	0.223*** [12.253]	0.645*** [22.727]	0.644*** [22.399]	0.457*** [8.887]
<i>Tobins q</i>	0.120*** [6.571]	0.119*** [6.732]	0.090*** [5.879]	0.021** [2.095]	0.021** [2.154]	0.020** [2.146]	0.158*** [3.736]	0.153*** [3.754]	0.131*** [4.088]
<i>ROA</i>	-0.220** [-1.987]	-0.222** [-2.036]	0.245*** [2.653]	0.119* [1.817]	0.117* [1.793]	0.315*** [5.097]	-0.584** [-2.155]	-0.578** [-2.158]	0.187 [0.863]
<i>ROA (t-1)</i>	-0.246** [-2.335]	-0.235** [-2.283]	0.218** [2.578]	-0.245*** [-4.066]	-0.241*** [-4.027]	-0.061 [-1.125]	-0.229 [-0.844]	-0.211 [-0.787]	0.485** [2.224]
<i>Stock volatility</i>	0.349 [1.593]	0.357 [1.643]	-0.025 [-0.146]	-0.394*** [-2.950]	-0.386*** [-2.891]	-0.409*** [-3.943]	0.319 [0.590]	0.297 [0.551]	-0.053 [-0.128]
<i>Stock return</i>	0.089*** [3.662]	0.085*** [3.568]	0.073*** [4.161]	0.144*** [9.838]	0.142*** [9.825]	0.132*** [11.427]	0.112** [2.051]	0.110** [2.038]	0.072* [1.787]
<i>Stock return (t-1)</i>	0.153*** [7.438]	0.150*** [7.285]	0.116*** [7.755]	0.097*** [8.139]	0.095*** [8.035]	0.085*** [9.222]	0.178*** [3.696]	0.174*** [3.620]	0.108*** [2.877]
<i>Ceo age</i>	0.024 [1.199]	0.024 [1.229]	0.024 [1.108]	0.024 [1.472]	0.023 [1.472]	0.025 [1.631]	0.159*** [3.140]	0.161*** [3.198]	0.077 [1.515]
<i>Ceo age squared</i>	-0.000 [-1.455]	-0.000 [-1.491]	-0.000 [-1.362]	-0.000 [-1.223]	-0.000 [-1.223]	-0.000 [-1.475]	-0.002*** [-3.387]	-0.002*** [-3.445]	-0.001* [-1.827]
<i>Ceo tenure</i>	0.000** [2.468]	0.000** [2.519]	0.000* [1.931]	0.000*** [3.497]	0.000*** [3.549]	0.000*** [3.805]	-0.000 [-0.057]	-0.000 [-0.072]	-0.000 [-0.117]
<i>Ceo tenure squared</i>	-0.000** [-2.374]	-0.000** [-2.404]	-0.000 [-1.491]	-0.000* [-1.930]	-0.000** [-1.962]	-0.000* [-1.778]	-0.000 [-0.975]	-0.000 [-0.950]	-0.000 [-1.022]
<i>Observations</i>	14,207	14,207	14,207	14,170	14,170	14,170	14,222	14,222	14,222
<i>R-squared</i>	0.568	0.570	0.286	0.563	0.564	0.261	0.385	0.386	0.185
<i>Year squared FE</i>	No	No	Yes	No	No	Yes	No	No	Yes
<i>Year*Industry FE</i>	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
<i>Firm FE</i>	No	No	Yes	No	No	Yes	No	No	Yes

Table 6. Delta and Vega

The table presents estimates of OLS panel regressions of CEO delta, vega, and percentage of equity pay on floating and fixed PPE as a percentage of assets and other CEO and firm level control variables. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PPE) data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroskedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels.

	Delta			Vega		Equity percentage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>PP&E fixed (1992)</i>	-0.002*** [-3.109]			-0.028** [-2.269]			0.003 [0.108]		
<i>PP&E</i>		-0.002*** [-3.203]	-0.000 [-0.257]		-0.034*** [-2.836]	-0.028 [-1.429]		-0.067*** [-2.702]	-0.053 [-1.285]
<i>Log sales</i>	-0.001*** [-16.194]	-0.001*** [-16.409]	-0.001*** [-5.300]	-0.007*** [-5.491]	-0.008*** [-5.736]	0.003 [0.770]	0.059*** [17.781]	0.059*** [17.628]	0.041*** [5.133]
<i>Tobins q</i>	-0.000*** [-5.792]	-0.000*** [-5.553]	-0.000 [-0.711]	-0.005*** [-3.581]	-0.005*** [-3.416]	0.006*** [4.140]	0.030*** [6.214]	0.029*** [6.246]	0.022*** [5.206]
<i>ROA</i>	-0.000 [-0.098]	-0.000 [-0.174]	0.000 [0.544]	0.043*** [4.054]	0.042*** [3.984]	0.036*** [3.079]	-0.126*** [-3.736]	-0.125*** [-3.746]	-0.019 [-0.626]
<i>ROA (t-1)</i>	-0.001 [-1.084]	-0.001 [-1.043]	0.000 [0.070]	0.062*** [5.725]	0.063*** [5.782]	0.045*** [4.322]	0.006 [0.178]	0.009 [0.269]	0.089*** [2.924]
<i>Stock volatility</i>	-0.001 [-0.353]	-0.000 [-0.212]	-0.002 [-1.522]	-0.226*** [-9.459]	-0.223*** [-9.382]	-0.109*** [-4.984]	0.207*** [3.179]	0.203*** [3.125]	0.090 [1.482]
<i>Stock return</i>	0.001*** [9.292]	0.001*** [9.112]	0.001*** [7.789]	0.012*** [5.404]	0.012*** [5.200]	0.003 [1.575]	-0.013** [-1.981]	-0.013** [-2.032]	-0.015*** [-2.592]
<i>Stock return (t-1)</i>	0.000*** [2.647]	0.000** [2.482]	0.000* [1.734]	0.008*** [3.652]	0.008*** [3.463]	0.002 [1.348]	0.014** [2.476]	0.014** [2.381]	0.008 [1.556]
<i>Ceo age</i>	-0.000 [-0.416]	-0.000 [-0.479]	0.000 [0.652]	0.000 [0.127]	0.000 [0.086]	0.005 [1.364]	0.008 [1.427]	0.008 [1.507]	-0.002 [-0.250]
<i>Ceo age squared</i>	0.000 [0.211]	0.000 [0.270]	-0.000 [-0.553]	-0.000 [-0.471]	-0.000 [-0.431]	-0.000 [-1.420]	-0.000* [-1.953]	-0.000** [-2.031]	-0.000 [-0.173]
<i>Ceo tenure</i>	0.000*** [5.098]	0.000*** [5.179]	0.000* [1.943]	0.000*** [6.243]	0.000*** [6.269]	0.000*** [3.681]	-0.000 [-0.520]	-0.000 [-0.569]	-0.000 [-0.849]
<i>Ceo tenure squared</i>	-0.000** [-1.971]	-0.000** [-2.031]	0.000 [0.026]	-0.000*** [-3.451]	-0.000*** [-3.476]	-0.000* [-1.738]	-0.000 [-1.343]	-0.000 [-1.302]	-0.000 [-1.038]
<i>Observations</i>	10,582	10,582	10,619	10,582	10,582	10,619	14,165	14,165	14,207
<i>R-squared</i>	0.334	0.334	0.255	0.243	0.243	0.239	0.299	0.300	0.233
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
<i>Firm FE</i>	No	No	Yes	No	No	Yes	No	No	Yes

