The Effect of Outside Directors' Equity Compensation on Labor Investment*

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Abstract: A significant increase of outside director equity compensation (ODEC) in the past two decades has attracted much debate. Against this backdrop, this study examines how ODEC affects several aspects of corporate labor investments. Using a sample of U.S. firms during the period from 2006 to 2019, we find that ODEC is associated with a smaller absolute difference between the actual and expected net hiring, i.e., higher efficiency in labor investment. Our findings are robust to alternative proxies for ODEC and labor investment efficiency, and endogeneity tests. In addition, we find that the impact of ODEC on labor investment efficiency is less (more) pronounced for firms with greater institutional ownership or CEO ownership (human capital-intensive and complex firms). We also find that ODEC increases the timeliness of labor adjustment. Finally, we provide evidence that equity compensation incentivizes outside directors to reduce employee injuries and increase pro-social employee policies, which can potentially improve firm value in the long run. Overall, our findings contribute to the debate on the effectiveness of ODEC by showing its impact on labor investments.

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1. Introduction

Outside directors' equity compensation (hereafter, ODEC) has experienced rapid increase since the adoption of the Sarbanes–Oxley Act (SOX). The median of ODEC has increased from $40,481 in 2002 to $68,448 in 2005, reflecting a growth rate of 69% during 2002-2005 (Linck et al., 2009). Additionally, the growth rate reached 102% from 2006 ($71,760) to 2019 ($145,026) as shown by our data.[1] While proponents of ODEC contend that it can increase firm value by better aligning outside directors' interest with shareholders' (e.g., Jensen 1993; Blue Ribbon Report 1995; CALPERS 2009), opponents argue that it may incentivize outside directors to maximize their own short-term wealth at the expenses of shareholders (e.g., Sengupta and Zhang, 2015). Additionally, the role of outside directors in taking care of stakeholders, particularly employees, has been extensively debated and remains a topic of ongoing interest (Lorsch and McIver 1989; Stout, 2003; Agle et al. 2008; Adams, Licht and Sagiv 2011; Stout, 2012; Marcus 2015). Against the backdrop, this study attempts to shed light on this interesting phenomenon of increasing ODEC by examining the effect of ODEC on several aspects of corporate labor investment. We focus on labor investment, including managers' hiring decision and employee-friendly policies, among various managerial decisions to enhance our comprehension of how outside directors navigate the delicate balance

[1] We find that the median total pay for an outside director increases dramatically, rising from $148,506 in 2006 to $193,500 in 2012 (a 30.3% increase) and to $256,874 in 2019 (a 73.0% increase) (untabulated). There is also an increase in the proportion of equity for an outside director in total compensation, with the median proportion rising from 48.3% in 2006 to 56.5% in 2019.

between their responsibilities to shareholders and stakeholders, which may occasionally conflict with each other, particularly in the context of making labor-related decisions.[2]

To the extent that labor investment efficiency reflects board monitoring effectiveness and influences shareholder value (Jung et al. 2014; Khedmati, Sualihu, and Yawson 2020), our study considers labor investment efficiency as the most important aspect of labor investment. Drawing on the literature, we argue that equity compensation can incentivize outside directors to provide more monitoring and advisory efforts to increase labor investment efficiency in at least two ways. First, equity compensation incentivizes outside directors to monitor managers (Jensen 1993; Hillman and Daiziel 2003) to mitigate the frictions leading to inefficiency labor investment. As self-serving managers tend to over-hire (under-hire) employees to build their empire (extract rents) (Jensen and Meckling 1976; Jung et al. 2014), outside directors with equity compensation can diligently monitor managers from over-hiring (under-hiring). Additionally, ODEC can incentivize directors to monitor the quality of corporate disclosure and in turn, lowers the cost of capital by reducing the information asymmetry between managers and outside fund providers (Sengupta and Zhang, 2015), potentially mitigating underinvestment due to insufficient capital (Jung et al. 2014). Second, ODEC encourages outside directors to provide more advice on employment and increase labor investment efficiency. Prior studies show that directors can transfer knowledge on management practices across firms they served (Fracassi and Tate 2002; Giannetti, Liao, and Yu 2015) and their knowledge sharing can facilitate efficient investment (Chang and Wu 2021). As

[2] Of course, examining labor investment is important also because labor cost is economically significant and employees are critical to long-term innovation and success (Mao and Weathers 2019). For example, Bernanke (2004) estimates that corporate labor cost is approximately two thirds of production cost. The Annual Survey of Manufacturers reports that payroll and employee fringe benefits in the U.S. manufacturing sector increased from $784 billion in 2008 to $839 billion in 2016, whereas capital expenditure increased only slightly from $166 billion to $168 billion during the same period. The numbers in 2008 (2016) are available at http://www.census.gov.manufacturing.asm/index.html (http://www.census.gov/content/census/en/data/tables/2016/econ/asm/2016-asm.html).

such, ODEC can incentivize outside directors to share labor-related practices with executives and therefore increase labor investment efficiency. Collectively, these arguments suggest a positive relation between ODEC and labor investment efficiency.

Conversely, as outside directors have private incentives, provision of equity compensation may encourage them to pursue short-term profitability to increase the value of their stockholdings (Sengupta and Zhang 2015), suggesting that these directors may pursue sub-optimal labor policies such as excessive layoffs to increase short-term profits at the expense of long-term firm value. Furthermore, supporting the notion that higher ODEC may reflect CEO-director collusion (Fedaseyeu et al. 2018), outside directors with more equity pay may avoid challenging the management (Sharma 2011) and pay less monitoring efforts (Liu, Lobo and Yu 2021). Thus, outside directors with more equity pay may have lower incentives to prevent CEOs from formulating sub-optimal labor policies. More importantly and related to our study, another school of thought contends that outside directors, regardless of their compensation, should be altruistic and socially responsible (Hillman et al. 2000; Kassinis and Vafeas 2002; Stout 2003, Stout 2012), e.g., taking care of employees (Vafeas and Vlittis 2018), suggesting that these directors should prioritize employees' interests, which may be in conflict with efficient labor investment that can maximize shareholder value (Mehrotra and Morck 2017). In sum, we believe that the relation between ODEC and labor investment efficiency is an open empirical question.

To test our hypothesis, we use a sample of U.S. firms from 2006 to 2019. We collect data on director compensation from ExecuComp and match the data with other directors' characteristics provided by Institutional Shareholder Services. After calculating the sum of stock and option compensation as a proportion of total compensation for each outside (i.e., independent) director of a firm, we measure the ODEC for a firm by the average of these ratios for all the outside directors

in the firm (Sengupta and Zhang 2015). The proxy for labor investment is actual net hiring (i.e., the percentage change in the number of employees). Labor investment is more efficient when there is a smaller absolute difference between the actual and expected net hiring based on fundamental economic factors (e.g., Pinnuck and Lillis 2007; Jung et al. 2014).

We find that a higher percentage of ODEC in total compensation is associated with more efficient labor investment. The relation is also economically significant. An increase of one standard deviation in outside director's equity compensation is associated with a 5.11% increase in labor investment efficiency. The results support the view that ODEC improves shareholder value by increasing labor investment efficiency. We further separate labor investment inefficiency into overinvestment and underinvestment in labor, and examine whether ODEC would mitigate both forms of inefficiency in labor investment. Overinvestment (underinvestment) in labor occurs when the actual hiring is greater (less) than the expected level based on firm fundamentals. Overinvestment could occur if managers prefer to enjoy a "quiet life" and retain the status quo even when there is a need (e.g., due to unprofitable projects) to reduce the number of employees (Ghaly et al. 2020). As hiring increases business costs, managers may underinvest in labor to meet earnings targets when they experience pressure from myopic investors (e.g., Sualihu et al. 2021). We find that ODEC increases labor investment efficiency by mitigating both overinvestment and underinvestment in labor.

We also show that our results are robust to the two-stage least squares (2SLS) approach. We construct a first-stage instrumental variable using the industry median equity compensation of outside directors (Lahlou and Navatte, 2017). To mitigate the concern related to measurement errors in our main variables, we also employ alternative proxies for ODEC (e.g., Kim, Kwak, Lee,

and Suk, 2019) and for labor investment efficiency (e.g., Ghaly et al., 2020) and show that our results remain robust.

To further our understanding regarding the relation between ODEC and labor investment efficiency, we examine the effects of the potential moderators, including institutional ownership, CEO ownership, human capital intensity, and firm complexity on the relation by conducting cross-sectional analyses. We first examine the interplay between ODEC and institutional ownership in terms of enhancing labor investment efficiency. We find that the impact of ODEC is weaker when institutional ownership is higher, suggesting a substitutive effect for these two mechanisms. Second, supporting the notion that high CEO ownership can mitigate agency problems (e.g., Jensen 1993), we find a substitutional relation between ODEC and CEO ownership in terms of improving labor investment efficiency. Firms that operate in human capital-intensive industries generally employ labor with high skills and expertise, which results in high adjustment costs (Cao and Rees, 2020). Therefore, we expect that ODEC will play a more important role for firms in human capital-intensive industries than for other firms. Consistent with our prediction, we show that ODEC plays a greater role in reducing hiring inefficiency for firms that are more human-capital intensive. We also examine whether firm complexity affects the association between ODEC and labor investment efficiency. Managers of more complex firms may find it easier to engage in suboptimal corporate investment decisions such as empire building (Jensen 1986), because such firms face larger information asymmetry (Ghaly et al. 2020), and managers of such firms are more difficult to monitor (Farrell et al. 2008). Consistent with our prediction, we find that complex firms suffer from higher inefficiency in labor investment than less complex firms, but that the higher ODEC can mitigate labor investment inefficiency to a larger extent for more complex firms than it can for less complex firms.

Another related and interesting question is whether and how ODEC affects the timeliness of labor adjustment. To answer this question, we draw on the literature (Gu et al. 2020) and specifically investigate how ODEC affects corporate employment stickiness. We report that ODEC motivates outside directors to facilitate reducing the number of employees and the amount of labor costs during economic downturns, consistent with our main results.

Lastly, we investigate the impact of ODEC on the employee injury rate and pro-social employee policies. Labor investment encompasses not only the hiring of employees but also initiatives aimed at enhancing employees' benefits and safety, and protecting employee rights. Corporate investment in employee safety and pro-social employee policies might incur short-term costs but could lead to long-term increase in firm value. If ODEC is directed towards enhancing long-term firm value as enlightened stakeholder theory (Jensen 2010; Edmans 2011) suggests, we should observe a negative (positive) relation between ODEC and the employee injury rate (pro-social employee policies). Our empirical findings are consistent with the above hypothesis, indicating that ODEC can motivate outside directors to pursue long-term firm value by better treating employees (Lorsch and McIver 1989; Agle et al. 2008; Adams, Licht and Sagiv 2011).

Our study makes several contributions to the literature. First, the existing literature is inconclusive regarding the impact of ODEC on corporate decisions and performance (e.g., Perry 2000; Sharma, 2011; Sengupta and Zhang 2015; Hope et al. 2019; Liu et al. 2021). While some studies show that ODEC is positively related to governance outcomes (e.g., Perry 2000; Sengupta and Zhang 2015; Hope et al. 2019; Chan et al. 2023), others express concerns that ODEC may distort their monitoring function and that excess equity compensation may exacerbate board entrenchment (e.g., Archambeault et al., 2008; Sharma, 2011; Dah and Frye, 2017; Liu et al. 2021).

Our study contributes to the debate by showing that ODEC improves hiring efficiency and employee safety, and motivates directors to implement employee-friendly policies.

Second, to the best of our knowledge, we are the first to examine how ODEC *per se* affects labor policies. Prior studies demonstrate that the *proportion* of outside directors matters for employee-related decisions (e.g., Perry and Shivdasani 2005; Vafeas and Vlittis 2018). Related to our study, Perry and Shivdasani (2005) focus on a sample of only 94 firms with severe decline in performance and show that firms with an outside-dominated board are more likely to initiate employee layoffs when the firms experience a material decline in performance, suggesting the positive effect of outside directors on managers' layoff decision. We extend Perry and Shivdasani (2005) by using a larger sample of firms without relying on extreme cases of firm performance and provide evidence that ODEC can mitigate inefficiency in corporate labor investment.

Third, our study is also related to the literature on the role of outside directors in shareholder-stakeholder conflicts (Lorsch and McIver 1989; Agle et al. 2008; Adams, Licht and Sagiv 2011; Marcus 2015). At the heart of the debate is whether and how outside directors should balance the interest of shareholders and stakeholders which may occasionally conflict with each other. Our study contributes to this discussion by showing that ODEC can motivate outside directors to pursue long-term shareholder interest by better treating employees (Lorsch and McIver 1989; Agle et al. 2008; Adams, Licht and Sagiv 2011). Finally, our study also contributes to the literature on employees' safety and welfare (e.g., Cohn and Wardlaw 2016; Caskey and Ozel 2017; Bradley, Mao, and Zhang 2022; Suto and Takehara 2022). Our study adds to this line of the literature by showing that ODEC is an effective corporate governance mechanism that can increase employees' safety. Our findings have implications for both corporate policy-making and

regulatory frameworks, suggesting that ODEC could be a lever for enhancing employee safety and well-being.

The remainder of the paper is organized as follows. Section 2 provides the literature review and hypothesis development. Section 3 describes methodology and research design. Section 4 summarizes empirical findings and presents a discussion of the results. Section 5 provides the conclusion, contributions, and limitations of our study.

2. Literature Review and Hypothesis Development

Outside Directors' Equity Compensation (ODEC)

A board consists of inside directors and outside directors. While inside directors have information advantage over outside directors, outside directors are more independent from management and can exploit their expertise to advise and monitor CEOs (e.g., Fama 1980; Fama and Jensen 1983). Because of the prominent role of outside directors in corporate governance, an important question is how to incentivize them to function their duties. Although reputation provides strong incentives for outside directors since it enables them to acquire additional directorships in other firms (Fama and Jensen 1983; Yermack 2004), reputation alone may not be sufficient to mitigate agency problems (Holmstrom 1999). In recognition of the insufficiency of reputation in motivating directors, Jensen (1993) argues that equity compensation can better align outside directors' interest with shareholders' by linking the wealth of the directors to firm value. The enactment of SOX significantly increases outside directors' working loads and legal liabilities, which create high demand to compensate outside directors. As a result, the last two decades witness a significant increase in outside directors' total compensation and the proportion of equity (Linck et al. 2009). Against this backdrop, several studies examine the outcomes of ODEC.

A strand of literature documents that ODEC increases outside directors' monitoring and/or advising effort. For example, prior studies show that ODEC increases the chance of CEO turnover when firm performance is poor (Perry 2000), increases firm value (Fich and Shivdasani 2005), increases corporate disclosure and decreases cost of equity (Sengupta and Zhang 2015), discourages related-party transactions (Hope et al. 2019), and improves the quality of strategic alliance decisions (Chen et al. 2023). However, as outside directors have their own interests, high equity compensation may not improve governance (Linck et al. 2009). For instance, Sharma (2011) finds a negative relation between ODEC and a firm's propensity to pay dividends, suggesting that increasing equity incentive compensation may exacerbate agency problems, i.e., result in excessive risk-taking (Sharma 2011). In a similar vein, Liu et al. (2021) show that audit committee members with high equity compensation pay less monitoring effort as evidenced by lower audit fees.

Despite the importance of labor in corporate innovation and success, the effect of ODEC on corporate employee policies is unexplored in the literature. At the heart of this issue is how equity compensation affects outside directors' incentives to balance between short-term and long-term shareholders' interest and between shareholder value maximization and their altruistic and socially responsible attitude towards stakeholders, particularly employees (e.g., Stout 2003, 2012; Vafeas and Vlittis 2018) because their decisions to affect employment policies may often entail employee layoffs or employee benefit reductions.

Labor Investment Efficiency

Labor investment inefficiency can arise for several reasons. Adverse selection problems can lead to inefficient labor investment because managers and outside capital providers have asymmetric information (Jung et al. 2014; Roychowdhury et al. 2019). In the context of fund-raising activities, potential investors may charge a high cost of capital and discount stock price

because of information risk. As raising funds becomes costly, managers may forgo projects with a positive net present value, which leads to inefficient labor investment (i.e., underinvestment in labor). Additionally, the moral hazard problem is another important factor because self-serving managers have strong incentives to over-hire employees to satisfy their private benefits (Jensen and Meckling 1976; Jung et al. 2014).

However, labor investment can be inefficient even in the absence of adverse selection and moral hazard problems. Roychowdhury et al. (2019) argue that investment decisions may not be efficient when managers face information uncertainty about the return and risk of a potential investment, which is labeled as managerial learning hypothesis. According to this hypothesis, managers can improve the efficiency of their decisions and increase firm value by learning new information, which includes information on future investment opportunities, product demand, and financing policies from a variety of channels, such as stock prices, financial reporting information, and peers (Roychowdhury et al. 2019).

In the context of labor investment efficiency, several mechanisms can mitigate moral hazard, adverse selection, and information uncertainty problems, and enhance labor investment efficiency. First, institutional investors who participate in long-term investment can accumulate firm-specific knowledge and manager-specific information; such information helps to lower the cost of monitoring managerial behaviors, and thus enhances the efficiency of labor investment (Ghaly et al. 2020). Second, board independence may mitigate moral hazard problems and improve labor investment efficiency. Specifically, Khedmati et al. (2020) document that CEO – director social ties reduce the effectiveness of monitoring and reduce the efficiency of investment in labor. Third, corporate disclosures can decrease information asymmetry between managers and capital providers and hence reduce adverse selection (Jung et al. 2014). This could in turn mitigate under-

investment in labor and improve labor investment efficiency. Given the importance of outside directors in advising and monitoring CEOs, an important yet unexplored question is whether and how ODEC affects labor investment efficiency.

Hypothesis Development

Drawing on the literature, we argue that ODEC can align interests of stockholders with those of outside directors (Jensen 1993; Hillman and Daiziel 2003) and motivate them to effectively advise and monitor labor investment policies in the following ways. First, ODEC provides strong incentives to outsider directors to perform monitoring roles and thus increase labor investment efficiency. Prior studies suggest that financing costs and managerial agency problems can result in inefficient labor investment by increasing adverse selection and agency problems (Jung et al. 2014), respectively. ODEC incentivize outside directors to monitor corporate disclosures, resulting in higher quality and quantity of corporate disclosures (Sengupta and Zhang 2015), which reduces the potential underinvestment in labor for profitable projects caused by insufficient capital and mitigate inefficient labor investment problems due to moral hazard problems (Jung et al. 2014). Additionally, ODEC is negatively associated with cost of equity (Sengupta and Zhang 2015), which can help a firm to finance and mitigate under-investment problems (Jung et al. 2014).

Second, compensating outside directors with equity can incentivize them to better advise managers to make informed labor investment decisions by sharing labor-related experience and information (Hillman and Daiziel 2003), which are useful for labor investment decisions. The social network of outside directors can facilitate valuable information flows among firms and experience sharing (Fracassi and Tate 2002; Giannetti et al. 2015), resulting in more efficient investment (Chang and Wu 2021). As such, ODEC incentivizes outside directors to share labor-

related information with executives and expand their information set, which can result in more informed labor decisions (Roychowdhury, Shroff, and Verdi 2019). Based on the above arguments, it is plausible that high equity compensation for outside directors can improve the efficiency of labor investment.

On the other hand, directors are also economic agents (Fama and Jensen 1983; Deutsch et al. 2007; Deutsch et al. 2011) and may pursue their own benefits instead of the interests of shareholders. For instance, audit committee members who are granted short-term stock option compensation have a lower oversight quality because they focus on short-term performance (Archambeault et al. 2008). Equity incentives for outside directors, such as stock options, can aggravate agency problems and lead outside directors to avoid challenging managerial policies, such as dividend payout policies and high-risk investments (Sharma 2011). Similarly, outside directors may not challenge a labor investment decision even if it deviates from the optimal investment level. Using equity compensation to get directors' support, managers can underinvest in labor to increase the internal funds available for their private consumption (Khedmati et al. 2020) or overinvest in labor to enhance their power.

More importantly and related to our study, another school of thought argues that outside directors embody altruism and social responsibility (Hillman et al. 2000; Kassinis and Vafeas 2002; Stout 2003; Stout 2012). This perspective suggests that outside directors prioritize the well-being of employees than shareholder value maximization (Vafeas and Vlittis, 2018), potentially resulting in sub-optimal investment decisions in labor. With these conflicting arguments, the association between ODEC and labor investment efficiency is an open empirical question. The above discussions lead to the following hypothesis (in a null form).

Hypothesis: *The proportion of equity compensation in total compensation of outside directors is not related to the efficiency of labor investment.*

While our main hypothesis concerns labor investment efficiency because it can reflect board monitoring effectiveness and influence shareholder value (Jung et al. 2014; Khedmati, Sualihu, and Yawson 2020), we also advance our understanding of the impact of ODEC by examining other aspects of labor investments. More specifically, drawing on the literature on labor cost stickiness (Khedmati et al. 2020), we also examine the effect of ODEC on the timeliness of labor adjustment. If ODEC results in better (worse) governance performance, we should observe that firms with high ODEC adjust their labor policies in a more (less) timely manner. Finally, we also examine the effect of ODEC on employee injury rates and pro-social employee policies. The enlightened stakeholder theory (Jensen 2010; Edmans 2011) suggests that better treatment of employee can result in stock price increase and therefore equity compensation can incentivize outside directors to reduce employee injury rates and implement pro-social employee policies. However, the myopia hypothesis (Sengupta and Zhang 2015) predicts the opposite. Because of the competing arguments, we turn to data to examine these research questions.

3. Variables, Research Design, and Sample

Labor Investment Efficiency

As a proxy for labor investment, we use net hiring, which is the percentage change in the number of employees. We measure the expected net hiring by regressing net hiring on a list of firm fundamental variables (e.g., Pinnuck and Lillis 2007; Jung et al. 2014; Khedmati et al. 2020), as shown in Equation (1):

$$
\begin{aligned}
Net\_Hiring_{i,t} = {} & \beta_0 + \beta_1 Sales\_Growth_{i,t} + \beta_2 Sales\_Growth_{i,t-1} + \beta_3 ROA_{i,t} + \beta_4 \Delta ROA_{i,t} \\
& + \beta_5 \Delta ROA_{i,t-1} + \beta_6 Return_{i,t} + \beta_7 Firm\_Size\_R_{i,t-1} + \beta_8 Quick_{i,t-1} + \beta_9 \Delta Quick_{i,t-1} \\
& + \beta_{10} \Delta Quick_{i,t} + \beta_{11} Leverage_{i,t-1} + \beta_{12} LossBIN1_{i,t-1} + \beta_{13} LossBIN2_{i,t-1} \\
& + \beta_{14} LossBIN3_{i,t-1} + \beta_{15} LossBIN4_{i,t-1} + \beta_{16} LossBIN5_{i,t-1} + \beta_{17} AUR_{i,t-1} \\
& + \beta_{18} CAPX_{i,t-1} + \beta_{19} AQC_{i,t-1} + \beta_{20} XRD_{i,t-1} + \beta_{21} lnGDPpc_{i,t-1} + IndustryFE \\
& + \varepsilon_{i,t} \qquad (1)
\end{aligned}
$$

where the subscripts *i* and *t* refer to the firm and year, respectively. *Net_Hiring* is the percentage change in the number of employees, *Sales_Growth* is the percentage change in sales revenue, *ROA* is return on assets, Δ*ROA* is the change in *ROA*, *Return* is the annual stock return, *Firm_Size_R* is the natural logarithm of market value of equity at the beginning of the year, then ranked into percentiles, *Quick* is the quick ratio (the ratio of receivables plus short-term investments and cash to current liabilities), Δ*Quick* is the change in quick ratio, and *Leverage* is the sum of long-term debt and debt in current liabilities, scaled by total assets. *LossBIN* variables are dummy variables that indicate each range of prior-year *ROA* with a length interval of 0.005 from 0 to -0.025 (e.g., *LossBIN1* takes a value of 1 if *ROA* in the previous year is between -0.005 and 0, otherwise *LossBIN1* equals 0; *LossBIN2* equals 1 if *ROA* in the previous year is between -0.01 and -0.005, and otherwise *LossBIN2* is 0; and so on). *AUR* is the ratio of annual sales to assets. *CAPX* is the ratio of capital expenditure to assets, *AQC* is the ratio of acquisition expenditure to assets, *XRD* is the ratio of R&D expenditure to assets, and *lnGDPpc* is the natural logarithm of gross domestic product (GDP) per capita.[3] The model also includes industry fixed effects (Jung et al. 2014). Our measure of labor investment inefficiency, *Abnormal hiring*, is the absolute value of residuals from

[3] Our main results are similar when excluding the ratio of annual sales to assets (*AUR*), capital expenditure to assets (*CAPX*), acquisition expenditure to assets (*ACQ*), R&D expenditure to assets (*XRD*), and the natural logarithm of GDP per capita (*lnGDPpc*) from Equation (1). This specification is used in Jung et al. (2014) for the estimation of expected net hiring.

estimating Equation (1). A smaller (larger) absolute value means that labor investment is more efficient (inefficient).[4]

Research Design

To test our hypothesis, i.e., the relation between ODEC and labor investment efficiency, we estimate the model shown in Equation (2):

$$\begin{aligned} Abnormal\ hiring_{i,t} &= \beta_0 + \beta_1 MDIRCOMP_{i,t-1} + \beta_2 MTB_{i,t-1} + \beta_3 Firm\_Size_{i,t-1} + \beta_4 Quick_{i,t-1} \\ &+ \beta_5 Leverage_{i,t-1} + \beta_6 Dividend_{i,t-1} + \beta_7 SD\_CFO_{i,t-1} + \beta_8 SD\_Sales_{i,t-1} \\ &+ \beta_9 Tangible_{i,t-1} + \beta_{10} Loss_{i,t-1} + \beta_{11} Institutional_{i,t-1} + \beta_{12} SD\_net\_hire_{i,t-1} \\ &+ \beta_{13} Labor\_intensity_{i,t-1} + \beta_{14} UNION_{i,t-1} + \beta_{15} Abn\_other\_invest_{i,t-1} \\ &+ \beta_{16} AQ_{i,t-1} + \beta_{17} CEOGender_{i,t-1} + \beta_{18} CEOAge_{i,t-1} + \beta_{19} CEO\_dual_{i,t-1} \\ &+ \beta_{20} MCEOCOMP_{i,t-1} + \beta_{21} BDSize_{i,t-1} + \beta_{22} BDIndependence_{i,t-1} \\ &+ \beta_{23} BDGender_{i,t-1} + \beta_{24} BDAge_{i,t-1} + IndustryFE + YearFE \\ &+ \varepsilon_{i,t} \end{aligned} \quad (2)$$

where *MDIRCOMP* is the measure of ODED. We first calculate equity compensation (the sum of option and stock compensation) as a proportion of total compensation for each outside director of a firm. Then, we take the average of the proportions for all outside directors in a firm for each year (*MDIRCOMP*). Sengupta and Zhang (2015) argue that this measure is relatively less scale dependent than those which use dollar compensations. All control and independent variables are lagged by a year. We include three levels of controls, i.e., firm-level, CEO-level, and board-level controls.

For firm level controls, we use market-to-book ratio (*MTB*) to control for growth opportunities and the natural logarithm of market value (*Firm_Size*) to control for firm size as growth opportunities and firm size affect employment growth. As liquidity and financial risk affect employment decisions, we add *Quick*, *Leverage*, and *Dividend*. *Dividend* is a dummy variable that equals 1 if a firm pays dividends, and 0 otherwise. Since both cash flow (CFO) volatility and sales

[4] A summary of descriptions on the above variables is also provided in Appendix A.

volatility also affect hiring decisions, we control for the standard deviation of CFO over years t-5 to t-1 (*SD_CFO*) and the standard deviation of sales over years t-5 to t-1 (*SD_Sales*), respectively. The extent of investment in fixed assets affect employment decisions; thus, we add property, plant, and equipment, scaled by total assets (*Tangible*). Loss-making firms may have a higher probability of cutting their labor investment than profitable firms; therefore, we control for any incidence of loss (*Loss*) using a dummy variable that equals 1 if ROA is negative, and 0 otherwise. As institutional investors may play a monitoring role in corporate investment, we control for institutional shareholdings (*Institutional*). Labor investment volatility in the past is also related to current year's labor investment decision, and thus, we control for the standard deviation of the percentage change in the number of employees over years t-5 to t-1 (*SD_net_hire*). Since managers' hiring decision is affected by labor intensity and labor unions, we add *Labor_intensity*, measured as the ratio of employees to assets and *UNION*, which is industry level unionization rate. As hiring decision is correlated with other investment decisions, for example, capital expenditure, we also control for the inefficiency of non-labor investment (*Abn_other_invest*) using the absolute residual from estimating the following model: $Other\_invest_{i,t} = \beta_0 + \beta_1 Sales\_Growth_{i,t-1} + \varepsilon_{i,t}$, where *Other_Invest* = acquisition + R&D expenditure + capital expenditure - cash receipt from selling property, plant, and equipment, scaled by assets in the prior year. Finally, as financial reporting quality affects labor investment (Jung et al. 2014), we control for accounting quality (*AQ*), using the absolute value of Dechow and Dichev's (2002) measure of abnormal accruals, as modified by Ball and Shivakumar (2005).

We also control for various CEOs' personal characteristics, which can be related to corporate investment decisions (e.g., Jensen and Murphy 1990; Jensen 1993; Holmstrom 1999; Sualihu et al. 2021). We control for CEO gender (*CEOGender*) (Faccio, Marchica, and Mura 2016)

and CEO age (*CEOAge*) (Holmstrom 1999; Yim 2013; Serfling 2014). If the CEO is the board chairperson within a firm (CEO duality), it will be more difficult for the board to perform critical functions such as firing and evaluating the CEO (Jensen 1993). Thus, we add a dummy variable (*CEO_dual*) that equals 1 if the CEO is the board chairperson, and 0 otherwise. We also control for CEO equity compensation (*MCEOCOMP*) as it can also affect labor investment (Sualihu et al. 2021).

For board characteristics, we control for board size (*BDSize*) using the number of directors of a board. Boards of directors can provide advisory and monitoring roles (Fama and Jensen 1983) and influence labor investment efficiency. The effectiveness of their roles may depend on their attributes. Oversized boards can be ineffective because of poor communications and the overwhelming nature of decision-making (Jensen 1993; Yermack 1996). However, a large board may bring greater access to information that is useful to labor investment decisions compared with a smaller board. Board independence can affect monitoring effectiveness (Fama and Jensen 1983; Weisbach 1988) and hence labor investment efficiency as well. Thus, we control for board independence (*BDIndependence*) using the proportion of outside directors. Board gender diversity may also affect governance, and thus, investment policies (e.g., Chen, Leung, Song, and Goergen 2019). Thus, we include board gender diversity (*BDGender*) by calculating the proportion of male directors on the board. Similar to CEO age, the age of directors may affect corporate investment. Therefore, we include the natural logarithm of the average age of the board to control for the age of the board members (*BDAge*).[5] To account for time trends and time-invariant industry heterogeneity, we estimate our main models with year and industry fixed effects.[6]

Data and Sample

[5] Descriptions of all the above variables are also summarized in the Appendix A.
[6] In additional tests, we also consider other time-varying and time-invariant effects.

For the sample construction for Equation (1), we collect the number of employees and other financial information from Compustat. Stock return information is from CRSP, and GDP per capita is from the World Bank. Following prior studies (e.g., Jung et al. 2014; Khedmati et al. 2020), our initial sample starts from 1983 with all available information to estimate the expected net hiring and hence labor investment efficiency, and it consists of 115,648 firm-years. Following Ghaly et al. (2020), we exclude utilities and financial firms (SIC codes from 4900 to 4999 or from 6000 to 6999) because these firms are heavily regulated. We collect directors' compensation data from ExecuComp which includes the name of individual directors and company identifiers. Other information on boards and directors is from Institutional Shareholder Services Inc. (ISS) which includes the features of individual directors for the sample firms in the S&P 1500, such as name, age, gender, and classification (e.g., inside, linked, or independent outside directors). We match the director compensation by director names and the company identifiers between ExecuComp and ISS to obtain data on outside directors' equity compensation and other directors' information. The labor unionization data is from Hirsch and Macpherson's (2003) updated database of Union Membership and Coverage. For additional datasets used in Equation (2), managerial ability data are from Demerjian et al.'s (2012) updated database.[7] Our final sample consists of 9,495 firm-years from 2006 to 2019 because of data availability of directors' compensation. Our final sample begins from 2006 because it is the first year in which U.S. public companies are required to provide each individual director's compensation and ExecuComp provides detailed director-level compensation data. To mitigate the effect of outliers, we winsorize all continuous variables at the 1st and 99th percentiles (Jung et al. 2014).

[7] The number of observations used to estimate Equation (2) is smaller than the sample used for Equation (1).

4. Empirical Results and Discussion

4.1 Estimation of Labor Investment Efficiency

Panel A of Table 1 shows the summary statistics of variables used in Equation (1). Most descriptive statistics are consistent with prior literature.[8] We report the results of estimating Equation (1) in Column 1, Panel B of Table 1. The results are generally consistent with our prediction and the literature (Jung et al. 2014; Khedmati et al. 2020). The absolute value of residuals from Equation (1) is our primary measure for labor investment inefficiency, *Abnormal hiring*.

4.2 Descriptive Statistics

Table 2, Panel A presents descriptive statistics for variables used in Equation (2). The mean (median) value of *Abnormal hiring*, is 0.087 (0.051). The mean (median) value of *MDIRCOMP* is 0.500 (0.542), which is comparable with the mean (median) value of 0.500 (0.516) observed by Sengupta and Zhang (2015). The distributional statistics of firm-level controls are similar to those of relevant labor investment research (Jung et al. 2014), and those of CEO-level and board-level controls are also comparable to prior studies (e.g., Dah and Frye 2017; Lahlou and Navatte 2017). Panel B presents Pearson correlation coefficients. *MDIRCOMP* is negatively related to *Abnormal hiring*, providing preliminary evidence that ODEC improves labor investment efficiency. Correlation coefficients between our main variables (such as *Abnormal hiring* and *MDIRCOMP*) and control variables are generally consistent with those reported by prior literature (e.g., Jung et al. 2014). In general, we do not find high correlation coefficients between *MDIRCOMP* and other control variables.[9]

[8] For example, the mean (median) of the percentage change in the number of employees (*Net_Hiring*) is 7.90% (2.40%), which is comparable with the 7.90% (2.90%) reported in Khedmati et al. (2020).

[9] To mitigate any unobserved potential multicollinearity, we estimate the variance inflation factor (VIF) and find that all VIFs are less than 3, implying that multicollinearity is not an important concern in this study.

4.3. Main Results

Table 3 presents the results for the relation between ODEC and labor investment efficiency. We control for year, and industry fixed effects, and provide t-statistics based on heteroskedastically robust standard errors. Consistent with univariate results, the coefficient on *MDIRCOMP* is significantly negative, indicating that ODEC is negatively related to *Abnormal hiring* (i.e., the inverse measure of labor investment efficiency). The result is also economically significant. An increase of one standard deviation in ODEC is associated with a 5.11% reduction in labor investment inefficiency.[10] Turning to control variables, we find that the coefficients on *Firm_Size*, *Dividend*, *Institutional*, and *Labor_intensity* are negative and significant, indicating that large and dividend paying firms, firms with high institutional ownership, and firms with high labor intensity tend to invest in labor more efficiently than their counterpart firms. In addition, we report positive and significant relations between labor investment inefficiency and *Quick*, *SD_CFO*, *Loss*, *SD_net_hire*, and *Abn_other_invest*, suggesting that firms with higher liquidity, higher cash flow volatility, losses, higher hiring volatility, and larger abnormal non-labor investments tend to exhibit less efficiency in labor investment than their counterpart firms.

Specific Forms of Labor Investment Inefficiency

We extend the baseline analysis by separately investigating whether ODEC affects overinvestment in labor and underinvestment in labor. The subsample of overinvesting (underinvesting) firms are those in which the actual net hiring is greater (less) than expected. In line with Jung et al. (2014), we further split the overinvestment sample into two parts, where over-hiring (under-firing) firms consist of those in the overinvestment subsample with a positive

[10] The sample average value of *Abnormal hiring* is 0.087. The standard deviation of *MDIRCOMP* is 0.234 and the coefficient is -0.019. Therefore, an increase of one standard deviation in *MDIRCOMP* is related to a 5.11% reduction in the inefficiency of labor investment (-0.019*0.234/0.087 = -0.0511).

(negative) expected net hiring. Likewise, we decompose the underinvestment sample into under-hiring (over-firing) firms that have a positive (negative) expected net hiring.

Panel A of Table 4 presents results on the relation between overinvestment in labor and ODEC. In Column 1, we use all the observations of over-investment in labor. We find a negative and significant coefficient on *MDIRCOMP*, suggesting that ODEC mitigate overinvestment in labor, such as empire building. In Column 2, where our analysis focuses on over-hiring cases, we provide evidence that over-hiring is significantly mitigated by ODEC. However, we find a negative but insignificant coefficient on *MDIRCOMP* in Column 3 for under-firing sample. We present results on the underinvestment subsample in Panel B. In Column 4, we use all the observations of under-investment in labor. The negative and significant coefficient on *MDIRCOMP* implies that ODEC reduces the extent of under-investment in labor. The results in Columns 5 and 6 suggest that ODEC mitigates both types of under-investment (i.e., over-firing and under-hiring). Overall, the results in Table 4 suggest that the positive relation between ODEC and labor investment efficiency is due to the reduction in both over-investment and under-investment in labor.

4.4. Addressing Concerns of Endogeneity

In this section, we perform additional analysis to mitigate potential endogeneity problems such as correlated omitted variables, reverse causality, and self-selection biases.

Fixed Effects: Following prior literature (e.g., Jung et al. 2014), we include year and industry fixed effects in main analysis. However, there are other potential sources of endogeneity. First, it is possible that there are persistent differences in characteristics across states (e.g., labor laws) that may affect the relation between ODEC and labor investment efficiency. To account for these time-invariant state specific characteristics, we additionally control for state fixed effects in our main model. Column 1 of Table 5 shows that our results remain qualitatively unchanged, implying that

baseline findings are not affected by the time-invariant characteristics across states. Second, local economic conditions and geographic location can influence labor investment decisions (Landier et al. 2009). To address concerns of time-varying differences in terms of industries and economic environments, we include industry-year and state-year fixed effects in our main regressions (Ghaly et al. 2020). Results in Column 2 of Table 5 show that the coefficient on *MDIRCOMP* remains negative and significant. We also run our main model with firm and year fixed effects to control for time-invariant firm characteristics that may affect both ODEC and labor investment. Column 3 of Table 5 shows that our main results remain unchanged with firm fixed effects.

Change Specification: As an additional robustness test, we employ a change in variables specification by regressing the change in abnormal net hiring (Δ*Abnormal hiring*) on the change in ODEC (Δ*MDIRCOMP*) and the change in all control variables. Using the change specification can alleviate the concern arising from correlated omitted variables (Naiker et al. 2013; Sualihu et al. 2021). We report the results in Column 4 of Table 5. We find that the coefficient on Δ*MDIRCOMP* is significantly negative, consistent with our main findings, mitigating the concern due to correlated omitted variables.

***Two-Stage Least Squares (2SLS)*:** To further rule out the endogeneity concern, we use the 2SLS estimation procedure. Since firms behave like their peers (Scharfstein and Stein 1990), similar to Lahlou and Navatte (2017), our instrumental variable (*IndustryDEQR*) is the industry median equity-based compensation (%) of outside directors lagged by one year, which is unlikely to influence a firm's labor investment efficiency through channels other than influencing the firm-level ODEC. In the first stage, we regress *MDIRCOMP* on the instrumental variable and all control variables as in Equation (2). We expect the instrumental variable to be positively related to *MDIRCOMP*. Column 5 of Table 5 shows the estimation results of the first-stage regression. As

expected, the coefficient on the instrumental variable, *IndustryDEQR* is significantly positive, suggesting that the industry median of ODEC is a significant determinant of ODEC at the firm level.[11] Then, in the second stage regression, we use the predicted value of *MDIRCOMP* from the first stage regression. Column 6 of Table 5 shows the results which indicate that the relation between the predicted ODEC and abnormal hiring is still negative and significant, implying that our main findings remain unchanged with the 2SLS estimation procedure.

4.5. Robustness Tests

Alternative Proxies for Labor Investment Efficiency

As robustness tests, we further consider alternative measures of labor investment efficiency. Prior research shows that sales growth is a strong predictor of growth opportunities (e.g., Biddle et al., 2009). Thus, in line with Biddle et al. (2009), we use lagged sales growth as the only independent variable in Equation (1) to estimate the expected level of net hiring. Results of estimating this simple model are presented in Table 1, Panel B, Column 2. We find that the results (untabulated) based on this simple model are similar to our main results. Following Jung et al. (2014), we also use the median labor investment in the firm's industry as an alternative measure of expected net hiring. Thus, a larger absolute difference between the net hiring of a firm and that of its industry peers implies greater inefficiency in labor investment. Again, results (untabulated) based on this measure are similar to our main results. Lastly, we also estimate the expected net hiring for an alternative time period starting in 2001 rather than 1983 to avoid the possibility of "stale information" influencing the results. We find a similar result for the alternative time period (untabulated).

Alternative Proxies for Outside Directors' Equity Compensation

[11] The partial F-statistic for *IndustryDEQR* is 2,781.25, suggesting that it is not a weak instrument.

To further check the robustness of our results, we also employ five alternative measures for ODEC. First, option compensation and stock compensation can provide different motivations for outside directors in their corporate risk and investment decisions because the directors may perceive stock as current wealth, but options as potential future gains (e.g., Deutsch et al. 2007). Thus, we separately measure stock and stock options for outside directors, i.e., *MDIRCOMPS* (an averaged ratio of stock to total pay) and *MDIRCOMPO* (an averaged ratio of stock options to total pay), and use them in our main regression instead of *MDIRCOMP*. Results (untabulated) show that although both *MDIRCOMPS* and *MDIRCOMPO* are significantly negative, stock compensation (*MDIRCOMPS*) has a greater magnitude and statistical significance than option compensation (*MDIRCOMPO*), suggesting that stock compensation to outside directors have a larger role in increasing labor investment efficiency than option compensation.

Second, following Kim et al. (2019), we also consider the median proportion of ODEC to total pay. This modification can avoid the effect of a potential extreme value (i.e., an outlier) for equity compensation (stock and option) earned by a particular outside director. Results (untabulated) based on this measure are similar to our main results. We also examine whether the dollar amount of equity compensation matters. To examine the effect of the amount of equity compensation (rather than its proportion in total compensation) on labor investment efficiency, we use both median and mean (natural logarithm) values of outside directors' equity compensation (*MedStock_Opt* and *MeanStock_Opt*, respectively) instead of our main measure. We continue to find qualitatively similar results.

4.6. Cross-Sectional Tests

Whereas equity compensation acts as an important internal governance mechanism that may provide incentives for outside directors to improve their monitoring of labor investment

efficiency, other governance mechanisms, such as institutional ownership and CEO ownership, may influence the effectiveness of ODEC on labor investment efficiency. If institutional investors can monitor managerial activities, this may reduce the need for monitoring by outside directors. Thus, the effectiveness of ODEC may be less pronounced in the presence of institutional investors. To measure the level of institutional ownership, we use *HighInstitutionalOwn* that equals 1 (0) if a firm's institutional ownership is above (below) the sample median. To test the moderating effect, we focus on the interaction term between *MDIRCOMP* and *HighInstitutionalOwn*. Table 6, Column 1 shows the results. The coefficients on both *MDIRCOMP* and *HighInstitutionalOwn* are negative and significant, indicating that both ODEC and institutional ownership can enhance labor investment efficiency. Consistent with our substitution hypothesis, the coefficient on the interaction term, *MDIRCOMP*HighInstitutionalOwn* is positive and significant, implying that the effectiveness of ODEC in improving labor investment efficiency is lower for firms with higher institutional ownership.

In addition to external ownership factors, such as institutional shareholdings, CEO ownership can affect agency problems and thus, the efficiency of labor investment. If a high percentage of CEO ownership can align managers' and shareholders' interests, outside directors can reduce the effort that they devote to monitoring, and thus, the effect of ODEC on labor investment efficiency will be less pronounced. Consistent with the interdependent relationship between CEO ownership and ODEC, Rediker and Seth (1995) document that the monitoring roles provided by outside directors have substitution effects with managerial ownership. Thus, we expect that CEO ownership moderates the impact of ODEC on labor investment efficiency. We use a dummy variable, *HighCEOOwn* that equals 1 (0) if a firm's managerial ownership is above (below) median. Table 6, Column 2 reports the findings related to CEO ownership. Consistent

with the alignment effect, the coefficient on *HighCEOOwn* is negative and significant, implying that a large CEO ownership can reduce inefficiency in labor investment. More importantly, the coefficient on *MDIRCOMP*HighCEOOwn* is positive and significant, supporting our prediction that when the CEO has greater ownership, the positive effect of ODEC on labor investment efficiency is weaker. Thus, the incentive provided by ODEC is less important when CEOs have larger stock ownership, indicating a substitutive relationship between CEO ownership and ODEC.

Human-capital-intensive firms possess highly skilled labor and tend to face higher labor adjustment costs than less human-capital-intensive firms, and hence it is not easy for them to adjust their labor investments (Cao and Rees 2020). As a result, firms operating in human-capital-intensive industries may need additional monitoring and advisory service, compared with less human-capital-intensive firms. Therefore, we expect that the effect of ODED on labor investment efficiency is greater for firms with higher human-capital intensity. To proxy for the intensity of human capital, we partition our sample into two subsamples according to whether a firm belongs to a human-capital-intensive industry. Following Cao and Rees (2020), we label firms as human-capital-intensive if they belong to healthcare, high-technology, or telecommunications industries.[12] Then, we create a dummy variable, *High_Human_Cap* which equals 1 if a firm belongs to a human-capital-intensive industry, and 0 otherwise. Results are presented in Table 6, Column 3. The coefficient on *High_Human_Cap* is significant and positive, suggesting that firms with higher human capital intensity tend to have higher labor investment inefficiency. More importantly, we find a negative and significant coefficient on the interaction term, *MDIRCOMP*High_Human_Cap*, supporting our prediction that the effectiveness of ODEC on labor investment efficiency is stronger when human capital is more important to a firm.

[12] Their two- and three-digit SIC codes are 36, 48, 80, 283, 357, and 384.

Lastly, managers of complex firms are more likely to make suboptimal investment decisions and face greater agency conflicts because they face higher information asymmetry than less complex firms (Jensen 1986; Hoechle et al. 2012). ODEC can motivate high-quality outside directors to devote additional efforts to address the potential asymmetric information problems and/or it can attract high-quality outside directors to provide advice related to labor investment, hence reducing the suboptimal labor investment decisions. Thus, we expect ODEC to mitigate the inefficiency of labor investment to a larger extent for more complex firms. To test the potential moderating effect of firm complexity on our results, we follow Ghaly et al. 2020 and create a dummy variable, *Complex_Firm* which equals 1 if the firm is complex (i.e., has more than two business segments), and 0 otherwise. The interaction term, *MDIRCOMP*Complex_Firm* indicates how the association between labor investment efficiency and ODEC varies with firm complexity. In Table 6, Column 4, we first find a positive and significant coefficient on *Complex_Firm*, suggesting that complex firms tend to be more inefficient in their labor investments than firms that are not complex. As expected, the coefficient on *MDIRCOMP*Complex_Firm* is negative and significant, indicating that the impact of ODEC on labor investment efficiency is more pronounced for more complex firms than for less complex firms.

In sum, we show that the positive relation between ODEC and labor investment efficiency varies with various firm characteristics such as institutional ownership, managerial ownership, human capital intensity, and firm complexity.

4.7. The Impact of ODEC on Labor Cost Stickiness and Employment Level Stickiness

In addition to our main results based on hiring efficiency, we further examine how ODEC affects the timeliness of labor adjustment. Specifically, by drawing the literature on cost stickiness, we estimate the impact of ODEC on the stickiness of labor costs and employment number.

Prabowo et al. (2018) document that the self-interest of managers who engage in empire building may restrain them from firing labor when sales decrease, and that firms with weak corporate governance have stickier labor costs than those with strong governance. As equity compensation can incentivize outside directors to perform their duties, we expect the stickiness of labor costs to decrease with ODEC. To test our prediction, following Khedmati et al. (2020), we estimate Equation (3) below:

$$\log\left(\frac{LabCost_{i,t}}{LabCost_{i,t-1}}\right) = \beta_0 + \beta_1 \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) + \beta_2 Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) + \beta_3 Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * MDIRCOMP_{i,t} + \beta_4 Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * Controls_{i,t} + \beta_5 MDIRCOMP_{i,t} + \beta_6 Controls_{i,t} + IndustryFE + YearFE + \varepsilon_{i,t} \quad (3)$$

where *LabCost* denotes staff expenses, sourced from Compustat, which represent salary, wages, and other benefits paid to employees and officers; *Rev* is the total revenue; *Decr* equals 1 if total revenue is less than the previous year, and 0 otherwise. For *Controls*, asset intensity (*AI*) is the ratio of assets over revenue; *Suc_Decr* equals 1 if revenue decreases during both current and previous years, and 0 otherwise; *Loss* equals 1 if ROA is negative in the previous year, and 0 otherwise; and *Institutional* and *UNION* are as previously defined in Equation (2).

Results are reported in Model 1 of Table 7.[13] β_1 in Equation (3) is positive and significant while β_2 is negative and significant, suggesting that labor cost is sticky. In line with our expectation, the coefficient on $Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * MDIRCOMP_{i,t}$ is positive and significant, implying that ODEC alleviates the stickiness of labor costs.

Labor cost stickiness can occur owing to sticky adjustments of the number of employees and/or sticky average wage rate (Gu et al. 2020). However, since wages are usually sticky because of constant contract periods (Taylor 1980), we also examine the impact of ODEC on the stickiness

[13] Labor costs are voluntarily disclosed, which reduces the sample size dramatically. The sample size of Model 1 is approximately 7% (= 673/8117*100%) of the sample size in Model 2.

of employment level. Following Gu et al. (2020), we examine the stickiness of employment level by replacing the dependent variable in Equation (3) with $log\left(\frac{Employee_{i,t}}{Employee_{i,t-1}}\right)$, where *Employee* is the number of employees in a firm. Results are reported in Model 2 of Table 7. Similar to results in Model 1, we report a positive coefficient on $\log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right)$ and a negative coefficient for $Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right)$, indicating the existence of the stickiness of employment level. More importantly, we find that the coefficient of our interest, $Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * MDIRCOMP_{i,t}$, is significantly positive, suggesting that ODEC mitigates labor cost stickiness by facilitating the adjustment of employment level.

Collectively, the results in Table 7 show that equity compensation incentivizes outside directors to provide timely advice to managers to cut labor costs in response to an economic downturn, as well as timely advice to decrease the number of employees.

4.8. The Impact of ODEC on Employee Injuries and Pro-Social Employee Policies

Up to this point, our focus has been on managers' hiring decisions, showing that ODEC enhances the efficiency of these decisions. This finding is consistent with the notion that ODEC aligns the interests of outside directors with those of shareholders to maximize shareholder wealth. However, in prioritizing shareholder value and financial performance, especially in the short term, other stakeholders, such as employees, might be negatively affected (Caskey and Ozel 2017). As a result, ODEC might negatively affect employees' welfare and safety. On the other hand, prior studies have shown a significant decrease in firm value corresponding to higher employee injury rates (Cohn and Wardlaw 2016) and an increase in firm value related to employee-oriented corporate social responsibility (Suto and Takehara, 2022), suggesting that safety investments and pro-social employee policies benefit firm valuation in the long run. As such, ODEC could have a

positive association with employees' safety and welfare. Given above arguments, it remains an open empirical question whether equity compensation might incentivize outside directors to prioritize and improve employees' welfare. In this section, we aim to investigate whether ODEC affects employees' welfare, specifically employees' safety and pro-social employee policies.

We use a model similar to Equation (2), but replace the dependent variables with employee injury and employee policy measures and employ a Poisson regression. Table 8 provides the results of estimating the effect of ODEC on employee injuries. The employee injury data is from the Occupational Safety and Health Administration (OSHA). Following prior studies (e.g., Caskey and Ozel 2017; Bradley et al. 2022), we employ *Total Case Rate* as a proxy for employee injuries. *Total Case Rate* is the annualized total number of employee injury cases per 100 employees, which measures all deaths, injuries, and illnesses that result in days away from work or with job restriction or transfer and other recordable cases in a firm divided by the number of hours worked by all employees of a firm in a year and multiplied by 200,000 (employees work an average of 2,000 hours per year).[14] We find that the coefficient on *MDIRCOMP* is negative and significant, suggesting that ODEC significantly reduces employees' injury rate. We also use an alternative measure, *DART* instead of *Total Case Rate* to check the robustness of our results. One key difference is that *DART* excludes deaths cases in counting employee injuries. We continue to find that the coefficient on *MDIRCOMP* is significantly negative.

Table 9 presents the results of examining the effect of ODEC on firms' pro-social employee policies. Using employee policy data from Refinitiv, we create the following three measures for employee policies. *HumanRightsPolicy* is a dummy variable which equals 1 if the company has a policy for the exclusion of child, forced or compulsory labor, or to guarantee the freedom of

[14] Our results are based on data from 2007 to 2011 and from 2016 to 2019. Data from 2007 to 2011 are obtained from OSHA Data Initiative Program (ODI). Data from 2016 to 2019 are hand-collected.

association universally applied independent of local laws, and 0 otherwise. *PolicyChildLabor* is a dummy variable which equals 1 if the company has a policy to avoid the use of child labor, and 0 otherwise. *PolicyForcedLabor* is a dummy variable which equals 1 if the company has a policy to avoid the use of forced labor, and 0 otherwise. The independent variable of our interest is *MDIRCOMP*. From Columns 1 to 3, we provide consistent evidence that ODEC is positively associated with the existence of pro-social employee policies. Collectively, we show that equity compensation can motivate outside directors to maintain employee safety and pro-social employee policies, which could potentially increase long-term shareholder value.

5. Conclusion

This study investigates the relationship between ODEC and several aspects of labor investment. Using a sample of U.S. firms for the period from 2006 to 2019, we demonstrate that ODEC improves labor investment efficiency. These results are robust to alternative proxies for labor investment efficiency and ODEC, and alternative models, such as 2SLS regressions. In addition, we report evidence that the impact of ODEC is less pronounced when firms have other strong governance mechanisms, such as higher institutional and managerial ownership. Furthermore, we show that ODEC plays a more important role in improving labor investment efficiency for more human-capital-intensive and more complex firms. We also find that equity compensation incentivizes outside directors to induce managers to reduce labor costs in response to economic downturns in a timelier manner (i.e., reducing labor cost stickiness and employment level stickiness). Lastly, we document a negative (positive) relation between ODEC and employee injury rate (pro-social employee policies), suggesting that equity compensation encourages outside directors to pursue shareholder value without scarifying employee welfare.

Our study is not without limitations. First, most firms do not separately disclose their labor costs because labor-related expenses are voluntarily disclosed. As a result, labor cost may not be feasible to estimate labor investment efficiency due to small sample size. Second, using U.S. firms in our sample might limit the generalizability of the results to other economies. In other words, researchers should be cautious in applying our findings to other economies that have different institutional and cultural environments from U.S. Institutional and cultural environments can significantly influence the effects of various corporate governance mechanisms (such as outside directors' equity compensation) on corporate outcomes (Cumming, Filatotchev, Knill, Reeb, and Senbet 2017). Future research could extend our findings to other economies to further investigate how the relation between ODEC and labor investment efficiency varies with different institutional and cultural environments.

Nonetheless, this study provides important practical implications for regulators, shareholders, and directors. Our study justifies the necessity of increasing ODEC in the last two decades as we show that ODEC increases labor investment efficiency, facilitates timely labor policy adjustments, and lowers employee injury rate. Particularly, with the increasing attention to employee safety among employees, investors, and regulators, our study suggests that shareholders should consider providing outside directors with equity compensation.

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Appendix A
Variable Description

Variables	Description
Abn_other_invest	Abnormal other (non-labor) investments, defined as the absolute value of the residual from the model of: $Other\_invest_{it}=\beta_0+\beta_1 Sales\_Growth_{it-1}+\varepsilon_{it}$, where *Sales_Growth* is the percentage change in sales revenue. *Other_Invest* is the sum of capital expenditures, acquisition expenditures, and R&D expenditures, less cash receipts from the sale of property, plant, and equipment, scaled by lagged total assets.
Abnormal net hiring	The dependent variable in Equation (2). It is the absolute value of the residual in Equation (1). It is an inverse measure of labor investment efficiency, where a smaller value means that labor investment is more efficient.
AI	The ratio of total assets over total revenue.
AQ	The absolute value of Dechow and Dichev's (2002) measure of abnormal accruals, as modified by Ball and Shivakumar (2005).
AQC	The ratio of acquisition expenditure to total assets.
AUR	The ratio of annual sales to total assets.
BDAge	The natural logarithm of the average age of the directors.
BDGender	The percentage of male directors on the board.
BDIndependence	The percentage of independent directors on the board.
BDSize	The total number of directors on the board.
CAPX	The ratio of capital expenditure to total assets.
CEOAge	The natural logarithm of the age of the CEO.
CEO_dual	A dummy variable that equals 1 if the CEO holds the position of the board chairperson, and 0 otherwise.
CEOGender	A dummy variable that equals 1 (0) if the CEO is male (female) .
ΔQuick	The change in the quick ratio.
ΔROA	The change in ROA .
Complex_Firm	A dummy variable that equals 1 if a firm has more than two business segments, and 0 otherwise.
DART	Annualized number of cases per 100 employees, which measures all injuries, and illnesses resulting in days away from work and with job restriction or transfer divided by the number of hours worked by all employees in a year and multiplied by 200,000.
Decr	A dummy variable that equals 1 if total revenue decreased from the previous year, and 0 otherwise.
DEQR	The median proportion of outside directors' equity-based (i.e., stock and option) compensation to total compensation.
Dividend	A dummy variable that equals 1 if the firm pays dividends, and 0 otherwise
Employee	The number of employees in a firm.
FirmSize	The natural logarithm of the firm's market value.
Firm_Size_R	The natural logarithm of the market value of equity, ranked into percentiles.
HighCEOOwn	A dummy variable that equals 1 if the CEO ownership is above the median, and 0 otherwise.
High_Human_Cap	A dummy variable that equals 1 if a firm belongs to a human-capital-intensive industry (the relevant two- and three-digit SIC codes are 36, 48, 80, 283, 357, and 384), and 0 otherwise.
HighInstitutionalOwn	A dummy variable that equals 1 if the institutional ownership is above the median, and 0 otherwise.
HumanRightsPolicy	A dummy variable that equals 1 if the company has a policy for the exclusion of child, forced or compulsory labour, or to guarantee the freedom of association universally applied independent of local laws, and 0 otherwise.
IndustryDEQR	The industry median equity compensation (%) of outside directors. It is an instrumental variable in the first stage to predict *MDIRCOMP* for the two-stage least squares (2SLS) regression.
Institutional	The proportion of outstanding shares held by institutional investors.

LabCost	Staff expenses, which represents salary, wages, and other benefits paid to employees and officers.
Labor_intensity	The ratio of employees to total assets.
Leverage	The sum of debt in current liabilities and long-term debt, scaled by the total assets.
lnGDPpc	The natural logarithm of GDP per capita.
Loss	A dummy variable that equals 1 if the ROA is negative, and 0 otherwise.
LossBIN	Dummy variables that indicate each interval of prior-year ROA with a length interval of 0.005 from 0 to -0.025. For example, LossBIN1 equals 1 if prior-year ROA is between -0.005 and 0, otherwise LossBIN1 equals 0; LossBIN2 equals 1 if the prior-year ROA is between -0.01 and -0.005; otherwise LossBIN2 equals 0; and so on.
MCEOCOMP	The sum of stock and option compensation of the CEO divided by the total compensation of the CEO.
MDIRCOMP	The mean ratio of equity-based (i.e., stock and option) compensation to total compensation of outside (i.e., independent) directors.
MDIRCOMPO	The mean ratio of option compensation to total compensation of outside directors.
MDIRCOMPS	The mean ratio of stock compensation to total compensation of outside directors.
MeanStock_Opt	The mean (natural logarithm) value of outside directors' equity-based (i.e., stock and option) compensation.
MedStock_Opt	The median (natural logarithm) value of outside directors' equity-based (i.e., stock and option) compensation.
MTB	The market-to-book value of common stock.
Net_Hiring	The dependent variable in Equation (1), which is the percentage change in the number of employees.
PolicyChildLabor	A dummy variable that equals 1 if the company has a policy to avoid the use of child labor - actions, programs or initiatives to avoid child labor or the employment of children under legal working age for the company or its suppliers - consider information from industry code, and 0 otherwise.
PolicyForcedLabor	A dummy variable that equals 1 if the company has a policy to avoid the use of forced labor - actions, programs or initiatives to avoid forced or compulsory labor for the company or its suppliers - practices to avoid any work for which people are forced to do against their will, and 0 otherwise .
Quick	Quick ratio (the ratio of cash and short-term investments plus receivables to current liabilities) .
Return	The annual stock return.
Rev	The total revenue of a firm.
ROA	The return on assets.
Sales_Growth	Percentage change in sales revenue.
SD_CFO	The standard deviation of cash flows from operations over years t – 5 to t – 1.
SD_net_hire	The standard deviation of the percentage change in employees over years t – 5 to t – 1.
SD_Sales	The standard deviation of sales revenue over years t – 5 to t – 1.
Suc_Decr	A dummy variable that equals 1 if total revenue decreased during the current and the previous year, and 0 otherwise.
Tangible	The ratio of property, plant, and equipment to total assets.
Total Case	The annualized number of cases per 100 employees, which measures all deaths, injuries, and illnesses divided by the number of hours worked by all employees in a year and multiplied by 200,000 (employees work an average of close to 2,000 hours per year).
UNION	Labor unionization rate. It is an estimate of state-level union membership and coverage. The data are from Hirsch and Macpherson's (2003) updated database of Union Membership and Coverage.
XRD	The ratio of R&D expenditure to total assets.

Table 1
Estimating the Expected Level of Net Hiring (Equation (1))

Panel A: Descriptive Statistics for Variables used in Equation (1)						
Variable	N	Mean	Std. Dev.	Q1	Median	Q3
$Net\_Hiring_{i,t}$	115,648	0.079	0.361	-0.057	0.024	0.138
$Sales\_Growth_{i,t}$	115,648	0.169	0.670	-0.039	0.073	0.217
$Sales\_Growth_{i,t-1}$	115,648	0.230	0.786	-0.025	0.086	0.247
$\Delta ROA_{i,t}$	115,648	0.002	0.326	-0.051	-0.001	0.038
$\Delta ROA_{i,t-1}$	115,648	0.016	0.401	-0.051	-0.001	0.040
$ROA_{i,t}$	115,648	-0.040	0.346	-0.058	0.031	0.083
$Return_{i,t}$	115,648	0.130	0.640	-0.268	0.029	0.359
$FirmSize\_R_{i,t-1}$	115,648	56.007	27.689	33.000	58.000	80.000
$Quick_{i,t-1}$	115,648	2.149	2.885	0.794	1.280	2.306
$\Delta Quick_{i,t-1}$	115,648	0.207	1.374	-0.216	-0.011	0.226
$\Delta Quick_{i,t}$	115,648	0.145	1.173	-0.223	-0.019	0.202
$Leverage_{i,t-1}$	115,648	0.227	0.232	0.029	0.187	0.350
$LOSSBIN1_{i,t-1}$	115,648	0.011	0.106	0.000	0.000	0.000
$LOSSBIN2_{i,t-1}$	115,648	0.012	0.110	0.000	0.000	0.000
$LOSSBIN3_{i,t-1}$	115,648	0.175	0.380	0.000	0.000	0.000
$LOSSBIN4_{i,t-1}$	115,648	0.011	0.106	0.000	0.000	0.000
$LOSSBIN5_{i,t-1}$	115,648	0.010	0.100	0.000	0.000	0.000
$AUR_{i,t-1}$	115,648	1.140	0.801	0.580	0.991	1.501
$CAPX_{i,t-1}$	115,648	0.060	0.066	0.019	0.039	0.076
$AQC_{i,t-1}$	115,648	0.023	0.061	0.000	0.000	0.009
$XRD_{i,t-1}$	115,648	0.058	0.239	0.000	0.003	0.062
$lnGDPpc_{i,t-1}$	115,648	10.533	0.345	10.264	10.545	10.792

Panel B: Regression Results of Equation (1)

	(1)	(2)
$Sales\_Growth_{i,t}$	0.191***	
	(40.28)	
$Sales\_Growth_{i,t-1}$	0.030***	0.054***
	(12.55)	(28.00)
$\Delta ROA_{i,t}$	-0.107***	
	(-14.76)	
$\Delta ROA_{i,t-1}$	-0.024***	
	(-5.21)	
$ROA_{i,t}$	-0.002	
	(-0.22)	
$Return_{i,t}$	0.077***	
	(34.21)	
$FirmSize\_R_{i,t-1}$	0.001***	
	(17.31)	
$Quick_{i,t-1}$	0.008***	
	(12.73)	
$\Delta Quick_{i,t-1}$	0.017***	
	(12.87)	
$\Delta Quick_{i,t}$	-0.006***	
	(-3.67)	
$Leverage_{i,t-1}$	-0.053***	
	(-9.49)	
$LOSSBIN1_{i,t-1}$	-0.027***	
	(-4.07)	
$LOSSBIN2_{i,t-1}$	-0.023***	
	(-3.55)	
$LOSSBIN3_{i,t-1}$	-0.016***	
	(-5.61)	
$LOSSBIN4_{i,t-1}$	-0.006	
	(-0.81)	
$LOSSBIN5_{i,t-1}$	-0.010	
	(-1.30)	
$AUR_{i,t-1}$	0.009***	
	(4.97)	
$CAPX_{i,t-1}$	0.158***	
	(7.39)	
$AQC_{i,t-1}$	0.072***	
	(3.80)	
$XRD_{i,t-1}$	-0.057**	
	(-2.05)	
$lnGDPpc_{i,t-1}$	-0.022*	
	(-1.84)	
Constant	0.161	0.010
	(1.33)	(0.57)
Observations	115,648	166,115
R-squared	0.194	0.036
Industry fixed effects	Yes	Yes

Note: This table reports the descriptive statistics and regression results of Equation (1). Panel A reports the descriptive statistics for the variables used in the estimation of expected net hiring. Panel B reports the regression results for the estimation of the expected net hiring. All variables are defined in Appendix A. The t-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Although sample sizes vary, we follow Jung et al. (2014) and Ghaly et al. (2020) in presenting the data with the maximum number of observations available. Panel B: Regression Results of Equation (1).

Table 2
Descriptive Statistics for Variables used in Equation (2)

Panel A: Summary Statistics						
Variable	N	Mean	Std. Dev.	Q1	Median	Q3
Abnormal hiring$_{i, t}$	9495	0.087	0.147	0.023	0.051	0.099
MDIRCOMP$_{i, t-1}$	9495	0.500	0.234	0.435	0.542	0.643
MTB$_{i, t-1}$	9495	3.360	6.359	1.621	2.505	3.940
FirmSize$_{i, t-1}$	9495	7.880	1.473	6.796	7.714	8.893
Quick$_{i, t-1}$	9495	1.680	1.626	0.830	1.265	1.955
Leverage$_{i, t-1}$	9495	0.218	0.196	0.065	0.201	0.319
Dividend$_{i, t-1}$	9495	0.563	0.496	0.000	1.000	1.000
SD_CFO$_{i, t-1}$	9495	0.033	0.045	0.012	0.021	0.038
SD_Sales$_{i, t-1}$	9495	0.177	0.531	0.060	0.110	0.189
Tangible$_{i, t-1}$	9495	0.248	0.214	0.087	0.177	0.342
Loss$_{i, t-1}$	9495	0.138	0.345	0.000	0.000	0.000
Institutional$_{i, t-1}$	9495	0.676	0.354	0.616	0.824	0.926
UNION$_{i, t-1}$	9495	0.089	0.048	0.052	0.066	0.125
SD_net_hire$_{i, t-1}$	9495	0.136	0.155	0.053	0.091	0.159
Labor_intensity$_{i, t-1}$	9495	0.005	0.009	0.002	0.003	0.006
Abn_other_invest$_{i, t-1}$	9495	0.091	0.109	0.033	0.065	0.113
AQ$_{i, t-1}$	9495	5.477	2.849	3.000	5.000	8.000
CEOGender$_{i, t-1}$	9495	0.960	0.195	1.000	1.000	1.000
CEOAge$_{i, t-1}$	9495	4.028	0.125	3.951	4.025	4.111
CEO_dual$_{i, t-1}$	9495	0.434	0.496	0.000	0.000	1.000
MCEOCOMP$_{i, t-1}$	9495	0.487	0.237	0.354	0.524	0.660
BDSize$_{i, t-1}$	9495	8.517	2.333	7.000	8.000	10.000
BDIndependence$_{i, t-1}$	9495	0.794	0.108	0.727	0.818	0.889
BDGender$_{i, t-1}$	9495	0.859	0.108	0.800	0.875	0.923
BDAge$_{i, t-1}$	9495	4.143	0.066	4.104	4.145	4.185

Table 2 (Continued)

Panel B: Pearson Correlation Matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
[1]	*Abnormal net hiring*$_{i, t}$	1.00											
[2]	*MDIRCOMP*$_{i, t-1}$	**-0.04***	1.00										
[3]	*MTB*$_{i, t-1}$	-0.01	**0.05***	1.00									
[4]	*FirmSize*$_{i, t-1}$	**-0.07***	**0.21***	**0.16***	1.00								
[5]	*Quick*$_{i, t-1}$	**0.10***	**0.04***	-0.01	**-0.17***	1.00							
[6]	*leverage*$_{i, t-1}$	0.02	**0.03***	-0.01	**0.17***	**-0.23***	1.00						
[7]	*Dividend*$_{i, t-1}$	**-0.06***	**-0.06***	**0.04***	**0.30***	**-0.21***	**0.09***	1.00					
[8]	*SD_CFO*$_{i, t-1}$	**0.08***	**-0.03***	**0.04***	**-0.15***	**0.24***	**-0.03***	**-0.17***	1.00				
[9]	*SD_Sales*$_{i, t-1}$	**0.06***	**-0.04***	0.01	**-0.04***	**0.13***	0.00	**-0.09***	**0.29***	1.00			
[10]	*Tangible*$_{i, t-1}$	-0.01	**-0.07***	**-0.06***	**0.06***	**-0.23***	**0.17***	**0.14***	-0.02	**0.02***	1.00		
[11]	*Loss*$_{i, t-1}$	**0.09***	0.00	**-0.07***	**-0.23***	**0.04***	**0.03***	**-0.15***	**0.11***	**0.05***	**0.04***	1.00	
[12]	*Institutional*$_{i, t-1}$	0.01	**0.13***	0.01	**-0.03***	**0.09***	**0.08***	**-0.15***	**0.05***	**0.05***	**-0.04***	**0.03***	1.00
[13]	*UNION*$_{i, t-1}$	**-0.02***	**-0.06***	-0.01	-0.01	**-0.05***	**0.02***	**0.07***	**-0.05***	-0.02	**-0.02***	**-0.02***	**-0.05***
[14]	*SD_net_hire*$_{i, t-1}$	**0.10***	**-0.02***	**-0.04***	**-0.12***	**0.05***	**0.06***	**-0.21***	**0.13***	**0.26***	**-0.04***	**0.11***	**0.06***
[15]	*Labor_intensity*$_{i, t-1}$	-0.02	**-0.08***	0.01	**-0.16***	**-0.14***	**-0.08***	**0.03***	**-0.05***	**-0.07***	**0.12***	**-0.04***	**-0.15***
[16]	*Abn_other_invest*$_{i, t-1}$	**0.36***	0.01	**0.04***	-0.01	**0.12***	0.00	**-0.08***	**0.08***	**0.04***	**-0.12***	**0.04***	**0.07***
[17]	*AQ*$_{i, t-1}$	**-0.03***	**0.07***	0.01	**0.62***	**-0.24***	**0.23***	**0.26***	**-0.05***	0.02	**0.17***	-0.01	**-0.05***
[18]	*GENDER*$_{i, t-1}$	0.01	0.02	-0.02	0.02	**0.02***	**0.02***	-0.01	-0.01	0.02	-0.01	0.02	**0.04***
[19]	*CEOAge*$_{i, t-1}$	**-0.04***	-0.02	**-0.04***	**0.05***	**-0.04***	**0.03***	**0.10***	**-0.04***	0.00	**0.06***	**-0.03***	**-0.04***
[20]	*CEO_dual*$_{i, t-1}$	**-0.05***	-0.01	-0.02	**0.10***	**-0.05***	**-0.03***	**0.08***	**-0.07***	-0.02	**0.08***	**-0.07***	0.01
[21]	*MCEOCOMP*$_{i, t-1}$	0.01	**0.32***	**0.07***	**0.30***	0.01	**0.11***	**-0.06***	**0.03***	0.00	**-0.04***	**0.05***	**0.09***
[22]	*BDSize*$_{i, t-1}$	0.01	**0.08***	**0.05***	**0.52***	**-0.25***	**0.21***	**0.30***	**-0.15***	**-0.06***	**0.08***	**-0.05***	**-0.09***
[23]	*BDIndependence*$_{i, t-1}$	-0.01	**0.15***	**0.04***	**0.21***	**-0.08***	**0.10***	**0.11***	**-0.05***	-0.02	-0.01	-0.01	**0.08***
[24]	*BDGender*$_{i, t-1}$	**0.04***	**-0.07***	**-0.05***	**-0.30***	**0.18***	**-0.13***	**-0.20***	**0.11***	**0.08***	0.00	**0.07***	**0.10***
[25]	*BDAge*$_{i, t-1}$	-0.02	**-0.02***	**-0.04***	0.01	**0.06***	**-0.03***	**0.09***	**-0.03***	0.01	0.01	**-0.02***	0.00

Table 2 (continued)

Panel B (continued): Pearson Correlation Matrix

		[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]
[1]	*Abnormal net hiring*$_{i, t}$													
[2]	*MDIRCOMP*$_{i, t-1}$													
[3]	*MTB*$_{i, t-1}$													
[4]	*FirmSize*$_{i, t-1}$													
[5]	*Quick*$_{i, t-1}$													
[6]	*leverage*$_{i, t-1}$													
[7]	*Dividend*$_{i, t-1}$													
[8]	*SD_CFO*$_{i, t-1}$													
[9]	*SD_Sales*$_{i, t-1}$													
[10]	*Tangible*$_{i, t-1}$													
[11]	*Loss*$_{i, t-1}$													
[12]	*Institutional*$_{i, t-1}$													
[13]	*UNION*$_{i, t-1}$	1.00												
[14]	*SD_net_hire*$_{i, t-1}$	**-0.03***	1.00											
[15]	*Labor_intensity*$_{i, t-1}$	0.01	**-0.05***	1.00										
[16]	*Abn_other_invest*$_{i, t-1}$	-0.01	**0.06***	**-0.03***	1.00									
[17]	*AQ*$_{i, t-1}$	0.01	-0.01	**-0.20***	**-0.05***	1.00								
[18]	*GENDER*$_{i, t-1}$	**0.02***	**0.04***	**-0.06***	0.00	0.00	1.00							
[19]	*CEOAge*$_{i, t-1}$	**-0.02***	**-0.04***	0.00	-0.01	**0.07***	**0.05***	1.00						
[20]	*CEO_dual*$_{i, t-1}$	**0.03***	**-0.04***	0.01	**-0.04***	**0.06***	**0.05***	**0.27***	1.00					
[21]	*MCEOCOMP*$_{i, t-1}$	**-0.08***	0.02	**-0.08***	**0.04***	**0.18***	-0.01	**-0.09***	**-0.08***	1.00				
[22]	*BDSize*$_{i, t-1}$	0.01	**-0.08***	**-0.05***	**-0.03***	**0.46***	-0.01	0.00	0.01	**0.18***	1.00			
[23]	*BDIndependence*$_{i, t-1}$	**-0.03***	**-0.06***	**-0.06***	0.01	**0.17***	-0.01	**-0.02***	**0.11***	**0.25***	**0.36***	1.00		
[24]	*BDGender*$_{i, t-1}$	**-0.02***	**0.13***	**-0.06***	**0.03***	**-0.23***	**0.25***	**-0.02***	**-0.04***	**-0.10***	**-0.33***	**-0.24***	1.00	
[25]	*BDAge*$_{i, t-1}$	**-0.02***	-0.02	**-0.05***	**0.03***	**0.04***	**0.02***	**0.23***	**0.05***	**-0.07***	**-0.04***	**-0.08***	**0.16***	1.00

This table presents descriptive statistics for our main analysis, including the inverse measure of labor investment efficiency, outside directors' equity compensation, firm-level control variables, CEO-level control variables, and board-level control variables. Panel A presents the distributional statistics. Panel B reports the Pearson correlation matrix. All variables are defined in Appendix A. The symbol * in Panel B denotes statistical significance at the 5% level. Although sample sizes vary, we follow related studies (e.g., Jung et al., 2014) in reporting the data with the maximum number of observations available.

Table 3
The Relation between Outside Directors' Equity Compensation and Labor Investment Efficiency

VARIABLES	Labor investment inefficiency
***MDIRCOMP*$_{i, t-1}$**	**-0.019*****
	(-2.88)
MTB$_{i, t-1}$	-0.000
	(-0.42)
FirmSize$_{i, t-1}$	-0.004**
	(-2.28)
Quick$_{i, t-1}$	0.008***
	(7.84)
Leverage$_{i, t-1}$	0.013
	(1.60)
Dividend$_{i, t-1}$	-0.007**
	(-2.13)
SD_CFO$_{i, t-1}$	0.220***
	(6.22)
SD_Sales$_{i, t-1}$	0.000
	(0.15)
Tangible$_{i, t-1}$	-0.007
	(-0.67)
Loss$_{i, t-1}$	0.016***
	(3.67)
Institutional$_{i, t-1}$	-0.011**
	(-2.42)
UNION$_{i, t-1}$	-0.019
	(-0.60)
SD_net_hire$_{i, t-1}$	0.076***
	(7.70)
Labor_intensity$_{i, t-1}$	-0.541***
	(-2.64)
Abn_other_invest$_{i, t-1}$	0.393***
	(28.20)
AQ$_{i, t-1}$	0.001
	(0.79)
CEOGender$_{i, t-1}$	0.008
	(1.05)
CEOAge$_{i, t-1}$	-0.039***
	(-3.17)
CEO_dual$_{i, t-1}$	0.000
	(0.14)
MCEOCOMP$_{i, t-1}$	0.004
	(0.63)
BDSize$_{i, t-1}$	0.004***
	(4.61)
BDIndependence$_{i, t-1}$	-0.020
	(-1.30)
BDGender$_{i, t-1}$	0.022
	(1.33)
BDAge$_{i, t-1}$	-0.027
	(-1.17)
Constant	0.275***
	(2.62)

Table 3 (continued)

Observations	9,495
R-squared	0.137
Year fixed effects	Yes
Industry fixed effects	Yes

Note: This table presents the regression results on the impact of outside director's equity compensation on abnormal net hiring (an inverse measure of labor investment efficiency). We regress *Abnormal net hiring* on the variable of primary interest, *MDIRCOMP*, and on firm- CEO-, and board-level controls.

Table 4
The Relation between Outside Directors' Equity Compensation and Specific Forms of Labor Investment Inefficiency

	Panel A: Overinvestment			Panel B: Underinvestment		
VARIABLES	Total	OverHire	UnderFire	Total	UnderHire	OverFire
	(1)	(2)	(3)	(4)	(5)	(6)
MDIRCOMP$_{i, t-1}$	**-0.027****	**-0.043****	**-0.024**	**-0.016*****	**-0.011***	**-0.039*****
	(-2.04)	**(-2.49)**	**(-0.71)**	**(-2.68)**	**(-1.66)**	**(-2.71)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,026	2,844	1,182	5,469	4,356	1,113
R-squared	0.174	0.200	0.145	0.135	0.164	0.179
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table provides the regression results on the effect of outside directors' equity compensation on specific forms of labor investment inefficiency. Panel A reports the results based on the sample of overinvestment in labor, and Panel B reports the results based on the sample of underinvestment of labor. In Model 1, we estimate Equation (2) for the overinvesting firms, in which overinvestment occurs when the actual net hiring is greater than the expected net hiring. We decompose the overinvesting firms into two subsamples, the over-hiring subsample in Model 2 and the under-firing subsample in Model 3, where a firm is classified as over-hiring (under-firing) if it overinvests with a positive (negative) expected net hiring. In Model 4, we estimate Equation (2) for the underinvesting firms, in which underinvestment occurs when the actual net hiring is less than the expected net hiring. We decompose the underinvesting firms into subsamples of under-hiring in Model 5 and over-firing in Model 6, where a firm is classified as under-hiring (over-firing) if it underinvests in labor with positive (negative) expected net hiring. All variables are defined in Appendix A. The t-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5
Addressing Concerns of Endogeneity

					2SLS	
VARIABLES	(1)	(2)	(3)	(4) Change analysis	(5) 1st stage	(6) 2nd stage
***MDIRCOMP*$_{i, t-1}$**	**-0.020****	**-0.020****	**-0.020****	**-0.042****		**-0.051*****
	(-2.38)	**(-2.26)**	**(-2.17)**	**(-2.02)**		**(-3.37)**
IndustryDEQR$_{i, t-1}$					0.921***	
					(49.38)	
Controls and intercept	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,495	9,495	9,495	6,151	9,495	9,495
R-squared	0.142	0.228	0.125	0.173	0.502	0.138
Year fixed effects	Yes	No	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	No	Yes	Yes	Yes
State fixed effects	Yes	No	No	No	No	No
Firm fixed effects	No	No	Yes	No	No	No
Industry-year fixed effects	No	Yes	No	No	No	No
State-year fixed effects	No	Yes	No	No	No	No

Note: This table reports the results for endogeneity analyses. Model 1 repeats the main analysis using all the variables and the year and industry fixed effects of Equation (2). In addition, it includes state fixed effects to account for time-invariant characteristics across states. Model 2 includes all the variables in Equation (2) but instead of controlling for year, industry, and state fixed effects, it incorporates industry-year and state-year fixed effects to address concerns of time-varying differences across industries and in economic environments. Model 3 shows the results using all the variables in Equation (2) with year and firm fixed effects. Model 4 reports the result of the change specification by regressing the annual change in abnormal net hiring (*Abnormal net hiring*) on the annual change in outside directors' equity compensation (*MDIRCOMP*) and the annual change in all control variables in Equation (2). Models 5 and 6 present the results of the two-stage least squares (2SLS) regression on the impact of outside directors' equity compensation on labor investment efficiency. Model 5 is the first stage of the 2SLS; we regress *MDIRCOMP* on the instrumental variable (*IndustryDEQR*) and other control variables in Equation (2). The predicted level of *MDIRCOMP* in the first stage is used to show the impact of outside directors' equity compensation on labor investment efficiency in the second stage (Model 6). For brevity, the coefficients of the controls are not reported. All variables are defined in Appendix A. The t-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6
The Moderating Roles of Institutional Ownership, CEO Ownership, Human Capital Intensity, and Firm Complexity

VARIABLES	(1) Institutional Ownership	(2) CEO Ownership	(3) Human Capital Intensity	(4) Firm Complexity
MDIRCOMP$_{i, t-1}$	**-0.036*** **	**-0.027*** **	**-0.013***	**-0.013***
	(-2.77)	**(-2.72)**	**(-1.91)**	**(-1.68)**
HighInstitutionalOwn$_{i, t-1}$	-0.014*			
	(-1.70)			
MDIRCOMP$_{i, t-1}$*HighInstitutionalOwn$_{i, t-1}$	**0.029***			
	(1.91)			
HighCEOOwn$_{i, t-1}$		-0.015**		
		(-2.07)		
MDIRCOMP$_{i, t-1}$*HighCEOOwn$_{i, t-1}$		**0.026***		
		(1.92)		
High_Human_Cap$_{i, t-1}$			0.024**	
			(2.15)	
MDIRCOMP i,t-1*High_Human_Cap$_{i, t-1}$			**-0.027****	
			(-2.14)	
Complex_Firm$_{i, t-1}$				0.013**
				(2.14)
MDIRCOMP$_{i, t}$-1*Complex_Firm$_{i, t-1}$				**-0.020***
				(-1.76)
Constant	0.270***	0.258**	0.315***	0.322***
	(2.66)	(2.57)	(3.35)	(3.44)
Observations	9,495	9,495	9,495	9,495
R-squared	0.137	0.137	0.138	0.137
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm-level controls in Equation (2)	Yes	Yes	Yes	Yes
CEO-level controls in Equation (2)	Yes	Yes	Yes	Yes
Board-level controls in Equation (2)	Yes	Yes	Yes	Yes

Note: This table presents the results for the moderating effects of institutional ownership, CEO ownership, human capital intensity, and firm complexity on the relationship between outside directors' equity compensation and abnormal net hiring (the inverse measure of labor investment efficiency). In Model 1, we examine the effect of institutional ownership using a dummy variable (*HighInstitutionalOwn*) that equals 1 if institutional ownership is above-the median, and 0 otherwise. In Model 2, we investigate the effect of CEO ownership using a dummy variable (*HighCEOOwn*) that equals 1 if CEO ownership is above-the median, and 0 otherwise. In Model 3, we study the impact of firms operating in human-capital-intensive industries, where a dummy variable (*High_Human_Cap*) equals 1 if a firm belongs to such an industry (applies to industries with two- and three-digit SIC codes of 36, 48, 80, 283, 357, and 384), and 0 otherwise. In Model 4, we examine the effect of complex firms using a dummy variable (*Complex_Firm*) that equals 1 if a firm has more than two business segments, and 0 otherwise. We include all controls in Equation (2) for all models. For brevity, the coefficients of the controls are not reported. All variables are defined in Appendix A. The t-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7
The Impact of Outside Directors' Equity Compensation on Labor Cost Stickiness and Employment Level Stickiness

VARIABLES	(1) $\log\left(\frac{LabCost_{i,t}}{LabCost_{i,t-1}}\right)$	(2) $log\left(\frac{Employee_{i,t}}{Employee_{i,t-1}}\right)$
$\log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right)$	0.756***	0.509***
	(22.90)	(34.94)
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right)$	-0.322*	-0.220***
	(-1.69)	(-3.34)
$\boldsymbol{Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * MDIRCOMP_{i,t}}$	**0.562*** **	**0.138***
	(3.99)	**(1.86)**
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * AI_{i,t}$	0.053	-0.008**
	(1.32)	(-2.39)
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * Suc\_Decr_{i,t}$	0.356***	0.192***
	(4.45)	(6.05)
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * Loss_{i,t-1}$	0.011	-0.326***
	(0.14)	(-10.72)
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * Institutional_{i,t}$	-0.441**	-0.107**
	(-2.42)	(-2.26)
$Decr_{i,t} * \log\left(\frac{Rev_{i,t}}{Rev_{i,t-1}}\right) * UNION_{i,t}$	-0.002	-1.097***
	(-0.00)	(-3.61)
$MDIRCOMP_{i,t}$	0.025*	0.013
	(1.78)	(1.34)
$AI_{i,t}$	-0.001	0.007***
	(-0.32)	(3.69)
$Suc\_Decr_{i,t}$	0.014	-0.001
	(1.20)	(-0.20)
$Loss_{i,t-1}$	-0.016	-0.026***
	(-1.53)	(-4.71)
$Institutional_{i,t}$	0.014	0.000
	(1.44)	(0.08)
$UNION_{i,t}$	0.010	-0.040
	(0.16)	(-1.17)
Constant	-0.049	-0.042
	(-1.61)	(-1.53)
Observations	673	8,117
R-squared	0.701	0.350
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes

Note: This table reports the regression results for the impact of outside directors' equity compensation on labor cost stickiness and employment level stickiness. All variables are defined in Appendix A. The t-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8
The Effect of Outside Directors' Equity Compensation on Employee Injuries

VARIABLES	(1) *Total Case*	(2) *DART*
MDIRCOMP$_{i, t-1}$	**-0.400*** **	**-0.409*** **
	(-8.14)	**(-6.61)**
MTB$_{i, t-1}$	0.035***	0.037***
	(30.69)	(27.65)
FirmSize$_{i, t-1}$	-0.206***	-0.218***
	(-17.45)	(-14.98)
Quick$_{i, t-1}$	-0.069***	-0.053***
	(-4.91)	(-2.93)
Leverage$_{i, t-1}$	0.468***	0.622***
	(7.31)	(8.31)
Dividend$_{i, t-1}$	0.291***	0.309***
	(10.62)	(8.90)
SD_CFO$_{i, t-1}$	-0.831**	-1.080**
	(-2.56)	(-2.39)
SD_Sales$_{i, t-1}$	-1.342***	-2.056***
	(-10.61)	(-12.56)
Tangible$_{i, t-1}$	0.628***	0.924***
	(8.34)	(10.06)
Loss$_{i, t-1}$	-0.477***	-0.574***
	(-12.55)	(-11.56)
Institutional$_{i, t-1}$	0.244***	0.379***
	(7.45)	(9.19)
UNION$_{i, t-1}$	0.088	0.298
	(0.39)	(1.07)
SD_net_hire$_{i, t-1}$	1.015***	1.305***
	(11.32)	(12.03)
Labor_intensity$_{i, t-1}$	15.517***	19.149***
	(8.93)	(9.34)
Abn_other_invest$_{i, t-1}$	0.435***	0.480***
	(4.70)	(4.13)
AQ$_{i, t-1}$	-0.084***	-0.110***
	(-13.88)	(-14.43)
CEOGender$_{i, t-1}$	0.840***	1.000***
	(12.23)	(11.74)
CEOAge$_{i, t-1}$	0.117	0.064
	(1.21)	(0.52)
CEO_dual$_{i, t-1}$	-0.459***	-0.540***
	(-19.14)	(-18.11)
MCEOCOMP$_{i, t-1}$	-0.226***	-0.255***
	(-4.25)	(-3.82)
BDSize$_{i, t-1}$	-0.021***	-0.020***
	(-3.52)	(-2.70)
BDIndependence$_{i, t-1}$	0.998***	1.354***
	(8.24)	(8.83)
BDGender$_{i, t-1}$	-2.873***	-3.535***
	(-24.51)	(-24.75)
BDAge$_{i, t-1}$	4.229***	5.519***
	(20.75)	(21.47)

Table 8 (continued)

Constant	-12.983***	-18.404***
	(-14.60)	(-16.32)
Observations	2,395	2,395
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes

Note: This table provides the regression results of Poisson model estimated on the effect of outside directors' equity compensation (*MDIRCOMP*) on employee injuries. The dependent variable (*Total Cases*) in Models (1) is the annualized number of cases per 100 employees, which measures all deaths, injuries, and illnesses divided by the number of hours worked by all employees in a year and multiplied by 200,000 (employees work an average of close to 2,000 hours per year). The dependent variable (*DART*) in Models (2) is the annualized number of cases per 100 employees, which measures all injuries, and illnesses resulting in days away from work and with job restriction or transfer divided by the number of hours worked by all employees in a year and multiplied by 200,000. All variables are defined in the Appendix. The z-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9
The Effect of Outside Directors' Equity Compensation on Human Rights Policy for Labor

VARIABLES	(1) *HumanRightsPolicy*	(2) *PolicyChildLabor*	(3) *PolicyForcedLabor*
MDIRCOMP$_{i, t-1}$	**0.324***	**0.446***	**0.775*****
	(1.73)	**(1.93)**	**(3.14)**
MTB$_{i, t-1}$	-0.001	0.005	0.005
	(-0.12)	(0.80)	(0.75)
FirmSize$_{i, t-1}$	0.327***	0.323***	0.258***
	(7.66)	(6.26)	(4.87)
Quick$_{i, t-1}$	0.032	0.036	0.073*
	(0.84)	(0.76)	(1.66)
Leverage$_{i, t-1}$	-0.144	0.577**	0.677**
	(-0.62)	(2.13)	(2.50)
Dividend$_{i, t-1}$	0.647***	0.592***	0.490***
	(7.24)	(5.05)	(4.17)
SD_CFO$_{i, t-1}$	-2.505	-5.288**	-3.942*
	(-1.63)	(-2.34)	(-1.77)
SD_Sales$_{i, t-1}$	-0.457	-0.674	-0.490
	(-1.51)	(-1.38)	(-1.04)
Tangible$_{i, t-1}$	-1.371***	-1.263***	-1.381***
	(-6.96)	(-5.16)	(-5.41)
Loss$_{i, t-1}$	-0.127	0.066	-0.084
	(-0.93)	(0.38)	(-0.45)
Institutional$_{i, t-1}$	-0.663***	-0.498***	-0.587***
	(-6.08)	(-3.99)	(-4.60)
UNION$_{i, t-1}$	-3.763***	-3.325***	-5.606***
	(-4.62)	(-3.44)	(-5.46)
SD_net_hire$_{i, t-1}$	-0.953***	0.100	-0.740
	(-2.76)	(0.23)	(-1.51)
Labor_intensity$_{i, t-1}$	18.727***	15.763***	10.700*
	(3.67)	(2.78)	(1.81)
Abn_other_invest$_{i, t-1}$	-1.720***	-2.252***	-2.099***
	(-3.65)	(-3.45)	(-3.19)
AQ$_{i, t-1}$	-0.102***	-0.089***	-0.040*
	(-5.51)	(-3.72)	(-1.69)
CEOGender$_{i, t-1}$	-0.312	-0.523**	-0.758***
	(-1.31)	(-2.30)	(-3.39)
CEOAge$_{i, t-1}$	-0.069	0.694	-0.144
	(-0.20)	(1.64)	(-0.33)
CEO_dual$_{i, t-1}$	-0.140*	-0.144	-0.032
	(-1.74)	(-1.51)	(-0.32)
MCEOCOMP$_{i, t-1}$	0.159	-0.205	-0.002
	(0.85)	(-0.93)	(-0.01)
BDSize$_{i, t-1}$	0.129***	0.046*	0.041*
	(6.32)	(1.96)	(1.70)
BDIndependence$_{i, t-1}$	1.364***	0.627	1.613***
	(3.35)	(1.27)	(3.07)
BDGender$_{i, t-1}$	-2.768***	-2.197***	-2.241***
	(-6.40)	(-4.33)	(-4.31)

Table 9 (continued)

$BDAge_{i,\,t-1}$	2.264***	1.321*	2.687***
	(3.23)	(1.76)	(3.11)
Constant	-10.592***	-10.290***	-12.768***
	(-3.53)	(-3.05)	(-3.41)
Observations	3,821	3,783	3,781
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes

Note: This table provides the logit regression results of the effect of outside directors' equity compensation (*MDIRCOMP*) on human rights policy for labor (Models (1) to (3)). The dependent variable in Model (1) is *HumanRightsPolicy*, a dummy variable which equals 1 if the company has a policy for the exclusion of child, forced or compulsory labor, or to guarantee the freedom of association universally applied independent of local laws and 0 otherwise. The dependent variable in Model (2) is *PolicyChildLabor*, a dummy variable which equals 1 if the company has a policy to avoid the use of child labor and 0 otherwise. The dependent variable in Model (3) is *PolicyForcedLabor*, a dummy variable which equals 1 if the company has a policy to avoid the use of forced labor and 0 otherwise. All variables are defined in the Appendix. The z-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.