From Campus to Corporation:
Corporate Donations to Universities and Labor Efficiency

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JEL Classification: G34, J21, M54
Keywords: University donations, Labor investment efficiency, Strategic donations, Reputation building

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1. Introduction

Corporate charitable donations, a pivotal form of corporate social responsibility, have garnered significant attention owing to their escalating amounts.[1] While corporate philanthropy is generally viewed in the literature of corporate charitable donations as a strategic choice which aimed at bolstering corporate reputation, fostering positive relationships with stakeholders, and yielding benefits for firms (Berman et al., 1999; Godfrey, 2005; Gao et al., 2023), recent finance and economics studies building upon this framework and provide mixed evidence of whether corporate philanthropy can enhance shareholder values (Masulis and Reza, 2015; Liang and Renneboog, 2017). In this study, we extend this line of inquiries by examining the effect of corporate philanthropy on a firm's investment in labor, an important factor that associated with shareholder values while less explored in the literature.

Philanthropic endeavors are posited to assist companies in securing government support, improving public perception, and amplifying product sales (Sánchez, 2000; Godfrey, 2005; Su and He, 2010; Zhang et al., 2010; Gao et al., 2017). Consistent with this argument, some theoretical studies suggest that corporate donations may help enhance a firm's attractiveness as an employer and give it a competitive advantage in recruiting employees (Turban and Greening, 1997; Turban and Cable, 2003). Furthermore, Navarro (1988) and Ricks and Williams (2005) imply that charitable donations to education may increase a firm's access to trained labor. However, there is no empirical evidence on how firms' donation behavior affects labor recruitment. We fill the gap in the empirical literature by documenting the impact of corporate charitable donations to universities on corporate employee recruitment, specifically on the efficiency of corporate labor investment.

Theoretically speaking, there are two opposing views in the literature on whether charitable donations could improve shareholder values. According to the strategic donation's view, as defined by Saiia et al. (2003), corporate philanthropy involves using corporate resources to build stronger relationships between donors and beneficiaries—a practice known as "doing good to do well". Proponents argue that such donations can foster political connections, generate advertising effects, enhance public image, and boost product sales (Sánchez, 2000; Hess et al., 2002; Godfrey, 2005;

[1] Total U.S. giving in 2022 is $21.08 billion (Giving USA 2022 Annual Report).

Su and He, 2010; Zhang et al., 2010; Gao et al., 2017). Consequently, these strategic contributions may lead to improved firm performance and increased shareholder values (Wokutch and Spencer, 1987; Shaw and Post, 1993; Patten, 2007; Su and He, 2010; Wang and Qian, 2011; Barnett and Salomon, 2012; Zhang et al., 2014; Liang and Renneboog, 2017). Recent research indicates that companies may strategically employ philanthropic donations as a means to garner support or approval from stakeholders, ultimately enhancing capital investment efficiency and M&A performance. This strategic use of philanthropy should contribute to an overall increase in firm value (Chen et al., 2018; Gao et al., 2023). However, agency perspectives argue that corporate donations often signify conflicts of interest between shareholders and managers. In this scenario, managers may utilize corporate funds to support their personal charitable preferences, thereby enhancing their individual reputations and social networks, and pursuing personal interest (Haley, 1991; Brown et al., 2006; Marquis et al., 2007; Masulis and Reza, 2015; Tan and Tang, 2016; Cai et al., 2021). Consequently, the existing research on the economic implications of corporate philanthropy remains inconclusive.

Corporate philanthropy refers to corporate donations to charitable or social causes such as education, healthcare, arts, environmental protection, and disaster relief (Godfrey, 2005; Wang et al., 2008; Gao et al., 2023). The impacts on firms may vary depending on the recipients of these donations. However, current research on the economic implications of charitable contributions predominantly concentrates on the donation amount. There is scarce evidence on the effects of different types of donation recipients. An exception is evident in the study of Cai et al. (2021), who observed that CEOs receiving substantial compensation are less likely to face replacement for poor performance when associated with charitable foundations served by independent directors. There exists a huge gap in understanding how corporate philanthropy, beyond monetary contributions, influences firm dynamics and outcomes.

University foundations in China have experienced a rapid growth over the past decade. By 2022, there is a total of 747 university foundations nationwide, with more than 40 foundations established almost every year during the period 2010-2020. The total net assets of university foundations at the end of 2021 is about 75.3 billion RMB, accounting for 31 percent of the total net assets of foundations nationwide, and the total endowment income in 2021 is about 18.3 billion RMB, accounting for 19 percent of the total endowment income of foundations nationwide in 2021.

Why a large number of firms choose to donate to educational institutions is intriguing and underexplored. Universities, serving as reservoirs of human capital, contribute significantly to the labor market by supplying a vast pool of highly qualified individuals (Bardhan et al., 2013). Some studies propose that corporate donations to educational institutions might enhance a firm's access to skilled labor (Navarro, 1998; Ricks and Williams, 2005). However, there is a current absence of empirical evidence supporting this assertion. Labor is playing an increasing role in determining a firm's competitive success (Pfeffer, 1996; Jung et al., 2014; Cao and Rees, 2020), and firms are often restricted in their employment decisions by external labor market constraints, making it difficult to hire enough employees in a timely manner (Yuan et al., 2023), especially with the gradual disappearance of demographic bonus in China, the problem of labor shortage has come to the fore. Inefficient labor investment, which deviates from the optimal level of labor investment, can be costly to firms since it results in overcapacity problems and insufficient growth in the form of over-investment and under-investment (Jung et al., 2014). The literature has documented the important role of decision making in firms' labor investment, especially given the need for firms to maintain optimal labor investments (Pinnuck and Lillis, 2007; Ellul et al., 2018). Thus, whether a firm could efficiently invest in labor is economically significantly (Jung et al., 2014; Cao and Rees, 2020). Utilizing the university education foundation as a conduit for donations, this study investigates whether firms strategically contribute to educational institutions with the aim of cultivating robust connections, securing a high-caliber labor force, improving labor investment efficiency, and ultimately augmenting the firm's value.

Leveraging a dataset comprising hand-collected donation information from 2,804 Chinese firms spanning from 2010 to 2021, we find that corporate donations to universities significantly increase its labor investment efficiency. On average, a one-standard-deviation increase in corporate donations is associated with an increase of 4.87% in labor investment efficiency. Our results are robust to a variety of sensitivity tests, including alternative measures of donations and labor investment efficiency, and an alternative sample using propensity score matching.

To address potential endogeneity concerns, we first adopt a change model to examine the corresponding changes in labor investment efficiency when a firm initiates (or terminates) university donations. We find that labor investment efficiency tends to increase when a firm initiates such donations while decrease after terminating such donations. Second, we use the number of newly-

established university education foundations at the province where a firm's headquarter is located as an instrument variable for donations to universities, and the 2SLS results are consistent with our baseline results.

We then move on to investigate whether the donations to the university improves the talent structure of the firm. We find that corporate donations to universities tend to increase the ratio of high educational and skilled employees. We further split our sample to extend baseline results by separately examining the relationship between university donations and over-investment (i.e., over-hiring and under-firing) and under-investment (i.e., under-hiring and over-firing). This approach allows us to uncover the specific pathways through which corporate donations to universities impact labor investment efficiency. The results suggest that enhancing labor investment efficiency involves addressing under-investment in employment, particularly by mitigating issues related to under-hiring and under-firing.

In cross-sectional analysis, we examine whether our results are more pronounced among firms that are more likely to hire high-skilled employees and firms that are more likely to hire through reputation building. Human capital-intensive firms generally possess higher levels of expertise, education, and labor skills, and therefore are the key source of value creation (Cao and Rees, 2020), which are subject to higher labor market frictions because competition in high-skilled sectors often involves "talent wars" that makes it difficult for those firms to efficiently recruit talent (Chang and Jo, 2019). We also examine whether the relationship between donations and labor investment efficiency is affected by product market competition. Firms operating in more competitive market environments face a greater risk of losing valuable talent to competitors than firms facing lower levels of competition and are more motivated to donate to universities. Aghion et al. (2005) argue that competition increases the need for innovation, which requires more talents to work for the firm. The increase in demand for high-skilled personnel by firms with high human capital intensity and the "war for talent" caused by a highly competitive environment are more likely to prompt firms to realize the talent matching mechanism between universities and firms through the donation-recruitment model (Turban and Greening, 1997). Consistent with our expectations, we find that the positive relationship between donations to universities and corporate labor investment efficiency is more pronounced for firms with higher human capital intensity and product market competition.

Prior literature documented that donations can be used for promotional purposes and to

enhance corporate reputation (Godfrey, 2005; Zhang et al., 2010; Gao et al., 2012). Firms considering their reputation and legitimacy would prefer to collaborate with prestigious universities (Hong and Su, 2013). Hence, we expect that the relationship between corporate donations to universities and labor investment efficiency should be more pronounced for firms that are more likely to hire through reputation building. We conduct the test in both the regional level and the firm level, respectively. The results at the regional level indicate that the positive relationship between donations to universities and corporate labor investment efficiency is more pronounced for firms in regions with higher distortions in urban labor allocation and population exodus. The results at the firm level show that the positive relationship between donations to universities and corporate labor investment efficiency is more pronounced among firms with lower employee welfare and higher advertising expenditures. In addition, we find that firms' negative media coverage strengthens the positive relationship between corporate donations to universities and labor investment efficiency.

Our study contributes to the related literature in three important ways. First, our study contributes to the literature on the impact of corporate donations on firm value (Shaw and Post, 1993; Marquis et al., 2007; Su and He, 2010; Wang and Qian, 2011; Zhang et al., 2014; Masulis and Reza, 2015; Liang and Renneboog, 2017; Gao et al., 2023). The findings of previous research on the relationship between corporate donations and firm values are mixed (Wokutch and Spencer,1987; Wang et al., 2008; Wang and Qian, 2011; Masulis and Reza, 2015). By tracing corporate giving channel and documenting that philanthropy benefits investors by increasing labor investment efficiency, we gain a better understanding of the positive economic consequences of corporate philanthropy.

Second, to the best of our knowledge, our paper is the first study that attempts to focus on the impact of strategic donations to universities on potential workforce using a unique data, whereas existing research reveals little about the circumstances under which specific organizations opts to donate due to a specific cause. Our findings complement the study by Cai et al. (2021), which focus on the agency perspective of charitable donations and document evidence that CEOs receive high compensation and are unlikely to be replaced for poor performance through donations to charitable foundations on which independent directors serve. In sharp contrast to the findings of Cai et al. (2021), we find that donations to universities increase the labor investment efficiency of a firm, supporting the positive impact of charitable donations on firm value.

Third, we also add to the burgeoning literature on labor investment efficiency. Previous literature has documented that financial reporting quality (Jung et al., 2014), stock characteristics (Ben-Nasr and Alshwer, 2016; Ding et al., 2021; Sualihu et al., 2021; Ee et al., 2022), political environment (Kong et al., 2018; Luo et al., 2020), CEO-director ties (Khedmati et al., 2020), competition (Boubaker et al., 2022; Yuan et al., 2023; Lai et al., 2023) , employee-friendly policy (Cao and Rees, 2020), institutional ownership and analyst coverage (Ghaly et al., 2020; Lee and Mo, 2020) are influential factors for labor investment efficiency. Our study contributes to this emerging stream of literature on the determinants of labor investment efficiency by identifying donations to universities as another important determinant.