Table 7. Performance Sensitivity

The table presents Real Estate Exposure and the Sensitivity of CEO Compensation to Accounting and Stock Market Performances. The table presents estimates of OLS panel regressions of the logarithm of CEO total compensation on the interaction between High PPE(1992) & firm performance (as measured by stock market return or ROA) and other CEO and firm level control variables. High PPE is a dummy variable set to one if a firm's PPE is above the median PPE for the year 1992. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PPE) data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroskedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>High PP&E* Stock return</i>	-0.018 [-0.574]	-0.011 [-0.315]	-0.020 [-0.716]	-0.001 [-0.032]	0.006 [0.157]	0.002 [0.076]
<i>High PP&E* Stock return (t-1)</i>	-0.051 [-1.627]	-0.040 [-1.167]	-0.040 [-1.480]	-0.053 [-1.635]	-0.045 [-1.271]	-0.029 [-1.008]
<i>High PP&E*ROA</i>	0.634*** [3.221]	0.597*** [2.825]	0.594*** [3.388]	0.604*** [3.260]	0.626*** [3.237]	0.385** [2.233]
<i>High PP&E*ROA(t-1)</i>	0.151 [0.825]	0.105 [0.538]	0.032 [0.201]	0.116 [0.678]	0.110 [0.596]	-0.046 [-0.303]
<i>High PP&E</i>	-0.119*** [-3.467]	-0.116*** [-3.279]		-0.220*** [-7.284]	-0.224*** [-7.104]	-0.079*** [-2.847]
<i>Log sales</i>	0.473*** [39.039]	0.471*** [37.134]	0.351*** [13.808]	0.473*** [39.334]	0.470*** [37.441]	0.350*** [13.774]
<i>Tobins q</i>	0.119*** [6.929]	0.118*** [6.371]	0.087*** [5.736]	0.120*** [7.354]	0.118*** [6.743]	0.088*** [5.793]
<i>ROA</i>	-0.375*** [-2.811]	-0.394*** [-2.848]	0.038 [0.313]	-0.417*** [-2.968]	-0.452*** [-3.103]	0.089 [0.693]
<i>ROA (t-1)</i>	-0.186 [-1.504]	-0.242* [-1.850]	0.213** [1.970]	-0.198 [-1.583]	-0.269** [-1.999]	0.235** [2.215]
<i>Stock volatility</i>	0.435** [2.187]	0.388* [1.797]	-0.053 [-0.307]	0.464** [2.371]	0.410* [1.928]	-0.035 [-0.200]
<i>Stock return</i>	0.093*** [3.195]	0.094*** [2.978]	0.089*** [3.837]	0.082*** [2.648]	0.082** [2.485]	0.077*** [3.025]
<i>Stock return (t-1)</i>	0.169*** [6.701]	0.166*** [6.077]	0.137*** [6.988]	0.173*** [6.243]	0.170*** [5.663]	0.134*** [5.986]
<i>Ceo age</i>	0.027 [1.375]	0.024 [1.179]	0.022 [1.016]	0.029 [1.465]	0.025 [1.275]	0.022 [1.022]
<i>Ceo age squared</i>	-0.000* [-1.650]	-0.000 [-1.440]	-0.000 [-1.281]	-0.000* [-1.733]	-0.000 [-1.534]	-0.000 [-1.286]
<i>Ceo tenure</i>	0.000*** [2.672]	0.000** [2.503]	0.000** [2.066]	0.000*** [2.682]	0.000** [2.499]	0.000** [2.054]
<i>Ceo tenure squared</i>	-0.000** [-2.335]	-0.000** [-2.393]	-0.000 [-1.620]	-0.000** [-2.313]	-0.000** [-2.334]	-0.000 [-1.624]
<i>PP&E</i>	Fixed	Fixed	Fixed	Floating	Floating	Floating
<i>Observations</i>	14,165	14,207	14,207	14,165	14,207	14,207
<i>R-squared</i>	0.542	0.569	0.285	0.546	0.573	0.285
<i>Year FE</i>	Yes	No	Yes	Yes	No	Yes
<i>Industry FE</i>	Yes	No	No	Yes	No	No
<i>Year * Industry FE</i>	No	Yes	No	No	Yes	No
<i>Firm FE</i>	No	No	Yes	No	No	Yes

Table 8. Firm Governance

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total compensation on floating and fixed PPE and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PPE as the instrument variables to estimate the logarithm of MVE. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PPE) data is available for the years 1992 – 2011 inclusive. Panels are differentiated by whether firms have below/above median Gompers, Ishii, and Metrick (2003) Governance Index (G-Index) or below/above median institutional ownership. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroskedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels.

	(1)	(2)	(3)	(4)
<i>Panel A: Low G index</i>				
<i>Log MVE</i>	0.298*** [11.209]	0.497** [2.055]	0.304*** [10.807]	0.383 [1.497]
<i>ROA</i>			-0.144 [-1.130]	-0.261 [-0.685]
<i>Observations</i>	6,317	6,317	6,317	6,317
<i>R-squared</i>	0.227	0.207	0.228	0.225
<i>Panel B: High G index</i>				
<i>Log MVE</i>	0.364*** [18.197]	0.364 [1.326]	0.355*** [16.765]	0.106 [0.318]
<i>ROA</i>			0.245* [1.896]	0.659 [1.156]
<i>Observations</i>	7,658	7,658	7,658	7,658
<i>R-squared</i>	0.340	0.340	0.340	0.313
<i>Panel C: Low Institutional Ownership</i>				
<i>Log MVE</i>	0.311*** [8.584]	0.647 [1.281]	0.309*** [7.969]	0.687 [1.030]
<i>ROA</i>			0.043 [0.302]	-0.529 [-0.514]
<i>Observations</i>	5,149	5,149	5,149	5,149
<i>R-squared</i>	0.200	0.145	0.200	0.135
<i>Panel D: High Institutional Ownership</i>				
<i>Log MVE</i>	0.312*** [11.212]	0.376 [1.252]	0.296*** [10.121]	0.183 [0.528]
<i>ROA</i>			0.428*** [2.830]	0.582 [1.183]
<i>Observations</i>	5,696	5,696	5,696	5,696
<i>R-squared</i>	0.205	0.203	0.207	0.202
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes

Table 9. Inelasticity

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI predicted by land supply elasticity and the Case-Shiller House Price Index and the lag of predicted HPI multiplied by PP&E to estimate Log of MVE and Log of Debt following Bertrand and Mullainathan (2001). The third specification uses HPI predicted by land supply elasticity and the Case-Shiller House Price Index and the predicted HPI multiplied by PP&E to predict logarithm of the market value of firm equity (MVE) and Return on Assets (ROA). It then includes the predicted Log MVE and ROA as independent variables. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation		
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>HPI predict</i>	-0.003 [-1.401]	-0.000 [-0.739]							
<i>PP&E*HPI (t-1) predict</i>	0.005*** [4.868]	0.001*** [6.838]							
<i>Log MVE (t-1) predict</i>			1.193*** [4.814]						
<i>ROA (t-1) predict</i>			3.813 [0.724]						
<i>Log MVE</i>				0.344*** [20.285]	0.542 [0.551]	0.139*** [9.948]	0.967 [0.789]	0.518*** [13.792]	-0.487 [-0.203]
<i>ROA</i>				0.041 [0.474]	1.514 [0.272]	0.412*** [6.304]	-2.836 [-0.407]	-0.226 [-1.083]	10.619 [0.773]
<i>PP&E</i>	-1.004*** [-5.753]	-0.153*** [-7.322]	-1.161*** [-5.539]	-0.362*** [-2.982]	-0.211 [-1.003]	-0.231*** [-2.861]	-0.028 [-0.109]	-0.426 [-1.441]	-0.379 [-0.691]
<i>Tobins q</i>	0.291*** [18.820]	0.019*** [11.269]	0.112*** [5.186]	-0.005 [-0.360]	-0.095 [-0.508]	0.003 [0.316]	-0.184 [-0.804]	-0.018 [-0.591]	0.061 [0.133]
<i>Stock volatility</i>	-2.474*** [-11.528]	-0.301*** [-10.324]	-3.095*** [-9.672]	0.529*** [3.328]	1.451 [1.641]	-0.152 [-1.446]	0.915 [0.873]	0.743* [1.890]	1.438 [0.658]
<i>Stock return (t-1)</i>	0.089*** [7.627]	0.025*** [12.966]	0.115*** [4.717]	0.082*** [6.169]	0.025 [0.425]	0.048*** [5.885]	0.061 [0.817]	0.068** [1.991]	-0.130 [-0.822]
<i>ROA (t-1)</i>	1.163*** [12.376]	0.162*** [7.359]	0.600*** [3.135]	0.008 [0.092]	-0.455 [-1.441]	-0.216*** [-3.817]	-0.643* [-1.650]	0.161 [0.753]	-0.520 [-0.616]
<i>Ceo age</i>	0.030 [1.352]	0.001 [0.650]	0.054 [1.624]	0.032 [1.553]	0.019 [0.592]	0.033** [2.126]	0.007 [0.215]	0.093* [1.930]	0.093 [1.120]
<i>Ceo age squared</i>	-0.000 [-1.315]	-0.000 [-0.811]	-0.000 [-1.445]	-0.000* [-1.778]	-0.000 [-0.776]	-0.000* [-1.933]	-0.000 [-0.197]	-0.001** [-2.240]	-0.001 [-1.307]
<i>Ceo tenure</i>	0.000 [1.137]	0.000 [0.784]	-0.000 [-0.596]	0.000 [1.383]	0.000 [0.493]	0.000*** [3.299]	0.000 [0.965]	-0.000 [-0.426]	-0.000 [-0.556]
<i>Ceo tenure squared</i>	0.000 [0.018]	0.000 [0.553]	-0.000 [-1.328]	-0.000 [-0.922]	-0.000 [-0.531]	-0.000 [-1.320]	-0.000 [-0.505]	-0.000 [-0.810]	-0.000 [-0.500]
<i>Observations</i>	13,136	13,136	13,233	14,129	13,136	14,093	13,100	14,142	13,149
<i>R-squared</i>	0.420	0.205	0.320	0.307	0.252	0.238	-0.635	0.198	-0.076
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year * MSA FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 10. Debt

