

Compensation Contract Design to Mitigate Adverse Selection: Inducement Grants and New CEO Announcements[☆]

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Abstract

We examine how firms design compensation contracts to mitigate adverse selection problems when hiring a new CEO. Focusing on the sensitivity of inducement grants to the new CEO announcement return, we predict and find that firms provide inducement grants that are more sensitive to the new CEO announcement return when costs of adverse selection problems are higher and information asymmetry about the new CEO is more severe. Consistent with inducement grant sensitivity mitigating adverse selection problems, we find that the market reacts more favorably to new CEO announcements with inducement grants that are more sensitive to the announcement return.

Keywords: Inducement grants, CEO turnover, adverse selection

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1. Introduction

Selecting a CEO with skills and risk preferences that match the needs of the firm is one of the most important tasks facing a firm's board of directors (Hermalin, 2005; Adams, Hermalin, and Weisbach, 2010). The task is difficult because asymmetric information about a CEO's skills and appetite for risk results in adverse selection problems. The information asymmetry is particularly severe when a firm hires a new external CEO. Despite the additional agency costs, firms often hire CEOs from the outside (Murphy and Zabojnik, 2004). Prior studies document that firms with greater opacity and risk provide inducement grants (also known as sign-on bonuses) to mitigate termination risk (Xu and Yang, 2016) and to compensate CEOs for wealth they forgo at their prior institution (Fee and Hadlock, 2003). We shed new light on the use of inducement grants by examining how firms use inducement equity grants to help mitigate adverse problems when hiring new external CEOs.

Inducement grants are unique in that the contract terms are determined before the new CEO appointment and the details of the contract are disclosed with the new CEO announcement, which often occurs in advance of the new CEO's start date. The grants may contain equities that are granted before, at or after the new CEO announcement date, and include a fixed number of securities or grants with a fixed value. The variation in contract designs influences the sensitivity of the inducement equity to the new CEO announcement, which firms may take advantage of to resolve adverse selection problems when hiring a new external CEO.

We predict that the sensitivity of inducement grants to the announcement return helps resolve adverse selection problems in two ways. First, inducement equity grants help firms select CEOs with skills that meet the needs of the firm because these CEOs will expect the market to respond favorably to news of their appointment and will accept inducement equity grants that are more sensitive to the announcement return. Second, we predict that inducement equity grants help firms resolve adverse selection problems about the CEO's aversion to risk because CEOs who are less averse to risk will accept inducement equity

grants that are more sensitive to the risk of the announcement return.

Firms must weigh the cost of imposing additional risk on the CEO against the benefit of resolving adverse selection problems because exposing inducement grants to the announcement return results in costly risk-sharing (e.g., Hölmstrom, 1982, 1979). Therefore we predict that firms contract with inducement equity grants that are more sensitive to the announcement return when the benefits from hiring a CEO with skills and risk preferences that meet the needs of the firm are greater. Following Parrino (1997), who suggests that firms in more homogeneous industries can more easily determine CEO skills ex-post and face lower costs to replace CEOs, we use the homogeneity of the industry in which the firm operates to measure the benefit from retaining a CEO with skills that meet the needs of the firm. We also hypothesize that firms contract with inducement grants that are more sensitive to the announcement return to select a CEO who is less averse to risk when the potential loss from underinvestment in valuable risky projects is greater. We measure the investment opportunity set (*IOS*) to capture the potential loss from underinvestment in valuable risky projects as in Baber, Janakiraman, and Kang (1996) and Gaver and Gaver (1993).

Finally, we consider how variation in information asymmetry influences the use of inducement grants to resolve adverse selection problems. Because adverse selection problems extend from information asymmetry about CEO skills and risk-taking preferences, we conjecture that resolving them with costly contracting is less important when the firm faces less information asymmetry about the CEO. To investigate this relationship, we measure the changes in stock return volatility around the new CEO announcement following Neuhierl, Scherbina, and Schlusche (2013), who show that the change in stock volatility following news announcements reflects uncertainty about the news. We focus on announcements of newly hired CEOs and use the change in volatility as a proxy for information asymmetry about the new CEO.

We test these predictions using a sample of 510 new CEOs that were hired from outside the firm between 2004 and 2013. We measure the sensitivity of the inducement grant

to the new CEO announcement return, $\$Sensitivity$. We document significant variation in the sensitivity of the inducement grant to the announcement return. $\$Sensitivity$ differs from other measures of incentives provided to new CEOs such as the delta of annual equity grants because $\$Sensitivity$ isolates the sensitivity to the new CEO announcement return, which is insulated from CEO effort. Because it is insulated from effort, $\$Sensitivity$ captures the contract features that focus on resolving adverse selection problems rather than moral hazard problems and is a distinct construct from prior studies that focus on the magnitude of inducement grants (sign-on bonuses) (e.g., Fee and Hadlock, 2003; Xu and Yang, 2016). $\$Sensitivity$ also provides a unique opportunity to investigate the role of an observable ex-ante contract, which is different from annual contracts that are usually contingent on performance, at the discretion of the board ex-post, and not publicly observable at the new CEO announcement.

Consistent with the sensitivity of inducement grants to the announcement return helping resolve adverse selection problems related to CEO skills, we find that firms facing greater difficulties determining CEO skills ex-post and higher costs to replace CEOs contract with inducement equity grants that are more sensitive to the announcement return. Consistent with firms using inducement equity awards to help resolve adverse selection problems related to the CEO's aversion to risk, we find that firms with greater potential losses from underinvestment in valuable risky projects provide inducement equity grants that are more sensitive to the announcement return. Consistent with firms relying more on contracting to resolve adverse selection problems when information asymmetry about the CEO is more severe, we find that the sensitivity of inducement equity awards to the new CEO announcement return is increasing in information asymmetry about the CEO. We also find evidence that firms that hire executive search firms to reduce information asymmetry about CEOs provide inducement grants that are less sensitive to the announcement return.

Finally, we document a positive relation between the stock market reaction to the new CEO announcement and the sensitivity of inducement grants to the CEO announcement

return. This finding is consistent with the market responding favorably to new CEO appointments when the contract separates CEOs with characteristics that meet the needs of the firm, in expectation.

Our study contributes to a growing stream of literature on contract design for new CEOs. Fee and Hadlock (2003), Xu and Yang (2016) and Van Wesep (2010) predict and find evidence that firms provide inducement grants to compensate CEOs for wealth they forgo when they resign from their prior position. Fee and Hadlock (2003) show that 205 out of the 214 external CEO hires from a public firm into a public firm receive some initial cash or equity grants, and that the prior employer's stock performance and forfeited wealth at the prior firm are positively related to the magnitude of the initial pay. Xu and Yang (2016) conclude that firms compensate with signing bonuses to mitigate termination risk. They find that signing bonuses are larger when there are greater concerns about hiring-firm performance and fundamental risk, and they are younger, less experienced and face greater costs from early termination. Similarly, Gillan, Hartzell, and Parrino (2009) find that firms operating in more uncertain business environments use explicit employment agreements to provide financial protection for the uncertain positions.

We contribute to this stream of literature by focusing on how firms use the sensitivity of the equity portion of the initial pay to the announcement return to resolve adverse selection problems and identify CEOs with skills and risk-taking preferences that meet the needs of the firm. This is an important addition to prior literature that primarily focuses on understanding how equity grants are used to resolve moral hazard problems (e.g. Jensen and Murphy, 1990). We also shed additional light on inducement grants by identifying how firms design these contracts to help resolve adverse selection problems (Darrough and Melumad, 1995). Finally, we illustrate how equity grant design influences the sensitivity of the value of the grant to events that follow the contract date, which can apply to settings beyond new CEO announcements such as hiring other executives, mergers and acquisitions and meeting innovation hurdles such as a patent or FDA approval.

2. Hypotheses development

Asymmetric information results in adverse selection problems when hiring a new external CEO (Greenwald, 1986). Theories suggest that one way to mitigate adverse selection problems is to use contingent contracts, where a CEO's wealth relates to the CEO's type (e.g. Stiglitz 1975; Salop and Salop 1976; Picard 1987). Dutta (2008) shows that incentive compensation can resolve adverse selection problems. We argue that a specific feature of incentive compensation, inducement grant sensitivity to the new CEO announcement return, can help firms mitigate adverse selection problems when hiring a new external CEO.