The rest of the paper proceeds as follows. Section 2 provides a brief description of related literature and develops empirical hypotheses. Section 3 describes our data and research design, and Section 4 presents the empirical results. Section 5 concludes.

2. Related literature and hypothesis development

2.1 Labor investment efficiency

Labor investment accounts for roughly two-thirds of economy-wide value-added and exert significant impacts on improving the competitiveness of micro-enterprises and even macroeconomic development (Hamermesh, 1995; Jung et al., 2014). Considering that investment decisions are the main path to corporate value creation in the classical financial theory framework, a number of studies have explored the impact of CSR performance on corporate investment decisions. However, the main focus has been on the role of CSR performance on the capital investment behavior of firms (Bhandari and Javakhadze, 2017; Benlemlih and Bitar, 2018; Chen et al., 2018; Cook et al., 2019; Arouri et al., 2019; Gao et al., 2023), and have lacked attention to the efficiency of labor investment, which is centered on human capital. Yet, compared to capital investment, labor investment owns some unique and important characteristics. First, the adjustment costs associated with labor tend to be relatively low (Dixit and Pindyck, 1994), but more frequently made, implying that labor investment has a continuous impact on firms' costs and returns (Merz and Yashi, 2007). Second, labor is more mobile and reversible (Pindyck, 1988), and employees can act strategically by choosing where to work due to alternative opportunities. Finally, the long-term and uncertain nature of returns on labor investment makes firms prioritize the allocation of labor when

adjusting the firm's investment strategy (Pinnuck and Lillis, 2007). Thus, whether a firm can efficiently invest in labor is economically significantly (Jung et al., 2014).

Labor is playing an increasing role in determining a firm's competitive success (Pfeffer, 1996; Cao and Rees, 2020). Employees are seen as a firm's valuable resource and an important source of success, which are closely linked to the efficiency of labor investment of firms (Cao and Rees, 2020). However, the empirical literature seems to have paid insufficient attention to labor investment (Jung et al., 2014). Several recent studies have shown that corporate employment decisions are affected by a variety factors; such as, financial reporting quality (Jung et al., 2014), stock characteristics (Ben-Nasr and Alshwer, 2016; Ding et al., 2021; Sualihu et al., 2021; Ee et al., 2022), political environment (Kong et al., 2018; Luo et al., 2020), CEO-director ties (Khedmati et al., 2020), competitions (Boubaker et al., 2021; Yuan et al., 2023; Lai et al., 2023) , employee-friendly policy (Cao and Rees, 2020), institutional ownership and analyst coverage (Ghaly et al., 2020; Lee and Mo, 2020). Related to our study, Cao and Rees (2020) investigate the impact of firms' human resource treatment policies on employment decisions and show that employee-friendly policies are found to be significantly associated with higher labor investment efficiency. Yuan et al. (2023) focus on the effect of labor marketisation level on corporate labor investment efficiency and suggest that higher labor marketisation level is associated with higher corporate labor investment efficiency.

2.2 Corporate charitable donations

Charitable donations have attracted great interest as an important part of corporate social responsibility (Peloza and Shang, 2011). In recent years, with the rapid development of the market economy, firms are striving to establish their unique place amid intense competition. Consequently, charitable donations have gone beyond the traditional scope of "charity" and are now an important strategic tool for meeting business needs. However, the existing research on the economic impact of corporate philanthropy remains inconclusive. There was a shift away from traditional donations behavior towards what many researchers have called "strategic philanthropy" since the late 1980s (Morris and Biederman, 1985; Hess et al., 2002; Porter and Kramer, 2006; Gao et al., 2023). Strategic philanthropy emphasizes closer relationships between corporate donors and their beneficiaries (Gautier and Pache, 2015), and firms should manage their stakeholders in a way that could help achieve their desired results (Mitchell et al., 1997). Corporate donations could assist

firms in forming political relationship, creating advertising effects, enhancing their public image, and boosting product sales (Sánchez, 2000; Hess et al., 2002; Godfrey, 2005; Su and He, 2010; Zhang et al., 2010; Gao et al., 2017), thus increasing firm performance and shareholder values (Wokutch and Spencer, 1987; Shaw and Post, 1993; Patten, 2007; Su and He, 2010; Wang and Qian, 2011; Barnett and Salomon, 2012; Zhang et al., 2014; Liang and Renneboog, 2017). Recent studies document that firms may strategically use philanthropic donations to obtain support or approval from stakeholders so as to increase capital investment efficiency and M&A performance (Chen et al., 2018; Gao et al., 2023), then increase firm valuation.

However, from the agency problem perspective, the counterargument is that corporate donations often signify conflicts of interest between shareholders and managers, where managers support their own charity preferences with corporate funds and enhance their personal reputations and social networks, achieving personal self-interest, which deviates from firm value and shareholder wealth maximization (Haley, 1991; Brown et al., 2006; Marquis et al., 2007; Masulis and Reza, 2015; Tan and Tang, 2016; Cai et al., 2021). The literature showed that self-interested managers may be keen on enhancing their personal reputations and thus resort to corporate philanthropy as a means to promote their individual political or career agenda (Marquis et al., 2007; Chen et al., 2018). Cai et al. (2021) document that CEOs receive high compensation and are unlikely to be replaced for poor performance through donations to charitable foundations on which independent directors serve, which demonstrates the agency problem view of charitable donations. Hence, the findings of previous research on the relationship between corporate donations and firm values are mixed (Wokutch and Spencer,1987; Wang et al., 2008; Wang and Qian, 2011; Masulis and Reza, 2015).

2.3 University donations and labor investment efficiency

University donations may affect labor investment efficiency in two different ways. On one hand, corporate donations to universities may increase the labor investment efficiency of firms. First, according to instrumental stakeholder theory, which underscores the connection between stakeholder management and business objectives, firms should manage key stakeholders to gain essential resources for their development (Donaldson and Preston, 1995; Jones et al., 2018). Gao et al. (2023) document that companies strategically use philanthropic donations to garner support from

stakeholders, potentially increasing future acquisitions. Second, Turban and Greening (1997) propose that corporate donations can improve a company's image, making it more attractive to potential job applicants who share the firm's values. It is reasonable to assume that companies seeking to expand their workforce may streamline the process by making philanthropic donations to universities (Ricks and Williams, 2005). Skilled employees with higher levels of education and expertise are valuable assets, significantly improving a firm's labor investment efficiency (Cao and Rees, 2020). Third, donations to universities provide access to a well-trained workforce, reduce labor frictions, and lower search costs. Supporting education may also increase the long-term supply of labor, lowering labor costs (Navarro, 1988). Establishing talent-building funds at universities through charitable giving helps cultivate talents in specific research areas, fostering a talent matching mechanism between universities and firms. Fourth, modern corporates prioritize reputation (Roberts and Dowling, 2002; Gautier and Pache, 2015). Providing educational resources and scholarships creates a positive impression on students, enhancing a firm's image on campuses. These factors, considered reputational assets, are potential sources of competitive advantage (Hess et al., 2002). Firms gain an advantage in recruiting graduates, demonstrating the indirect benefits of strategic corporate philanthropy and its potential for competitive advantages in human resources. Branco and Rodrigues (2006) revealed that CSR activities are linked to stronger reputation, making the firm more attractive to highly skilled potential employees and aligning with strategic needs. Charitable donations attract more job seekers, making it easier to recruit high-skilled labor and increasing firms' labor investment efficiency. Therefore, donations to universities can result in more efficient labor investment for firms.

On the other hand, corporate donations to universities may also reduce labor investment efficiency. According to the agency perspective, corporate philanthropy is considered as indicative of agency problems between managers and owners, where managers may prioritize their own interests (Masulis and Reza, 2015). Managers driven by self-interest can undermine firm value, and literature suggests that such managers may use corporate philanthropy to boost personal reputations and advance individual political or career agendas (Marquis et al., 2007; Chen et al., 2018; Cai et al., 2021). In addition, the trade-off hypothesis suggests that investing in donations may disrupt firms' investment efficiency by diverting capital and essential resources that could otherwise be directly used for related investments in human capital (Preston and O'Bannon, 1997). Thus,

managers pursuing personal goals and deriving private benefits from donations may deplete the firm's resources, introducing inefficiencies in investment policies (Benlemlih and Bitar, 2018), consequently diminishing the labor investment efficiency of firms.

Because no definite conclusion can be drawn regarding the relationship between university donations and labor investment efficiency, we construct two competing hypotheses, where H1a underscores the strategic donation's view of corporate donations and H1b highlights the agency problem perspective of corporate donations:

H1a. All else being equal, university donations are positively associated with labor investment efficiency.

H1b. All else being equal, university donations are negatively associated with labor investment efficiency.

3. Data and research design

3.1 Sample selection

We manually collect data on donations received by the university education foundations from the following sources: (1) the official websites of different university education foundations, (2) financial statements of all A-share listed firms, (3) social responsibility reports of all A-share listed firm, (4) the official website of CNINFO [2] (5) the official website of "Charity in China" (cszg.mca.gov.cn), and (6) the website of foundation center (www.foundationcenter.org.cn). We compile a dataset which includes detailed information on a total of 17,666 records of donation over the 2010-2021 period. We also cross-check our donation data with CNRDS (Chinese Research Data Services Platform)[3], which provides information on a smaller number of 7,402 donations received by the university education foundations over the same 2010-2021 period.

We then identify the link between donations received by the university education foundations and the listed firms. Following Wasi and Flaaen (2015) and Cai et al. (2021), we rely on a fuzzy matching procedure augmented with human checking to merge our donation data with listed firms and their subsidiaries. This procedure has managed to link 1,542 corporate donations made by 877

[2] CNINFO (cninfo.com.cn) is the platform designated by the Shenzhen Stock Exchange for listed firms to disclose information.

[3] CNRDS is an open platform providing high-quality data for academic research. See more details at https://www.cnrds.com.

unique listed firms to university education foundations.

We start with all 4,868 firms listed on the Shenzhen Stock Exchange (SZSE) and the Shanghai Stock Exchange (SHSE) and 38,510 firm-year observations over the 2010-2021 period. Following the literature, we exclude financial firms, and firms with ST/*ST status from our empirical analysis, leading to a smaller sample of 35,216 firm-year observations. We further exclude 9,986 firm-years that they don't make any donations in the year. This filtering procedure is important since our comparison is based upon those firms making corporate donations and the only difference for these firms is whether or not their donations go to university education foundations. As usual, we require that all firms should have information necessary for our empirical analysis so we lose another 7,129 firm-years observations which do not have complete information. This screening procedure yields a final sample which consists of 18,101 firm-year observations from 2,804 unique firms, with 1,145 corporate donations to university education foundations.