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), the logarithm of 1 plus the firm's total debt and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate Log of MVE and Log of Debt following Bertrand and Mullainathan (2001). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: Log (1+Debt)	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>HPI</i>	0.001 [0.996]	-0.001 [-0.701]						
<i>PP&E*HPI(t-1)</i>	0.003*** [3.403]	0.003** [2.025]						
<i>Log MVE</i>			0.336*** [18.569]	-0.461 [-0.435]	0.155*** [10.945]	-0.553 [-0.736]	0.494*** [12.315]	-0.323 [-0.185]
<i>Log (1+Debt issue)</i>			0.019* [1.851]	1.272 [1.154]	-0.002 [-0.376]	0.855 [1.063]	0.034 [1.481]	1.977 [1.101]
<i>PP&E</i>	-0.798*** [-4.617]	-0.506 [-1.460]	-0.366*** [-3.019]	-0.579 [-0.988]	-0.249*** [-3.083]	-0.468 [-1.177]	-0.415 [-1.403]	-0.561 [-0.569]
<i>Tobins q</i>	0.299*** [20.388]	-0.368*** [-11.869]	0.005 [0.395]	0.700 [1.010]	0.005 [0.531]	0.529 [1.056]	-0.002 [-0.069]	0.951 [0.839]
<i>Stock volatility</i>	-2.434*** [-12.031]	0.174 [0.498]	0.489*** [3.059]	-1.744 [-0.629]	-0.232** [-2.185]	-2.154 [-1.093]	0.741* [1.880]	-1.629 [-0.363]
<i>Stock return (t-1)</i>	0.091*** [7.940]	-0.047** [-2.000]	0.086*** [6.556]	0.215 [1.453]	0.058*** [7.025]	0.163 [1.515]	0.068** [2.008]	0.229 [0.948]
<i>ROA (t-1)</i>	1.184*** [13.223]	-0.520*** [-2.721]	0.028 [0.330]	1.620 [0.908]	-0.169*** [-2.819]	1.130 [0.871]	0.161 [0.724]	2.132 [0.725]
<i>Ceo age</i>	0.031 [1.478]	0.122*** [2.869]	0.032 [1.564]	-0.096 [-0.834]	0.035** [2.273]	-0.048 [-0.573]	0.092* [1.900]	-0.122 [-0.627]
<i>Ceo age squared</i>	-0.000 [-1.475]	-0.001*** [-2.780]	-0.000* [-1.793]	0.001 [0.768]	-0.000** [-2.083]	0.000 [0.572]	-0.001** [-2.219]	0.001 [0.508]
<i>Ceo tenure</i>	0.000 [1.342]	0.000 [0.685]	0.000 [1.501]	0.000 [0.141]	0.000*** [3.321]	0.000 [0.909]	-0.000 [-0.260]	-0.000 [-0.455]
<i>Ceo tenure squared</i>	0.000 [0.396]	-0.000 [-0.606]	-0.000 [-0.994]	0.000 [0.306]	-0.000 [-1.248]	0.000 [0.145]	-0.000 [-0.913]	0.000 [0.126]
<i>Observations</i>	14,075	14,075	14,075	14,075	14,039	14,039	14,088	14,088
<i>R-squared</i>	0.421	0.142	0.307	-3.560	0.233	-4.263	0.198	-1.525
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year * MSA FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix A1. Data Definitions

CEO Level Variables

<i>Total Compensation</i>	Total CEO pay in thousand \$, which consists of salary, bonus, value of restricted stock granted, value of options granted, longterm incentive payout, and other compensation (Execucomp TDC1).
<i>Cash Compensation</i>	Salary plus bonus in thousand \$ (Execucomp TOTAL_CURR).
<i>Equity Compensation</i>	Value of restricted stock granted plus value of options granted in thousand \$ (Execucomp RSTKGRNT + OPTION_AWARDS_BLK_VALUE).
<i>Delta</i>	The sensitivity of the executive's stock and options portfolio to a 1% change in the level of stock price.
<i>Vega</i>	The sensitivity of the executive's stock and options portfolio to a 1% change in the level of stock price volatility.
<i>Equity Percentage</i>	Equity compensation divided by total compensation.
<i>CEO Age</i>	Age of CEO in years (RiskMetrics).
<i>CEO Tenure</i>	Number of years as CEO in the current position (RiskMetrics).

Firm Level Variables

<i>Log Sales</i>	Log of sales in thousands of \$ (Compustat SALE).
<i>Log MVE</i>	Log of market capitalization in thousands of \$ (Compustat PRCC_F * CSHO).
<i>Tobins q</i>	Sum of total assets plus market value of equity minus book value of equity divided by total assets [Compustat (AT + CSHO x PRCC_F - CEQ) / AT].
<i>ROA</i>	Earnings before interest and taxes divided by total assets (Compustat EBIT / AT).
<i>Volatility</i>	Annualized standard deviation of monthly stock returns (CRSP).
<i>Stock Return</i>	Annual stock return [Compustat (PRCC_F(t) / AJEX(t) + DVPSX_F(t) / AJEX(t)) / (PRCC_F(t-1) / AJEX_F(t-1))].
<i>CAPEX</i>	Capital expenditures divided by total assets (Compustat CAPX / AT).

<i>Intangibles</i>	Intangibles divided by total assets (Compustat INTAN / AT).
<i>PP&E</i>	Plant, Property, & Equipment divided by total assets (Compustat PPENT / AT).
<i>PP&E(1992)</i>	Plant, Property, & Equipment in the year 1992 divided by total assets in the year 1992 (Compustat PPENT / AT).
<i>HPI</i>	Level of the House Price Index for a particular Core Based Statistical Area (Federal Housing Finance Association).
<i>High PP&E</i>	Dummy variable set to 1 if a firm's PP&E is above the median for a given year, 0 otherwise.
<i>Interaction</i>	Plant, Property, & Equipment (PP&E) multiplied by House Price Index (HPI).