Resolving the adverse selection problem with inducement grants that are exposed to the announcement return imposes risk on the CEO, which results in costly risk-sharing (e.g. Hölmstrom, 1982, 1979). The costly risk-sharing varies with the CEO's perception of and aversion to risk (e.g. Lambert, Larcker, and Verrecchia 1991). In addition, the firm's willingness to bear costly risk-sharing varies with the benefits to the firm from resolving adverse selection problems. We take advantage of variation in benefits of resolving adverse selection problems to predict which firms are more likely to bear the cost of contracting with inducement grants to resolve adverse selection problems.

First, we focus on adverse selection problems about CEO skills. Although CEOs cannot credibly disclose their skill sets, we expect that CEOs with greater skill sets will be more likely to accept contracts with inducement grants that are more sensitive to the announcement return. These CEOs will accept the additional risk of the announcement return because they perceive the risk to be low and expect to benefit from a positive reaction to the announcement of their appointment. This mechanism assumes that the CEO believes the market knows more about the CEO's skills than the board of directors. This assumption is consistent with an efficient market, where stock prices impound public and private information (e.g. Kim and Verrecchia, 1997 and Lambert, Leuz, and Verrecchia, 2007). While the board of directors has private information about the firm, its members may not have private information about the CEO's skills, which the market may price upon the new CEO announcement. The

relationship between a CEO's skills and the board members' perception of the risk of the announcement return creates a separating equilibrium where firms can mitigate adverse selection problems about CEO skills by granting inducement equity awards with greater sensitivity to the announcement return.

Because resolving adverse selection problems requires firms to impose additional risk on the new incoming CEO, firms must weigh the benefits of resolving adverse selection problems against the additional contracting cost of risk-sharing. We expect firms to contract with inducement grants that are more sensitive to the announcement return when the benefits from resolving adverse selection problems related to CEO skills meeting the needs of the firm increase. This leads to the following hypothesis:

H1: Inducement grant sensitivity to the new CEO announcement return is increasing in the firm's benefit from resolving adverse selection problems about CEO skills.

Second, we consider adverse selection problems related to the incoming CEO's aversion to risk. The CEO's aversion to risk influences their discount rate for risky payments. Therefore CEOs with a greater aversion to risk are less likely to accept an initial contract that is more sensitive to the announcement return, all else equal. The relationship between a CEO's aversion to risk and the CEO's preference for the sensitivity of inducement grants to the announcement return creates a separating equilibrium where the sensitivity to the announcement return will separate CEOs that are less averse to risk and more willing to accept the riskier contract.

Firms with more risky investment opportunities require a CEO with a greater appetite for risk to exploit those opportunities.¹ Therefore we predict that firms will contract with inducement grants that are more sensitive to the announcement return as the potential

¹Guay (1999) predicts and finds that firms provide incentives to take risk as a function of the potential loss from underinvestment in risky projects. We contribute to this study by expanding to the selection of CEOs based on their appetite for risk.

loss from underinvestment in valuable risky projects increases. This leads to the following hypothesis:

H2: Inducement grant sensitivity to the new CEO announcement return is increasing in the firm's potential losses from underinvestment in valuable risky projects.

Adverse selection problems extend from information asymmetry that exists when hiring a new external CEO. Because these problems are increasing in information asymmetry, we predict that firms contract to help resolve them to a greater degree when facing greater information asymmetry about the incoming CEO. Therefore we expect firms to contract with inducement grants that are more sensitive to the announcement return when information asymmetry about the CEO is more severe. This leads to our third hypothesis:

H3: Inducement grant sensitivity to the new CEO announcement return is increasing in information asymmetry about an incoming CEO.

3. Sample and empirical methodology

3.1. Sample

To construct a comprehensive sample of new external CEO hirings, we use reports that are required to be filed with the Securities and Exchange Commission (SEC) when companies appoint new executives. The SEC requires newly appointed officers to file an initial statement of beneficial ownership of securities (Form 3) within 10 days of appointment. In addition, since August 23, 2004, companies have been required to file a Form 8-K (Item 5.02) within four business days of a new CEO appointment and to describe in the filing any contract or arrangement associated with the event. We start with the entire set of Form 3s in EDGAR (Electronic Data Gathering, Analysis, and Retrieval system of the SEC) filed after January 1, 2004, and search the titles of reporting persons to identify filings associated with new CEO

appointments.² We then match each new CEO Form 3 to all 8-Ks (with Item 5.02 events) that are filed within 90 days before or after the Form 3 filing date. Finally, we examine each filing to identify which 8-K includes the new CEO announcement and retain all observations for which we are able to match a Form 3 to the corresponding new CEO announcement 8-K. For the remaining sample, we record the new CEO announcement date and extract the CEO compensation components as described below.³

From this sample, we inspect the 8-K for initial contract information. NASDAQ Listing Rule 5635(c) and NYSE rule 303A.08 require that a listed company seek shareholder approval when it establishes or materially amends a stock option, stock purchase plan or other stock-based compensation for officers, directors, employees or consultants. However, the listing rules also indicate that shareholder approval is *not* required for an issuance to a person not previously an employee or director of the company as an inducement to enter into employment with the company. Although shareholder approval is not required, the company must issue a press release that discloses the material terms of inducement awards promptly following the contract signing. To satisfy the listing requirements, firms generally disclose details about inducement grants with the new CEO announcement. We record inducement equity awards from contracts that are included as exhibits to the 8-K filings that contain the CEO announcements. When a contract is not included as an exhibit, we search the body of the 8-K and the press release (if available) for the contract details. Inducement equity grants typically fall into one of the following categories: common stock, restricted stock, stock options, stock appreciation rights, and phantom units. The amount of an equity grant is specified using either a fixed dollar value (and a variable number of securities), or a fixed number of securities.⁴ We retain all new CEO appointments that we confirm were outsiders

²We search the reported title in the Form 3 for terms similar to “Chief Executive” and “CEO” to identify filings linked to new CEOs. We exclude division CEOs.

³If the company issued a press release to announce the new CEO, we use the press release date as the announcement date. Otherwise, we record the 8-K filing date as the announcement date.

⁴The unit price for value-based grants is typically based on the stock price at the time of the grant transaction date.

and with the necessary data to conduct our tests.

We take several additional steps to ensure the accuracy of the measures in our sample. First, we use SDC Platinum M&A data to exclude new CEO appointments associated with mergers. Also, to ensure that our sample includes only external CEOs rather than individuals who were promoted from within the company, we exclude any observations for which the initial holdings reported in the Form 3 are greater than 5% of the number of underlying securities in the inducement equity grants. Our final sample consists of 510 new external CEO appointments where we can observe the initial contract, CEO and hiring firm characteristics, and sufficient data to construct the CEO announcement return and control variables. Note that that the proportion of our sample that includes new external CEOs with a sign-on bonus (either cash or equity) is 96%, which is consistent with the proportion found by Fee and Hadlock (2003).

3.2. Inducement equity-grant sensitivity to announcement return

Although inducement grant contract terms are determined before the announcement, there is a variation in grant dates relative to the new CEO announcement along with a variation in forms of grants. Specifically, some firms contract with inducement equity awards that are granted before the new CEO announcement. Other inducement grants include equity awards of a fixed number of securities that are determined prior to the new CEO announcement but granted after the announcement. Both of these granting patterns expose the value of the equity awards to the announcement return. In contrast, some firms contract with inducement equity awards of a predetermined value that are granted *after* the new CEO announcement, which shields the value of the equity grant from the announcement return. Variation in the inducement grant design and the resultant variation in the sensitivity of the inducement grant to the announcement return provide firms with a unique opportunity to help resolve adverse selection problems when hiring a new external CEO.

We measure the sensitivity of the inducement grant to the new CEO announcement return as the change in value of the inducement grant to a percentage change in the stock price,

similar to equity incentive measures (e.g. delta) used in prior literature (Core and Guay, 2002, 1999; Jensen and Murphy, 1990). Our measure captures the difference in exposure of inducement equity grants to the announcement return. The sensitivity of each grant, $\$Sensitivity_Grant$ is determined by its specific design features including whether the grant date is before or after the CEO announcement, whether it is a stock or option grant, and whether it is contracted on the number of shares or a fixed value. To measure $\$Sensitivity_Grant$ we estimate pre-announcement grant values using pre-announcement stock prices and other valuation inputs and quantify the percentage changes in grant values that result from a 1 percent change in stock price. We group the grants into the following sensitivity categories:

1. *Zero*, no sensitivity;
2. *Return*, a (one percent*grant value) dollar change in grant value;
3. *Delta*, a (one percent*stock price*option delta*number of options) dollar change in grant value.