Table 1 presents the distribution of sample firms by year (Panel A) and industry distribution of university donations (Panel B). As indicated in Panel A, our final sample includes 1,145 university donations over the sample period, ranging from the lowest number of donations of 71 in 2012 to the highest number of donations of 139 in 2018. The average proportion of firms with donations to universities is 6.33%, ranging from the lowest of 4.70% in 2014 to the highest of 9.04% in 2018. An interesting finding in Panel B is that the pharmaceutical manufacturing industry (9.87%), the computer, communications and other electronic equipment manufacturing industry (7.52%), and the electrical machinery and equipment manufacturing industry (7.07%) are the top three industries that are more inclined to make donations to universities, which suggests that firms with a greater need for high-end technology developers are more likely to collaborate with universities through charitable donations, cultivating talents in specific research areas of the firm and realizing the talent matching mechanism between universities and firms.

***** Insert Table 1 about here *****

3.2 Donations

We use the willingness to donate (*DONWILL*) and donation amount (*AMOUNT*) to measure the behavior of listed firms that make donations to universities. In particular, *DONWILL* is a dummy variable, which takes the value of one if a firm makes donations to at least one university education

foundation in a given year and zero otherwise. Following Jia and Zhang (2018), the amount of donations (*AMOUNT*) is defined as the ratio of giving to assets in a given year.

3.3 Labor investment efficiency

Following the prior literature (Jung et al., 2014; Khedmati et al., 2020; Cao and Rees, 2020), we measure labor investment inefficiency using abnormal net hiring. We define abnormal net hiring conceptually as the difference between the actual change in a firm's labor force and the expected change based on fundamental economic factors. Abnormal net hiring is the absolute value of the residuals from Eq. (1) and is an inverse measure of labor investment efficiency, the lower the value, the higher the labor investment efficiency. In order to make the interpretation of the independent variable consistent in direction, we multiply the number by -1.

$$\begin{aligned} NET\_HIRE_{it} = {} & \beta_0 + \beta_1 SALES\_GROWTH_{it-1} + \beta_2 SALES\_GROWTH_{it} + \beta_3 \Delta ROA_{it} \\ & + \beta_4 \Delta ROA_{it-1} + \beta_5 ROA_{it} + \beta_6 RETURN_{it} + \beta_7 SIZE\_R_{it-1} + \beta_8 QUICK_{it-1} \\ & + \beta_9 \Delta QUICK_{it-1} + \beta_{10} \Delta QUICK_{it} + \beta_{11} LEV_{it-1} + \beta_{12} LOSSBIN1_{it-1} \\ & + \beta_{13} LOSSBIN2_{it-1} + \beta_{14} LOSSBIN3_{it-1} + \beta_{15} LOSSBIN4_{it-1} \\ & + \beta_{16} LOSSBIN5_{it-1} + \varepsilon_{it} \end{aligned} \quad (1)$$

where NET_HIRE_{it} is the percentage change in employees from year *t-1* to year *t* for firm *i*; *SALES_GROWTH* is the percentage change in sales; *ROA* is the return on assets; *Return* is the annual stock return; *SIZE_R* is firm size; *QUICK* is the ratio of cash and short-term investments plus receivables to current liabilities; *LEV* is measured as liabilities, scaled by the book value of assets; and *LOSSBIN* variables are five dummy variables indicating each interval of prior-year *ROA* of length 0.005 from 0 to -0.025.[4] The model includes industry fixed effects to control for the confounding effects of industry trends.

3.4 Control variables

Following previous studies (Jung et al., 2014; Ben-Nasr and Alshwer, 2016; Khedmati et al., 2020; Cao and Rees, 2020), we consider a series of control variables in our regression analysis, we include firm size (*SIZE*), leverage (*LEV*), listing age (*AGE*), book-to-market ratio (*MB*), return on assets (*ROA*), the nature of ownership (*SOE*), institutional shareholding (*INS*), liquidity (*QUICK*),

[4] For instance, *LOSSBIN1* takes a value of one if prior-year *ROA* is between -0.005 and 0, and zero otherwise; and *LOSSBIN2* equals one if prior year *ROA* is between -0.010 and -0.005 and zero otherwise, and so on.

cash flow (*CASHFLOW*), tangibility (*TANGIBLE*), CEO duality (*DUAL*), average educational background of CEO and Chairman (*Education*), board independence (*INDRATIO*), Appendix A provides a full list of variables used in this study and their detailed definitions.

3.5 Baseline model

We examine the empirical relationship between the behavior of listed firms that make donations to universities and corporate labor investment efficiency by estimating the following regression model:

$$LABOREFF_{it+1} = \beta_0 + \beta_1 DONWILL_{it}(or AMOUNT_{it}) + \sum \beta_i (Controlvariables)_{it} + \sum Firm + \sum Year + \varepsilon_{it} \quad (2)$$

where $LABOREFF_{it+1}$ is the absolute value of the difference between actual net hiring and the expected level in year *t+1*, we multiply the number by -1 so that larger values of *LABOREFF* correspond to greater labor investment efficiency; $DONWILL_{it}$ is a dummy variable which takes the value of one if a firm has donated to universities in a given year and zero otherwise; $AMOUNT_{it}$ is defined as the ratio of giving to assets. Control variables is a vector of control variables as defined in Section 3.4. To mitigate the influence of outliers, we winsorize all continuous variables at the 1% and 99% levels. For all regressions, we control for year and firm fixed effects to control for time-invariant factors and to estimate within firms, and cluster the standard errors at the firm level to account for the potential within-firm correlations.

4. Empirical results

4.1 Descriptive statistics and correlations

Table 2 presents descriptive statistics for all variables in Eq. (2). The mean (median) value of *LABOREFF* is -0.237 (-0.172). Regarding our key independent variables, the mean value of *DONWILL* across our sample is 0.063, indicating that 6.33% of our sample firms have donated to universities, while the mean (median) value of *AMOUNT* is 0.029 (0.000), and the mean value of the raw data on donation amounts (*Donation*) is 0.45 million, indicating that firms donate an average of RMB 0.45 million to the universities. Besides, institutional investor ownership averaged 6.43% and independent directors accounts for 37.41% board seats, about 22.95% of the CEOs in the sample also hold the position of chairman. All other variables are consistent with prior research.

***** Insert Table 2 about here *****

Table 3 presents correlation analysis on the variables used in our baseline regression, the Pearson correlation coefficient for *LABOREFF* and *DONWILL* (*AMOUNT*) is 0.027 (0.025), both significant at the 1% level, lending preliminary support to H1a. However, the unconditional correlation analysis does not control for other firm characteristics, and it is important to test whether the positive relation between donations and labor investment efficiency is driven by other firm-specific factors. Table 3 also reveals that labor investment efficiency is correlated with a number of firm characteristics. Thus, it is important to include these firm-specific variables as control variables in the multivariate regression analysis.

***** Insert Table 3 about here *****

4.2 Baseline results

Table 4 presents the regression results for our baseline model given in Eq. (2). Columns (1) and (2) are regression results without control variables, columns (3) and (4) are regression results for our baseline model given in Eq. (2). Column (1) and (3) present the regression results when we use *DONWILL* as the independent variable while column (2) and (4) provide results for the regression using the amount of donations (*AMOUNT*). The t-values in parentheses are calculated using robust standard errors clustered by firm.

***** Insert Table 4 about here *****

Consistent with H1a, we find evidence of a significantly positive relationship between donations to universities and corporate labor investment efficiency. More specifically, the coefficient on *DONWILL* for the Column (3) is 0.049 (t-stat = 6.528), which implies that a one standard deviation increase in donations is associated with an increase of 4.87% in labor investment efficiency. Thus, this impact is not only statistically significant but also economically meaningful. Likewise, the coefficient on *AMOUNT* for column (4) is 0.075 (t-stat = 7.016), is also significantly positive at the 1% level, indicating that a one standard deviation increase in the amount of donations can lead to an increase of 5.17% in labor investment efficiency. This finding lends credence to the view that donations to universities may enhance the labor investment efficiency of the firm. Moreover, we find that firms with higher level of book-to-market ratio and tangibility exhibit more efficient labor investments, which is consistent with Jung et al. (2014).

4.3 Indicator sensitivity tests

In this section, we perform several robustness tests to prove the robustness of our baseline findings. First, we examine whether our findings are robust to alternative measures of labor investment efficiency. In particular, following existing literature (Jung et al., 2014; Cao and Rees, 2020), we use the rate of change of employees (rate of change in the total number of employees of listed companies) to replace the dependent variable (*NET_HIRE*) in Eq. (1) and re-estimate the indicator of labor investment efficiency (*LABOREFF1*). We also use a firm' s industry median level of net hiring as a proxy for the expected net hiring to re-estimate the indicator of labor investment efficiency (*LABOREFF2*) (Cao and Rees, 2020). Second, we re-define donation amount (*Amount*) using the natural logarithm of one plus all donations to universities to conduct sensitivity tests for the independent variable indicators.

We repeat our multivariate regression analysis using alternative measures, regression results presented in Table 5 are broadly consistent with our baseline results. The coefficients on *DONWILL* and *AMOUNT* (*Amount*) are both positive and significant for all regressions in columns (1) to (5). Overall, the results in Table 5 reveal that the coefficients of the variables of interest (i.e., each alternative labor investment efficiency and donation amount measures) are positive and statistically significant in all models. Thus, our results are robust across various proxies for independent and dependent variables.

***** Insert Table 5 about here *****

4.4 Addressing endogeneity concerns

Although we have alleviated the omitted-variable bias by controlling for many time-invariant and time varying effects, concerns remain over the role of reverse causality inferences, that is, firms with higher labor investment efficiency may be more motivated to make donations to universities. Besides, our findings might be driven by the omitted-variable problem due to unobservable factors associated with donations and corporate labor investment efficiency. In this section, we present three econometric approaches to further alleviate concerns about endogeneity issues in general: (1) propensity score matching (PSM), (2) change model, and (3) instrumental variable (IV) estimation.

4.4.1 Propensity score matching

First, firms that made donations to universities may differ from those that didn't in terms of

firm characteristics. To control for those observable differences, we rely on PSM method to construct a carefully matched sample such that each treatment firm making donations to universities is matched with an otherwise comparable control firm making no university donations. More specifically, we use the following three different specifications in matching these two treatment and control groups: (1) nearest neighbor matching, (2) caliper matching method, and (3) entropy balancing (EB) matching (Hainmueller, 2012). Table 6 presents regression results using different PSM methods. Taken together, we find evidence of a significantly positive relationship between donations to universities and labor investment efficiency across all six regression specifications presented in Table 6, corroborating our main findings.

***** Insert Table 6 about here *****

4.4.2 Donation initiation and termination

To mitigate the concern that firms making donations to universities may differ from the other firms due to reasons not considered in our regression analyses, we examine the changes in labor investment efficiency when a firm initiates (or terminates) university donations. More specifically, we first regress the annual change in labor investment efficiency (*ΔLABOREFF*) on a dummy variable which takes a value of one in the year when a firm makes donation to universities for the first time (*Initiation*) and zero otherwise. We then regress the annual change in labor investment efficiency (*ΔLABOREFF*) on a dummy variable which takes a value of one in the year when a firm stops making donations (*Termination*) and zero otherwise. We include the same set of control variables as our previous analysis. We expect a larger increase in labor investment efficiency when firms begin to make donations for the first time and a larger decrease in labor investment efficiency when firms terminate such corporate activities.