**Internet Appendix for
“CEO Compensation and Real Estate Prices:
Are CEOs Paid for Pure Luck?”**

Ben Bennett

Arizona State University – W. P. Carey School of Business

Cláudia Custódio

Arizona State University – W. P. Carey School of Business

Dragana Cvijanovic

University of North Carolina at Chapel Hill

Table IA1. Positive vs. Negative Real Estate Shocks and Firm Performance

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI, the presence of a positive real estate (RE) shock, the lag of HPI multiplied by PP&E, the presence of a positive RE shock multiplied by lagged HPI, and the presence of a positive RE shock multiplied by lagged HPI multiplied PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). Positive RE shock is defined as one if HPI has increases year-over-year and zero otherwise. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Log MVE</i>			0.343***	-0.151	0.138***	-0.377	0.516***	0.314
			[20.093]	[-0.447]	[9.818]	[-1.333]	[13.647]	[0.458]
<i>ROA</i>			0.040	6.253**	0.412***	4.834**	-0.216	6.177
			[0.456]	[2.387]	[6.304]	[2.175]	[-1.030]	[1.319]
<i>HPI (t-1)</i>	0.000	-0.000**						
	[0.773]	[-2.192]						
<i>PP&E*HPI(t-1)</i>	0.003***	0.000***						
	[3.268]	[4.015]						
<i>Positive RE shock (t-1)</i>	0.095	0.009						
	[1.602]	[1.228]						
<i>Positive RE shock (t-1)*PP&E*HPI (t-1)</i>	0.000	0.000						
	[0.152]	[1.592]						
<i>Positive RE shock (t-1)* HPI (t-1)</i>	-0.000	-0.000						
	[-1.398]	[-1.221]						
<i>PP&E</i>	-0.849***	-0.107***	-0.362***	-0.211	-0.232***	-0.246	-0.426	0.008
	[-4.584]	[-5.188]	[-2.975]	[-1.008]	[-2.858]	[-1.410]	[-1.436]	[0.018]
<i>Tobins q</i>	0.298***	0.019***	-0.004	0.026	0.004	0.075	-0.016	-0.067
	[19.095]	[10.711]	[-0.295]	[0.346]	[0.413]	[1.198]	[-0.546]	[-0.423]
<i>Stock volatility</i>	-2.427***	-0.298***	0.542***	1.228*	-0.145	-0.075	0.808**	2.317*
	[-11.513]	[-10.120]	[3.390]	[1.835]	[-1.378]	[-0.141]	[2.053]	[1.749]
<i>Stock return (t-1)</i>	0.095***	0.026***	0.081***	-0.033	0.048***	-0.020	0.066*	-0.085
	[8.029]	[12.857]	[6.152]	[-0.614]	[5.831]	[-0.444]	[1.920]	[-0.867]
<i>ROA (t-1)</i>	1.158***	0.157***	0.014	-0.383	-0.210***	-0.297	0.181	-0.526
	[12.016]	[6.932]	[0.173]	[-1.118]	[-3.710]	[-1.078]	[0.845]	[-0.818]
<i>Ceo age</i>	0.022	0.003	0.035*	0.025	0.035**	0.024	0.091*	0.066
	[0.969]	[1.488]	[1.727]	[0.901]	[2.233]	[1.123]	[1.854]	[1.170]
<i>Ceo age squared</i>	-0.000	-0.000	-0.000**	-0.000	-0.000**	-0.000	-0.001**	-0.001
	[-0.997]	[-1.592]	[-1.966]	[-1.058]	[-2.054]	[-0.986]	[-2.166]	[-1.436]
<i>Ceo tenure</i>	0.000	0.000	0.000	0.000	0.000***	0.000***	-0.000	-0.000
	[1.423]	[0.114]	[1.492]	[1.632]	[3.406]	[3.051]	[-0.414]	[-0.100]
<i>Ceo tenure squared</i>	0.000	0.000	-0.000	-0.000	-0.000	-0.000*	-0.000	-0.000
	[0.250]	[1.400]	[-1.021]	[-1.503]	[-1.370]	[-1.817]	[-0.766]	[-1.043]
<i>Observations</i>	12,634	12,634	14,207	12,634	14,170	12,598	14,222	12,642
<i>R-squared</i>	0.408	0.191	0.306	-0.226	0.236	-0.445	0.197	0.088
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA2. Positive vs. Negative Real Estate Shocks and CEO Pay

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI, the presence of a positive real estate (RE) shock, the lag of HPI multiplied by PP&E, the presence of a positive RE shock multiplied by lagged HPI, and the presence of a positive RE shock multiplied by lagged HPI multiplied PP&E to estimate Log of MVE, ROA, the interaction of lagged positive RE shock and the Log of MVE, and the interaction of lagged positive RE shock and ROA. Positive RE shock is defined as one if HPI has increases year-over-year and zero otherwise. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Positive RE shock (t-1) *	Positive RE shock (t-1) *	Total Compensation		Cash Compensation		Equity Compensation	
	Log MVE	ROA	Log(MVE)	ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Log MVE</i>					0.332***	-0.101	0.129***	-0.301	0.494***	0.405
					[18.296]	[-0.290]	[9.020]	[-1.154]	[12.471]	[0.555]
<i>Positive RE shock (t-1) * Log(MVE)</i>					-0.004	-0.006	0.003	0.010	-0.005	-0.023
					[-1.242]	[-0.359]	[1.348]	[0.772]	[-0.800]	[-0.840]
<i>ROA</i>					-0.169	6.717**	-0.093	5.688**	-0.350	6.911
					[-1.195]	[2.077]	[-0.920]	[2.166]	[-1.052]	[1.210]
<i>Positive RE shock (t-1) * ROA</i>					0.259	-0.154	0.638***	-2.364	0.243	1.136
					[1.636]	[-0.041]	[5.287]	[-0.802]	[0.653]	[0.172]
<i>HPI (t-1)</i>	0.000	-0.000**	-0.001	0.000						
	[0.773]	[-2.192]	[-1.342]	[0.259]						
<i>PP&E*HPI (t-1)</i>	0.003***	0.000***	-0.000	0.000***						
	[3.268]	[4.015]	[-0.384]	[2.904]						
<i>Positive RE shock (t-1)</i>	0.095	0.009	7.120***	0.055***						
	[1.602]	[1.228]	[46.166]	[7.478]						
<i>Positive RE shock (t-1)*PP&E*HPI (t-1)</i>	0.000	0.000	0.004***	0.000						
	[0.152]	[1.592]	[3.075]	[0.396]						
<i>Positive RE shock (t-1)*HPI (t-1)</i>	-0.000	-0.000	0.002**	-0.000***						
	[-1.398]	[-1.221]	[2.035]	[-2.860]						

<i>PP&E</i>	-0.849***	-0.107***	-0.617***	-0.053***	-0.325**	-0.160	-0.254***	-0.214	-0.275	0.136
	[-4.584]	[-5.188]	[-3.040]	[-2.685]	[-2.504]	[-0.734]	[-2.938]	[-1.279]	[-0.889]	[0.302]
<i>Tobins q</i>	0.298***	0.019***	0.336***	0.020***	0.004	0.008	0.005	0.080	0.004	-0.123
	[19.095]	[10.711]	[20.142]	[14.199]	[0.237]	[0.101]	[0.512]	[1.313]	[0.123]	[-0.733]
<i>Stock volatility</i>	-2.427***	-0.298***	-0.801***	-0.209***	0.608***	1.455**	-0.145	-0.128	0.918**	2.993**
	[-11.513]	[-10.120]	[-3.123]	[-7.620]	[3.658]	[2.099]	[-1.308]	[-0.253]	[2.248]	[2.079]
<i>Stock return (t-1)</i>	0.095***	0.026***	0.097***	0.020***	0.083***	-0.046	0.049***	-0.002	0.062*	-0.134
	[8.029]	[12.857]	[6.649]	[11.167]	[6.197]	[-0.816]	[5.814]	[-0.052]	[1.724]	[-1.212]
<i>ROA (t-1)</i>	1.158***	0.157***	0.576***	0.096***	0.047	-0.490	-0.189***	-0.309	0.270	-0.825
	[12.016]	[6.932]	[3.905]	[5.005]	[0.550]	[-1.371]	[-3.132]	[-1.204]	[1.220]	[-1.176]
<i>Ceo age</i>	0.022	0.003	0.007	0.002	0.035	0.022	0.029*	0.023	0.083	0.059
	[0.969]	[1.488]	[0.258]	[0.737]	[1.616]	[0.796]	[1.805]	[1.127]	[1.566]	[1.019]
<i>Ceo age squared</i>	-0.000	-0.000	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.000	-0.001*	-0.001
	[-0.997]	[-1.592]	[-0.275]	[-0.780]	[-1.837]	[-0.944]	[-1.622]	[-0.973]	[-1.867]	[-1.274]
<i>Ceo tenure</i>	0.000	0.000	0.000	-0.000	0.000	0.000	0.000***	0.000***	-0.000	-0.000
	[1.423]	[0.114]	[0.979]	[-0.002]	[1.582]	[1.571]	[3.463]	[3.121]	[-0.198]	[-0.141]
<i>Ceo tenure squared</i>	0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000*	-0.000	-0.000
	[0.250]	[1.400]	[-0.240]	[1.336]	[-1.047]	[-1.558]	[-1.554]	[-1.772]	[-0.745]	[-1.118]
<i>Observations</i>	12,634	12,634	12,634	12,634	12,753	12,634	12,718	12,598	12,763	12,642
<i>R-squared</i>	0.408	0.191	0.948	0.207	0.273	-0.268	0.232	-0.285	0.180	0.033
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA3. Extremely Negative Real Estate Shocks and Firm Performance