To illustrate the method used to measure the grant sensitivity, consider a contract that is finalized two days prior to the CEO announcement and includes the following four inducement equity-grant types (the corresponding sensitivity category for each grant type is indicated in parentheses):

1. *Post_S_* \$: Stock with a total value of \$50,000, granted at the end of the day following the new CEO announcement (*Zero*);
2. *Pre_S_* #: 500 shares of stock granted two days prior to the new CEO announcement (*Return*);
3. *Post_O_* #: 1,000 stock options granted at the end of the day following the new CEO announcement (*Return*);
4. *Pre_O_* #: 1,000 stock options granted two days prior to the new CEO announcement (*Delta*).

Assume a stock price that equals \$100 two days prior to the announcement and an announcement return that is one percent (\$1). Also, assume that options are granted with

an exercise price that is equal to the stock price of the underlying security on the grant date and the parameters to determine the stock option values include stock volatility of 0.3, time to expiration of seven years, dividend yield of zero and a risk-free rate of 10%. Also, assume that, other than stock price, the input parameters are constant over the new CEO announcement period.

Because the value of $Post_S_ \$$ is unaffected by changes in stock price around the CEO announcement, the sensitivity of $Post_S_ \$$ is zero. After the announcement, the firm issues 495.05 shares to meet the contracted \$50,000. In contrast, $Pre_S_ \#$ is sensitive to the announcement return. The one percent announcement return increases the value of $Pre_S_ \#$ from \$50,000 to \$50,500, a sensitivity of \$500 (or one percent).

Although $Post_O_ \#$ consists of options with the number of securities underlying the option set prior to the announcement, because it is granted after the announcement, the value of the grant is sensitive to the announcement return. To estimate the sensitivity of $Post_O_ \#$, we first estimate the pre-announcement value of the options using the pre-announcement stock price and option pricing inputs. Although the value of $Post_O_ \#$ is not determined until the strike price is set following the announcement, the value of an equivalent grant with a strike price equal to the pre-announcement stock price is the benchmark for measuring the sensitivity to the announcement return. In this example, the stock price prior to the announcement of \$100, along with the parameter assumptions, results in an estimated value of \$60,866.86 for the 1,000 stock options in $Post_O_ \#$. An announcement return of 1 percent would cause the exercise price of the actual grant to increase by 1 percent, and assuming all other inputs remain constant, the value of $Post_O_ \#$ would be \$61,476.53 after the announcement. Therefore the sensitivity of $Post_O_ \#$ to a one percent announcement return is the difference between the post-announcement value of \$61,476.53 and the pre-announcement value of \$60,866.86, which is \$608.67.

The value of $Pre_O_ \#$, which includes options granted prior to the new CEO announcement is \$60,866.86. The sensitivity of the option value to a one percent change in stock price

is \$883.09, which is one percent * \$100 (the stock price) * 0.88309 (the option delta) * 1,000 (the number of options). In Appendix A, we provide sensitivity calculations for all inducement grant types and a figure that links each grant type to a corresponding announcement return sensitivity category.

These examples demonstrate that $\$Sensitivity_Grant$ varies substantially and is a distinct construct that captures the degree to which the inducement grant is exposed to the announcement return beyond that captured by the magnitude of the grants studied in prior work. As an example of the distinct qualities of $\$Sensitivity_Grant$, note that an equity grant that is contracted to occur in the future, e.g. $Post_O_ \#$, is sensitive to the return on the underlying security after the contract date but before the grant occurs. This has implications for research that considers the sensitivity of executive equity grants to other firm events, in particular when executive equity granting patterns are contracted in advance. $\$Sensitivity_Grant$ is also different from other measures of incentives around the new CEO appointment, such as the delta of the stock and option grants or the annual contract, because $\$Sensitivity_Grant$ captures strictly the sensitivity to the new CEO announcement return, which is insulated from CEO effort. Therefore while there may be economic reasons for granting equity to new CEOs to help resolve moral hazard problems, focusing on $\$Sensitivity_Grant$ isolates the contract feature that is sensitive to the new CEO announcement return that is not affected by CEO effort.

3.3. Research design

3.3.1. Inducement equity grants and adverse selection

Our hypotheses predict that the sensitivity of inducement grants to the new CEO announcement return is positively related to the firm's benefit from identifying a CEO with skills that meet the needs of the firm, potential losses from underinvestment in valuable risky projects, and information asymmetry. Because many firms provide inducement grant portfolios that consist of multiple equity grants, we aggregate the sensitivity of the inducement equity grants, $\$Sensitivity_Grant$, for a new CEO to calculate the total sensitivity to the

announcement return, $\$Sensitivity$.

To measure the benefit to the firm from retaining a CEO with skills that meet its needs, we measure the homogeneity of the industry in which the firm operates. Following Parrino (1997), we construct a proxy for industry homogeneity, *Industry Homogeneity*, as the average partial correlation of stock returns within an industry over the five years that precede the new CEO announcement. Parrino (1997) suggests that firms in more homogeneous industries can more easily determine CEO skills ex-post and face lower costs to replace CEOs. Because the benefit from CEO skills meeting the needs of the firm is lower for firms operating in more homogeneous industries, H1 predicts that firms in these industries provide inducement grants that are less sensitive to the announcement return.

To test our second hypothesis, we follow Baber et al. (1996) and Gaver and Gaver (1993) and measure the investment opportunity set (*IOS*) to capture the potential loss from underinvestment in valuable risky projects. *IOS* is a factor score that represents the investment opportunity set based on investment intensity, market-to-book value of assets, geometric mean annual growth rate of the market value of assets, and R&D expenditures scaled by assets. As evidence that this measure captures the investment opportunity set, Baber et al. (1996) show that *IOS* is related *ex-post* to the firm's investments. To the extent that the investment opportunity set captures the potential loss from underinvestment in valuable risky projects, H2 predicts that firms with greater *IOS* provide inducement grants that are more sensitive to the announcement return to select CEOs that are less averse to risk.

To test our third hypothesis, we must measure information asymmetry about the CEO. We define *Information Asymmetry* as the change in stock return volatility in response to the new CEO announcement, measured as the change in stock return volatility between the event window (event days 0 and 1) and pre-event window (event day -1), where day 0 is the new CEO announcement date similar to that of Neuhierl et al. (2013). Stock prices are sampled at five-minute intervals using intra-day data from Trading and Quotes (TAQ) database, using

the mid-points of bid-ask spreads.⁵ Neuhierl et al. (2013) show that this measure captures the valuation uncertainty content of news, which we extend to the market’s uncertainty about the CEO. To the extent that the uncertainty captures information asymmetry about the CEO, H3 predicts that firms facing greater *Information Asymmetry* provide inducement grants that are more sensitive to the announcement return.

We use these proxies to test our hypotheses by estimating the following equation:

$$\begin{aligned} \$Sensitivity &= \beta_0 + \beta_1 Industry\ Homogeneity + \beta_2 IOS \\ &+ \beta_3 Information\ Asymmetry + \beta_4 Size + \beta_5 Leverage + \varepsilon \end{aligned} \tag{1}$$

Equation (1) includes the logarithm of hiring firm total assets, *Size*, to control for the effect of firm size on total compensation levels (Murphy, 1985). We also include the book value of debt divided by market value of equity, *Leverage*, because prior research finds that CEOs receive greater compensation and higher pay-for-performance sensitivity during the first year of their tenure when the hiring firm is more financially distressed (Chang, Hayes, and Hillegeist, 2015).

Our first hypothesis predicts that firms facing higher costs for not resolving adverse selection problems related to CEO skills provide inducement grants that are more sensitive to the announcement return. Therefore to the extent that the benefit from identifying CEO skills is lower for firms operating in more homogeneous industries, H1 predicts that $\beta_1 < 0$. Our second hypothesis predicts that inducement grant sensitivity to the announcement return is increasing in the potential loss from underinvestment in valuable risky projects, which predicts that $\beta_2 > 0$. H3 predicts that the sensitivity of the inducement grant to the announcement return is increasing in information asymmetry about the CEO, $\beta_3 > 0$.

⁵We require at least 50 quotes per day and use linear interpolation between the two most recent quotes when the price for a five-minute interval is not available. We also require at least 60 data points for every event day to calculate the intra-day return volatility and the stock to have quotes for at least half of the trading day.

4. Data and results

4.1. Sample distribution and summary statistics

Our sample includes 510 new external CEO announcements over the period 2004-2013. Table 1 presents summary statistics of $\$Sensitivity_Grant$ and sample distribution by inducement grant type based on the descriptions in Section 4.2 and Figure 1. To measure $\$Sensitivity_Grant$, we use the closing stock price on the grant date, the annualized daily stock return volatility over the 12 months prior to the new CEO announcement, a dividend yield of zero, a time-to-expiration of seven years, and the seven-year US-Treasury bill rate on the grant date.

Inducement equity grants include options (including stock options and stock appreciation rights) that are granted prior to the announcement with a contracted number of shares ($Pre_O_ \#$) in 102 instances. The mean (median) sensitivity of this grant type is \$44,600 (\$20,200). Inducement grants include stock (common stock, restricted stock and phantom units) with a contracted number of shares ($Pre_S_ \#$) in 47 instances, with a mean (median) sensitivity of \$17,960 (\$8,170). In two cases, firms grant options with a contracted value prior to the new CEO announcement ($Pre_O_ \$$) with an average sensitivity of \$80,160. In seven cases, firms grant stock with a contracted value prior to the CEO announcement ($Pre_S_ \$$) with a mean (median) sensitivity of \$20,720 (\$17,500).

Although pre-announcement grants make up the greatest average sensitivity to the announcement return, post-announcement grants with a contracted number of securities constitute the greatest frequency of inducement grants. This set includes grants that are contracted prior to the new CEO announcement but granted after the announcement and consists of 298 option grants ($Post_O_ \#$) and 184 stock grants ($Post_S_ \#$). The mean (median) sensitivity of these grants are \$28,220 (\$14,730) and \$25,760 (\$13,810), respectively. The sensitivity of these grants, in addition to their frequency, indicate that these categories of grants constitute a significant proportion of $\$Sensitivity$.

Finally, 67 grants include equities that are insulated from the announcement return.

Specifically, firms grant inducement equity awards with contract values that are granted after the CEO announcement. This set of grants includes 24 stock option grants (*Post_O_* \$), and 43 stock grants (*Post_S_* \$) that are not sensitive to the CEO announcement return.

Together, the summary statistics provided in Table 1 illustrate the variation in inducement equity-grant patterns and the influence of that variation on the sensitivity of the equity grant to the announcement return. Because many firms provide inducement grant portfolios that consist of multiple equity grants, we aggregate the portfolio of inducement equity grants for a new CEO to calculate the total sensitivity to the announcement return, *\$Sensitivity*.

Table 2 presents summary statistics of initial CEO contracts, the predicted economic determinants, and other hiring firm and new CEO characteristics. Mean (median) sensitivity of the inducement equity-grant portfolio, *\$Sensitivity*, is \$34,580 (\$17,710) for a 1 percent announcement return. New CEO appointments include inducement equity grants 95 percent of the time. The mean (median) value of inducement grants is \$3,312,630 (\$1,869,760), while mean (median) value of sign-on-bonus is \$159,160 (\$0).⁶

Turning to our hypothesized determinants of the exposure to the new CEO announcement return, the mean (median) *Industry Homogeneity* is 0.15 (0.11), the mean (median) *IOS* is 0.03 (-0.22), and *Information Asymmetry* is 0.11 (0.07). These summary statistics are consistent with the broad variation in firms represented in our sample. Table 2 also provides summary statistics of firm characteristics. The mean (median) book value of assets is \$1,496 (294) million dollars, while the mean (median) leverage is 0.74 (0.11). The mean (median) three-day abnormal new CEO announcement return is three percent (one percent). The positive average new CEO announcement return is consistent with prior studies that find the stock market usually reacts positively to external CEO replacements following CEO turnovers (e.g. Huson, Malatesta, and Parrino, 2004). The average announcement return of

⁶For stock awards of a fixed number of securities, we estimate the dollar value of the grant by multiplying the grant date stock price by the number of securities. For stock option awards of a fixed number of underlying securities, we estimate the option grant values using the same parameter assumptions used to estimate *\$Sensitivity*.

3% yields a change in wealth of approximately \$100,830 for the average contract sensitivity. This is a three-day return that is 67% of the average sign-on bonus. At the same time, the standard deviation of the new CEO announcement return is 11%, which suggests that new CEOs with equity grants that are sensitive to the new CEO announcement return bear substantial risk around the announcement of their hiring.

Consistent with findings from prior research on CEO turnover (e.g. Coughlan and Schmidt, 1985; Warner, Watts, and Wruck, 1988; Weisbach, 1988), hiring firms have generally performed poorly prior to the CEO transition, with a mean *ROA* of -0.07 and *CumRet* of -0.09. Also, consistent with the market uncertainty about firm performance preceding the new CEO appointment, the return volatility over the 12 months prior to the new CEO announcement return is 0.04 (0.03).⁷

Panel B reports the industry distribution of the hiring firms for Fama-French 12 industries. Although all 12 industries are represented in the sample, business equipment and healthcare constitute the greatest proportion of the sample.⁸

4.2. Results of empirical tests

4.2.1. Inducement grants and adverse selection

Table 3 presents test results of the hypotheses as described in Equation (1). The results reported in Column (1) focus on our first hypothesis that relates inducement equity grants with adverse selection problems about CEO skills. The explanatory variable of interest is

⁷We compare our sample to firms in ExecuComp over our sample period in untabulated results. We find that our sample-firms operate in less homogeneous industries with greater investment opportunity sets than ExecuComp firms. Also, as expected, our sample firms are significantly smaller with greater leverage than ExecuComp firms. Focusing on performance, as expected, our sample firms perform significantly worse than firms in the ExecuComp sample on both *ROA* and *CumRet*. At the same time, the return volatility is higher for our sample firms. Finally, the grant date fair value of annual equity grants and the delta of the annual equity grants are significantly smaller in our sample than firms in ExecuComp, where annual equity grants include those granted after the inducement grants but before the end of the first year of employment. t-tests of the differences are all significant at p -value < 0.01 . We also find that our sample spans a broader set of smaller firms than that of Fee and Hadlock (2003), who focus on the largest 1,000 firms in their sample period.

⁸In untabulated results, we find that each year in the sample period is well represented, with a slightly larger number of observations occurring during the years 2005-2008.

Industry Homogeneity, our proxy for firms that operate in more homogenous industries. Consistent with H1, we find firms operating in more homogeneous industries grant inducement equity awards that are less sensitive to the new CEO announcement return as evidenced by $\beta_1 < 0$ (p -value < 0.01). This supports our prediction that firms that can more easily determine CEO skills *ex-post* and face lower costs to replace CEOs rely less on inducement grants to resolve adverse selection problems regarding CEO skills.

The results reported in Column (2) focus on the use of inducement grants to mitigate adverse selection problems related to the CEO's appetite for risk. We find that the coefficient on *IOS* is positive and significant, $\beta_2 > 0$ (p -value < 0.01), which provides evidence that inducement equity-grant sensitivity to the CEO announcement return relates positively to the firm's potential loss from underinvestment in valuable risky projects. This finding supports the prediction in H2 that firms facing greater potential losses from underinvestment in valuable risky projects contract with inducement grants that are more sensitive to the announcement return to resolve adverse selection problems related to the CEO's aversion to risk. The results reported in Column (3) focus on information asymmetry. We find a positive and significant coefficient on *Information Asymmetry*, $\beta_3 > 0$ (p -value < 0.01), which supports the prediction in H3 that the sensitivity inducement equity grants to the announcement return are increasing in information asymmetry.

Table 3 Column (4) reports the results of the complete model. We continue to find support for H1 that firms operating in more homogeneous industries grant inducement equity awards that are less sensitive to the CEO announcement return as evidenced by $\beta_1 < 0$ (p -value < 0.01). We also continue to find support for H2 that inducement equity-grant sensitivity to the CEO announcement return relates positively to the firm's potential loss from underinvestment in valuable risky projects, $\beta_2 > 0$ (p -value < 0.01). Finally, we find that the sensitivity of inducement equity awards to the CEO announcement return is increasing in information asymmetry $\beta_3 > 0$ (p -value < 0.01), which supports the prediction in H3 that firms facing less information asymmetry about the CEO rely less on inducement

grants to resolve adverse selection problems.⁹ In all models, the coefficient on *Size* is positive and significant, while the coefficient on *Leverage* is not significant, except in Column (3).