Table 7 presents regression results. Consistent with our expectations, the coefficient on *Initiation* in columns (1) is positive and significant at the 1% level, indicating that labor investment efficiency tends to increase substantially after firms start to make donations to universities for the first time in history. In sharp contrast, the coefficient on *Termination* in column (2) is negative and significant at the 1% level, implying that labor investment efficiency declines after firms stop making donations. These findings lend strong support to our baseline analysis.

***** Insert Table 7 about here *****

4.4.3 Instrumental variable (IV) estimations

It is impossible to exhaust all potential omitted variables that may drive the positive relationship between donations to universities and corporate labor investment efficiency. To further alleviate endogeneity concerns, we are trying to construct an instrumental variable. More specifically, we identify an exogenous source of variation in the demand for university donations and study whether corporate labor investment efficiency increases at firms making donations to universities in response to such a demand shock. To satisfy the relevance and exclusion conditions of an an appropriate instrument, we use the number of newly-established university education foundations in the province where the firm is headquartered in the current year (*Number*) as an instrumental variable. The higher the number of newly-established university education foundations in the province where the firm is headquartered, the more likely it is that the firm will be promoted to donate to university education foundations. In addition, there is no evidence that the number of newly-established university education foundations in the province where the firm is headquartered is related to the labor investment efficiency of local firms, thus satisfying the exogeneity assumption.

Table 8 presents the two-stage regression results using this instrumental variable. The coefficients on the instrumental variable in the first-stage regression are positive and significant (columns 1 and 3), indicating that it is indeed a relevant instrument. The second-stage regression results presented in columns (2) and (4), where the dependent variable is *LABOREFF*, show that the coefficients on the propensity to donate to universities (*DONWILL*) and the amount of donations (*AMOUNT*) continue to remain positive and significant at the 5% level. Note that the F-statistics obtained from a weak instrument test in the two first-stage regressions are both greater than 10, suggesting that *Number* is not a weak instrument and using this instrumental variable is unlikely to bias our estimation. These results lend further empirical support to our baseline findings that donations to universities increase the corporate labor investment efficiency.

***** Insert Table 8 about here *****

4.5 Further analysis

4.5.1 Donations to universities and human capital structure

Our main results indicate that donations to universities is positively associated with abnormal net hiring, suggesting donations facilitates more efficient labor investments. In this section, we

investigate whether the donations to the universities optimize the human capital structure of the firm. Corporate donations to universities may increase hiring levels by recruiting more highly educated employees, which in turn increases the human capital structure. Specifically, we measure human capital structure using the ratio of education of the firm's employees and the ratio of employees in technical sections. We classify human capital into three types: ratio of employees with bachelor's degree or above (*Bachelor*), ratio of employees with master's and doctoral degrees (*MasPhd*) and ratio of employees in technical sections (*Tech*). We obtained education data on the employees of listed firms from the WIND[5] database.

Table 9 presents regression results. Consistent with our expectations, we find both the coefficient on *DONWILL* and *AMOUNT* are positive and significant across all six columns, indicating that corporate donations to universities increase the ratio of high educational and skilled employees and optimizes the human capital structure of the firms.

***** Insert Table 9 about here *****

4.5.2 Over-investment versus under-investment

We extend our baseline results by separately examining the relationship between university donations and over-investment (i.e., over-hiring and under-firing) and under-investment (i.e., under-hiring and over-firing) in this section to explore the channels through which corporate donations to universities affect labor investment efficiency. Following Jung et al. (2014), over-investment is defined as positive abnormal net hiring (i.e., actual net hiring greater than expected) and under-investment is defined as negative abnormal net hiring (i.e., actual net hiring less than expected). Panel A of Table 10 presents regression results. The results from columns (1) to (4) indicate that the donation to universities is mainly aimed at alleviating the under-investment rather than over-investment.

Based on whether the expected level of *NET_HIRE* from Eq. (1) is positive or negative, we then further decompose over-investment and under-investment into four subsamples: *over-hiring*, *under-firing*, *under-hiring* and *over-firing* (Jung et al., 2014)[6]. As reported in Panel B of Table 10.

[5] WIND is an open platform providing high-quality data for academic research. See more details at https://www.wind.com.cn/.

[6] Over-hiring: over-investment when expected net hiring is positive; Under-firing: over-investment when expected net hiring is negative; Under-hiring: under-investment when expected net hiring is positive; Over-firing: under-investment when expected net hiring is negative.

The results from columns (1) to (8) indicate that corporate donations to universities enhance corporate labor investment efficiency mainly by mitigating under-hiring and under-firing.

***** Insert Table 10 about here *****

4.6 Cross-sectional analysis

4.6.1 Firms' tendency to hire high-skilled employees

We then examine whether the relationship between donations to universities and labor investment efficiency is more pronounced for firms that are more likely to hire high-skilled employees. Human capital intensive firms generally possess higher levels of expertise, education, and labor skills, and therefore are the key source of value creation (Cao and Rees, 2020). Human capital intensive firms are subject to higher labor market frictions because competition in high-skilled sectors often involves "talent wars" that makes it difficult for those firms to efficiently recruit talent (Chang and Jo, 2019). Aghion et al. (2005) further argue that competition increases the need for innovation, which requires talent of the firm. The incentive to donate to universities may be higher for firms facing high levels of competition, as these firms face a greater risk of losing talent and proprietary information to competitors in a highly competitive market (Cao and Rees, 2020). The increase in demand for high-skilled personnel by firms with high human capital intensity and the "war for talent" caused by a highly competitive environment are more likely to prompt firms to realize the talent matching mechanism between universities and firms through the donation-recruitment model (Turban and Greening, 1997). Therefore, we examine whether the correlation between corporate donations to universities and labor investment efficiency is more significant in firms with higher human capital intensity and those facing higher product market competition. We proxy for human capital intensive using R&D intensity that is measured as the ratio of R&D expenditure to total assets (Ghaly et al., 2020). *MRD* is a dummy variable, which takes the value of one if a firm's human capital intensive is higher than the industry median in a given year, and zero otherwise. Besides, we measure human capital intensity using whether the firm is recognized as a high-tech enterprise. *HIGHTECH* is a dummy variable, which takes the value of one if the firm is a high-tech enterprise, zero otherwise. We use Herfindahl-Hirschman Index to proxy for product market competition (Zhang et al., 2010; Giroud and Mueller, 2011), *HHI* is a dummy variable which takes a value of one if a firm's Herfindahl-Hirschman Index is lower than the industry median in a

given year, and zero otherwise.

Table 11 presents the regression results. Consistent with our expectations, we find that the positive relationship between donations to universities and corporate labor investment efficiency is more pronounced for firms with higher human capital intensity and product market competition, as indicated by the positive and significant coefficient estimates on interaction terms across all six columns. Taken together, these findings suggest that the positive relationship between donations to universities and corporate labor investment efficiency is more significant in firms that are more likely to hire high-skilled employees.

***** Insert Table 11 about here *****

4.6.2 Reputation building

Prior literature documented that donations can be used for promotional purposes and to enhance corporate reputation (Godfrey, 2005; Zhang et al., 2010; Gao et al., 2012). Firms considering their reputation and legitimacy would prefer to collaborate with prestigious universities (Hong and Su, 2013). Corporate donations to universities may have been made for reputation building, which in turn recruits more talented graduates to join the firm. Besides, enhancing the reputation of the firm by donating to universities may reduces the information asymmetry, which in turn recruits better talent in the job market. Hence, we argue that the relationship between corporate donations to universities and labor investment efficiency is more significant for firms that are more likely to hire through reputation building. We conduct the test in two dimensions, the regional level and the firm level, respectively.

The higher the degree of distortion in urban labor allocation, the higher the degree of employment information asymmetry in the labor market, which in turn inhibits matching links between the labor force and jobs in different regions, ultimately reducing the likelihood of employment (Niu and Cui, 2022). Corporate giving to universities may reduce local employment information asymmetry by enhancing corporate reputation, which in turn raise employment possibilities and ultimately increases the efficiency of labor allocation. The correlation between donations to universities and labor investment efficiency is therefore expected to be more significant in regions with higher distortions in urban labor allocation. However, compared to labor inflow cities, labor outflow cities have a relative lack of high-skilled human capital, reducing the talent

pool in the outflow location. In turn, the demand for high-skilled labor and the relative lack of high-skilled labor in labor outflow cities leads to inefficient labor investment efficiency of firms. For motives such as promotional purposes and reputation enhancement, firms in labor outflow cities are more motivated to make donations to universities in order to acquire talent. Thus, the relationship between donations to universities and labor investment efficiency is expected to be more pronounced for firms in labor outflows areas.

Referring to Niu and Cui (2022) , We measure the degree of labor allocation distortion using the absolute value of the coefficient of labor allocation distortion, where a larger absolute value implies a stronger degree of labor allocation distortion. *Abstaul* takes the value of one if the absolute value of the labor allocation distortion coefficient for the prefecture where the firm is located is higher than the industry median in a given year, and zero otherwise. Besides, we use the net population change for city i in year t to measure whether the location is a labor force outflow city, *FLOW* takes the value of one if the net population change in the firm's location is less than 0, and zero otherwise.

Table 12 presents the regression results. Consistent with our expectations, we find that the positive relationship between donations to universities and corporate labor investment efficiency is more pronounced among firms in cities with higher distortions in labor allocation, as well as in cities with labor outflows, as indicated by the positive and significant coefficient estimates on interaction terms across column(1) to (4) of Table 12.

***** Insert Table 12 about here *****

We then investigate whether corporate reputation building motivation promotes the positive correlation between donations to universities and labor investment efficiency in terms of CSR compliance, advertising expenditures and negative media coverage, respectively. Socially responsible firms can attract and maintain a work force (Sánchez, 2000), focusing on the interest protection of employees is also an important aspect of corporate social responsibility. Cao and Rees (2020) documented that employee-unfriendly firms are significantly associated with lower labor investment efficiency. When the social responsibility fulfillment of the employees of a firm is lower, the risk of employee turnover is higher, which in turn reduces the competitive advantage in terms of human resources. Firms' CSR performance is related positively to their reputation and to their attractiveness as employers (Greening and Turban, 1997). Hence, the motivation for firms to

enhance its reputation by making donations to universities will be stronger. Besides, the effect of university donations to increase the labor investment efficiency is weakened as the degree of corporate responsibility for employees increases. Prior literature has also documented the relationship between advertising expenditures and CSR. Navarro (1988) implies that firms that spend more on advertising tend to give more to charity, higher advertising expenditures represent the stronger motivation for reputation building of the firm. Moreover, the threat of negative media coverage or stigmatization reduces a firm's legitimacy and reputation among stakeholders (Pollock and Rindova, 2003), which increases the likelihood of failure in recruit employees. In this case, firms have strong incentives to use philanthropy to change the attitude of the stakeholders and recover stakeholders' confidence in it. Therefore, firms with prior negative media coverage or stigmatization threat should be in a better position to strategically use philanthropic donations to facilitate their subsequent recruitment. Thus, the effect of corporate giving to universities on corporate labor investment efficiency may be more pronounced when firms have lower levels of employee social responsibility fulfillment, as well as when firms have higher advertising expenditures and negative media coverage. *ESR* is a dummy variable, which takes a value of one if a firm's employee social responsibility is higher than the industry median in a given year, and zero otherwise. Likewise, *ADV* takes the value of one if the ratio of advertising expenses to total assets of the firm is above the industry median in a given year, otherwise it takes the value of zero. *NEGNEWS* takes the value of one if the number of negative media coverage of the firm is above the industry median in a given year, and zero otherwise.