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI, the presence of a negative real estate (RE) shock, the lag of HPI multiplied by PP&E, the presence of a negative RE shock multiplied by lagged HPI, and the presence of a negative RE shock multiplied by lagged HPI multiplied PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). Negative RE shock is defined as one if the change in HPI year-over-year is in the bottom quartile and zero otherwise. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Log MVE</i>			0.343***	-0.021	0.138***	-0.287	0.516***	0.519
			[20.093]	[-0.079]	[9.818]	[-1.353]	[13.647]	[0.854]
<i>ROA</i>			0.040	7.152***	0.412***	5.096**	-0.216	10.672**
			[0.456]	[2.725]	[6.304]	[2.399]	[-1.030]	[2.077]
<i>HPI (t-1)</i>	0.000	-0.000***						
	[0.945]	[-3.230]						
<i>PP&E*HPI (t-1)</i>	0.003***	0.000***						
	[3.431]	[4.906]						
<i>Negative RE shock (t-1)</i>	-0.069	0.006						
	[-1.442]	[0.856]						
<i>Negative RE shock (t-1)*PP&E*HPI(t-1)</i>	-0.000	-0.000						
	[-0.039]	[-0.729]						
<i>Negative RE shock (t-1)*HPI(t-1)</i>	0.000*	-0.000						
	[1.957]	[-0.399]						
<i>PP&E</i>	-0.801***	-0.098***	-0.362***	-0.168	-0.232***	-0.200	-0.426	0.157
	[-4.627]	[-5.327]	[-2.975]	[-0.874]	[-2.858]	[-1.266]	[-1.436]	[0.368]
<i>Tobins q</i>	0.298***	0.019***	-0.004	-0.034	0.004	0.040	-0.016	-0.230
	[20.450]	[11.396]	[-0.295]	[-0.497]	[0.413]	[0.755]	[-0.546]	[-1.432]
<i>Stock volatility</i>	-2.429***	-0.306***	0.542***	1.755**	-0.145	0.203	0.808**	4.065**
	[-12.087]	[-10.862]	[3.390]	[2.407]	[-1.378]	[0.351]	[2.053]	[2.555]
<i>Stock return (t-1)</i>	0.090***	0.025***	0.081***	-0.065	0.048***	-0.034	0.066*	-0.208*

	[7.953]	[13.018]	[6.152]	[-1.093]	[5.831]	[-0.715]	[1.920]	[-1.726]
<i>ROA (t-1)</i>	1.188***	0.169***	0.014	-0.761*	-0.210***	-0.487	0.181	-1.661**
	[13.278]	[7.918]	[0.173]	[-1.886]	[-3.710]	[-1.537]	[0.845]	[-1.963]
<i>Ceo age</i>	0.028	0.002	0.035*	0.033	0.035**	0.038*	0.091*	0.070
	[1.327]	[0.850]	[1.727]	[1.297]	[2.233]	[1.896]	[1.854]	[1.310]
<i>Ceo age squared</i>	-0.000	-0.000	-0.000**	-0.000	-0.000**	-0.000*	-0.001**	-0.001
	[-1.313]	[-0.994]	[-1.966]	[-1.428]	[-2.054]	[-1.731]	[-2.166]	[-1.545]
<i>Ceo tenure</i>	0.000	0.000	0.000	0.000	0.000***	0.000***	-0.000	-0.000
	[1.324]	[0.810]	[1.492]	[1.142]	[3.406]	[2.832]	[-0.414]	[-0.659]
<i>Ceo tenure squared</i>	0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	[0.312]	[0.816]	[-1.021]	[-1.319]	[-1.370]	[-1.505]	[-0.766]	[-1.054]
<i>Observations</i>	14,096	14,096	14,207	14,096	14,170	14,060	14,222	14,109
<i>R-squared</i>	0.420	0.199	0.306	-0.267	0.236	-0.435	0.197	-0.068
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA4. Extremely Negative Real Estate Shocks and CEO Pay

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI, the presence of a negative real estate (RE) shock, the lag of HPI multiplied by PP&E, the presence of a negative RE shock multiplied by lagged HPI, and the presence of a negative RE shock multiplied by lagged HPI multiplied PP&E to estimate Log of MVE, ROA, the interaction of lagged negative RE shock and the Log of MVE, and the interaction of lagged negative RE shock and ROA. Negative RE shock is defined as one if the change in HPI year-over-year is in the bottom quartile and zero otherwise. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

					Total Compensation		Cash Compensation		Equity Compensation	
	Log MVE	ROA	Negative RE shock (t-1) * Log MVE	Negative RE shock (t-1) * ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log MVE					0.343***	-0.140	0.138***	-0.288	0.516***	0.309
					[20.139]	[-0.385]	[9.880]	[-1.029]	[13.652]	[0.420]
Negative RE shock (t-1) * Log MVE					-0.002	0.010	0.000	-0.000	-0.005	0.020
					[-0.905]	[0.472]	[0.151]	[-0.023]	[-0.874]	[0.503]
ROA					0.029	8.373**	0.443***	5.115*	-0.309	12.797*
					[0.313]	[2.288]	[6.234]	[1.843]	[-1.434]	[1.926]
Negative RE shock (t-1) * ROA					0.056	-2.488	-0.147	-0.009	0.444	-4.523
					[0.332]	[-0.589]	[-1.433]	[-0.003]	[0.982]	[-0.562]
HPI (t-1)	0.000	-0.000***	-0.000	-0.000**						
	[0.945]	[-3.230]	[-1.396]	[-2.513]						
PP&E*HPI(t-1)	0.003***	0.000***	-0.000	0.000*						
	[3.431]	[4.906]	[-0.229]	[1.668]						
Negative RE shock (t-1)	-0.069	0.006	6.817***	0.053***						
	[-1.442]	[0.856]	[46.712]	[6.322]						
Neg. RE shock (t-1) * PP&E*HPI(t-1)	-0.000	-0.000	0.004***	-0.000						
	[-0.039]	[-0.729]	[2.744]	[-0.007]						
Neg. RE shock (t-1) *HPI(t-1)	0.000*	-0.000	0.003***	-0.000*						
	[1.957]	[-0.399]	[3.635]	[-1.755]						
PP&E	-0.801***	-0.098***	-0.266**	-0.020*	-0.364***	-0.194	-0.232***	-0.200	-0.428	0.111
	[-4.627]	[-5.327]	[-2.158]	[-1.783]	[-2.989]	[-0.926]	[-2.864]	[-1.226]	[-1.444]	[0.253]