We test the robustness of our results to an alternative measure of information asymmetry, the change in idiosyncratic volatility, measured as the logarithm of (daily idiosyncratic return volatility in event window day 0 to 20)/(daily idiosyncratic return volatility in event window day -21 to day -1), where daily idiosyncratic return is the residual return from the Fama-French three-factor model following Ang, Hodrick, Xing, and Zhang (2006).¹⁰ This alternative proxy is measured over a longer horizon than *Information Asymmetry* and is less likely to be affected by the leakage of information about the new CEO prior to the announcement. Pan, Wang, and Weisbach (2015) find evidence that this measure of stock return volatility around CEO turnovers is a proxy for the market’s uncertainty about the CEO’s skill. In untabulated results, we find qualitatively similar results when we consider this alternative measure of information asymmetry.

Finally, we consider interactions of our tests of H1 and H2 with information asymmetry. Specifically, we interact *Information Asymmetry* with *Industry Homogeneity* and *IOS*. In untabulated results, we continue to find support for H1 and H2 as evidenced by a negative and significant coefficient on *Industry Homogeneity* and a positive and significant coefficient on *IOS*. We also continue to find support for H3 based on the positive and significant coefficient on the *Information Asymmetry* main effect. At the same time, we find no evidence that the relation between *\$Sensitivity* and *Industry Homogeneity* is more negative when information asymmetry is greater. We find some evidence of an increase in the relation between *\$Sensitivity* and *IOS* when information asymmetry is greater, as evidenced by a positive and significant coefficient the interaction of *Information Asymmetry* and *IOS* (p -value < 0.10).

⁹In unreported tests, we also consider market-to-book (*MTB*) and research and development expense (*R&D*) as metrics of the potential loss from underinvestment in valuable risky projects. The results are qualitatively similar to those reported in Table 3. Specifically, we find positive and significant coefficients on *R&D* and *MTB*.

¹⁰We also use market adjusted return and total raw return in untabulated results to measure daily return and the results are similar.

The results presented in Table 3 support our hypotheses that firms contract with inducement equity awards that are more sensitive to the announcement return to help resolve adverse selection problems related to whether the CEO’s skills and risk-taking preferences meet the needs of the firm when the benefits of doing so are greater. At the same time, firms contract with inducement grants that are more sensitive to the new CEO announcement return when facing greater information asymmetry about the CEO.

4.2.2. Market reaction tests

The hypotheses rely on inducement grant sensitivity to the announcement return mitigating adverse selection problems by creating a separating equilibrium where CEOs with skills and risk-taking preferences that meet the needs of the firm select firms in a way that benefits firm value. This is similar to the prediction of Terviö (2008), where matching occurs in equilibrium such that capable executives match with productive firms. Therefore we expect the market to react more positively to a new CEO announcement when the firm contracts with inducement equity grants that are more sensitive to the announcement return because resolving adverse selection problems increases firm value, in expectation.

We test this conjecture by relating the CEO announcement return to $\$Sensitivity$. We measure the cumulative abnormal announcement return, $CAR3$, for the three-day window (-1, 1) surrounding the announcement date. To calculate expected returns we estimate the market model using daily stock returns from the (-160, -61) trading-day window.¹¹

We estimate the following model:

$$CAR3 = \gamma_0 + \gamma_1 \$Sensitivity + \gamma_2 Size + \gamma_3 CumRet + \gamma_4 ROA + \gamma_5 RetVol + \varepsilon \quad (2)$$

We also include the following variables to control for the effect of hiring firm size and prior performance on the new CEO announcement stock returns (Bonnier and Bruner (1989)): $Size$, defined as the logarithm of the book value of the hiring firm’s total assets; ROA ,

¹¹In robustness tests, we confirm that our results are not sensitive to the choice of the CEO announcement return measure. We find consistent results using the market adjusted return and the cumulative raw return.

defined as operating income divided by total assets; *CumRet*, defined as the cumulative monthly stock-return over the 12 months prior to the new CEO announcement, and *RetVol*, defined as the annualized daily stock-return volatility over the 12 months prior to the new CEO announcement.¹²

To the extent that inducement grants resolve adverse selection problems in a way that increases expected firm value, we predict a positive relation between the market reaction to the new CEO announcement and the sensitivity of the inducement grant to the announcement return ($\gamma_1 > 0$). Note that this test does not require the market to price the information contained in the inducement equity awards. Rather, this test only requires that the market reacts to the set of information revealed in the announcement in a manner that is consistent with inducement equity award characteristics resolving adverse selection problems. That is, we test whether the market reaction is consistent with a contracting scheme that separates CEOs in a way that is beneficial to shareholders and that the benefit is increasing in the importance for the firm to select CEOs with skills and risk-taking preferences that match the needs of the firm.

Table 4 presents results from the estimation of the model in Equation (2) that relates the new CEO announcement market reaction to inducement grant sensitivity. We find that the abnormal return around the new CEO announcement is positively related to the *\$Sensitivity* (p -value < 0.10). These results suggest that the market reaction to the new CEO appointment is positively related to extent that the initial contract helps mitigate adverse selection problems.

One concern is that the return we measure is due to market participants reacting to inducement grant sensitivity, not the resolution of adverse selection problems. Theoretically, if the market reacts positively to higher *\$Sensitivity*, assuming it is a signal of a good match between the new CEO's skills and the firm's needs, absent any additional information,

¹²Bonnier and Bruner (1989) show that stock returns to the announcement of new external CEOs are negatively associated with size and performance prior to the CEO turnover.

then all CEOs would accept contracts with higher $\$Sensitivity$ to take advantage of the positive market reaction. As a result, there would be no separating equilibrium and no information content in $\$Sensitivity$ regarding the match. We investigate the possibility of this off-equilibrium result. If the CEO were to “fool” the market into responding favorably to the appointment by accepting inducement grants that are more sensitive to the new CEO announcement, we expect the “overreaction” to the announcement to reverse as the truth about the CEO is revealed (Pan et al., 2015). Therefore the CEO would take advantage of the inflated price and sell his or her securities soon after the market responds favorably to the announcement but before the true type is revealed. To test this conjecture, we collected the Form 4 insider-trading filings from the SEC for the CEOs in the six-months following the appointment as CEO. We found no evidence from these filings that CEOs liquidate shares during this period. Regardless of whether the lack of CEO liquidations is due to selling frictions (such as insider selling restrictions) or an increase in fundamental value, we conclude from this lack of evidence that CEOs are not signaling the stock price higher and benefiting from a short-run stock price increase by selling their equity holdings in the firm.

The results presented in Table 4 provide further evidence to support our hypotheses that inducement equity awards help firms resolve adverse selection problems. The evidence that the market reaction is positively related to the contract sensitivity, supports our conjecture that the market reacts favorably when the contracting mechanism helps firms resolve adverse selection problems.

4.2.3. *Search firm*

In some instances, the board of directors will retain an executive search firm to aid in the selection of a new CEO. Executive search firms find suitable candidates and provide additional information about them. This search process reduces information asymmetry about the CEO and therefore reduces the adverse selection problem.

To construct *Search Firm*, we first collect hiring firm proxy statements for the year prior to, and year of, the new CEO start. We then searched the proxy statements for language

indicating the firm retained a search firm to identify key executives in the year.¹³ If one of the proxy statements indicated the use of a search firm, we set *Search Firm* to one and zero otherwise. We find that 24% of our sample firms retained an executive search firm.

To the extent that executive search firms reduce information asymmetry about the incoming CEO, we predict that the sensitivity of the inducement grant to the announcement return is lower when the firm retains an executive search firm. We recognize that the firm chooses whether to retain an executive search firm. However, the firm chooses whether to retain the executive search firm *before* contracting with the new CEO. Therefore the design of the new CEO’s contract and the extent to which the firm uses inducement grants to resolve adverse selection problems is conditional on the information environment after choosing to retain an executive search firm.

To test the role of the executive search firm on the sensitivity of the inducement grant, we estimate the following empirical model:

$$\begin{aligned} \$Sensitivity &= \beta_0 + \beta_1 Industry\ Homogeneity + \beta_2 IOS + \beta_3 Information\ Asymmetry \\ &+ \beta_4 Search\ Firm + \beta_5 Size + \beta_6 Leverage + \varepsilon \end{aligned} \tag{3}$$

Table 5 reports the results from estimating Equation (3). Consistent with our conjecture, we find a negative and significant coefficient on *Search Firm* (p -value < 0.01). We also continue to find evidence in support of our primary hypotheses even after including *Search Firm*.

The results reported in Table 5 demonstrate that firms rely less on the sensitivity of inducement grants to the new CEO announcement return to help resolve adverse selection

¹³We searched for the terms “search” and “firm” within 50 characters of one another, which nearly always matched “search firm.” For each resulting match, we then searched the surrounding 200 characters for verbs used in the past tense that were commonly used to describe either the retention of a search firm or the hiring recommendations of a search firm (e.g. engaged, retained, utilized, hired, recommended, proposed, identified). Occasionally, the resulting matches identified the use of a search firm to identify directors. We assume that, if a search firm is used to identify a director, then it is also used to identify a new CEO and therefore do not distinguish director from CEO matches.

problems when the firm takes other actions to reduce information asymmetry, such as hiring an executive search firm. At the same time, the use of an executive search firm does not reduce information asymmetry to a degree that eliminates the relationship between $\$Sensitivity$ and our hypothesized economic determinants of the need to resolve adverse selection problems.

4.2.4. *Other compensation, risk and economic significance*

We consider the possibility that hiring firms reduce the risk associated with the announcement return sensitivity by entering into an implicit contract where the firm compensates the incoming CEO for a negative CEO announcement reaction. To this end, we investigate whether the firm grants additional equity or reprices stock options within one-month of the new CEO announcement return. To test this, we collect Form 4 filings for the CEOs and find no unscheduled grants or repricing during that period. The lack of additional grants or repricing of stock options suggests that the firm is not compensating the CEO for any loss of value that results from a negative new CEO announcement return.

We also consider the possibility that annual equity grants designed to resolve moral hazard problems may also help to reduce adverse selection problem. To understand how these influence $\$Sensitivity$, we include additional explanatory variables for $\$Sensitivity$. We measure the grant date fair value and the sensitivity of the equity granted in the CEO's first year in office to a percentage change in stock price (delta). In many cases, the Summary Compensation and Plan-Based Awards tables of the proxy statement combine the inducement equity grants with the other annual equity grants. To isolate and measure annual equity grants that are *not* part of the inducement equity grant, we collect annual equity grants from Form 4 filings for the newly hired CEO. We focus on Form 4 filings for the first 12 months following the new CEO announcement. We consider 12 months following the announcement for all CEOs in our sample to reduce the influence of variation in employment time at the first fiscal

year-end.¹⁴ We test the influence of the annual grants as additional explanatory variables for $\$Sensitivity$ in Table 6. We find positive and significant relations between $\$Sensitivity$ and both the grant date fair value and delta of the annual equity grants. At the same time, we continue to find evidence in support of our hypotheses after controlling for other annual equity compensation measures; a negative and significant coefficient on *Industry Homogeneity* and positive and significant coefficients on *IOS* and *Information Asymmetry*. We conclude from these results that annual equity grants are positively related with $\$Sensitivity$ but not in a way that influences the results of our hypotheses tests, which supports our hypothesis that the sensitivity of the inducement equity grant to the new CEO announcement return is insulated from CEO effort and focuses on resolving the adverse selection problem.

To provide evidence on the economic significance of inducement grant sensitivity to announcement returns, in untabulated results, we compare the absolute value of the change in value of the inducement grants due to the CEO announcement return to two measures of wealth changes associated with alternative mechanisms. The first is the absolute change in value of other annual equity grants over the year following the new CEO announcement. The second is absolute change in value of inducement grants over the year following the new CEO announcement. The average ratio of $\$Induce\ Grants/(\$Induce\ Grants+\$Annual\ Grants)$ is 0.72, where $\$Annual\ Grants$ is the grant date fair values of the equity granted to the CEO in the 12 months following the new CEO announcement. The average change in value associated with inducement grants over the announcement period is \$68,050, compared to the average change in the value of annual equity grants over the year following the new CEO announcement of -\$31,950. The absolute change in value of the inducement grants over the announcement period divided by the sum of the absolute change in value of the inducement grants over the announcement period and the absolute change in value of annual grants over the year following the new CEO announcement is 0.51. Furthermore, the absolute change

¹⁴We find in untabulated results that the grant date fair value and delta of equity granted in the first year are \$1,651,980 and \$21,330, which are significantly less than the inducement grant magnitude and sensitivity of \$3,312,630 and \$34,580.

in value of the inducement grants over the announcement period divided by the sum of the absolute changes in value of the inducement grants during the announcement period and the year following the new CEO announcement is 0.17. These results suggest that the change in value of inducement grants over the new CEO announcement period is an economically significant portion of the total change in value of all equity granted over the year following the new CEO announcement and the total change in the value of the inducement equity grants over the year following the new CEO announcement.

Together, we find no evidence that firms compensate CEOs for the risk in inducement grant sensitivity with other forms of pay. We also acknowledge that other forms of compensation may complement the sensitivity of inducement grants to the announcement return to help resolve adverse selection problems but find that the sensitivity of inducement equity grants to the announcement return are large in magnitude and wealth changes compared with other annual equity granted to the CEO.

5. Conclusion

We investigate whether and how firms contract with new CEOs to help resolve adverse selection problems. We focus on inducement grants, unique contract elements that are associated with hiring new external CEOs. The sensitivity of inducement equity-grant values to new CEO announcement return help firms resolve adverse selection problems. We predict and find that firms facing a higher cost for not resolving these problems about CEO skills and greater potential losses from underinvestment in risky projects contract with inducement grants that are more sensitive to the announcement return. We also predict and find that firms facing greater information asymmetry contract with inducement grants that are more sensitive to the announcement return. In support of our conjecture that inducement grant sensitivity helps resolve adverse selection problems, we find that the market reacts more favorably to new CEO announcements that include inducement grants with greater sensitivities to the announcement return.

Our results are consistent with firms using inducement grants to mitigate adverse selection problems when hiring new external CEOs. Our findings contribute to a growing literature on the use of compensation schemes to resolve adverse selection problems (e.g. Cadman, Carrizosa, and Faurel (2014)) and are an important addition to the long stream of literature that focuses on how contracts resolve moral hazard problems. Finally, we construct a measure of the sensitivity of the value of an equity grant to an event that follows the contract date, which applies to settings beyond new CEO announcements.

Appendix A

This appendix describes inducement equity grant types, sensitivity calculations, and presents a figure portraying how grants with specific features correspond to the various announcement return sensitivity categories.

The grant types (*Categories*) are as follows:

1. *Pre_S_#*: 500 shares of stock granted two days prior to the CEO announcement (*Return*);
2. *Pre_S_*\$: Stock with a total value of \$50,000, granted two days prior to the CEO announcement (*Return*);
3. *Pre_O_#*: 1,000 stock options granted two days prior to the CEO announcement (*Delta*);
4. *Pre_O_*\$: Stock options with a total value of \$60,866.86 granted two days prior to the CEO announcement (*Delta*);
5. *Post_S_#*: 500 shares of stock granted at the end of the day following the CEO announcement (*Return*);
6. *Post_S_*\$: Stock with a total value of \$50,000, granted at the end of the day following the CEO announcement (*Zero*);
7. *Post_O_#*: 1,000 stock options granted at the end of the day following the CEO announcement (*Return*);
8. *Post_O_*\$: Stock options with a total value of \$50,000, granted at the end of the day following the CEO announcement (*Zero*).

To calculate the sensitivity to a one percent announcement return, *\$Sensitivity_Grant*, assume that the stock price two days prior to the announcement is \$100 and the announcement return is one percent (\$1). Also assume that options are granted at the money and the parameters to determine the stock option values include stock volatility of 0.3, time to expiration of seven years, and a risk-free rate of 10%. Also, assume the input parameters

are constant across the new CEO announcement. With these assumptions, the sensitivity of each grant type to a one percent announcement return is as follows.

The one percent announcement return increases the value of $Pre_S_ \#$ from \$50,000 to \$50,500, resulting in a sensitivity of \$500.

$Pre_S_ \$$ has the same sensitivity as $Pre_S_ \#$, because the contracted value of shares equates to 1,000 shares. A one percent announcement return increases the value of $Pre_S_ \$$ from \$50,000 to \$50,500, resulting in a sensitivity of \$500.

The value of $Pre_O_ \#$, which includes options granted prior to the new CEO announcement is \$60,866.86. The sensitivity of the option value to a one percent change in stock price is one percent * \$100 (the stock price) * .88309 (the option delta) * 1,000 (the number of options), which is \$883.09.

$Pre_O_ \$$ includes options granted prior to the new CEO announcement. Based on the assumptions in this example, \$60,866.86 granted two days prior to the CEO announcement is equivalent to 1,000 options. The sensitivity of the option value to a one percent change in stock price is one percent * \$100 (the stock price) * 0.88309 (the option delta) * 1,000 (the number of options), which is \$883.09. Note that this is the same sensitivity as $Pre_O_ \#$.