Column (5) to (10) of Table 12 present the regression results. Consistent with our expectations, we find that the positive relationship between donations to universities and corporate labor investment efficiency is more significant among firms with lower employee welfare, higher advertising expenditures and high level of threat of negative media coverage or stigmatization.

5. **Conclusion**

Utilizing an extensive dataset of Chinese firms' donations to university foundations spanning the period from 2010 to 2021, this study establishes that corporate donations to universities contribute to an enhanced labor investment efficiency within the firm. On average, a one standard

deviation increase in donations is linked to a notable 4.87% improvement in labor investment efficiency. These results withstand rigorous testing through various sensitivity analyses, persisting even when alternative measures are employed for both donations and labor investment efficiency. Robustness is maintained across different endogeneity tests, encompassing diverse propensity score matching methods, change models, and the two-stage model.

Delving deeper, we explore the mechanisms through which efficiency is bolstered and find compelling evidence that donations to universities optimize the human capital structure of the firm and primarily mitigate under-investment rather than over-investment. Notably, our investigation reveals that the impact of donations on labor investment efficiency is more pronounced among firms with a propensity for hiring high-skilled employees and those that prioritize reputation building in their hiring processes.

This study has both important theoretical and managerial implications. In the theoretical term, this paper discusses in depth the mechanism and specific manifestations of the impact of donations to education on the labor investment efficiency, which provides a better understanding of the positive impact of charitable donations on firm value and enriches the literature in the fields of the economic consequences of strategic philanthropy and the factors affecting the corporate labor investment efficiency. In the practical term, hiring employees exposes firms to labor market frictions and the associated costs can be substantial, such as searching costs (job advertisements), selection and hiring (resume screening and interviews), and training costs. Considering that these associated costs may be large and difficult to avoid, firms are not free to adjust their labor force and need to maintain a certain level of talent attractiveness to avoid under-recruitment. Our findings show that university donations can be an important tool for recruitment and reduce the risk of labor market frictions, and provide direct evidence on the managerial consequences of corporate philanthropy. In this way, firms are likely to achieve a level of labor investment close to the optimal level justified by economic fundamentals. Executives of firms may recognize the strategic or instrumental value of corporate donations and integrate firms' non-market strategy (i.e., corporate donations) with a market strategy such as labor recruitment. Our study supports that both the society and the firms could benefit from corporate donations, and achieve a win-win situation.

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Table 1: Distribution of firms donating to university

Panel A presents the distribution of firms donating to university by year. Panel B presents the industry distribution of firms donating to university.

Panel A: Distribution of firms making university donations by years

Year	Firms with university donations		Firms without university donations		Full Sample	
	N	%	N	%	N	%
2011	93	8.24	1,035	91.76	1,128	6.23
2012	71	5.59	1,198	94.41	1,269	7.01
2013	99	6.10	1,523	93.90	1,622	8.96
2014	83	4.70	1,682	95.30	1,765	9.75
2015	107	5.93	1,698	94.07	1,805	9.97
2016	124	6.63	1,747	93.37	1,871	10.34
2017	138	6.99	1,837	93.01	1,975	10.91
2018	139	9.04	1,399	90.96	1,574	8.50
2019	82	5.21	1,492	94.79	1,104	8.70
2020	83	4.77	1,658	95.23	1,741	9.62
2021	126	6.95	1,687	93.05	1,813	10.02
Total	1,145	6.33	16,956	93.67	18,101	100.00

Panel B: Industry distribution of firms making university donations

Industry	Total	%
Pharmaceutical manufacturing (C27)	113	9.87
Computer, communications and other electronic equipment manufacturing (C39)	86	7.52
Electrical machinery and equipment manufacturing (C38)	81	7.07
Chemical raw materials and chemical products manufacturing (C26)	71	6.20
Real estate (K70)	67	5.85
Manufacture of special-purpose equipment (C35)	65	5.68
Software and information technology services (I65)	55	4.80
Retail (F52)	43	3.76
Wholesale (F51)	41	3.58
Automobile manufacturing (C36)	39	3.41
Other industries	484	42.27
Total	1,145	100.00

Table 2: Summary statistics

This table reports the summary statistics of main variables used in our empirical tests. Our main sample consists of 18,101 firm-year observations over the period 2010-2021. The number of observations, mean, standard deviation, minimum value, median, maximum value are reported from left to right, in sequence for each variable. Detailed definitions of all variables are described in Appendix A.

Variable	N	Mean	SD	Min	Median	Max
LABOREFF	18,101	-0.237	0.240	-1.404	-0.172	-0.000
DONWILL	18,101	0.063	0.243	0.000	0.000	1.000
AMOUNT	18,101	0.029	0.165	0.000	0.000	1.350
Donation	18,101	0.450	20.279	0.000	0.000	2.7e+03
SIZE	18,101	22.472	1.312	20.122	22.282	26.440
LEV	18,101	0.462	0.195	0.065	0.466	0.865
AGE	18,101	2.310	0.660	0.693	2.398	3.296
MB	18,101	0.640	0.253	0.130	0.642	1.177
ROA	18,101	0.037	0.050	-0.165	0.033	0.187
SOE	18,101	0.456	0.498	0.000	0.000	1.000
INSR	18,101	0.064	0.090	0.000	0.027	0.459
QUICK	18,101	1.568	1.730	0.179	1.050	11.376
CASHFLOW	18,101	0.046	0.067	-0.147	0.046	0.234
TANGIBLE	18,101	0.229	0.169	0.002	0.195	0.719
DUAL	18,101	0.230	0.421	0.000	0.000	1.000
Education	18,101	3.523	0.741	1.000	3.500	6.000
INDRATIO	18,101	0.374	0.054	0.333	0.333	0.571

Table 3: Correlation matrix

This table presents Pearson (upper right) and Spearman (bottom left) correlations for all variables used in our main empirical analyses. ***, ***, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) *LABOREFF*		0.027***	0.028***	0.006	0.000	0.031***	0.095***	-0.058***	0.054***	-0.075***	-0.027***	0.030***	0.072***	-0.024***	-0.004	-0.013*
(2) *DONWILL*	0.027***		0.999***	0.066***	0.014*	0.010	-0.005	0.023***	-0.010	0.072***	0.005	0.008	-0.036***	0.014*	0.039***	0.010
(3) *AMOUNT*	0.025***	0.680***		0.059***	0.010	0.007	-0.010	0.023***	-0.012*	0.070***	0.008	0.007	-0.035***	0.015**	0.037***	0.010
(4) *SIZE*	0.024***	0.071***	-0.070***		0.518***	0.392***	0.590***	-0.059***	0.323***	0.165***	-0.406***	0.053***	0.003	-0.160***	0.180***	0.032***
(5) *LEV*	-0.004	0.014*	-0.058***	0.513***		0.303***	0.445***	-0.406***	0.261***	-0.085***	-0.755***	-0.151***	-0.019***	-0.110***	0.087***	0.007
(6) *AGE*	0.019***	0.012*	-0.039***	0.367***	0.322***		0.228***	-0.167***	0.441***	-0.108***	-0.323***	-0.002	-0.002	-0.207***	0.152***	-0.014*
(7) *MB*	0.107***	-0.007	-0.077***	0.594***	0.438***	0.214***		-0.297***	0.256***	-0.226***	-0.382***	-0.091***	0.067***	-0.129***	0.063***	0.000
(8) *ROA*	-0.031***	0.026***	0.008	-0.020***	-0.357***	-0.132***	-0.257***		-0.126***	0.391***	0.359***	0.388***	-0.064***	0.045***	-0.014*	-0.038***
(9) *SOE*	0.047***	-0.010	-0.043***	0.331***	0.264***	0.441***	0.258***	-0.078***		-0.044***	-0.263***	0.014*	0.123***	-0.278***	0.194***	-0.034***
(10) *INSR*	-0.068***	0.060***	0.030***	0.025***	-0.099***	-0.157***	-0.247***	0.339***	-0.091***		0.121***	0.141***	-0.064***	0.034***	0.043***	0.014*
(11) *QUICK*	0.003	0.002	0.044***	-0.337***	-0.654***	-0.301***	-0.284***	0.237***	-0.207***	0.106***		0.050***	-0.232***	0.116***	-0.033***	0.015*
(12) *CASHFLOW*	0.035***	0.009	-0.004	0.047***	-0.163***	0.002	-0.104***	0.382***	0.007	0.120***	0.054***		0.294***	-0.012	-0.006	-0.029***
(13) *TANGIBLE*	0.067***	-0.037***	-0.028***	0.075***	0.031***	0.059***	0.128***	-0.056***	0.173***	-0.093***	-0.198***	0.275***		-0.063***	-0.079***	-0.054***
(14) *DUAL*	-0.016**	0.014*	0.029***	-0.152***	-0.109***	-0.211***	-0.129***	0.021***	-0.278***	0.053***	0.101***	-0.012	-0.082***		-0.019***	0.102***
(15) *Education*	-0.002	0.040***	0.001	0.197***	0.094***	0.172***	0.067***	-0.014*	0.217***	0.016**	-0.033***	-0.009	-0.054***	-0.057***		0.030***
(16) *INDRATIO*	-0.012	0.013*	0.006	0.056***	0.010	-0.015**	0.003	-0.027***	-0.030***	0.009	0.007	-0.026***	-0.054***	0.107***	0.017**	

Table 4: Donations to universities and labor investment efficiency

This table presents the OLS estimation results on the relationship between donations to universities and labor investment efficiency. The dependent variable is labor investment efficiency (*LABOREFF*). The independent variables are propensity to make donations to universities (*DONWILL*) and the donation amount (*AMOUNT*). Columns (1) and (2) are regression results without control variables. Columns (3) and (4) are regression results using Equation (2). Firm fixed effects and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)
	LABOREFF			
DONWILL	0.048***		0.049***	
	(6.426)		(6.528)	
AMOUNT		0.074***		0.075***
		(6.962)		(7.016)
SIZE			-0.005	-0.005
			(-0.809)	(-0.715)
LEV			0.018	0.020
			(0.621)	(0.690)
AGE			-0.026*	-0.026*
			(-1.933)	(-1.945)
MB			0.115***	0.115***
			(5.970)	(5.960)
ROA			-0.058	-0.059
			(-0.982)	(-0.986)
SOE			0.017	0.017
			(1.188)	(1.194)
INSR			-0.055*	-0.054*
			(-1.711)	(-1.685)
QUICK			-0.000	-0.000
			(-0.105)	(-0.052)
CASHFLOW			0.015	0.015
			(0.389)	(0.402)
TANGIBLE			0.055*	0.056*
			(1.769)	(1.774)
DUAL			0.002	0.002
			(0.311)	(0.320)
Education			-0.000	-0.000
			(-0.057)	(-0.042)
INDRATIO			-0.005	-0.003
			(-0.081)	(-0.056)
Intercept	-0.331***	-0.332***	-0.239*	-0.255*
	(-39.559)	(-39.716)	(-1.646)	(-1.760)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	18,101	18,101	18,101	18,101
Adj. R^2	0.067	0.068	0.072	0.072

Table 5: Robustness

This table presents the robustness results on the relation between donations to universities and labor investment efficiency. Following Jung et al. (2014) and Cao and Rees (2020), columns (1) and (2) use the rate of change of employees to replace the dependent variable (*NET_HIRE*) in Equation (1) and re-estimate the indicator of labor investment efficiency (*LABOREFF1*). Columns (3) and (4) use a firm' s industry median level of net hiring as a proxy for the optimal level to re-estimate the indicator of labor investment efficiency (*LABOREFF2*). Column (5) uses alternative measure of donation amount (*Amount*) as the independent variable. *Amount* is the natural logarithm of one plus all donations made to the universities in a given year. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)	(5)
	LABOREFF1		*LABOREFF2*		*LABOREFF*
DONWILL	0.002***		0.018***		
	(2.986)		(2.831)		
AMOUNT		0.002***		0.034***	
		(2.875)		(4.455)	
Amount					0.004***
					(7.044)
SIZE	0.002**	0.002***	0.033***	0.033***	-0.006
	(2.570)	(2.604)	(5.631)	(5.669)	(-0.817)
LEV	0.004	0.004	0.004	0.005	0.018
	(1.405)	(1.428)	(0.164)	(0.199)	(0.625)
AGE	0.000	0.000	-0.016	-0.016	-0.026*
	(0.391)	(0.385)	(-1.441)	(-1.445)	(-1.934)
MB	-0.000	-0.000	0.038**	0.038**	0.116***
	(-0.287)	(-0.295)	(2.525)	(2.526)	(5.981)
ROA	-0.008	-0.008	-0.025	-0.025	-0.058
	(-1.478)	(-1.481)	(-0.513)	(-0.509)	(-0.981)
SOE	-0.000	-0.000	0.018	0.018	0.017
	(-0.116)	(-0.111)	(1.396)	(1.392)	(1.183)
INSR	0.005*	0.005*	-0.049*	-0.049*	-0.055*
	(1.843)	(1.856)	(-1.896)	(-1.883)	(-1.709)
QUICK	0.001***	0.001***	-0.000	-0.000	-0.000
	(6.381)	(6.400)	(-0.130)	(-0.104)	(-0.106)
CASHFLOW	-0.006**	-0.006**	-0.001	-0.001	0.015
	(-2.380)	(-2.374)	(-0.038)	(-0.031)	(0.385)
TANGIBLE	0.006**	0.006**	0.006	0.006	0.055*
	(2.151)	(2.153)	(0.218)	(0.222)	(1.771)
DUAL	-0.001	-0.001	-0.016***	-0.016***	0.002
	(-1.353)	(-1.348)	(-2.791)	(-2.790)	(0.308)
Education	0.000	0.000	0.001	0.001	-0.000
	(0.639)	(0.649)	(0.327)	(0.327)	(-0.061)
INDRATIO	0.007	0.007	0.006	0.006	-0.005
	(1.437)	(1.453)	(0.125)	(0.128)	(-0.085)
Intercept	-0.071***	-0.072***	-0.888***	-0.894***	-0.238
	(-4.782)	(-4.824)	(-7.216)	(-7.263)	(-1.640)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	18,121	18,121	18,101	18,101	18,101
Adj. R^2	0.010	0.010	0.044	0.045	0.072

Table 6: Propensity score matching

This table reports the regression results using different propensity score matching (PSM) methods. Columns (1) and (2) use the nearest neighbor matching method. Columns (3) and (4) use the caliper match method with a caliper of 0.01. Columns (5) and (6) use the entropy balancing matching method. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)	(5)	(6)
	LABOREFF					
DONWILL	0.051***		0.047***		0.046***	
	(2.732)		(2.697)		(7.695)	
AMOUNT		0.064**		0.067***		0.079***
		(2.331)		(3.631)		(7.320)
SIZE	-0.026	-0.023	-0.037*	-0.033	-0.024***	-0.021**
	(-1.050)	(-0.929)	(-1.708)	(-1.568)	(-2.651)	(-2.325)
LEV	-0.107	-0.074	-0.018	0.007	0.026	0.037
	(-0.863)	(-0.591)	(-0.163)	(0.059)	(0.611)	(0.812)
AGE	0.063	0.065	0.012	0.014	-0.033*	-0.031
	(1.195)	(1.214)	(0.247)	(0.298)	(-1.672)	(-1.603)
MB	0.005	0.015	0.062	0.064	0.095***	0.097***
	(0.076)	(0.212)	(0.887)	(0.920)	(3.462)	(3.596)
ROA	0.035	0.027	0.324	0.299	-0.025	-0.035
	(0.134)	(0.105)	(1.273)	(1.183)	(-0.261)	(-0.363)
SOE	0.010	-0.003	0.057	0.057	0.025	0.023
	(0.124)	(-0.036)	(0.635)	(0.648)	(0.988)	(0.942)
INSR	-0.144	-0.137	-0.077	-0.084	-0.055	-0.050
	(-1.385)	(-1.314)	(-0.662)	(-0.728)	(-1.273)	(-1.164)
QUICK	0.003	0.004	-0.000	0.002	-0.000	0.001
	(0.359)	(0.452)	(-0.023)	(0.263)	(-0.152)	(0.178)
CASHFLOW	0.104	0.111	0.107	0.110	0.031**	0.135**
	(0.710)	(0.758)	(0.686)	(0.706)	(2.292)	(2.365)
TANGIBLE	0.340***	0.345***	0.204*	0.221*	0.129***	0.134***
	(2.622)	(2.645)	(1.668)	(1.804)	(3.090)	(3.213)
DUAL	0.034	0.036	0.007	0.007	0.010	0.010
	(1.203)	(1.293)	(0.282)	(0.290)	(1.024)	(1.043)
Education	-0.021	-0.022	-0.005	-0.005	0.000	-0.000
	(-1.050)	(-1.121)	(-0.281)	(-0.284)	(0.041)	(-0.000)
INDRATIO	0.224	0.269	-0.127	-0.120	0.036	0.045
	(1.024)	(1.191)	(-0.637)	(-0.595)	(0.452)	(0.561)
Intercept	0.078	-0.017	0.466	0.364	0.297	0.213
	(0.149)	(-0.033)	(0.984)	(0.776)	(1.323)	(0.952)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,290	2,290	2,192	2,192	18,101	18,101
Adj. R^2	0.083	0.083	0.078	0.079	0.351	0.354

Table 7: Changes in labor investment efficiency around initiation and termination of donations to universities

This table examines the change in labor investment efficiency around the initiation and termination of donations to universities. The dependent variable is the annual change in labor investment efficiency (*ΔLABOREFF*). *Initiation* takes a value of one if a firm makes its first university donations in a given year and zero otherwise. *Termination* takes a value of one if a firm stops making university donations in a given year and zero otherwise. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)
	ΔLABOREFF	
Initiation	0.053***	
	(3.643)	
Termination		-0.049***
		(-3.255)
SIZE	0.040***	0.041***
	(4.576)	(4.647)
LEV	-0.081**	-0.080*
	(-1.997)	(-1.959)
AGE	-0.017	-0.018
	(-0.907)	(-0.927)
MB	-0.011	-0.010
	(-0.415)	(-0.380)
ROA	-0.195*	-0.197**
	(-1.960)	(-1.985)
SOE	0.026	0.027
	(1.190)	(1.216)
INSR	-0.117**	-0.118**
	(-2.421)	(-2.427)
QUICK	-0.012***	-0.012***
	(-3.372)	(-3.387)
CASHFLOW	-0.104*	-0.102*
	(-1.741)	(-1.697)
TANGIBLE	-0.016	-0.017
	(-0.375)	(-0.392)
DUAL	-0.012	-0.012
	(-1.160)	(-1.191)
Education	0.001	0.002
	(0.190)	(0.236)
INDRATIO	0.035	0.040
	(0.447)	(0.519)
Intercept	-0.784***	-0.798***
	(-4.133)	(-4.199)
Firm FE	Yes	Yes
Year FE	Yes	Yes
Observations	14,676	14,676
Adj. R^2	0.043	0.043

Table 8: Regression results using an instrumental variable

This table presents the results from the two-stage model using the number of newly-established university education foundations in the province where the firm is headquartered in the current year (*Number*) as an instrumental variable. Columns (1) and (3) present the first-stage results. The dependent variable is the propensity to make university donations (*DONWILL*) and the donation amount (*AMOUNT*). Columns (2) and (4) present the second-stage regression results using the predicted values of university donations obtained from columns (1) and (3). The dependent variable is labor investment efficiency. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	*First stage*	*Second stage*	*First stage*	*Second stage*
	DONWILL	*LABOREFF*	*AMOUNT*	*LABOREFF*
Number	0.003***		0.001***	
	(4.351)		(3.201)	
DONWILL		0.917**		
		(2.103)		
AMOUNT				1.850**
				(2.252)
SIZE	0.017***	-0.020	0.003	-0.009
	(4.182)	(-1.647)	(0.963)	(-0.831)
LEV	0.007	0.012	-0.022	0.060
	(0.253)	(0.431)	(-1.016)	(1.645)
AGE	-0.009	-0.018	-0.004	-0.019
	(-0.832)	(-0.892)	(-0.352)	(-0.681)
MB	-0.032***	0.142***	-0.018**	0.147***
	(-3.013)	(5.938)	(-2.193)	(5.070)
ROA	-0.070	0.001	-0.042	0.014
	(-1.608)	(0.021)	(-0.953)	(0.133)
SOE	0.027*	-0.006	0.017*	-0.013
	(1.772)	(-0.317)	(1.853)	(-0.546)
INSR	0.019	-0.072**	0.000	-0.055
	(0.913)	(-2.321)	(0.001)	(-1.646)
QUICK	0.001	-0.001	-0.001*	0.002
	(0.616)	(-0.304)	(-1.862)	(0.881)
CASHFLOW	0.000	0.015	-0.006	0.027
	(0.013)	(0.402)	(-0.301)	(0.449)
TANGIBLE	-0.003	0.057**	-0.005	0.063*
	(-0.149)	(2.468)	(-0.221)	（1.711）
DUAL	0.006	-0.003	0.003	-0.003
	(1.201)	(-0.480)	(0.586)	(-0.313)
Education	0.009***	-0.009	0.005	-0.009
	(3.375)	(-0.963)	(1.303)	(-0.691)
INDRATIO	0.129**	-0.117	0.066**	-0.120
	(2.153)	(-1.148)	(2.083)	(-1.331)

Intercept	0.046	0.075**	0.035	0.027**
	(0.361)	(2.208)	(0.635)	(2.347)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	18,101	18,101	18,101	18,101
Adj. R^2	0.181	0.070	0.180	0.070
Kleibergen-Paap rk Wald F statistic	18.940		17.266	

Table 9: Donations to universities and human capital structure

This table presents regression results on the relationship between donations to universities and human capital structure. The dependent variables is ratio of employees with bachelor's degree or above (*Bachelor*), ratio of employees with master's or doctoral degrees (*MasPhd*) and ratio of employees in technical sections (*Tech*). The independent variables are propensity to make donations to universities (*DONWILL*) and the donation amount (*AMOUNT*). Firm fixed effects and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)	(5)	(6)
	Bachelor		*MasPhd*		*Tech*	
DONWILL	0.872**		0.395***		0.875***	
	(2.550)		(3.250)		(2.611)	
AMOUNT		1.024**		0.449**		1.344**
		(1.970)		(2.272)		(2.548)
SIZE	1.012**	1.021**	0.699***	0.706***	0.818**	0.828**
	(2.299)	(2.320)	(3.691)	(3.734)	(2.155)	(2.187)
LEV	-0.574	-0.555	-1.223*	-1.216*	0.298	0.325
	(-0.399)	(-0.384)	(-1.898)	(-1.888)	(0.203)	(0.221)
AGE	-2.953***	-2.954***	-0.729***	-0.729***	-1.586**	-1.596**
	(-4.500)	(-4.501)	(-3.044)	(-3.040)	(-2.295)	(-2.311)
MB	0.634	0.637	-0.490*	-0.489*	-0.531	-0.525
	(0.970)	(0.975)	(-1.758)	(-1.750)	(-0.703)	(-0.696)
ROA	-0.610	-0.626	-1.438*	-1.436*	0.679	0.679
	(-0.262)	(-0.268)	(-1.686)	(-1.681)	(0.320)	(0.319)
SOE	-0.205	-0.202	-0.329	-0.325	-0.883	-0.880
	(-0.294)	(-0.289)	(-1.223)	(-1.204)	(-1.082)	(-1.078)
INSR	3.100***	3.127***	0.218	0.221	0.574	0.590
	(2.621)	(2.642)	(0.480)	(0.485)	(0.447)	(0.459)
QUICK	0.132	0.134	0.044	0.044	0.101	0.103
	(1.289)	(1.305)	(0.814)	(0.811)	(0.712)	(0.728)
CASHFLOW	-2.719**	-2.714**	-0.772	-0.779	-1.565	-1.553
	(-2.120)	(-2.116)	(-1.415)	(-1.426)	(-1.116)	(-1.109)
TANGIBLE	-5.417***	-5.416***	-1.249***	-1.248***	-4.667***	-4.665***
	(-3.280)	(-3.279)	(-2.636)	(-2.637)	(-2.997)	(-2.996)
DUAL	0.286	0.289	0.055	0.057	-0.193	-0.189
	(1.094)	(1.108)	(0.563)	(0.583)	(-0.592)	(-0.580)
Education	0.401*	0.405*	0.068	0.072	0.091	0.092
	(1.853)	(1.871)	(0.546)	(0.579)	(0.343)	(0.347)
INDRATIO	-3.647	-3.601	-1.284	-1.260	-3.504	-3.469
	(-1.522)	(-1.503)	(-1.392)	(-1.367)	(-1.562)	(-1.547)
Intercept	5.634	5.428	-2.462	-2.809	8.614	8.373
	(0.590)	(0.573)	(-0.450)	(-0.518)	(0.967)	(0.951)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,087	15,087	12,203	12,203	15,928	15,928
Adj. R^2	0.141	0.140	0.094	0.093	0.020	0.020

Table 10: Over-investment versus under-investment

This table reports the regression results on the impact of donations to universities on specific types of labor investment efficiency. Panel A presents the results for the subsamples of over-investment and under-investment. In Panel A, we examine the relationship between donations to universities and over-investment in labor in columns (1) and (2), and the relationship between donations to universities and under-investment in labor in columns (3) and (4). In Panel B, we decompose over-investment (into over-hiring and under-firing) and under-investment (into under-hiring and over-firing). Columns (1) to (4) of panel B report the results for the over-hiring and under-firing sub-samples. Columns (5) to (8) of panel B report the results for the under-hiring and over-firing sub-samples. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Over-investment *vs.* under-investment

Y=	(1)	(2)	(3)	(4)
	Over-investment		*Under-investment*	
	LABOREFF			
DONWILL	0.004		0.056***	
	(0.192)		(7.470)	
AMOUNT		0.035		0.066***
		(0.961)		(7.087)
SIZE	-0.021	-0.021	0.025***	0.025***
	(-1.524)	(-1.536)	(3.455)	(3.528)
LEV	0.137**	0.138**	-0.112***	-0.109***
	(2.423)	(2.441)	(-3.474)	(-3.385)
AGE	-0.008	-0.008	-0.058***	-0.058***
	(-0.317)	(-0.317)	(-3.886)	(-3.881)
MB	0.345***	0.345***	-0.127***	-0.127***
	(9.264)	(9.269)	(-6.282)	(-6.292)
ROA	0.064	0.064	-0.250***	-0.246***
	(0.521)	(0.529)	(-3.743)	(-3.671)
SOE	0.023	0.023	0.012	0.012
	(0.785)	(0.795)	(0.652)	(0.666)
INSR	-0.169***	-0.171***	0.005	0.007
	(-2.878)	(-2.905)	(0.149)	(0.190)
QUICK	-0.002	-0.002	-0.001	-0.000
	(-0.440)	(-0.403)	(-0.243)	(-0.199)
CASHFLOW	0.082	0.083	-0.088**	-0.088**
	(1.090)	(1.102)	(-2.031)	(-2.020)
TANGIBLE	0.091	0.091	0.023	0.023
	(1.497)	(1.488)	(0.670)	(0.681)
DUAL	-0.006	-0.006	0.003	0.003
	(-0.394)	(-0.392)	(0.421)	(0.452)
Education	-0.009	-0.010	0.001	0.001
	(-0.931)	(-0.958)	(0.102)	(0.162)
INDRATIO	0.111	0.106	-0.083	-0.076
	(0.977)	(0.929)	(-1.283)	(-1.181)
Intercept	-0.131	-0.126	-0.602***	-0.618***
	(-0.462)	(-0.445)	(-3.911)	(-4.015)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,991	7,991	10,102	10,102
Adj. R^2	0.080	0.080	0.097	0.096

Panel B: Over-investment (over-hiring and under-firing) and under-investment (under-hiring and over-firing).

Y=	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Over-investment				*Under-investment*			
	Over-hiring		*Under-firing*		*Under-hiring*		*Over-firing*	
DONWILL	-0.013		0.026		0.030***		0.020	
	(-0.444)		(1.364)		(2.630)		(1.386)	
AMOUNT		0.038		0.063***		0.023*		0.027
		(0.705)		(3.256)		(1.816)		(1.066)
SIZE	0.022	0.022	-0.008	-0.008	-0.014	-0.014	0.011	0.011
	(1.258)	(1.224)	(-0.767)	(-0.761)	(-0.952)	(-0.932)	(1.264)	(1.272)
LEV	0.130	0.133	0.016	0.016	-0.006	-0.001	-0.043	-0.043
	(1.602)	(1.638)	(0.371)	(0.376)	(-0.082)	(-0.010)	(-1.074)	(-1.057)
AGE	-0.040	-0.040	-0.022	-0.024	0.016	0.015	-0.067***	-0.067***
	(-1.064)	(-1.063)	(-0.994)	(-1.077)	(0.486)	(0.441)	(-3.690)	(-3.686)
MB	0.270***	0.272***	-0.002	-0.001	-0.068	-0.070	-0.064**	-0.064**
	(5.024)	(5.048)	(-0.059)	(-0.023)	(-1.409)	(-1.452)	(-2.455)	(-2.433)
ROA	0.106	0.112	0.215	0.215	-0.007	-0.008	-0.340***	-0.339***
	(0.556)	(0.590)	(1.460)	(1.456)	(-0.043)	(-0.050)	(-3.995)	(-3.982)
SOE	0.035	0.036	0.045*	0.045*	0.003	0.005	0.007	0.007
	(0.842)	(0.858)	(1.663)	(1.664)	(0.061)	(0.119)	(0.371)	(0.362)
INSR	-0.130	-0.133*	-0.077	-0.078	-0.039	-0.043	-0.016	-0.015
	(-1.625)	(-1.658)	(-1.289)	(-1.317)	(-0.549)	(-0.604)	(-0.335)	(-0.314)
QUICK	-0.002	-0.002	-0.000	-0.000	0.001	0.001	-0.001	-0.001
	(-0.342)	(-0.285)	(-0.014)	(-0.010)	(0.108)	(0.159)	(-0.233)	(-0.225)
CASHFLOW	0.068	0.074	0.018	0.023	-0.145*	-0.141*	-0.046	-0.046
	(0.611)	(0.662)	(0.303)	(0.379)	(-1.765)	(-1.714)	(-0.815)	(-0.815)
TANGIBLE	0.001	0.002	0.034	0.027	0.115	0.116	0.049	0.049
	(0.007)	(0.019)	(0.576)	(0.460)	(1.496)	(1.503)	(1.092)	(1.095)
DUAL	0.002	0.001	-0.012	-0.012	-0.008	-0.008	0.005	0.005
	(0.084)	(0.065)	(-0.788)	(-0.816)	(-0.487)	(-0.487)	(0.516)	(0.526)
Education	-0.019	-0.019	0.016	0.016	0.015	0.015	-0.004	-0.004
	(-1.281)	(-1.309)	(1.596)	(1.522)	(1.228)	(1.234)	(-0.628)	(-0.606)

INDRATIO	0.089	0.082	-0.013	-0.023	-0.102	-0.103	-0.066	-0.064
	(0.551)	(0.506)	(-0.142)	(-0.248)	(-0.813)	(-0.819)	(-0.827)	(-0.802)
Intercept	-0.936**	-0.923**	0.022	0.037	-0.006	-0.010	-0.582***	-0.586***
	(-2.472)	(-2.440)	(0.094)	(0.159)	(-0.019)	(-0.031)	(-2.941)	(-2.956)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,462	5,462	2,529	2,529	3,530	3,530	6,572	6,572
Adj. R^2	0.044	0.044	0.026	0.027	0.116	0.114	0.226	0.226

Table 11: Human capital intensity and product market competition

This table presents the regression results when we differentiate the firms based on their human capital intensity and product market competition. We measure the human capital intensity of firms using the ratio of R&D expenditure to total sales. *MRD* is a dummy variable, which takes a value of one if a firm's human capital intensive is higher than the industry median in a given year, and zero otherwise. We define high-tech industry as the human-capital-intensive industry. *HIGHTECH* is a dummy variable, which takes a value of one if the firm is a high-tech enterprise, and zero otherwise. We use Herfindahl-Hirschman Index to proxy for product market competition. *HHI* is a dummy variable which takes a value of one if a firm's Herfindahl-Hirschman Index is lower than the industry median in a given year, and zero otherwise. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)	(5)	(6)
	LABOREFF					
*DONWILL*MRD*	0.066***					
	(4.350)					
*AMOUNT*MRD*		0.061***				
		(2.620)				
*DONWIL*HIGHTECH*			0.036**			
			(2.157)			
*AMUONT*HIGHTECH*				0.046*		
				(1.893)		
*DONWILL*MHHI*					0.047***	
					(3.412)	
*AMOUNT*MHHI*						0.037*
						(1.664)
DONWILL	0.010		0.027*		0.033***	
	(0.821)		(1.950)		(3.571)	
AMOUNT		0.035*		0.045**		0.062***
		(1.810)		(2.089)		(4.736)
MRD	0.016***	0.019***				
	(2.794)	(3.395)				
HIGHTECH			-0.002	0.001		
			(-0.218)	(0.094)		
MHHI					-0.015*	-0.013*
					(-1.943)	(-1.687)
Intercept	-0.236	-0.251*	-0.235	-0.251*	-0.231	-0.247*
	(-1.632)	(-1.734)	(-1.618)	(-1.729)	(-1.588)	(-1.704)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,101	18,101	18,101	18,101	18,101	18,101
Adj. R^2	0.074	0.074	0.072	0.072	0.072	0.073

Table 12: Labor allocation distortion, labor outflow, CSR rating, advertising expenditures and negative media coverage

This table presents the regression results when we differentiate the firms based on their motivation of reputation building. We measure the degree of labor allocation distortion using the absolute value of the coefficient of labor allocation distortion. *Abstaul* takes the value of one if the absolute value of the labor allocation distortion coefficient for the prefecture where the firm is headquartered is located is higher than the industry median in a given year, and zero otherwise. We use the net population change for city i in year t to measure whether the location is a labor force outflow city, *FLOW* takes the value of one if the net population change in the firm's location is less than 0, and zero otherwise. We use employee responsibility scores as a proxy variable for the extent to which firms fulfill their responsibilities to employees. *ESR* is a dummy variable, which takes the value of one if a firm's employee social responsibility is higher than the industry median in a given year, and zero otherwise. Likewise, *ADV* takes the value of one if the ratio of advertising expenses to total assets of the firm is above the industry median in a given year, otherwise it takes the value of zero. *NEGNEWS* takes the value of one if the number of negative media coverage of the firm is above the industry median in a given year, and zero otherwise. Firm and year fixed effects are controlled in all regressions. *t*-statistics in parentheses are calculated using standard errors clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Y=	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	LABOREFF									
*DONWILL*Abstaul*	0.031*									
	(1.833)									
*AMOUNT*Abstaul*		0.064***								
		(2.777)								
*DONWILL*FLOW*			0.042**							
			(2.313)							
*AMOUNT*FLOW*				0.055**						
				(2.077)						
*DONWILL*ESR*					0.047***					
					(3.095)					
*AMOUNT*ESR*						0.046**				
						(2.058)				
*DONWILL*ADV*							0.033**			
							(2.344)			
*AMOUNT*ADV*								0.052**		
								(2.564)		
*DONWILL*NEGNEWS*									0.022*	
									(1.683)	

*AMOUNT*NEGNEWS*										0.044**
										(2.243)
DONWILL	0.032***		0.036***		0.028**		0.033***		0.053***	
	(2.781)		(3.702)		(2.511)		(2.957)		(4.956)	
AMOUNT		0.039**		0.057***		0.049***		0.049***		0.064***
		(2.184)		(4.305)		(2.591)		(2.992)		(4.698)
Abstaul	-0.003	-0.003								
	(-0.371)	(-0.386)								
FLOW			-0.013	-0.012						
			(-1.368)	(-1.302)						
ESR					0.015**	0.016***				
					(2.573)	(2.834)				
ADV							-0.001	-0.000		
							(-0.086)	(-0.007)		
NEGNEWS									-0.008	-0.008
									(-1.596)	(-1.582)
SIZE	0.002	0.002	-0.002	-0.001	-0.002	-0.002	-0.006	-0.005	-0.003	-0.002
	(0.195)	(0.271)	(-0.231)	(-0.127)	(-0.315)	(-0.263)	(-0.828)	(-0.723)	(-0.436)	(-0.294)
LEV	-0.005	-0.004	-0.004	-0.002	0.014	0.017	0.019	0.021	0.007	0.009
	(-0.150)	(-0.104)	(-0.126)	(-0.075)	(0.493)	(0.573)	(0.651)	(0.720)	(0.221)	(0.298)
AGE	-0.042***	-0.042**	-0.034**	-0.034**	-0.025*	-0.025*	-0.026*	-0.026**	-0.025*	-0.026*
	(-2.584)	(-2.567)	(-2.305)	(-2.310)	(-1.839)	(-1.826)	(-1.952)	(-1.978)	(-1.849)	(-1.873)
MB	0.102***	0.102***	0.102***	0.102***	0.113***	0.114***	0.116***	0.116***	0.108***	0.108***
	(4.378)	(4.392)	(4.898)	(4.891)	(5.853)	(5.885)	(5.983)	(5.997)	(5.552)	(5.537)
ROA	-0.109	-0.110	-0.079	-0.083	-0.059	-0.058	-0.057	-0.058	-0.064	-0.065
	(-1.564)	(-1.586)	(-1.248)	(-1.309)	(-0.992)	(-0.972)	(-0.964)	(-0.976)	(-1.047)	(-1.061)
SOE	0.024	0.024	0.018	0.018	0.017	0.017	0.017	0.017	0.012	0.012
	(1.452)	(1.474)	(1.184)	(1.177)	(1.183)	(1.203)	(1.174)	(1.176)	(0.842)	(0.857)
INSR	-0.060*	-0.060*	-0.067**	-0.066*	-0.054*	-0.053	-0.055*	-0.054*	-0.058*	-0.057*
	(-1.729)	(-1.733)	(-1.970)	(-1.941)	(-1.687)	(-1.639)	(-1.721)	(-1.693)	(-1.780)	(-1.765)
QUICK	-0.001	-0.001	-0.002	-0.001	-0.000	-0.000	-0.000	-0.000	-0.001	-0.000
	(-0.300)	(-0.293)	(-0.636)	(-0.596)	(-0.205)	(-0.154)	(-0.103)	(-0.054)	(-0.214)	(-0.152)

CASHFLOW	0.012	0.013	0.022	0.023	0.015	0.015	0.015	0.015	0.014	0.015
	(0.269)	(0.294)	(0.540)	(0.558)	(0.385)	(0.388)	(0.392)	(0.403)	(0.358)	(0.379)
TANGIBLE	0.054	0.054	0.060*	0.060*	0.055*	0.054*	0.055*	0.055*	0.052	0.052
	(1.475)	(1.476)	(1.760)	(1.758)	(1.760)	(1.734)	(1.765)	(1.764)	(1.619)	(1.631)
DUAL	-0.005	-0.004	-0.001	-0.001	0.002	0.002	0.002	0.002	0.001	0.001
	(-0.579)	(-0.526)	(-0.169)	(-0.111)	(0.228)	(0.261)	(0.285)	(0.339)	(0.119)	(0.143)
Education	0.001	0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	0.000	0.001
	(0.086)	(0.088)	(-0.111)	(-0.138)	(-0.015)	(-0.011)	(-0.068)	(-0.057)	(0.080)	(0.114)
INDRATIO	-0.032	-0.030	-0.001	-0.000	-0.001	0.001	-0.005	-0.003	-0.001	0.002
	(-0.476)	(-0.443)	(-0.009)	(-0.003)	(-0.012)	(0.018)	(-0.083)	(-0.058)	(-0.024)	(0.030)
Intercept	-0.333**	-0.349**	-0.283*	-0.300**	-0.320**	-0.332**	-0.235	-0.253*	-0.280*	-0.304**
	(-1.996)	(-2.087)	(-1.853)	(-1.967)	(-2.152)	(-2.233)	(-1.623)	(-1.748)	(-1.907)	(-2.068)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,787	14,787	16,133	16,133	18,076	18,076	18,101	18,101	17,710	17,710
Adj. R^2	0.074	0.075	0.071	0.072	0.073	0.073	0.072	0.073	0.073	0.073

APPENDIX A: Variable Definitions

Variables	Definition and measurement
Dependent Variables	
LABOREFF	The magnitude of labor investment efficiency, which is calculated as the absolute value of the residual estimated based in Eq. (1), then multiply the number by -1.
LABOREFF1	Using the rate of change of employees (rate of change in the total number of employees of listed firms) to replace the dependent variable (*NET_HIRE*) in Eq. (1), then multiply the number by -1.
LABOREFF2	Using a firm's industry median level of net hiring as a proxy for *NET_HIRE* to replace the dependent variable (*NET_HIRE*) in Eq. (1), then multiply the number by -1.
Over-investment	Actual net hiring greater than expected level.
Under-investment	Actual net hiring less than expected level.
Over-hiring	Over-investment when expected net hiring is positive.
Under-firing	Over-investment when expected net hiring is negative.
Under-hiring	Under-investment when expected net hiring is positive.
Over-firing	Under-investment when expected net hiring is negative.
Key Independent Variables	
DONWILL	A dummy variable that takes one if a firm donates to university education foundations in a given year and zero otherwise.
AMOUNT	The ratio of donations to university education foundations to assets in a given year.
Amount	The natural logarithm of 1 plus all donations to university education foundations.
Donation	Total donations divided by one million.
Control Variables	
SIZE	Natural logarithm of total assets.
LEV	Total liabilities scaled by total assets.
AGE	The natural logarithm of one plus the number of years a firm has been listed.
MB	The market value of equity deflated by its book value at the end of the year.
ROA	Net income scaled by total assets.
SOE	A dummy variable that takes the value of one if the firm is controlled by the government, and zero otherwise.
INS	Percentage of shares held by institutional investors.
QUICK	(Current assets - inventories) / Current liabilities.
CASHFLOW	Operating income before depreciation minus interest expenses, income taxes, and capital expenditures, scaled by total assets.
TANGIBLE	Net fixed assets / total assets.
DUAL	A dummy variable that takes one if the CEO is also Chairman of the board, and zero otherwise.
Education	The average education background of the CEO and Chairman. Education

	takes the value of five for a PhD degree, four for a Master's degree, three for a Bachelor's degree, two for a junior college degree, and one for below a junior college degree.
IndDirector	Percentage of independent board members.
Variables Used in Further Analysis	
Bachelor	The ratio of employees with bachelor's degree or above.
MasPhd	The ratio of employees with master's and doctoral degrees.
Tech	The ratio of employees in technical sections.
Initiation	A dummy variable that takes one if a firm donates to the university education foundations for the first time and zero otherwise.
Termination	A dummy variable that takes one if a firm stops donating to the university education foundations and zero otherwise.
Number	The number of newly-established university education foundations in the province where the firm is headquartered in the current year.
MRD	MRD is a dummy variable, which takes one if a firm's human capital intensive is higher than the industry median in a given year, and zero otherwise.
HIGHTECH	A dummy variable, which takes one if the firm is a high-tech enterprise, zero otherwise.
HHI	A dummy variable which takes one if a firm's Herfindahl-Hirschman Index is lower than the industry median in a given year, and zero otherwise.
Abstaul	A dummy variable which takes the value of one if the absolute value of the labor allocation distortion coefficient for the prefecture where the firm is headquartered is located is higher than the industry median in a given year, and zero otherwise.
FLOW	A dummy variable which takes the value of one if the net population change in the firm's location is less than 0, and zero otherwise.
ESR	A dummy variable, which takes one if a firm's employee social responsibility is higher than the industry median in a given year, and zero otherwise.
ADV	A dummy variable, which takes the value of one if the ratio of advertising expenses to total assets of the firm is above the industry median in a given year, otherwise it takes the value of zero.
NEGNEWS	A dummy variable, which takes the value of one if the number of negative media coverage of the firm is above the industry median in a given year, and zero otherwise.