<i>Tobins q</i>	0.298***	0.019***	0.032***	0.001	-0.004	-0.018	0.003	0.040	-0.016	-0.201
	[20.450]	[11.396]	[2.600]	[1.538]	[-0.301]	[-0.232]	[0.360]	[0.678]	[-0.512]	[-1.171]
<i>Stock volatility</i>	-2.429***	-0.306***	-0.522***	-0.054***	0.537***	1.703**	-0.144	0.205	0.794**	3.957**
	[-12.087]	[-10.862]	[-3.234]	[-3.689]	[3.353]	[2.162]	[-1.355]	[0.351]	[2.022]	[2.400]
<i>Stock return (t-1)</i>	0.090***	0.025***	0.039***	0.005***	0.081***	-0.073	0.048***	-0.035	0.066*	-0.221*
	[7.953]	[13.018]	[3.348]	[5.583]	[6.140]	[-1.104]	[5.811]	[-0.696]	[1.920]	[-1.744]
<i>ROA (t-1)</i>	1.188***	0.169***	0.314***	0.050***	0.011	-0.708	-0.209***	-0.489	0.173	-1.552*
	[13.278]	[7.918]	[3.224]	[5.158]	[0.139]	[-1.615]	[-3.673]	[-1.502]	[0.804]	[-1.748]
<i>Ceo age</i>	0.028	0.002	-0.009	0.001	0.035*	0.037	0.035**	0.038*	0.091*	0.079
	[1.327]	[0.850]	[-0.744]	[0.994]	[1.732]	[1.328]	[2.243]	[1.811]	[1.850]	[1.352]
<i>Ceo age squared</i>	-0.000	-0.000	0.000	-0.000	-0.000**	-0.000	-0.000**	-0.000*	-0.001**	-0.001
	[-1.313]	[-0.994]	[0.533]	[-1.057]	[-1.971]	[-1.445]	[-2.064]	[-1.662]	[-2.162]	[-1.568]
<i>Ceo tenure</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000***	0.000***	-0.000	-0.000
	[1.324]	[0.810]	[1.052]	[0.034]	[1.490]	[1.140]	[3.399]	[2.810]	[-0.413]	[-0.612]
<i>Ceo tenure squared</i>	0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	[0.312]	[0.816]	[-0.505]	[0.388]	[-1.018]	[-1.261]	[-1.367]	[-1.504]	[-0.765]	[-1.046]
<i>Observations</i>	14,096	14,096	14,096	14,096	14,207	14,096	14,170	14,060	14,222	14,109
<i>R-squared</i>	0.420	0.199	0.954	0.124	0.306	-0.420	0.236	-0.440	0.197	-0.130
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA5. Quintiles

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). The second stage includes the five quintiles of ROA, five quintiles of size (logarithm of total assets), and five quintiles of firm age, each interacted with HPI. The quintiles of ROA, size and firm age should be calculated in the baseline year (1992). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All regressions include year quadratic and firm fixed effects. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

	1st: Log MVE		1st: ROA		Total Compensation		Cash Compensation		Equity Compensation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
<i>HPI (t-1)</i>	-0.001	-0.000*								
	[-1.105]	[-1.803]								
<i>PP&E*HPI (t-1)</i>	0.003***	0.000***								
	[4.343]	[4.652]								
<i>Log MVE</i>			0.349***	-1.158	0.135***	-1.807	0.523***	-0.130		
			[20.545]	[-0.517]	[10.125]	[-0.702]	[13.868]	[-0.047]		
<i>ROA</i>			0.023	17.496	0.435***	21.148	-0.214	16.047		
			[0.267]	[0.886]	[6.770]	[0.902]	[-1.028]	[0.664]		
<i>PP&E</i>	-0.931***	-0.096***	-0.335***	-0.259	-0.245***	-0.265	-0.397	0.096		
	[-5.375]	[-5.159]	[-2.747]	[-0.547]	[-3.132]	[-0.478]	[-1.342]	[0.182]		
<i>ROAQ1* PP&E*HPI (t-1)</i>	0.001	0.000	-0.001	-0.003	-0.002**	-0.005	-0.003	-0.007*		
	[0.535]	[1.405]	[-0.884]	[-0.824]	[-2.559]	[-0.936]	[-1.362]	[-1.908]		
<i>ROAQ2* PP&E*HPI (t-1)</i>	0.000	0.000	-0.000	-0.001	-0.002***	-0.002	0.001	-0.002		
	[0.451]	[0.956]	[-0.329]	[-0.543]	[-2.682]	[-1.149]	[0.356]	[-1.051]		
<i>ROAQ3* PP&E*HPI (t-1)</i>	-0.000	0.000	0.000	-0.001	-0.001*	-0.002	0.000	-0.003		
	[-0.476]	[0.611]	[0.076]	[-0.652]	[-1.873]	[-1.306]	[0.027]	[-1.563]		
<i>ROAQ4* PP&E*HPI (t-1)</i>	-0.001*	0.000	0.001	-0.001	-0.002**	-0.004	0.003	-0.000		
	[-1.732]	[0.509]	[0.890]	[-0.522]	[-2.141]	[-1.281]	[1.223]	[-0.155]		
<i>ROAQ5* PP&E*HPI (t-1)</i>	0.001	0.000	-0.000	0.001	-0.002**	-0.000	0.001	-0.001		
	[1.167]	[0.574]	[-0.159]	[0.322]	[-2.377]	[-0.049]	[0.334]	[-0.249]		
<i>SizeQ1* PP&E*HPI (t-1)</i>	0.004	0.000	0.000	0.003	0.003**	0.006	-0.001	-0.001		
	[0.880]	[0.499]	[0.276]	[0.277]	[2.366]	[0.514]	[-0.162]	[-0.088]		
<i>SizeQ3* PP&E*HPI (t-1)</i>	0.001	-0.000	0.001	0.003	0.004***	0.006	-0.001	0.001		
	[0.643]	[-0.345]	[0.797]	[0.725]	[5.735]	[1.403]	[-0.296]	[0.230]		

<i>SizeQ4* PP&E*HPI (t-1)</i>	0.001 [1.500]	-0.000*** [-3.447]	-0.001 [-1.586]	0.004 [0.670]	0.002*** [4.785]	0.008 [1.140]	-0.001 [-0.565]	0.003 [0.452]
<i>SizeQ5* PP&E*HPI (t-1)</i>	0.001 [1.510]	-0.000*** [-2.863]	-0.000 [-0.332]	0.003 [0.752]	0.001*** [3.992]	0.005 [1.098]	0.002* [1.910]	0.005 [0.896]
<i>qfirmage1_int</i>	0.001 [0.466]	0.000 [0.972]	-0.001 [-0.514]	-0.003 [-0.499]	0.000 [0.275]	-0.001 [-0.222]	-0.005 [-0.911]	-0.005 [-0.711]
<i>qfirmage2_int</i>	-0.001 [-0.884]	-0.000 [-1.507]	-0.000 [-0.309]	0.002 [0.553]	0.001 [1.002]	0.002 [0.534]	0.000 [0.128]	0.005 [1.305]
<i>qfirmage3_int</i>	0.002* [1.954]	0.000 [1.478]		-0.000 [-0.017]		0.000 [0.039]		0.000 [0.032]
<i>qfirmage4_int</i>	0.002* [1.800]	0.000 [1.019]	-0.001 [-0.918]	0.001 [0.274]	-0.000 [-0.185]	0.002 [0.534]	-0.001 [-0.618]	0.001 [0.193]
<i>qfirmage5_int</i>			-0.001 [-0.808]		-0.000 [-0.449]		-0.002 [-1.291]	
<i>Tobins q</i>	0.306*** [22.043]	0.019*** [11.559]	-0.009 [-0.646]	0.121 [0.363]	0.006 [0.682]	0.210 [0.564]	-0.020 [-0.660]	-0.131 [-0.312]
<i>Stock volatility</i>	-2.343*** [-11.915]	-0.303*** [-10.780]	0.485*** [3.111]	2.214 [1.385]	-0.085 [-0.825]	1.630 [0.822]	0.682* [1.762]	4.051** [2.207]
<i>Stock return (t-1)</i>	0.088*** [7.829]	0.025*** [12.974]	0.081*** [6.162]	-0.224 [-0.730]	0.047*** [5.891]	-0.309 [-0.812]	0.067* [1.958]	-0.284 [-0.766]
<i>ROA (t-1)</i>	1.212*** [13.651]	0.166*** [7.902]	-0.009 [-0.111]	-1.080 [-1.119]	-0.180*** [-3.223]	-1.198 [-1.040]	0.166 [0.779]	-1.725 [-1.561]
<i>Ceo age</i>	0.024 [1.177]	0.002 [0.906]	0.032 [1.561]	0.038 [0.743]	0.029* [1.876]	0.036 [0.643]	0.092* [1.902]	0.078 [1.204]
<i>Ceo age squared</i>	-0.000 [-1.186]	-0.000 [-1.039]	-0.000* [-1.795]	-0.000 [-0.795]	-0.000* [-1.728]	-0.000 [-0.555]	-0.001** [-2.226]	-0.001 [-1.436]
<i>Ceo tenure</i>	0.000 [1.501]	0.000 [0.720]	0.000 [1.534]	0.000 [0.811]	0.000*** [3.649]	0.000 [1.138]	-0.000 [-0.270]	-0.000 [-0.181]
<i>Ceo tenure squared</i>	0.000 [0.145]	0.000 [0.895]	-0.000 [-1.045]	-0.000 [-0.920]	-0.000 [-1.606]	-0.000 [-0.967]	-0.000 [-0.878]	-0.000 [-1.093]
<i>Observations</i>	14,120	14,120	14,120	14,120	14,084	14,084	14,133	14,133
<i>R-squared</i>	0.429	0.202	0.309	-3.446	0.252	-12.886	0.201	-0.349
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA6. Net Real Estate Buyer