$Post_S_ \#$ is sensitive to the announcement return because the number of shares are contracted prior to the announcement. The value of the 500 contracted shares increases by one percent, for a sensitivity of \$500. This example illustrates that despite granting the shares after the announcement, when the number of shares is contracted before the announcement the value of the shares is sensitive to the announcement return.

$Post_S_ \$$ is unaffected by the CEO announcement return, the sensitivity of $Post_S_ \$$ is zero. After the announcement, the firm issues 495.05 shares to meet the contracted \$50,000.

To estimate the sensitivity of $Post_O_ \#$, we first estimate the pre-announcement value of the options using the pre-announcement stock price and option pricing inputs. In this example, the Black-Scholes value is \$60,866.86 for the 1,000 stock options if granted prior to the new CEO announcement. An announcement return of 1 percent would cause the exercise

price of the actual grant to increase by 1 percent, and assuming all other inputs remain constant, the Black-Scholes value of the 1,000 options granted *after* the announcement is \$61,476.53. Therefore the sensitivity of $Post_O_{\#}$ to a one percent announcement return is the difference between the post-announcement value of \$61,476.53 and the pre-announcement value of \$60,866.86, which is \$608.67.

$Post_O_{\$}$ is unaffected by changes in stock price around the CEO announcement, therefore the sensitivity of $Post_O_{\$}$ is zero. After the announcement, the firm issues stock options to meet the contracted value of \$50,000.

Figure 1: Inducement Equity-Grant Design and Sensitivity to the Announcement Return Categories

		Contracted # Shares		Contracted Value	
Grant Timing	Instrument	Type	Category	Type	Category
Pre-announcement	Option	Pre_O_#	Delta	Pre_O_\$	Delta
	Stock	Pre_S_#	Return	Pre_S_\$	Return
Post-announcement	Option	Post_O_#	Return	Post_O_\$	Zero
	Stock	Post_S_#	Return	Post_S_\$	Zero

This figure presents inducement equity-grant design types, where *Type* is based on the equity-grant timing, instrument, and whether the grant is based on contracted # of shares or value. *Grant Timing* identifies whether the grant is contracted to occur before the new CEO announcement (Pre-Announcement) or after the new CEO announcement (Post-Announcement). *Instrument* identifies whether the equity grant is in the form of an option, which includes stock option grants and stock appreciation rights or stock, which includes common stock, restricted stock and phantom units. *Category* identifies the inducement grant sensitivity category where *Zero* is not sensitive, *Return* is one percent*grant value, and *Delta* is one percent*stock price*option delta*number of options.

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Table 1: Inducement Equity-Grant Summary Statistics

Grant Timing	Instrument	Contracted # Shares				Contracted Value			
		Type	N	Mean	Median	Type	N	Mean	Median
Pre-Announcement	Option	Pre_O_#	102	44.60	20.20	Pre_O_\$	2	80.16	80.16
	Stock	Pre_S_#	47	17.96	8.17	Pre_S_\$	8	20.72	17.5
Post-Announcement	Option	Post_O_#	298	28.22	14.73	Post_O_\$	24	0	0
	Stock	Post_S_#	184	25.76	13.81	Post_S_\$	43	0	0

This table presents summary statistics of inducement equity-grant sensitivity by equity grant type, where *Type* is based on the equity grant timing, instrument, and whether the grant is based on contracted # of shares or value. *Grant Timing* identifies whether the grant is contracted to occur before the new CEO announcement (Pre-Announcement) or after the new CEO announcement (Post-Announcement). *Instrument* identifies whether the equity grant is in the form of an option, which includes stock option grants and stock appreciation rights, or stock, which includes common stock, restricted stock and phantom units. *\$Sensitivity_Grant* is the sensitivity of the value of the inducement equity-grant to a 1 percent increase in stock price, reported in thousands of dollars. A detailed description of the measurement of *\$Sensitivity_Grant* is provided in section 4.2 and the appendix. N represents the number of grants of the grant type in our sample, noting that many contracts include multiple types.

Table 2: Firm and New CEO Contract Summary Statistics

Panel A: Firm Characteristics (N=510)

	N	Mean	Median	S.D.	Q1	Q3
<i>\$Sensitivity</i>	510	34.58	17.71	58.44	5.22	38.97
<i>Induce Grants</i>	510	3312.63	1869.76	4916.47	667.94	3838.52
<i>Sign-on Bonus</i>	510	159.16	0.00	627.25	0.00	35.00
<i>Industry Homogeneity</i>	510	0.15	0.11	0.10	0.08	0.20
<i>IOS</i>	510	0.03	-0.22	0.75	-0.40	0.15
<i>Information Asymmetry</i>	510	0.11	0.07	0.33	-0.07	0.26
<i>Size</i>	510	1495.59	293.99	3475.67	87.54	1239.80
<i>Leverage</i>	510	0.74	0.11	2.48	0.00	0.48
<i>CAR3</i>	510	0.03	0.01	0.11	-0.02	0.05
<i>CumRet</i>	510	-0.09	-0.16	0.58	-0.42	0.14
<i>ROA</i>	510	-0.07	0.01	0.31	-0.13	0.07
<i>RetVol</i>	510	0.04	0.03	0.02	0.02	0.04

Panel B: Industry Distribution

	Frequency	Percent
Consumer Nondurables	14	2.75
Consumer Durables	9	1.76
Manufacturing	44	8.63
Energy	9	1.76
Chemicals	10	1.96
Business Equipment	137	26.86
Telecom	17	3.33
Utilities	12	2.35
Wholesale, Retail and Services	67	13.14
Healthcare	110	21.57
Finance	42	8.24
Other	39	7.65
Total	510	100.00

This table presents summary statistics of firm and new CEO contract characteristics in Panel A and industry distribution by Fama-French 12 industries in Panel B. The sample includes 510 new CEO announcements over the period 2004-2013, where new CEOs are externally hired, initial contracts are available through SEC filings, and the turnovers are not related to mergers and acquisitions. *\$Sensitivity* is the sensitivity of the value of the inducement equity award portfolio to a 1 percent increase in stock price, reported in thousands of dollars. *Induce Grants* is the value of all inducement equity grants in thousands of dollars. *Sign-on Bonus* is the sign-on cash bonus in thousands of dollars. *Industry Homogeneity* is the industry average partial correlation coefficient, estimated using a two-factor regression model of monthly firm stock returns on an equal-weighted industry return index and an equal-weighted market index, averaged over the five years preceding the new CEO announcement (Parrino, 1997). *IOS* is the investment opportunity set estimated as the factor score of investment intensity, market-to-book assets, geometric mean annual growth rate of market value of assets, and R&D expenditures scaled by assets (Baber et al., 1996). *Information Asymmetry* is the logarithm of (stock price volatility in event window [0,1], divided by stock price volatility on event day -1), where event day 0 is the announcement date and stock price is measured at five minute interval.

Size is the book value of total assets, reported in millions of dollars. *Leverage* is the book value of debt divided by the market value of equity. *CAR3* is the three-day abnormal return within the three-day window (-1,1) using the market model, where the announcement date is day 0 and the market model is estimated with daily returns for the window (-160, -61). *CumRet* is the cumulative monthly stock return for the 12 months prior to the new CEO announcement. *ROA* is the operating income divided by the book value of total assets. *RetVol* is the daily return volatility for the year prior to the new CEO announcement.

Table 3: Inducement Grant Sensitivity and Adverse Selection Problems

$$\begin{aligned} \$Sensitivity &= \beta_0 + \beta_1 Industry Homogeneity + \beta_2 IOS \\ &+ \beta_3 Information Asymmetry + \beta_4 Size + \beta_5 Leverage + \varepsilon \end{aligned}$$

	(1)	(2)	(3)	(4)
<i>Industry Homogeneity</i>	-116.570*** (-3.48)			-102.239*** (-2.84)
<i>IOS</i>		15.457*** (5.77)		13.102*** (4.18)
<i>Information Asymmetry</i>			13.196** (2.27)	14.108*** (2.58)
<i>Size</i>	11.368*** (6.87)	12.143*** (5.07)	9.722*** (4.64)	13.679*** (6.78)
<i>Leverage</i>	-1.891 (-1.10)	-2.033 (-1.14)	-2.344* (-1.33)	-2.106 (-1.22)
Constant	-24.113** (-1.86)	-50.962*** (-3.51)	-35.498*** (-2.81)	-45.041*** (-2.72)
Observations	510	510	510	510
Pseudo R^2	0.015	0.015	0.012	0.018

*, ** and *** indicate $p < 0.10$, $p < 0.05$ and $p < 0.01$, based on one-tailed tests when there is a predicted sign, two-tailed otherwise. t -statistics are in parentheses.

This table reports results from estimating Tobit regressions of $\$Sensitivity$ on proxies for adverse selection problems and control variables. The model includes unreported year fixed effects. The full sample includes 510 new CEO announcements over the period 2004-2013, where new CEOs are externally hired, initial contracts are available through SEC filings, and the turnovers are not related to mergers and acquisitions. $\$Sensitivity$ is the sensitivity of the value of the inducement equity-award portfolio to a 1 percent increase in stock price, in thousands of dollars. *Industry Homogeneity* is the industry average partial correlation coefficient, estimated using a two-factor regression model of monthly firm stock returns on an equal-weighted industry return index and an equal-weighted market index, averaged over the five years preceding the new CEO announcement (Parrino, 1997). *IOS* is the investment opportunity set estimated as the factor score of investment intensity, market-to-book assets, geometric mean annual growth rate of market value of assets, and R&D expenditures scaled by assets (Baber et al., 1996). *Information Asymmetry* is measured as the logarithm of (stock price volatility in event window [0,1], divided by stock price volatility on event day -1), where event day 0 is the announcement date and stock price is measured at five minute interval. *Size* is the logarithm of book value of total assets, reported in millions of dollars. *Leverage* is the book value of debt divided by the market value of equity.

Table 4: CEO Announcement Market Reaction and Inducement Grant Sensitivity

$$CAR3 = \gamma_0 + \gamma_1 \$Sensitivity + \gamma_2 Size + \gamma_3 CumRet + \gamma_4 ROA + \gamma_5 RetVol + \varepsilon$$

<i>\$Sensitivity</i>	0.146* (1.67)
<i>Size</i>	0.002 (0.93)
<i>CumRet</i>	-0.028*** (-3.88)
<i>ROA</i>	0.016 (0.86)
<i>RetVol</i>	2.039** (2.46)
Constant	-0.064* (-1.57)
Observations	510
Adjusted R^2	0.112

*, ** and *** indicate $p < 0.10$, $p < 0.05$ and $p < 0.01$, based on one-tailed tests when there is a predicted sign, two-tailed otherwise. t -statistics are in parentheses.

This table reports results from estimating OLS regressions of $CAR3$ on $\$Sensitivity$ and control variables. The model includes unreported year fixed effects. The full sample includes 510 new CEO announcements over the period 2004-2013, where new CEOs are externally hired, initial contracts are available through SEC filings, and the turnovers are not related to mergers and acquisitions. $CAR3$ is the three-day abnormal return within the three-day window (-1,1) using the market model, where the announcement date is day 0 and the market model is estimated with daily returns for the window (-160, -61). $\$Sensitivity$ is the sensitivity of the value of the inducement equity award portfolio to a 1 percent increase in stock price, in thousands of dollars. $Size$ is the logarithm of the book value of total assets. $CumRet$ is the cumulative monthly stock return for the 12 months prior to the new CEO announcement. ROA is the operating income divided by the book value of total assets. $RetVol$ is the daily return volatility for the year prior to the new CEO announcement.

Table 5: Inducement Grant Sensitivity, Search Firm and Adverse Selection Problems

$$\begin{aligned} \$Sensitivity &= \beta_0 + \beta_1 Industry Homogeneity + \beta_2 IOS \\ &+ \beta_3 Information Asymmetry + \beta_4 Size + \beta_5 Leverage \\ &+ \beta_6 Search Firm + \varepsilon \end{aligned}$$

<i>Industry Homogeneity</i>	-104.693*** (-2.82)
<i>IOS</i>	12.410*** (4.03)
<i>Information Asymmetry</i>	14.279*** (2.53)
<i>Search Firm</i>	-13.443*** (-2.96)
<i>Size</i>	13.961*** (7.35)
<i>Leverage</i>	-2.128 (-1.26)
Constant	-43.257*** (-2.70)
Observations	510
Pseudo R^2	0.019

*, ** and *** indicate $p < 0.10$, $p < 0.05$ and $p < 0.01$, based on one-tailed tests when there is a predicted sign, two-tailed otherwise. t -statistics are in parentheses.

This table reports results from estimating Tobit regressions of $\$Sensitivity$ on proxies for adverse selection problems and control variables. The model includes unreported year fixed effects. The full sample includes 510 new CEO announcements over the period 2004-2013, where new CEOs are externally hired, initial contracts are available through SEC filings, and the turnovers are not related to mergers and acquisitions. $\$Sensitivity$ is the sensitivity of the value of the inducement equity award portfolio to a 1 percent increase in stock price, in thousands of dollars. *Industry Homogeneity* is the industry average partial correlation coefficient, estimated using a two-factor regression model of monthly firm stock returns on an equal-weighted industry return index and an equal-weighted market index, averaged over the five years preceding the new CEO announcement (Parrino, 1997). *IOS* is the investment opportunity set estimated as the factor score of investment intensity, market-to-book assets, geometric mean annual growth rate of market value of assets, and R&D expenditures scaled by assets (Baber et al., 1996). *Information Asymmetry* is measured as the logarithm of (stock price volatility in event window [0,1], divided by stock price volatility on event day -1), where event day 0 is the announcement date and stock price is measured at five minute interval. *Search Firm* is an indicator of using an executive search firm. *Size* is the logarithm of book value of total assets, reported in millions of dollars. *Leverage* is the book value of debt divided by the market value of equity.

Table 6: Inducement Grant Sensitivity, Adverse Selection Problems and Other Equity Compensation

$$\$Sensitivity = \beta_0 + \beta_1 Industry\ Homogeneity + \beta_2 IOS + \beta_3 Information\ Asymmetry + \beta_4 Size + \beta_5 Leverage + \beta_6 \$Annual\ Grants\ (Annual\ Grants\ Delta) + \varepsilon$$

	(1)	(2)
<i>Industry Homogeneity</i>	-76.800** (-2.12)	-74.223** (-2.02)
<i>IOS</i>	10.271*** (3.08)	10.089*** (3.05)
<i>Information Asymmetry</i>	10.695* (1.52)	10.590* (1.51)
<i>Size</i>	8.424*** (3.91)	7.897*** (3.66)
<i>Leverage</i>	-1.472 (-0.90)	-1.338 (-0.80)
<i>\$Annual Grants</i>	0.005*** (2.85)	
<i>Annual Grant Delta</i>		0.434*** (2.97)
Constant	-27.805** (-2.00)	-24.990** (-1.85)
Observations	510	510
Pseudo R^2	0.026	0.026

*, ** and *** indicate $p < 0.10$, $p < 0.05$ and $p < 0.01$, based on one-tailed tests when there is a predicted sign, two-tailed otherwise. t -statistics are in parentheses.

This table reports results from estimating Tobit regressions of $\$Sensitivity$ on proxies for adverse selection problems and control variables. The model includes unreported year fixed effects. The full sample includes 510 new CEO announcements over the period 2004-2013, where new CEOs are externally hired, initial contracts are available through SEC filings, and the turnovers are not related to mergers and acquisitions. $\$Sensitivity$ is the sensitivity of the value of the inducement equity award portfolio to a one percent increase in stock price, in thousands of dollars. *Industry Homogeneity* is the industry average partial correlation coefficient, estimated using a two-factor regression model of monthly firm stock returns on an equal-weighted industry return index and an equal-weighted market index, averaged over the five years preceding the new CEO announcement (Parrino, 1997). *IOS* is the investment opportunity set estimated as the factor score of investment intensity, market-to-book assets, geometric mean annual growth rate of market value of assets, and R&D expenditures scaled by assets (Baber et al., 1996). *Information Asymmetry* is measured as the logarithm of (stock price volatility in event window [0,1], divided by stock price volatility on event day -1), where event day 0 is the announcement date and stock price is measured at five-minute interval. *Size* is the logarithm of book value of total assets, reported in millions of dollars. *Leverage* is the book value of debt divided by the market value of equity. *\$Annual Grants* is the grant date fair value of total equity granted in the first year after the new CEO announcement, in thousands of dollars. *Annual Grants Delta* is the grant date sensitivity to 1% change in stock price of total equity granted in the first year after the new CEO announcement, in thousands of dollars.