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data, HPI data is available for the years 1992 – 2011 inclusive and whose ReAssets increase year-over-year. ReAssets are the sum of PP&E at cost, PP&E in progress at cost, and PP&E and improvements at cost. All regressions include year and firm fixed effects. All variables are winsorized at the 1th and 99th percentile values The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>HPI(t-1)</i>	0.001 [1.060]	-0.000** [-2.199]						
<i>PP&E*HPI(t-1)</i>	0.002** [2.377]	0.000*** [2.810]						
<i>Log MVE</i>			0.346*** [16.717]	0.034 [0.068]	0.139*** [7.865]	-0.430 [-1.064]	0.539*** [11.982]	1.032 [1.008]
<i>ROA</i>			0.302** [2.390]	14.919** [2.159]	0.629*** [6.528]	12.426** [2.147]	-0.049 [-0.181]	21.202 [1.627]
<i>PP&E</i>	-0.755*** [-4.215]	-0.041** [-2.337]	-0.359*** [-2.819]	-0.291 [-0.974]	-0.313*** [-3.483]	-0.428* [-1.691]	-0.334 [-1.075]	0.270 [0.404]
<i>Tobins q</i>	0.299*** [18.487]	0.019*** [13.257]	-0.016 [-0.998]	-0.205 [-1.340]	0.003 [0.217]	-0.053 [-0.430]	-0.040 [-1.144]	-0.600* [-1.889]
<i>Stock volatility</i>	-2.134*** [-9.416]	-0.216*** [-7.536]	0.606*** [3.074]	3.002** [2.072]	-0.217* [-1.722]	1.051 [0.870]	0.848* [1.722]	6.393** [2.228]
<i>Stock return (t-1)</i>	0.083*** [6.009]	0.024*** [13.379]	0.099*** [6.150]	-0.223 [-1.468]	0.042*** [4.174]	-0.196 [-1.540]	0.111*** [2.681]	-0.429 [-1.471]
<i>ROA (t-1)</i>	1.300*** [12.007]	0.193*** [8.916]	0.012 [0.109]	-2.423* [-1.939]	-0.137* [-1.679]	-1.710 [-1.631]	0.091 [0.350]	-4.670* [-1.939]
<i>Ceo age</i>	0.029 [1.284]	0.001 [0.535]	0.018 [0.752]	0.011 [0.319]	0.038** [2.049]	0.042 [1.524]	0.070 [1.310]	0.032 [0.439]
<i>Ceo age squared</i>	-0.000 [-1.240]	-0.000 [-0.564]	-0.000 [-0.953]	-0.000 [-0.443]	-0.000* [-1.909]	-0.000 [-1.431]	-0.001 [-1.614]	-0.000 [-0.690]
<i>Ceo tenure</i>	0.000 [1.212]	0.000 [0.578]	0.000*** [2.765]	0.000 [1.642]	0.000*** [3.644]	0.000** [2.408]	0.000 [0.595]	-0.000 [-0.006]
<i>Ceo tenure squared</i>	0.000 [0.418]	0.000 [0.384]	-0.000** [-2.155]	-0.000* [-1.844]	-0.000 [-1.566]	-0.000 [-1.392]	-0.000 [-1.585]	-0.000 [-1.455]
<i>Observations</i>	10,695	10,695	10,695	10,695	10,669	10,669	10,701	10,701
<i>R-squared</i>	0.465	0.210	0.339	-1.292	0.252	-2.369	0.223	-0.538
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA7. Real Estate Assets

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by Real Estate Assets (ReAssets) to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). ReAssets are the sum of PP&E at cost, PP&E in progress at cost, and PP&E and improvements at cost. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>HPI(t-1)</i>	0.001 [1.062]	-0.000** [-2.504]						
<i>HPI(t-1)*ReAssets</i>	0.002** [2.361]	0.000*** [3.043]						
<i>Log MVE</i>			0.344*** [20.447]	-0.162 [-0.482]	0.140*** [10.058]	-0.380 [-1.399]	0.522*** [13.947]	0.360 [0.506]
<i>ROA</i>			0.052 [0.600]	7.824* [1.897]	0.418*** [6.389]	5.040 [1.538]	-0.213 [-1.022]	12.106 [1.553]
<i>ReAssets</i>	-1.353*** [-5.444]	-0.043** [-2.329]	-0.154 [-1.200]	-0.560 [-1.261]	-0.021 [-0.201]	-0.557 [-1.520]	0.025 [0.073]	0.192 [0.197]
<i>Tobins q</i>	0.301*** [20.850]	0.019*** [11.519]	-0.006 [-0.404]	-0.004 [-0.043]	0.002 [0.228]	0.069 [0.879]	-0.020 [-0.660]	-0.211 [-0.965]
<i>Stock volatility</i>	-2.400*** [-12.071]	-0.304*** [-10.717]	0.523*** [3.268]	1.604 [1.335]	-0.158 [-1.503]	-0.038 [-0.041]	0.741* [1.873]	4.024* [1.647]
<i>Stock return (t-1)</i>	0.093*** [8.298]	0.026*** [13.256]	0.084*** [6.387]	-0.068 [-0.687]	0.050*** [6.129]	-0.023 [-0.288]	0.071** [2.071]	-0.229 [-1.191]
<i>ROA (t-1)</i>	1.147*** [12.981]	0.168*** [7.795]	-0.002 [-0.024]	-0.734 [-1.109]	-0.221*** [-3.895]	-0.390 [-0.771]	0.153 [0.713]	-1.734 [-1.333]
<i>Ceo age</i>	0.027 [1.305]	0.002 [0.840]	0.030 [1.464]	0.031 [1.111]	0.032** [2.061]	0.038* [1.774]	0.090* [1.863]	0.073 [1.286]
<i>Ceo age squared</i>	-0.000 [-1.288]	-0.000 [-0.995]	-0.000* [-1.694]	-0.000 [-1.207]	-0.000* [-1.876]	-0.000 [-1.603]	-0.001** [-2.177]	-0.001 [-1.492]
<i>Ceo tenure</i>	0.000 [1.389]	0.000 [0.863]	0.000 [1.560]	0.000 [1.236]	0.000*** [3.401]	0.000*** [2.840]	-0.000 [-0.259]	-0.000 [-0.486]
<i>Ceo tenure squared</i>	0.000 [0.269]	0.000 [0.797]	-0.000 [-1.113]	-0.000 [-1.308]	-0.000 [-1.420]	-0.000 [-1.407]	-0.000 [-0.963]	-0.000 [-1.207]
<i>Observations</i>	14,120	14,120	14,120	14,120	14,084	14,084	14,133	14,133
<i>R-squared</i>	0.428	0.195	0.305	-0.394	0.236	-0.484	0.198	-0.128
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA8. State Home Price Index

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of State HPI and the lag of State HPI multiplied by PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). The State HPI is calculated using state-level data on firms' operations within each state, obtained from Garcia and Norli (2012), multiplied by each state's HPI obtained from the Lincoln Institute of Land policy. The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive. All regressions include year quadratic and firm fixed effects. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>State HPI (t-1)</i>	-0.000** [-2.402]	0.000*** [2.891]						
<i>State HPI (t-1)*PP&E</i>	0.001*** [2.795]	-0.000*** [-2.612]						
<i>Log MVE</i>			0.344*** [20.260]	-0.612 [-0.427]	0.139*** [9.932]	-0.425 [-0.495]	0.518*** [13.773]	-2.417 [-0.659]
<i>ROA</i>			0.042 [0.476]	-14.892 [-1.168]	0.412*** [6.299]	-8.701 [-1.161]	-0.224 [-1.075]	-31.985 [-1.009]
<i>PP&E</i>	-0.558*** [-3.376]	-0.047*** [-3.115]	-0.361*** [-2.972]	-1.621 [-1.171]	-0.232*** [-2.873]	-0.979 [-1.207]	-0.421 [-1.422]	-3.565 [-1.014]
<i>Tobins q</i>	0.298*** [20.131]	0.020*** [11.954]	-0.005 [-0.361]	0.572 [0.873]	0.003 [0.316]	0.349 [0.899]	-0.018 [-0.592]	1.482 [0.888]
<i>Stock volatility</i>	-2.458*** [-11.956]	-0.293*** [-10.465]	0.529*** [3.319]	-6.212 [-0.887]	-0.154 [-1.461]	-4.222 [-1.017]	0.749* [1.903]	-15.881 [-0.891]
<i>Stock return (t-1)</i>	0.089*** [7.811]	0.025*** [13.033]	0.082*** [6.184]	0.542 [1.242]	0.049*** [5.912]	0.332 [1.273]	0.068** [1.973]	1.122 [1.028]
<i>ROA (t-1)</i>	1.174*** [13.103]	0.169*** [7.907]	0.006 [0.075]	3.652 [0.974]	-0.216*** [-3.826]	1.960 [0.892]	0.160 [0.747]	8.977 [0.948]
<i>Ceo age</i>	0.030 [1.429]	0.002 [0.975]	0.031 [1.523]	0.088 [1.101]	0.033** [2.118]	0.068 [1.338]	0.091* [1.896]	0.246 [1.192]
<i>Ceo age squared</i>	-0.000 [-1.420]	-0.000 [-1.128]	-0.000* [-1.752]	-0.001 [-1.178]	-0.000* [-1.926]	-0.001 [-1.299]	-0.001** [-2.208]	-0.002 [-1.270]
<i>Ceo tenure</i>	0.000 [1.386]	0.000 [0.667]	0.000 [1.505]	0.000 [1.122]	0.000*** [3.349]	0.000* [1.909]	-0.000 [-0.295]	0.000 [0.634]
<i>Ceo tenure squared</i>	0.000 [0.268]	0.000 [1.123]	-0.000 [-1.040]	0.000 [0.269]	-0.000 [-1.356]	-0.000 [-0.020]	-0.000 [-0.921]	0.000 [0.305]
<i>Observations</i>	14,120	14,120	14,120	14,120	14,084	14,084	14,133	14,133
<i>R-squared</i>	0.419	0.196	0.306	-3.321	0.238	-2.984	0.198	-3.477
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table IA9. Small Firms

The table presents estimates of OLS and Instrument Variable (IV) panel regressions of the logarithm of CEO total, cash, and equity compensation on logarithm of the market value of firm equity (MVE), Return on Assets (ROA) and other CEO and firm level control variables. The IV regressions use the lag of HPI and the lag of HPI multiplied by PP&E to estimate Log of MVE and ROA following Bertrand and Mullainathan (2001). The sample consists of all firms in Execucomp and Compustat for which Plant, Property & Equipment (PP&E) data and HPI data is available for the years 1992 – 2011 inclusive and belonging to the bottom three quartiles of the size distribution whose headquarters are located in one of the top 20 MSAs based on the MSA rank by population. All regressions include year quadratic and firm fixed effects. All variables are winsorized at the 1th and 99th percentile values. The standard errors are robust to heteroscedasticity and clustered at the firm level. Variable definitions are as defined in the Appendix. *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

			Total Compensation		Cash Compensation		Equity Compensation	
	1st: Log MVE	1st: ROA	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Log MVE</i>	0.000 [0.416]	-0.000*** [-2.994]						
<i>HPI (t-1)</i>	0.003*** [2.885]	0.000*** [4.425]						
<i>PP&E*HPI (t-1)</i>			0.353*** [19.843]	-0.379 [-0.792]	0.146*** [10.792]	-0.301 [-0.868]	0.558*** [13.128]	-0.170 [-0.187]
<i>ROA</i>			0.005 [0.050]	6.029* [1.928]	0.371*** [5.742]	3.947* [1.772]	-0.241 [-1.046]	10.394* [1.803]
<i>PP&E</i>	-0.667*** [-3.452]	-0.134*** [-5.500]	-0.301** [-2.114]	-0.087 [-0.296]	-0.174* [-1.887]	-0.057 [-0.296]	-0.257 [-0.716]	0.352 [0.655]
<i>Tobins q</i>	0.343*** [22.911]	0.021*** [10.300]	-0.009 [-0.578]	0.116 [0.903]	-0.002 [-0.163]	0.077 [0.824]	-0.035 [-1.016]	-0.010 [-0.039]
<i>Stock volatility</i>	-2.195*** [-10.471]	-0.314*** [-9.684]	0.649*** [3.754]	0.864 [1.016]	-0.092 [-0.849]	0.011 [0.018]	1.009** [2.296]	2.645 [1.568]
<i>Stock return (t-1)</i>	0.082*** [6.816]	0.026*** [12.017]	0.081*** [5.730]	-0.016 [-0.247]	0.049*** [5.837]	-0.009 [-0.190]	0.068* [1.794]	-0.150 [-1.226]
<i>ROA (t-1)</i>	1.188*** [12.674]	0.165*** [6.975]	0.023 [0.261]	-0.108 [-0.242]	-0.209*** [-3.737]	-0.261 [-0.827]	0.178 [0.763]	-0.713 [-0.806]
<i>Ceo age</i>	0.013 [0.698]	0.001 [0.647]	0.029 [1.411]	0.031 [1.131]	0.023 [1.448]	0.023 [1.176]	0.092* [1.801]	0.086 [1.552]
<i>Ceo age squared</i>	-0.000 [-0.720]	-0.000 [-0.809]	-0.000* [-1.719]	-0.000 [-1.319]	-0.000 [-1.317]	-0.000 [-1.040]	-0.001** [-2.164]	-0.001* [-1.822]
<i>Ceo tenure</i>	0.000 [1.546]	0.000 [1.361]	0.000 [1.606]	0.000 [1.320]	0.000*** [3.393]	0.000*** [2.688]	-0.000 [-0.416]	-0.000 [-0.505]
<i>Ceo tenure squared</i>	-0.000 [-0.169]	0.000 [0.307]	-0.000 [-1.321]	-0.000 [-1.349]	-0.000 [-1.386]	-0.000 [-1.433]	-0.000 [-0.935]	-0.000 [-1.052]
<i>Observations</i>	10,995	10,995	10,995	10,995	10,975	10,975	11,008	11,008
<i>R-squared</i>	0.442	0.200	0.290	-0.312	0.233	-0.313	0.188	-0.075
<i>Year Squared FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes