Do investments in human resource practices affect corporate investment efficiency?

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Abstract

We examine the effect of employee quality development on investment efficiency. We assume that relevant explicitly or implicitly costly human resource practices improve employee quality, thereby promoting investment efficiency. Using a large sample of US firms for the period 2002-2016, our findings reveal that human resource practices are *negatively* associated with investment efficiency, inducing both over- and under-investment. Results are more pronounced when we focus on human resource practices that have greater monetary direct costs, and on non-capital expenditures. Our evidence is consistent with agency motivations driving in the practices geared towards employee development, and with such expenditure ultimately not aligning the interests of employees and shareholders. The evidence is also consistent with investments in human resource practices being perceived as highly uncertain by outsiders, with negative consequences for the supply of capital.

JEL classifications: *O15, G10, G31*

Keywords: *Human resource practices, Employee quality, Investment efficiency, Over-investment, Under-investment.*

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1. Introduction

In friction-less capital markets, firms invest in all available positive NPV projects (Modigliani and Miller, 1958), until the marginal benefit of investment equals the marginal cost (Hayashi, 1982). However, in practice, firms face financing constraints (Hubbard, 1998). Capital market frictions lead to deviations from optimal investment (Cheng et al., 2013; Chen et al., 2017a, 2017b), resulting in both over- and under-investment. Over-investment is usually associated with poor project selection and managerial expropriation of existing firm resources; while under-investment is associated with firms facing financing constraints and a high cost of raising capital (Benlemlih and Bitar, 2018).

Drawing on agency theory (Jensen and Meckling, 1976; Jensen, 1986), the existing literature focuses on how misalignment between the interests of shareholders and the incentives of high-level employees, such as CEOs and CFOs, result in inefficient investments (Biddle et al., 2009), where moral hazard and adverse selection lead to either over- or under-investment, depending on available funding (Chen et al., 2017b). Despite the intuitive appeal of this focus on top executives as key decision-makers, we expect that lower-level employees are also of critical importance for corporate investing, since they ultimately are responsible for the execution of decisions and strategies that create and capture value (Wright et al., 1994; Sirmon et al.; 2007; Wright and McMahan, 2011; Nyberg et al., 2014). Such employees often possess value-relevant information about their firms (Babenko and Sen, 2016). They are also critical in identifying investment opportunities, detecting and monitoring deviations from scheduled investments, or directly conducting the research that leads to innovations (Aghion and Tirole, 1994). An arising question, therefore, is whether non-executive employees affect firm investment efficiency.

In this study, we examine the effect of firm efforts on employee quality development on investment efficiency. In particular, we analyze employee development *via* human resource (HR) practices. We argue that HR practices such as compensation unrelated to pure salary, training, job security, efforts to improve work design, and promotion of diversity can improve the overall quality of employees. Our underlying assumption is therefore that corporate efforts to develop and implement such HR practices should result in

employees who are more able, more motivated and committed, and with better opportunities to participate (Delery and Huselid, 1996; Youndt et al., 1996; Ichniowski and Shaw, 2003; Boxall and Macky, 2014). Following agency theory and social exchange theories (Blau, 1964; Akerlof, 1982; Eisenhardt, 1989; Tsui et al., 1997), in companies committed to HR practices, the interests of employees will more closely align with those of shareholders. Hence, moral hazard should be lower, while employees will have higher incentives to work for the benefit of the firm, perhaps as an act of reciprocation. Apart from this treatment effect, higher employee quality might have a sorting effect as well, attracting and retaining employees of better quality, i.e., more capable and more motivated (Lazear, 2000; Gerhart and Rynes, 2003). In this way, higher employee quality would lead to better alignment of the interests of the employees and the firm, with such employees being more able to support corporate investment projects, and thus, promote corporate investment efficiency.

However, HR practices do not always bring positive results (Cappelli and Neumark, 2001; Bloom et al., 2011). The social and gift exchange theories suggest that when such practices become the norm, they are no longer perceived as benefits or "gifts" by employees (de Menezes and Kelliher, 2017). There is also evidence that HR practices cease to pay off in cost-benefit terms (Kaufman, 2012), and that such practices have dis-synergies, meaning that certain combination of practices reduce, rather than enhance, firm performance (Becker et al., 1997; Chadwick, 2010). In addition, HR practices are often costly, and can deprive other types of investments from funding. Also, past research shows agency issues are associated with labor investment inefficiencies (Cronqvist et al., 2009; Atanassov and Kim, 2009; Chen et al., 2012). Cronqvist et al. (2009), for example, find that entrenched managers exhibit better behavior towards their employees. If these alternative consequences of HR practices dominate, employee quality might not have a positive impact on investment efficiency.

Given the mixed views in prior literature, we aim to shed light into the empirical question of whether firm efforts to develop employee quality *via* a system of HR practices is associated with investment efficiency. It can be readily deduced from strategic HR management (SHRM) literature research that relevant or a system of practices may or may not be associated with favorable corporate outcomes (Huselid,

1995; Bloom, et al., 2011), in a context of such investments having dis-synergies, being highly uncertain, costly, and potentially subtracting from other types of investments. Therefore, we aim to assess the way they affect adverse selection and moral hazard issues related to investment, and thus associated with deviations from optimal investment levels.

To examine these questions, we extract data on HR practices for US firms for the period 2002-2016 from the ASSET4 database, by matching firm-level to firm data from Compustat. We construct three HR indices based on ASSET4 detailed and disaggregated information: (i) one that includes all corporate efforts, (ii) one that includes costly HR practices only, as measured either by opportunity or cash-based costs, and finally, (iii) one that includes only HR practices that involve direct cash payments. Using a maximum of 5,902 firm-year observations for nonfinancial firms (corresponding to 785 different firms), we find that efforts to develop employee quality *negatively* associates with investment efficiency, inducing both over- and under-investment.

We further examine whether this association is stronger when efforts to improve the quality of employees are undertaken *via* a system of costly cash-based HR practices, such as bonuses and training, in contrast with other possible non-monetary HR practices, such as supporting diversity in the workplace and job security. The rationale for this analysis is that costly (in terms of cash-based or opportunity cost) HR practices, and particularly practices with an explicit cash cost, likely reduce the funds available for investment, depriving other types of investments from relevant resources or cash availability. The results support this idea and show that the observed negative association between employee quality development and investment efficiency becomes *more* pronounced when explicitly considering HR practices that are more directly costly, and particularly for purely monetary practices, that will ultimately require a cash outflow. When we repeat our analysis by decomposing investment into its capital (Capex) and non-capital expenditure (R&D and acquisitions) components, we find that the negative association between firm efforts to develop employee quality and investment efficiency is driven by *NonCapex* investments.

Our results are robust to a number of different model specifications used; namely, applying the methodologies used by Biddle et al. (2009), Cheng et al. (2013) and Chen et al. (2017b) to identify investment inefficiency. We also use the definitions of investment inefficiency from Biddle et al. (2009) and McNichols and Stubben (2008), by defining investment inefficiency in the form of firm-specific residuals from a model predicting the level of investment based on growth opportunities, as measured by sales growth (Biddle et al., 2009); and asset growth, past investment, cash flows from operations, and Tobin's Q (McNichols and Stubben, 2008). Our results are also robust to the application of firm-, in addition to industry- and year-, fixed effects in our analysis, and to the exclusion of the years of the financial crisis from our tests.

The negative association between HR practices e and investment efficiency is consistent with outside investors feeling uncertain about the eventual positive outcome (or not) of such investments, and restricting the supply of capital accordingly, leading to under-investment. A non-competing interpretation is that such practices have dis-synergies as well as the tying up of funds in such efforts restricts investment in other types of corporate efforts, unrelated to the development of employees, also leading to under-investment. The result is also consistent with relevant HR practices representing the result of managerial agency motivations, taking a number of forms e.g. invest in employees to justify managerial excessive compensation, or as a result of managerial hubris, to overly expand the firm beyond its optimal size. Such managerial motives are consistent with HR practices not being undertaken under the real scope of promoting the economic investment needs of the firm, and are, therefore, shown to significantly associate with over-investment.

Our results also indicate that this association between HR practices to develop employee quality and investment inefficiency is stronger for explicitly costly, especially in pure monetary terms, practices, and also for investment inefficiency in NonCapex projects. This suggests investment inefficiency is more strongly induced by practices with a direct cash cost. This is consistent with the idea that investors may be more concerned about the potential usefulness of HR practices if undertaken in the form of costly consumption of resources, and cash in particular, and constrain funding accordingly. Second, Capex

investments are naturally more specific than NonCapex ones, when the latter take the form of R&D or acquisitions, both of which can be considered as inherently uncertain in nature, with reference to variability of their possible future outcomes, compared to the more concrete and tangible nature of Capex investment. HR practices is found to be associated with inefficient investment in NonCapex, consistent with investors becoming especially concerned when investment takes a more uncertain form, as opposed to the more specific Capex, and adjusting the supply of capital accordingly.

In accordance with the above interpretation, our main result is more pronounced for higher managerial entrenchment, as proxied by longer managerial tenure, and for higher levels of equity, and particularly debt, issuance, and also for less complex firms. This is consistent with investment in HR representing a managerial perk, in accordance with agency motivations to maximize the manager's own benefit, and also adverse selection and moral hazard-consistent predictions, as we find that investment inefficiency is induced by HR practices in the context of higher external capital raising. At the same time, practices to develop employee quality do not significantly associate with investment inefficiency when most needed, and this should be the case for is for the more complex vs. less business settings, but do so for less complicated business environments.

Apart from a system of different types of HR practices, we find that individual HR practices lead also to investment inefficiency, suggesting that out results are not driven by certain HR practices neither vary based on the specific type of HR practice offered to the employees. This suggests that even in the case of specific practices, if employers offer more than needed, i.e. multiple practices of the same type, they incur unnecessary costs that may exceed benefits as well as may send the wrong signal to capital investors, ending up harming the investment efficiency of the firm. Our findings are in line with evidence showing that HR investments directed toward, for example, employee training can be substitutive in nature and adopting them at the same time can become counterproductive and, in extension, could diminish performance (Bapna et al., 2013). From a strategic perspective, what is surprising is that such practices

although in principal can develop employee quality, they can be detrimental in maximizing performance in terms of investment efficiency.

An alternative view to the one we have presented is that those firms that invest more efficiently will attract the highest quality employees, while HR efforts can only marginally improve employee quality. If that view holds, a causal link between investment in employee quality and investment efficiency should not be expected to exist because of that sorting effect. However, our findings point towards the direction of investments in employee quality actually associating with *lower* investment efficiency, and are not, thus, compatible with this direction of causality.

Our paper contributes to prior work by examining if corporate HR practices targeted at improving employee quality pay off in terms of investment efficiency. Indicatively, our study is different from a recent study by Cao and Rees (2018) that examines the effect of employee-friendly policies on labor investment efficiency, expressed in terms of the deviation of actual net hiring from expected levels. Therefore, our study contributes to the recent call by Call et al. (2017) for research that examines the effects of employee quality on investment efficiency. Our results contribute also to the SHRM literature, which explains that improving workplace standards has a significant impact on a company's ability to create value and achieve better firm performance (Barney, 1991; Huselid, 1995; Becker and Gerhart, 1996; Batt, 2002; Fauver et al., 2018). Our findings partly challenge this assumption. Performance is multidimensional and although improving employee quality *via* HR practices affects positively certain aspects of it, it affects negatively others, such as a firm's investment efficiency.

The rest of the study is organized as follows: In Section 2, we develop our research hypotheses. Section 3 presents the research design and the sample selection process, along with basic descriptive statistics. Section 4 reports and discusses our empirical findings, while Section 5 concludes.

2. Hypotheses development

2.1. Determining factors for investment efficiency

Adverse selection (information asymmetry) and moral hazard underpin firms' suboptimal investment decisions (Biddle et al., 2009; Chen et al., 2017b). Managers may use the firm's cash reserves to invest in unattractive projects for the purposes of self-gratification, or to maintain the independence of thel firms they lead (Blanchard et al., 1994). Certain behavioral characteristics of managers can also induce inefficient investment; these include career concerns, incongruity in risk preferences between managers and shareholders (Holmstrom, 1999), managerial preference for the so-called 'quite life' (Bertrand and Mullainathan, 2003), and hubris when managers overestimate their abilities to spot good investment opportunities (Chen et al., 2017b). Moral hazard problems produce over-investment *ex post* in the presence of enough resources to invest by, for example, growing the firm beyond its optimal size, by engaging in empire building, or through perquisite consumption, or management entrenchment (Jensen 1986; Aggarwal and Samwick, 2006; Chen et al., 2017b). However, if capital suppliers track this type of behavior, they might constrain the supply of capital ex ante, by charging a higher cost of capital, leading to under-investment (Biddle et al., 2009; Cheng et al., 2013; Chen et al., 2017b).

Adverse selection can play a role in inducing over- or under-investment as well. If managers are better informed about the firm's prospects than outsiders, they could try to time the issuance of capital by selling overpriced securities (lemon's problem). In this case, they might over-invest if successful, but might under-invest *ex post* if they pass up on good investment opportunities, in cases when investors respond to this information asymmetry problem by rationing the provision of capital (Biddle et al., 2009).

2.2. Employee quality and investment efficiency: Development of research hypotheses

Prior work focuses on the role of managers in affecting firms' investment efficiency. We argue that employees at lower levels also play a prominent role in the implementation of corporate investment policies. The SHRM literature suggests that it is the core workforce, and especially the one that is better managed,

that is more likely to have the greatest impact on the firm's value creation (e.g., Delery, 1998; Batt, 2002). Nevertheless, similarly to managers, agency issues may arise between employees and the firm and its shareholders, and the challenge for organizations is to align the interests of these parties. We focus on whether HR practices targeted at improving employee quality serve to align employees' and shareholders' interests, with consequences for investment efficiency. Specifically, we examine how firms' efforts in developing employee quality *via* the provision of HR practices creates value in terms of promoting investment efficiency.

The literature has connected HR practices with a number of positive employee outcomes, which in turn, should translate into better firm productivity and performance (e.g., Guest, 1997; Black and Lynch, 2004). The positive nexus is usually explained by the ability, motivation and opportunity (AMO) model of individual performance (Campbell et al., 1993; Huselid, 1995). The model suggests that HR practices work through their impact on the skills of employees, their motivation to exert effort as well as the opportunities they have to participate and perform. Therefore, we infer from this framework that investing in practices such as training, monetary and non-monetary rewards, participatory mechanisms, and practices that promote equal opportunities (which should help to develop talent regardless of background and/or special personal circumstances) should improve the overall quality of employees. HR practices are particularly effective when applied as a system of "interrelated and internally consistent HR practices," as they may capture higher-level effects on employee and/or firm performance, which cannot be captured by focusing solely on individual practices (Huselid, 1995; MacDuffie, 1995; Subramony, 2009; Chadwick, 2010; Chadwick et al., 2015). The system approach is based on the notion that one practice is more effective when adopted in combination with other HR practices. Practices adopted together are more effective because they can potentially reinforce one another to increase organizational efficiency and effectiveness (MacDuffie, 1995; Becker and Gerhart, 1996). Performance outcomes of HR systems include greater firm value (Delaney and Huselid, 1996), accounting profits (Huselid et al., 1997) and innovation performance (Laursen and Foss, 2003).

The results of prior work imply that employees who are better trained, more motivated, and have more opportunities (to participate) could better support the investment plans of the top management that possesses, in theory, superior information about the firm's prospects than investors (e.g., Babenko and Sen, 2016). Satisfying workplaces, that leave room for personal development, should advance employee job loyalty, reduce shirking or employee turnover and increase employee productivity (Jones and Wright, 1992; Huselid, 1995; Black and Lynch, 2004; Bloom et al., 2011, 2015; Chen et al., 2016b). In this way, employees should be more likely to have their interests aligned with the interests of the firm and its shareholders. In line with this expectation, prior research has shown that satisfied employees may support firm innovation, as they are more likely to internalize the firm's innovation objectives, which strengthens their motivation to overcome difficulties and failure during the innovation process (Chen et al., 2016a). If employee development efforts improve their retention, motivation, and productivity, their development should have a positive impact on productive investment efforts (Chen et al., 2016a). This employee profile should be more able to support employee proactive participation and teamwork, transfer of knowledge across different segments, learning and inter-unit collaboration, stimulating innovation (Chen et al., 2016b), and, as a result, supporting firm objectives for efficient corporate investment undertaking.

An explanation for the alignment of interests between employees and shareholders through HR practices that enhance employee quality is also provided by social and gift exchange theories, which proclaim the norm of reciprocity (Blau, 1964; Akerlof, 1982). These theories suggest that employees interpret the organization's actions as a reflection of its commitment to them, which they then reciprocate with their loyalty and commitment. According to these theories, the provision of benefits or "gifts" from the organization is part of an exchange between the two parties. Benefits or "gifts" can take the form of above-market wages, or other benefits such as job security, employee training and career development, contingent pay, which the employee is willing to return or reciprocate to the firm with the "gift" of effort, increased dedication to their job, and performance above the norm (Organ, 1997; Tsui et al., 1997; Chen et al., 2016a).

Apart from a treatment effect suggested in social and gift exchange theories, such HR practices may have a sorting effect as well. The existing evidence shows that firms with better HR practices act as a sorting device to attract and retain the most capable employees (Zenger, 1992; Lazear, 2000; Gerhart and Rynes, 2003; Stern, 2004; Bloom et al. 2011). For example, Jensen (2003) argues that more productive employees would choose performance pay, while less productive employees would avoid it and opt for a fixed-salary. Incentive compensation and other forms of incentives will encourage current employees who are nonperformers to leave the firm and hence, will enhance the retention of higher quality employees. At the same time, prospective employees who believe that they do not meet the skills and abilities required by the company are more likely to self-select out of the hiring process, enhancing the quality of candidates applying and entering the firm (Jones and Wright, 1992; Huselid, 1995). Sorting into firms based on available HR practices is a process which itself can affect performance outcomes (e.g., Lazear, 2000; Cadsby et al., 2006). This type of employees should have their interests more closely aligned to the ones of the firm, so moral hazard levels should be lower, along with higher incentives to work for the benefit of the firm.

Overall, the arguments of the AMO model, social exchange theories and the sorting effect suggest that investing in HR practices should result in higher quality employees, who are more likely to have their interests aligned with the ones of their employers. Therefore, one could expect that investing in employee quality, and producing a relevant desirable employee profile should be associated with improved investment efficiency. If relevant investment in employee quality is considered to be effective by outside investors, they should also support the firm's investment prospects by providing adequate capital, at an economically justified cost, considering that this investment by the management in employee quality is done for the sake of supporting investment prospects efficiently. Based on this line of reasoning, we expect that investing in employee quality has a positive impact on investment efficiency, in terms of both constraining over-investment and protecting from under-investment. Thus, our first hypothesis is as follows:

H1. *Employee quality development positively impacts investment efficiency.*

Although past research has shown that HR practices are associated with improved firm performance (Edmans, 2011; Faleye and Trahan, 2011; Ertugrul, 2013; for a review, see Cao and Rees, 2018), and even if the link between investing in employee quality and investment efficiency might be obvious, the actual outcome of such provisions at the firm level is controversial. The arguments pointing to positive impacts of employee quality on investment efficiency relate to cases when relevant management efforts are based on accurate and honest estimation of a firm's investment prospects. If due to information asymmetries stemming from adverse selection, outsiders are not convinced about the added value and exact content of such expenditure in employee development, and consider such practices motivated by managerial self-interest, they could constrain the provision of capital, leading to under-investment.

Furthermore, employee quality development could be associated both with attenuated or accentuated moral hazard issues. From the one hand, more committed employees should be expected to associate with fewer adverse behavior problems, and be less inclined to leave the firm so that that firm avoids losing their firm-specific knowledge, and consequently, enter into the costly process of having to train new staff. If employee quality development is considered to be efficient by outside investors, they may support the firm's investment prospects by providing adequate capital, at an economically justified cost. However, if providers of finance are unsure of the actual efficiency and tangible result of these practices, or about the exact managerial motives behind such decisions (e.g. support investment development efficiently, vs. engage in empire building), they may constrain funding, leading to under-investment. If efforts to improve employee quality are justified by managerial agency motivations, relating to both moral hazard and adverse selection, such as, for example, to justify high managerial compensation, by making sure that employees are content too, or engage in empire building, or is the result of pure hubris by managers overestimating their own abilities to identify investment opportunities (Chen et al., 2017b), then efforts to promote employee quality could be linked to over-investment.

Indeed, past research has associated agency issues with labor investment inefficiencies (Cronqvist et al., 2009; Chen et al., 2012; Atanassov and Kim, 2009). Cronqvist et al. (2009), for example, find that entrenched managers exhibit better behavior towards their employees. Thus, when efforts to increase

employee quality are justified by managerial opportunistic motivations, investors might not see the added value of such practices. Moreover, human capital investment may be perceived as costly and not sufficiently valuable to exceed gains in productivity and performance (Batt, 2002). According to the SHRM literature, for firms to create value, they have to use a wide set of HR practices, rather than introduce one or few practices. However, providing multiple or systems of HR practices carries significant costs, such as high coordination and implementation costs, and relatively inefficient utilization of individual practices (Chadwick, 2010). For example, retention of high quality employees may improve after introducing HR practices such as flexible work arrangements, but at the same time, there may be costs of production inflexibility, which will reduce productivity, as well as costs of implementation, which will reduce firm profitability (Bloom et al., 2011). An additional problem with systems of HR practices is that they may counteract each other, so that the adoption of one practice is less effective when adopted with other practices (Becker et al., 1997; Delery, 1998). The reason is that some practices might lead to the same outcome. For example, there are multiple methods to increase employee participation, such as using problem-solving teams or quality circles. Nevertheless, it is unlikely that using all of them increases participation, beyond using one or perhaps two practices. Therefore, using more than what is necessary might only carry costs without adding much value, leading to reduced, rather than enhanced, firm performance. Empirical evidence further confirms this idea and shows, for example, that different types of training can be substitutive in nature, and adopting them at the same time would diminish performance (Bapna et al., 2013). More recent evidence also shows that the presence of HR executives (as an indicator of firms' emphasis on HRM issues) has no impact on firms' post-IPO financial performance (Chadwick et al., 2016).

In addition to the above, the principal-agent framework (Jensen and Meckling, 1976) and free cash flow argumentation (Jensen, 1986) are consistent with higher free cash flows and internal reserves making it more likely for firms to have more resources to wastefully dedicate to employee benefits (Chen et al., 2016b). Consequently, the managers of such firms might expend more in their employees, while such costs may not necessarily create value for their shareholders (Chen et al., 2016b). Also, if managers consider that the development of their employees will be beneficial to themselves, for example, to gain a "quiet life" as

predicted by Bertrand and Mullainathan (2003), then HR practices aimed at developing employee quality could even have a negative effect on investment efficiency.

The aforementioned arguments also suggest that investors might not be convinced either about the motivation underpinning employee quality development, or about the added value *versus* costs of such practices. Then, they may constrain the supply of capital, leading to investment inefficiency.

Against this background, the social exchange theories also suggest that when HR practices become the norm inside an organization, they might be taken for granted by the employees, and may not be perceived as a benefit or gift given by the organization that needs to be reciprocated (Putnam et al., 2014; de Menezes and Kelliher, 2017). Consequently, any positive association between employee quality development via HR practices and performance would be weaken over time. In line with these arguments, prior work shows that there is no clear indication that certain practices, particularly when adopted as a system, help firms create value and they do not affect firm performance directly or indirectly (Cappelli and Neumark, 2001; Bloom et al., 2011). Therefore, it is possible that employee quality development *via* the provision of HR practices might have a negative impact on investment efficiency. Based on the above arguments, we hypothesize that:

H2. *Employee quality development negatively impacts investment efficiency.*

One notable difference across the types of HR practices is how costly they are, and specifically whether they use up monetary resources, ultimately requiring the sacrifice of cash. For example, training carries a significant direct monetary cost, because it requires companies to cover the cost of the courses when internal, and particularly external training is offered. It also carries a significant opportunity cost attributed to the time employees are absent attending classes during working hours. Other practices, such as employee participation in decision making, or flexible work arrangements, might be less costly, as they usually involve a less cash-based or a non-monetary cost. For example, flexible work arrangements, such as working from home, often involve coordination costs or opportunity costs in the form of production inflexibility. Although such investments reduce productivity and their cost of implementation decreases

profitability (Bloom et al., 2011), because of their costly (directly or indirectly) cash nature, such HR practices should be more likely to reduce the available resources the company has to spend, and potentially withdraw resources or cash from other types of investments. We consider this distinction to be particularly important for our study, given arguments posed by past research on a potential association between cash holdings and a tendency to over-invest, stemming from Jensen's (1986) free cash flow hypothesis. Given the identified link of excess capital holdings in terms of cash, and the tendency to engage in inefficient investment decisions, we view that there exists the need to distinguish between employee advancement efforts that have a more vs. less direct cost, and especially a direct monetary cash-related cost.

Furthermore, if investors are not convinced about the added value of HR practices, or are uncertain about the managers' motives, then they are likely to be perceived as wasteful spending. Then, investors might constrain capital, leading to investment inefficiencies. We expect that any association between firm effort to improve employee quality and investment efficiency should be stronger to the extent that this practices are costly, and particularly, for cash-based actions vs. other possible nonmonetary HR practices, such as supporting diversity in the workplace. Thus, we hypothesize that:

H3. *Employee quality development effects on investment efficiency are stronger for costly HR practices (directly or indirectly costly or cash-based).*

3. Sample selection and methodology

3.1. Employee quality development: Index construction

Thomson Reuters ASSET4 provides information across three dimensions or 'pillars': environmental, social and governance (ESG), for more than 4,500 companies worldwide. Its research analysts collect more than 900 objective evaluation points per year, using publically available information (Cheng et al., 2014).[1] After collecting raw CSR data, the analysts of Thomson Reuters ASSET4 transform it into a series of standardized

[1] This dataset has already been validated by a number of studies, more specifically by Cheng et al. (2014), Lys et al. (2015), Hawn and Ioannou (2016), Schons and Steienmeier (2016), El Ghoul et al. (2018), and is also discussed in Huang and Watson (2015).

ESG indices, by benchmarking the performance of a firm against the performance of the rest of the firms in the dataset (Hawn and Ioannou, 2016). In this way, ASSET4 data items consist of both raw data points, as well as constructed indices.

ASSET 4 contains various data points that consist of questions with a binary (yes or no). Following previous research (Hawn and Ioannou, 2016), we independently assess all data points from the social pillar,[2] that contain information on HR practices aimed at developing the quality of employees, and classify them into five categories: a) compensation unrelated to the salary component, b) training, c) work design, d) job security, and e) diversity. We then create HR indices based on these raw data points or questions for the above categories.[3]

In the course of reviewing the questions to be included in HR index creation, we testified that there existed considerable conceptual overlap between some questions, which led us to more formally investigate whether there was an underlying factor structure associated with these questions. So, for constructing individual indices for the above disaggregated categories, we subjected the subjectively selected questions to factor analysis to test whether the items measure the same underlying construct, following Hawn and Ioannou (2016) and kept questions that belonged to the same factor. Also, Cronbach's alphas indicated that the variables in each factor show satisfactory reliability with alphas over 0.8 in most cases. This process of constructing HR indices by overall examining all ASSET4 employee-related data points, is performed after assessing which items are compatible with relevant items used in HR management literature (Ramsay et al., 2000; Bloom and Van Reenen, 2010).[4]

[2] This may or may not belong to the so-called "Strategic Framework" of ASSET4 - see Hawn and Ioannou (2016), for a relevant description

[3] In this process, we convert a data point from continuous to binary form, so that its format is consistent with the remaining data points used. This item relates to whether there exist or not data on training hours for a firm in question.

[4] In a recent study, Fauver et al. (2018) construct an employee friendliness index by also making use of decomposed data from ASSET4, which includes both corporate efforts (inputs) e.g. policy to support the skills training of the employees, and outputs e.g. the company has won an award or any prize related to general employment quality (Fauver et al., 2018: 105). Given the focus of our study on company efforts to develop the quality of its employees, our HR indices make use of input data exclusively.

We also calculate an aggregate index for overall efforts made in improving employee quality, consisting of the five categories. The use of ASSET4 permits distinguishing directly costly HR practices from non-costly, even in to pure monetary and cash terms. This disaggregated information is particularly important for our study, given the reviewed arguments on a potential association between cash holdings and a tendency to over-invest, stemming from Jensen's (1986) free cash flow hypothesis. Also, given the identified link of excess capital holdings in terms of cash, and a possible tendency for managers to engage in inefficient investment decisions, we distinguish between employee quality enhancing practices that are costly in terms of direct or opportunity cost, and practices which create an explicit cost in monetary terms.

For this reason, we finally construct a total of three aggregate HR indices. The first index (HR) consists of all identified questions, reflecting HR practices, developed across the five categories (factor analysis confirms that practices can be grouped together), which should enhance the quality of the workforce. This index includes a total of 27 (yes or no answer) questions. The second index (HR-Costly) consists of 14 questions reflecting costly practices, in terms of monetary or opportunity cost; and the third index (HR-Cash-based) consists of 11 questions, reflecting practices with a monetary cost. Index constituting variables (or questions) are measured by binary indicators, equal to 1 if an HR practice exists in the firm, and 0 otherwise. Details on the construction of the three HR indices, and the exact questions used for their construction are reported in Appendix A.

3.2. Research design

To estimate the effect of HR practices targeted at improving employee quality on investment efficiency in year *t+1*, we follow the methodology of Biddle et al. (2009), Cheng et al. (2013), García Lara et al. (2016), and Chen et al., (2017b). Our baseline regression model is specified as follows:

$$INV_{i,t}\,(Capex_{i,t} \mid NonCapex_{i,t}) = \alpha_0 + \alpha_1\, HR\ Index_{i,t-1} + \alpha_2\, OverFirm_{i,t-1} + \\ + \alpha_3\, HR\ Index_{i,t-1} * OverFirm_{i,t-1} + \sum \lambda\, Controls_{i,t-1} + \varepsilon_{i,t}, \qquad (1)$$

where INV is a measure of total investment, defined as the sum of research and development expenditure, capital expenditure, and acquisition expenditure, less cash receipts from sale of property, plant, and equipment (PPE); multiplied by 100; and scaled by lagged total assets. Following Biddle et al. (2009), investment is further decomposed into capital expenditure (Capex), and non-capital expenditure (NonCapex; research and development and acquisition expenditure) components.

We identify investment inefficiency using firm-specific levels of cash and leverage as *ex ante* firm-specific characteristics that are likely to affect the likelihood that firms will over- or under-invest, following Biddle et al. (2009), Cheng et al. (2013) and Chen et al. (2017b). Specifically, we calculate OverFirm, which is a ranked variable computed as the average of ranked decile measures of cash and leverage. Deciles are calculated according to year and Fama and French (1997) 48 (FF48) industry sectors, in accordance with Chen et al., (2017b), and rescaled from 0 to 1. The underlying assumption is that firms without cash are more likely to be financially constrained, and prone to under-invest, while firms with high cash balances are prone to face higher agency problems (Jensen, 1986), and thus, over-invest (Biddle et al., 2009). At the same time, firms with high leverage should again be more prone to under-investing, as they should be more constrained and more likely to face a debt overhang problem (Biddle et al., 2009). In this way, the tendency of a firm to over-invest (under-invest) increases (decreases) with cash and decreases (increases) with leverage. Leverage is multiplied by minus one, so that it increases with the likelihood of over-investment. A high value of OverFirm is indicative of a firm prone to over-investment, and a low score is indicative of a firm prone to under-investment.

Our independent variables of interest are the HR Index, and the multiplicative term between the HR index and OverFirm. HR Index is one of our three indices, HR, HR-Costly, and HR-Cash-based, as described in Section 3.1 and Appendix A. If HR practices negatively (positively) associate with investment inefficiency, as predicted by H1 (H2), then coefficient α_1 should be positive (negative) and significant, and coefficient α_3 should be negative (positive) and significant. We further perform a joint significance test for α_1 and α_3, to simultaneously test whether HR Index overall contributes to investment efficiency. Equation

(1) is estimated with year and industry (according to FF48) fixed effects and heteroscedasticity robust standard errors. We also apply firm fixed effects in robustness tests.

Controls used in Equation (1) include proxies for monitoring or governance mechanisms, and determinants of investments, following Biddle et al. (2009), Cheng et al. (2013), Chen et al (2017b), and García Lara et al. (2016). Monitoring or governance mechanisms that could affect investment efficiency include the entrenchment index (E-index) by Bebchuck et al. (2009), and a binary indicator variable taking the value of 1 if the E-index is missing (E-index dummy); institutional holdings (INST), and analyst coverage (Analysts). We also include AQ as a decreasing proxy for the quality of financial reporting, following Biddle et al. (2009). All of these variables are interacted with OverFirm to control for their differential effect on over- and under-investment. Controls for determinants of investments include a proxy for firm size (LnTA), financial leverage (Lev), an indicator variable of whether a firm distributes dividends or not (Dividends), a proxy for bankruptcy risk (ZScore) based on Altman (1968), the market-to-book ratio (MB), operating cycle (OperCycle), investment cycle in percentage form (InvCycle%), a negative profit indicator (LOSS), the standard deviation of cash flow from operations (σ(CFO)), the standard deviation of sales (σ(Sales)) and investment (σ(I)), capital structure or leverage at the industry level (Ind K-structure), firm age (LnAGE), and finally a cash flow from operations strength variable (CFO) and a tangibility indicator (NetPPE). Detailed variable definitions are provided in Appendix B.

We further define investment inefficiency in an alternative manner, based on the empirical model used by Benlemlih and Bitar (2018), and estimate the following equation:

$$INV\_INEFF_{i,t} = \alpha + \alpha_1 \, HR\ Index_{i,t-1} + \sum \lambda \, Controls_{i,t-1} + \varepsilon_{i,t}, \quad (2)$$

where INV_INEFF is a signed investment inefficiency measure, calculated as in Biddle et al. (2009), by taking the firm-specific residual from an investment model estimated cross-sectionally for each year and FF48 industry, predicting the level of investment based on growth opportunities, as measured by sales growth. Deviations from the predicted level of investment, as reflected in the error terms of the model, represent investment inefficiency. They are taken in either signed (INV_INEFF) form, which considers the

direction of investment inefficiency, or in absolute form (INV_INEFF_ABS)). We further define Capex_INEFF as a Capex investment inefficiency measure, calculated as INV_INEFF, when defining investment as capital expenditure, and NonCapex_INEFF as a NonCapex investment inefficiency measure, when defining investment in the form of non-capital expenditures. In addition, we also define a modified investment inefficiency measure, based on McNichols and Stubben (2008), Schroff (2017), and Choi et al. (2018) among others. This proxy measures investment inefficiency in the form of firm-specific residuals from an investment model predicting the level of investment based on growth opportunities, as measured by sales growth, and also asset growth, past investment, cash flows from operations, and the Tobin's Q ratio. Again, deviations from the predicted level of investment, as reflected in the firm-specific error terms of the model, estimated cross-sectionally for each year and FF48 industry (taken in signed (INV_INEFF1) or in absolute form (INV_INEFF1_ABS)), represent investment inefficiency. Details of the estimation process are provided in Appendix B.

The independent variable of interest for Equation (2) is the HR Index, whose coefficient should be negatively (positively) significant in case HR practices to enhance employee quality attenuate (accentuate) investment inefficiency, used as the dependent variable. Control variables for Equation (2) are based on a similar model specification used by Benlemlih and Bitar (2018).

These include a proxy for firm size (LnTA), financial leverage (Lev), the market-to-book ratio (MB), a negative profit indicator (LOSS), industry-adjusted return on assets (IndAdj ROA), the standard deviation of cash flow from operations (σ(CFO)), firm age (LnAGE), cash flow from operations (CFO), tangibility (NetPPE), and a proxy for financial constraints faced by firms (KZ score), based on Kaplan and Zingales (1997), that takes higher values for more financially constrained firms. We further include controls for the standard deviation of sales (σ(Sales)) and the risk of bankruptcy (ZScore). Equation (2) is estimated with year and industry (according to FF48) fixed effects and heteroscedasticity robust standard errors. Detailed variable definitions are provided in Appendix B.

3.3. Sample and descriptive statistics

We extract HR data from the Thomson Reuters ASSET4 database between 2002 and 2016. ASSET4 covers 1,203 US-domiciled firms during that period,[5] out of which 244 are financial firms (SIC code 6). Following previous studies on investment efficiency (e.g. Biddle et al., 2009), we exclude financial firms given the different nature of investment for such firms. We apply the Fama and French 48 industry breakdown, and exclude financial firms (FF48 codes 44-47). Matching nonfinancial firms from ASSET4 to firms from Compustat (by CUSIP, or ticker, or company name, following a manual cross check of the matching process) results in a total of 926 individual firms. Subsequent firm and usable firm-year observation number is reduced due to data availability constraints. We obtain a maximum of 5,902 firm-year observations for nonfinancial firms during the sample period for our baseline model, corresponding to 785 different firms. For all subsequent calculations, firm-year observations employed are data-dependent, as we use as many observations as possible from available databases to increase test power. Additional databases used include Institutional Shareholder Services (ISS) for corporate governance data, Thomson Reuters for institutional holdings, and IBES for analyst coverage. All continuous variables are annually winsorized at percentiles 1-99% at the Compustat population level.

Table 1 reports some basic descriptive statistics for the main variables in our sample during the period 2002-2016, for all firm year observations with data required to estimate Equation (1), with the exception of analyst coverage. Average (median) investment (scaled by lagged TA) for the sample is 11.74% (8.22%), and relevant values for Capex investment (using lagged PPE scaling) increase to 22.89 (18.52) and fall to 5.18% (0.21%) for NonCapex investment (using lagged TA scaling). OverFirm gets an average (median) value of 0.48 (0.45). Our main HR investment variable, HR, takes an mean (median) value of 9.71 (10), out of a maximum possible value of 27 (given that it consists of a total of 27 yes or no questions, while the maximum value is 26 for our sample firms), and relevant numbers for HR-Costly are 5.27 (5) and finally 4.86 (5) for HR-Cash-based. We, thus, readily observe significant similarities in the average behavior of

[5] As of the period of data download, that is mid-2017. The first year with available data on ASSET4 is 2002.

the two cost-related HR indices, and higher values obtained for the HR index that encompasses practices, which may or may not be costly in monetary terms, directly or indirectly.

Insert Table 1 about here.

Table 2 reports Pearson correlation coefficients for our main variables. For reasons of economy of space, we only report coefficients for the main variables used in the estimation of Equation (1). The correlation coefficient of total investment (INV) with Capex is lower (0.3) than with NonCapex investment (0.78). Interestingly, correlations of investment and its components with the HR index are found to be slightly negative, ranging from -0.06 for total investment, to -0.08 and -0.03 for Capex and NonCapex, respectively. This provides an indication on a negative association between HR practices for advancing employee quality, and levels of corporate investment. Finally, the E-index and the binary indicator taking the value of 1 if the E-index us missing are also heavily correlated, and the same intuitively applies for firm-specific leverage and average leverage at the industry level for a given year.[6]

Insert Table 2 about here.

4. Empirical findings

4.1. Empirical findings - baseline model

Table 3 reports estimation results for Equation (1). Results are reported with and without including analyst coverage as an independent variable, given the significant reduction in the number of observations upon incorporating analysts data. Equation (1) is estimated with year and industry fixed effects, while we include

[6] We do not report correlation coefficients between INV, Capex, and NonCapex, and the three HR indices in Table 2, for reasons of economy of space. Correlations between INV and Capex, and the HR indices are significantly negative, and correlation coefficients remain negative but not significant between all HR indices and NonCapex. When we decompose the HR indices into their constituents (compensation, training, work design, job security and diversity), we observe that the highest values for correlation coefficients hold for compensation, training, and also work design, with values above 0.7 in every case between these decomposed values and every HR index, and observe lower values around between 0.20-0.6 between job security and diversity, and HR indices.

year and firm fixed effects, as well as exclude the years of the credit crunch 2008-2010 in the form of robustness checks.[7]

Insert Table 3 about here.

We observe from Table 3 that HR negatively and significantly relates to the level of total investment, and that the multiplicative term HR*OverFirm positively and significantly associates with investment. This is consistent with efforts to support employee quality being *positively* associated with inefficient investment in the immediately subsequent year, both in terms of under- and over-investment. HR and HR*OverFirm are jointly statistically significant, so as a whole contribute to deviations from optimal investment levels. These results hold regardless of model specification, without and with the inclusion of analyst coverage among controls and are robust to the use of firm fixed effects and to the exclusion of the years of the financial crisis from the sample period.

When we decompose total investment into Capex and NonCapex components, we interestingly observe that neither HR, or its multiplicative term with OverFirm are statistically significant when Capex is the dependent variable, with and without including analyst coverage in the estimated equation. However, when the analysts variable is excluded, we do get significant results for the joint significance test. When the dependent variable is NonCapex, the product of HR*OverFirm is observed to be positively significant at 5% level at least, with and without the inclusion of analysts controls, while HR as a standalone regressor keeps its negative significance in the model specification that includes analysts data. The joint significance test steadily indicates that the combination of HR and HR*OverFirm is positively significantly associated with investment inefficiency for NonCapex investments.

Moreover, we observe from Table 3 that HR practices that should enhance employee quality induce both over- and under-investment. This result is robust to firm fixed effects and time period controls, and

[7] The number of observations in Table 3 is lower than the number of observations from Table 1 as all independent variables are lagged one year in Table 3 results. The same applies when comparing numbers of observations for total investment vs. Capex and NonCapex investment models, as scaling used for Capex is NetPPE and not TA, in accordance with Biddle et al. (2009).

appears to be driven by investments in NonCapex, rather than Capex. There does not exist systematic evidence on HR practices inducing investment inefficiency for Capex, but there does so for R&D and acquisition-related investment. This finding is interpreted as an indication that agency motivations for investing in HR should be more prevalent when investment outcomes are more uncertain, leading to over-investment, and this is the case for NonCapex vs. the more concrete and tangible Capex investments. A non-competing interpretation is that investment in employee quality under the scope of supporting NonCapex investments lacks the possibility to causally and specifically support these investments, as they are more abstract in terms of possible outcomes compared to Capex, justifying the result of HR investments being associated with over-investment. This finding is also consistent with outside investors limiting the supply of capital when investments in HR are perceived as uncertain, as such HR investments can additionally limit the flow of resources towards other types of corporate investment, justifying the finding of HR practices significantly relating to under-investment.

Regarding the behavior of the rest of the variables, we observe that firm size, leverage, and dividend distribution all negatively and significantly associate with total investment, no matter the form that investment may take. The same negatively significant result is observed for the proxy for bankruptcy risk (ZScore), with the exception of the firm fixed effects morel specification, and for the loss indicator. Firms with low institutional ownership are also observed to have significantly lower levels of NonCapex investment, but not total investment or Capex, indicating that firms with fewer institutional shareholders do not tend to invest in R&D or acquisitions. On the contrary, the market-to-book ratio, investment cycle, analyst coverage, and volatility of investment are found to positively and significantly relate to total investment, for most model specifications. Interestingly, tangibility (NetPPE) is observed to positively and significantly associate with total investment (except when firm fixed effects are used), and negatively and significantly associate with Capex and NonCapex investments. This result, although possibly surprising in the case of Capex investment, could provide an indication that asset tangibility is used to support the total level of corporate investment, and not NonCapex investment, while it could suffer from mechanical behavior problems when Capex is the dependent variable. Finally, we observe that our decreasing measure

of accounting quality (AQ), in the regression specification that includes analyst coverage, in Table 3, negatively and significantly associates with investment in total form and NonCapex, and this result turns into positively significant for Capex. This finding indicates that lower accounting quality is associated with more investments in Capex, while better accounting quality is supportive of total and NonCapex investment. This finding is justifiable upon considering that NonCapex investment is inherently more uncertain, so should be supported by lower information asymmetry and information risk induced by improved financial reporting quality. The significance of other variables is found to vary with the model specification estimated each time, without pointing towards a specific direction for the majority of models..

Next, Equation (1) is estimated by replacing the HR variable with alternative definitions for this index, namely HR-Costly and HR-Cash-based, when the dependent variable is total investment, Capex and Non Capex, and by repeating the estimation with firm fixed effects as robustness controls. Relevant results are reported in Table 4, by excluding analyst coverage, to benefit from the highest possible number of observations. We observe from Table 4 that the direction of the results obtained in Table 3 is confirmed when focusing on costly HR practices, with either an expected monetary or opportunity cost (HR-Costly), and on practices that will ultimately demand a cash outflow (HR-Cash-based). The HR indices are observed to negatively and significantly associate with total investment and NonCapex, and the interaction of HR Index with OverFirm positively and significantly relates to total investment and NonCapex. The results for the joint significance tests confirm findings from Table 3, and so does the inclusion of fixed effects. Again, we do not get significant evidence that HR practices significantly associate with investment efficiency in terms of Capex, while relevant results for the joint significance test of HR Index and HR Index*OverFirm weakly point towards this direction for Capex investment.

Insert Table 4 about here.

Interestingly, when we compare results from Tables 3 and 4, we see that the coefficients for HR Index, and for HR Index*OverFirm steadily increase, in absolute terms, when we move from HR to the HR-Costly and then to the HR-Cash-based form of the index. This finding holds when defining investment in the form

of total outlays, and also as Capex and NonCapex, and when estimating the model using firm fixed effects (with total investment as the dependent variable), when we compare the evolution of coefficients for the three different definitions of the HR Index variable. Indicatively, for the firm and industry fixed effects specification for total investment, the coefficients for HR and HR*OverFirm on Table 3 take the values of -0.164 and 0.394, respectively, which become -0.288 and 0.687 for HR-Costly, and -0.369 and 0.813 for HR-Cash-based in Table 4. A similar coefficient trend is observed for the NonCapex models, and for the firm fixed effect specification as well. We interpret this finding as evidence that when HR practices are directly or indirectly costly, and especially HR practices associated with a direct monetary cost, over-investment should be more possible due to the direct resource consumption nature of such practices. This result is consistent with the notion that if capital providers are concerned about the potential usefulness of such practices if undertaken in the form of explicitly costly practices, particularly in terms of cash, they could adapt the provision of capital accordingly, given that such costly or cash-based investments in HR simultaneously limit the resources available for undertaking other types of investments.

4.2. Empirical findings - alternative model specifications

Table 5 reports estimation results for Equation (2), where we use our alternative investment inefficiency specification. We observe that the coefficients for HR, HR-Costly, and HR-Cash-based are positive and significant at 10% level when the dependent variable is total investment inefficiency, and the same applies when the dependent variable takes the form of inefficiency in terms of NonCapex. Consistent with findings from Tables 3 and 4, we do not get evidence of a significant association between HR Index, regardless of its form, and Capex investment inefficiency. Again, confirming the trend observed in Tables 3 and 4, we observe that the coefficient values for HR Index steadily increase as we move from HR to HR-Costly and then to the HR-Cash-based index: for the total investment inefficiency model, relevant coefficient value increases from 0.106 (HR) to 0.152 (HR-Costly) and then to 0.174 (HR-Cash-based), when using a less vs. more direct cost-based HR index. A similar picture is seen in the NonCapex inefficiency model (coefficient value of 0.097, turning into 0.136 and 0.160, when using less vs. more cost-based HR indices, respectively).

This evidence confirms that investments in HR practices positively and significantly associate with investment inefficiency, for total and NonCapex investments, while the result is more economically significant when applying more vs. less explicitly costly HR practices.

Insert Table 5 about here.

Regarding the behavior of the rest of control variables, we get signs of very limited significance, with the exception of firm age, which appears to negatively and significantly associate with investment inefficiency. Interestingly, we observe that the financial constraint indicator variable (KZ Score) positively and significantly (at either 5 or 1% levels) associates with investment inefficiency for both total and NonCapex investment inefficiency, while this coefficient turns into significantly positive for Capex investment inefficiency, consistent with the findings of Benlemlih and Bitar (2018) for the behavior of this variable in their total investment inefficiency model. As financial constraints increase with the value of the KZ Score, our finding implies that more constrained firms engage in *more* inefficient investments in terms of total and NonCapex investments, while more constrained firms engage in *less* inefficient Capex investments, and vice versa. We interpret this finding as indicative of financial constraints indeed mitigating investment inefficiency for the more tangible and less uncertain Capex projects for our sample of firms, while they work as an accentuating factor for inefficient NonCapex projects, and overall drive results for total investment inefficiency. In other words, financial constraints do not insulate firms from inefficient over- and under-investment in NonCapex form, which may be intuitively expected, e.g. upon constrained provision of capital by external investors for investments of less predictable outcome, which could lead to under-investment.

Table 6 reports results for Equation (2) when the dependent variable INV_INEFF is taken in absolute form, to account for total investment inefficiency regardless of direction (INV_INEFF_ABS). The Table also reports results when the dependent variable is INV_INEFF1_ABS, as described in Section 3.2 and Appendix B. Findings from Table 6 confirm evidence from Table 5, even upon defining investment inefficiency regardless of sign, and complementing the analysis with an alternative inefficiency measure.

All of the coefficients for HR, HR-Costly, and HR-Cash-based are positively significant at 5 or 1%, with an increasing trend as we move from HR to the most direct cost-intensive HR-Cash-based. This result is confirmed when the dependent variable is INV_INEFF1_ABS, with the exception of the model specification where the HR Index variable takes the form of HR-Cash-based.

Insert Table 6 about here.

Interestingly, we observe that the positively significant coefficient for the total investment signed inefficiency model observed in Table 5, is turning into significantly negative upon considering investment inefficiency regardless of direction. This finding is consistent with financial constraints negatively associating with investment inefficiency in absolute terms, that encompasses both under- and over-investment, and should be consistent with under-investment driving the negative association between the KZ Score and signed total investment inefficiency in results from Table 5, as predicted.

Bringing results from Tables 3-6 together, our evidence confirms H2a, which predicts a negative association between HR practices, aiming at improving the overall quality of the workforce, and investment efficiency. Such practices are observed to significantly associate with accentuating both under-and over-investment, and thus deviations from optimal investment levels. This result appears to be mainly driven from NonCapex investments, and to become more economically significant when defining investments in HR practices by including practices, which are more directly costly.

4.3. Empirical findings - robustness checks for basic model specification

To mitigate concerns that the observed negatively significant association between HR and investment efficiency is in any way mechanical, we estimate Equation (1) by lagging all independent variables by two, instead of one year. Also, prior work in SHRM explains that different measures of the HR index or system (i.e., the additive versus the multiplicative approach, see more in Delery, 1998; Chadwick, 2010) to the same data can sometimes produce different results. In an effort to examine whether the direction of the relationships is consistent and does not depend on the operationalization of the HR index, and in order to

control for lack of linearity in the way HR practices could relate to investment efficiency, we further re-estimate the equation by using the square of each HR index. Results in Table 7 show that the use of two year lags, and the use of squared HR indexes do not change the direction or significance of our main results. Furthermore, they show that moving from the most to the less directly costly form of HR index goes hand in hand with an increase in the absolute value of the coefficients of interest, indicating that both over- as well are under-investment are accentuated. Therefore, our findings remain unchanged and do not depend on the specific lagging of variables or the different operationalizations of the HR indexes.[8]

Insert Table 7 about here.

4.4. Supplementary analyses

The negative association between developing employee quality via HR practices and investment efficiency is consistent with information asymmetries stemming from adverse selection, and capital providers not being convinced about the value of such HR practices. Yet, one would expect such findings to be more pronounced for settings with greater managerial entrenchment, and more information asymmetry, e.g. for more complex firms. In supplementary analyses, we take into considerations these factors using proxies for managerial entrenchment and business complexity. Specifically, we use CEO tenure (the number of years the CEO has held that position; source: Execucomp) as a proxy for managerial entrenchment in the context of evidence that CEO longevity allows managers to influence decision-making in their favor (Boone et al., 2007), while this is also a significant determinant of the *status quo* within the firm (Hambrick et al., 1993). In addition, we use the number of segments in which the firm operates in a given year (business and geographical; source: Compustat) to capture firm complexity (Duchin et al., 2010).

[8] We have further repeated our analysis by using percentage changes in HR index as the independent variable of interest over five years, given that one and two year changes in the index are zero for the vast majority of firms in our sample (untabulated data), indicating a significant degree of stability for HR practices from year to year. Untabulated results show that investment inefficiency is stronger for firms from the bottom tercile of changes in the index. This is consistent with the interpretation of our findings based on the argument that in case such practices become the norm in employee investment, their incentivising function is reduced.

Table 8 reports results for the baseline model (Equation (1)) estimated according to terciles (low, mid, high) of CEO tenure, and the number of segments in which the firm operates in a given year. For brevity, estimation results for control variables are not reported. The first models show that the significantly negative association between HR practices and investment efficiency, for both over-and under-investment, holds only for the tercile with the highest CEO tenure. Furthermore, this result holds only for over-investment for middle CEO tenure, but not for under-investment, while it becomes non-significant when CEO tenure is low. With respect to firm complexity, we find that HR practices have a negative and significant effect on investment efficiency for lower complexity firms, but not for more complex firms, as results become insignificant for the tercile of firms operating in the highest number of segments.

Insert Table 8 about here.

Furthermore, we examine whether the ability of a firm to raise debt and equity capital could provide an additional indication about whether capital providers consider investment in employee quality via HR practices to be valuable to the firm. Again, we estimate our baseline model according to terciles of debt and equity issuance, defined as in García Lara et al., 2016. Results, in Table 8 show significant evidence of a negative effect of HR practices on investment efficiency for the top debt issuance tercile only. This also holds for over- (but not under-) investment for the middle tercile. The joint significance test indicates that as a whole, HR practices have a negative impact on investment efficiency. Although weaker, results are in the same direction for equity issuance and significant only for the top tercile.

Overall, evidence from Table 8 indicates that HR practices negatively associate to investment efficiency when managerial entrenchment is higher, and when equity, and particularly debt issuance is more extensive. This is consistent with interpreting our findings along argumentation that such investment could represent a managerial perk, supported by agency motivations to maximize the manager's own benefit. This is also consistent with adverse selection and moral hazard theory interpretation of our findings, as we observe that investment inefficiency is induced by HR practices in the context of higher external capital raising. At the same time, we observe that investment inefficiency is not significantly affected by HR investment when

firm complexity is higher, but is so for lower complexity firms, operating in fewer geographical and business segments[9]. This should be indicative of efforts to develop employee quality not associating with inefficiency when most needed, and this is for the more complex business settings. On the contrary, for simpler firms, such costs are indeed found to relate to inefficient corporate investing.[10]

Finally, we examine whether individual HR practices, rather than a bundle or system of HR practices show a negative relationship with investment efficiency, or whether the negative relationship found varies based on the specific type of HR practices offered to the employees. In the final step of the analysis, we estimate the baseline model using the decomposed HR index definitions, for each HR category, i.e., compensation, training, work design, job security, and diversity. Training and diversity indices can take either a comprehensive, or a purely costly (consisting of only five and three questions, respectively) form, following Appendix A. The regression results are reported in Table 9 and show that compensation, training (in explicitly costly form, or not), work design and diversity have a negative and significant impact on investment efficiency, associated with over- or under-investment. Work design (costly) and job security, although show negative coefficients, they are insignificant. Comparing the results of the joint significance test of HR Index (in a decomposed format) and HR Index*OverFirm, we observe that they are particularly strong in the case of compensation, training, and diversity indices. Overall, these findings suggest that that the negative association between HR practices and investment efficiency are not driven by a particular

[9] Results do not change qualitatively when repeated for terciles of business or geographical segments separately, although they are slightly weaker.

[10] When repeating out analysis according to firm growth (Tobin's Q) terciles, untabulated results indicate that investment inefficiency induced by HR practices is strongest for the lowest growth firms. We further re-estimate our baseline model according to terciles of employee education percentages at the industry level (% of employees holding at least a Bachelor's degree in the same industry, using data from the U.S. Bureau of Census; Faleye et al., 2013; Rouen, 2017), and (untabulated) results indicate that investment inefficiency is more induced by HR practices from industries with more educated staff. We consider that both these results are in support of the agency interpretation of our findings, indicating that investment in HR practices might be redundant when personnel has already been educated via higher education, and when firm growth prospects are actually low. Therefore, there is little provability for firm investment efficiency to be promoted via such practices in the context of limited growth opportunities.

practice or practices and that the type of HR practice does not alter direction of the results[11], adding further consistency and credibility to our findings.

Insert Table 9 about here.

5. Conclusion

We examine the effect of corporate efforts to invest in HR practices aiming at developing employee quality on investment efficiency. Using disaggregated data from the ASSET4 database that permit the construction of HR practices indices that encompass practices which are more vs. less directly costly, we test this question for US firms during 2002-2016. Our evidence indicates that investment in employee quality *negatively* associates with investment efficiency, inducing both inducing over- and under-investment. We also find that this negative association becomes more pronounced when applying HR practices, which are costly in terms of opportunity or direct cost, and particularly for practices that will ultimately require a cash outflow. Our results are robust to a number of different model specifications, which include the application of the methodologies used by Biddle et al. (2009), Cheng et al. (2013), Chen et al. (2017b), and McNichols and Stubben (2008) for defining investment inefficiency, and the use of firm, in addition to year and industry, fixed effects, and also controls for possible time period biases. We further confirm that the observed negative association between corporate investments in promoting employee quality and investment efficiency is driven by the inherently more uncertain NonCapex projects, as opposed to the more tangible and physical investments in Capex. Our findings are accentuated for higher levels of managerial entrenchment, less complex firms, and higher levels of debt and equity raising. Finally, our results show that similar to the bundle or system of HR practices, individual HR practices have also a negative impact on investment efficiency, complementing further our negative findings between HR practices as a bundle or system and investment efficiency.

[11] We have repeated results from Table 9 by making use of intensity of different HR indices regressors of interest, when intensity is measured by dividing the number of 'yes' answers to the questions reported in Appendix A per HR category, by the total number of 'yes' answers observed for the firm-year observation in question. Results (untabulated) do not indicate any significance of the intensity in the use of investment in different HR categories for explaining investment efficiency.

These findings suggest that the simplifying assumption that HR practices should have a positive effect on any aspect of corporate performance is not always realistic. Our findings are consistent with investors being uncertain about the eventual positive outcome (or not) of HR investments, constraining the supply of capital accordingly, which leads to under-investment. At the same time, they are consistent with the idea that investing in many HR practices might deprive firms from the adequate resources in order to invest in other types of projects, resulting again in under-investment. Our results are also consistent with investment in costly HR practices representing the result of managerial agency motivations, which may be manifested in different ways. For example, managers may choose to invest in their employees to justify their own excessive compensation, or this might be attributable to managerial hubris, when managers extend the firm beyond its optimal size, and in every case do not invest in their employees in order to support the effective corporate investing implementation of the firm, resulting in over-investment. The fact that our findings are accentuated when focusing on explicitly costly HR investment, and are actually driven by investment inefficiency related to the more abstract type of investment, whose outcome is more difficult to accurately predict, that is NonCapex, make our findings consistent with their interpretation based on agency argumentation. This interpretation is also consistent with the fact that we get more pronounced findings for higher managerial entrenchment and when capital raising levels is increased, while investment inefficiency is induced by such HR practices when most probably less needed, that is for firms operating in a less complex business environmentOur findings build on past research by addressing the question of whether explicit corporate efforts policies targeted at improving employee quality pay off in terms of improving investment efficiency, and overall do not support the hypothesis that investment in HR practices under the scope of enhancing the overall quality of the workforce supports and promotes the implementation of efficient corporate investment.

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Appendix A Definition of investment in employee quality indices

	HR	HR-Costly	HR-Cash-based
Compensation			
Does the company claim to provide a bonus plan down to managers?	x	x	x
Does the company claim to provide a bonus plan to at least the middle management level?	x	x	x
Does the company claim to provide a bonus plan to most employees?	x	x	x
Does the company claim to provide its employees with a pension fund, health care or other insurances?	x	x	x
Does the company have a competitive employee benefits policy?	x	x	x
Training			
Does the company claim to provide regular staff and business management training for its managers?	x	x	x
Does the company have a policy to support the skills training of its employees?	x	x	x
Does the company have a policy to support the skills training or career development of its employees?	x	x	x
Does the company train its executives or key employees on health & safety?	x	x	x
Do training hours data exist for this firm?	x	x	x
Does the company claim to favor promotion from within?	x		
Does the company have a policy to support the career development of its employees?	x		
Work design			
Does the company claim to provide day care services for its employees?	x	x	x
Does the company claim to provide generous maternity leave benefits?	x	x	
Does the company claim to provide generous vacations, career breaks or sabbaticals?	x	x	
Does the company have a work-life balance policy?	x		
Does the company claim to provide flexible working hours or working hours that promote a work-life balance?	x		
Does the company have the appropriate communication tools (whistle blower, ombudsman, suggestion box, hotline, newsletter, website, etc.) to improve diversity & opportunity?	x		
Does the company have the appropriate communication tools (whistle blower. website, etc.) to improve employee training & career development?	x		
Does the company have the appropriate internal communication tools (whistle blower, website, etc.) to improve employee health & safety?	x		
Does the company have the appropriate internal communication tools (whistle blower, website, etc.) to improve employee relations?	x		
Does the company show through the use of surveys or measurements that it is improving diversity & equal opportunity?	x		
Does the company show through the use of surveys or measurements that it is improving employee health & safety?	x		
Job security			
Does the company have a policy for maintaining long term employment growth & stability?	x	x	
Does the company have a job security policy?	x		
Diversity			
Does the company have a diversity & equal opportunity policy?	x		
Does the company promote positive discrimination?	x		

Note: All index constituting variables (questions) are measured by binary indicators, equal to 1 if an HR practice exists in the firm, and 0 otherwise. The letter *x* means that the particular practice is included in the index (Source: ASSET4).

Appendix B Definitions of variables

Investment efficiency-related variables (Source: Compustat)	
INV	is the sum of research and development expenditure, capital expenditure, and acquisition expenditure, less cash receipts from sale of property, plant, and equipment (PPE); multiplied by 100; and scaled by lagged total assets.
Capex	is capital expenditure; multiplied by 100; and scaled by lagged PPE.
NonCapex	is the sum of research and development expenditure and acquisition expenditure; multiplied by 100; and scaled by lagged total assets.
OverFirm	is a ranked variable calculated as the average of a ranked decile measure of cash and leverage. Cash and leverage deciles are calculated according to year and Fama and French 48 (FF48) industries, and are rescaled from 0 to 1. Leverage is multiplied by minus one before rank calculation; so both cash and leverage variables increase with the likelihood of over-investment.
INV_INEFF/INV_INEFF _ABS	is an investment inefficiency measure, calculated as in Biddle et al. (2009), by taking the firm-specific residual from an investment model predicting the level of investment based on growth opportunities, as measured by sales growth. Deviations from the predicted level of investment, as reflected in the error terms of the model (taken in signed (INV_INEFF) form, which considers the direction of investment inefficiency, or in absolute form (INV_INEFF_ABS)), represent investment inefficiency: $INV_{i,t} = \beta_0 + \beta_1 Sales\ Growth_{i,t-1} + \varepsilon_{i,t}$ where INV is as previously defined, and Sales $Growth_{i,t-1}$ is change in sales from year *t - 2* to year *t – 1*. The model is estimated cross-sectionally for each year and FF48 industry.
Capex_INEFF/(Capex_ INEFF_ABS	is a Capex investment inefficiency measure, calculated as INV_INEFF above, when defining investment as Capex. Deviations from the predicted level of investment, as reflected in the error terms of the model, are taken in signed (Capex_INEFF) form, which considers the direction of Capex investment inefficiency, or in absolute form (Capex_INEFF_ABS).
NonCapex_INEFF/ NonCapex_INEFF_ABS	is a NonCapex investment inefficiency measure, calculated as INV_INEFF above, when defining investment as NonCapex. Deviations from the predicted level of investment, as reflected in the error terms of the model, are taken in signed (NonCapex_INEFF) form, which considers the direction of NonCapex investment inefficiency, or in absolute form (NonCapex_INEFF_ABS).
INV_INEFF1/INV_ INEFF1_ABS	is a modified investment inefficiency measure, based on McNichols and Stubben (2008), Schroff (2017), and Choi et al. (2018) among others. Deviations from the predicted level of investment, as reflected in the firm-specific error terms of the model (taken in signed (INV_INEFF1) or in absolute form (INV_INEFF1_ABS)), represent investment inefficiency: $INV_{i,t} = \beta_0 + \beta_1 MB_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 Asset\ Growth_{i,t-1} + \beta_4 INV_{i,t-1} + \varepsilon_{i,t}$ where MB is the ratio of the market value of total assets to book value of total assets; CFO is cash flow from operations scaled by lagged total assets; and

	asset growth is percentage change in firm assets between year *t-2* and *t-1*. The model is estimated cross-sectionally for each year and FF48 industry.
Capex_INEFF1/(Capex_ INEFF1_ABS	is a modified Capex investment inefficiency measure, calculated as INV_INEFF1 above, when defining investment as Capex. Deviations from the predicted level of investment, as reflected in the error terms of the model, are taken in signed (Capex_INEFF1) or in absolute form (Capex_INEFF1_ABS).
NonCapex_INEFF1/(Non Capex_INEFF1_ABS	is a modified NonCapex investment inefficiency measure, calculated as INV_INEFF1 above, when defining investment as NonCapex. Deviations from the predicted level of investment, as reflected in the error terms of the model, are taken in signed (NonCapex_INEFF1) or in absolute form (NonCapex_INEFF1_ABS).
Investment in employee quality variables (Source: ASSET4)	
HR	is an investment in employee quality index including all types of corporate practices, with an explicit cost or not (see Appendix A).
HR-Costly	is an investment in employee quality index including corporate practices with either a cash-based or an opportunity cost (see Appendix A).
HR-Cash-based	is an investment in employee quality index including corporate practices with a cash-based only (see Appendix A).
Control variables (Source: Compustat, Institutional Shareholder Services (ISS), Thomson Reuters, IBES)	
LnTA	is the natural logarithm of total assets.
Lev	is long-term debt divided by the sum of long-term debt and the market value of equity (calculated by multiplying the number of shares outstanding by stock price at fiscal year-end).
Dividend	is an indicator variable equal to 1 if the firm paid a dividend; and 0 otherwise (by identifying dividend payment as in Biddle et al., 2009).
Zscore	is a measure of bankruptcy risk; based on the methodology of Altman (1968), and calculated as in Biddle et al. (2009).
MB	is the ratio of the market value of total assets (total assets plus market value at fiscal year-end, minus common shareholders' equity and deferred taxation) to book value of total assets.
OperCycle	is the natural logarithm of receivables to sales, plus inventory to cost of goods sold (COGS), multiplied by 360.
InvCycle%	is a decreasing measure of the length of the investment cycle, with the latter is defined as depreciation expense scaled by lagged total assets; and multiplied by 100.
LOSS	a binary indicator taking the value of 1 if net income before extraordinary items is negative, and 0 otherwise.

σ(CFO)	is the standard deviation of the cash flow from operations divided by average total assets from years *t-5* to *t-1*.
σ(Sales)	is the standard deviation of the sales divided by average total assets from years *t-5* to *t-1*.
σ(I)	is the standard deviation of annual investment (INV) from years *t-5* to *t-1*.
Ind K-structure	is the mean Lev for firms in the same FF48 industry for the year.
LnAGE	is the natural logarithm of firm age, calculated as the number of years the firm is listed with a nonmissing stock price on Compustat, following Farre-Mensa and Ljungqvist (2016).
CFO	is the ratio of cash flow from operations (CFO) to sales.
NetPPE	is the ratio of net PPE to total assets.
E-index	is the entrenchment index (E-index) by Bebchuck et al. (2009). We construct the annual measures of E-index on our own for years after 2006, using data from the Institutional Shareholder Services (ISS). Values for the E-index until 2006 are downloaded directly from the website of Lucian A. Bebchuk (http://www.law. harvard.edu/faculty/bebchuk/). When this index is missing, it is assigned the value of 0, while its value is multiplied by minus one so that higher values imply lower anti-takeover protection, and therefore increased market discipline.
E-index dummy	is an indicator variable taking the value of 1 if the E-index is missing, and 0 otherwise.
INST	is the percentage of firm shares held by institutional investors, using the average value for four quarters included in a fiscal year from Thomson Reuters.
AQ	is the standard deviation of the firm-level residuals from the Dechow and Dichev (2002) model during years *t-5* to *t-1*. This model is a regression of working capital accruals on lagged, current, and future cash flows, plus the change in revenue and PPE. All variables are scaled by average total assets. The model is estimated cross-sectionally for each FF48 industry with at least 20 observations in a given year.
Analysts	is the number of analysts following the firm, as provided by IBES summary file.
Additional control variables used in INV_INEFF model estimation (Tables 5 and 6)	
IndAdj ROA	is pretax income plus interest expense scaled by lagged total assets (ROA), minus median ROA for firms in the same FF48 industry for the year.
KZ Score	is the Kaplan and Zingales (1997) financial constraint proxy, calculated as in Lamont et al. (2001), and Farre-Mensa and Ljungqvist (2016). The score takes higher values for more financially constrained firms.

Table 1 Descriptive statistics

	Q1	*Mean*	*Median*	*Q3*	*Min*	*Max*	*StDev*	*N*
Investment efficiency-related variables								
INV	4.90	11.74	8.22	13.86	-4.67	320.50	13.75	6,271
Capex	12.04	22.89	18.52	27.75	0.00	479.39	19.45	6,271
NonCapex	0.00	5.18	0.21	6.40	0.00	316.99	11.84	6,271
OverFirm	0.35	0.48	0.45	0.60	0.10	1.00	0.18	6,271
Investment in employee quality variables								
HR	5.00	9.71	10.00	14.00	0.00	26.00	5.93	6,271
HR-Costly	2.00	5.27	5.00	8.00	0.00	14.00	3.48	6,271
HR-Cash-based	2.00	4.86	5.00	8.00	0.00	11.00	3.15	6,271
Control variables								
LnTA	7.93	8.83	8.69	9.66	5.01	12.43	1.21	6,271
Lev	0.06	0.20	0.15	0.29	0.00	0.96	0.18	6,271
Dividend	0.00	0.69	1.00	1.00	0.00	1.00	0.46	6,271
ZScore	0.76	1.38	1.27	1.86	-9.56	5.23	1.00	6,271
MB	1.22	2.02	1.66	2.38	0.39	20.33	1.26	6,271
OperCycle	4.19	4.58	4.62	4.98	1.43	7.08	0.66	6,271
InvCycle%	2.82	4.38	3.85	5.25	0.10	25.00	2.45	6,271
LOSS	0.00	0.12	0.00	0.00	0.00	1.00	0.33	6,271
σ(CFO)	0.02	0.04	0.03	0.05	0.00	0.41	0.03	6,271
σ(Sales)	0.07	0.18	0.12	0.23	0.00	2.41	0.18	6,271
σ(I)	1.88	8.03	4.05	8.66	0.01	376.57	13.64	6,271
Ind K-structure	0.09	0.19	0.15	0.25	0.00	0.59	0.12	6,271
LnAGE	2.40	2.90	3.04	3.69	0.00	4.04	0.93	6,271
CFO	0.08	0.16	0.14	0.23	-5.57	1.18	0.19	6,271
NetPPE	0.11	0.30	0.22	0.46	0.00	0.97	0.24	6,271
E-index	0.00	-0.88	0.00	0.00	-6.00	0.00	1.73	6,271
E-index dummy	1.00	0.78	1.00	1.00	0.00	1.00	0.41	6,271
INST	0.64	0.74	0.76	0.85	0.00	3.67	0.18	6,271
AQ	0.02	0.04	0.04	0.05	0.00	0.66	0.03	6,271
Analysts	9.67	15.32	14.42	21.00	1.00	45.75	8	2,974
Additional variables used in Equation (2) model estimation								
IndAdj ROA	0.02	0.06	0.04	0.07	0.00	2.41	0.08	6,129
KZ score	-5.51	-5.62	-0.98	0.76	-623.90	120.12	22.75	4,589

Note: The sample covers the period 2002-2016. Details on variable calculation are reported in Appendices A and B. INV is a measure of total investment, measured as is the sum of research and development expenditure, capital expenditure, and acquisition expenditure, less cash receipts from sale of property, plant, and equipment (PPE); multiplied by 100; and scaled by lagged total assets. Capex is capital expenditure; multiplied by 100; and scaled by lagged PPE. NonCapex is the sum of research and development expenditure and acquisition expenditure; multiplied by 100; and scaled by lagged total assets. OverFirm is a ranked variable calculated as the average of a ranked decile measure of cash and leverage. Relevant deciles are calculated according to year and Fama and French 48 (FF48) industries, rescaled from 0 to 1. Leverage is multiplied by minus one, so that both cash and leverage variables increase

with the likelihood of over-investment. HR, HR-Costly and HR-Cash-based are investment in employee quality indices including all types of corporate practices; or corporate practices with either a cash-based or an opportunity cost; or practices with a cash-based cost only, respectively. More details on their calculation are reported in Appendix A. LnTA is a proxy for firm size, defined as the natural logarithm of total assets. Lev stands for leverage, calculated as long-term debt divided by the sum of long-term debt and the market value of equity. Dividend is a binary indicator of whether the firm paid dividends or not, while ZScore is a measure of bankruptcy risk, based on Altman (1968). MB is the market-to-book ratio, calculated as market value of total assets to book value of total assets. OperCycle is a proxy for a firm's operating cycle, defined as is the natural logarithm of receivables to sales, plus inventory to cost of goods sold (COGS), multiplied by 360. InvCycle% is a decreasing measure of the length of the investment cycle, defined as depreciation expense scaled by lagged total assets, and multiplied by 100. LOSS is a binary indicator of whether net income before extraordinary items is negative or not. σ(CFO) is the standard deviation of the cash flow from operations divided by average total assets from years *t-5* to *t-1*. σ(Sales) is the standard deviation of the sales divided by average total assets from years *t-5* to *t-1*. σ(I) is the standard deviation of annual INV from years *t-5* to *t-1*. Ind K-structure reflects capital structure at the industry level, calculated as the mean Lev for firms in the same FF48 industry for the year. LnAGE is the natural logarithm of firm age, calculated as the number of years the firm is listed with a non-missing stock price on Compustat. CFO is the ratio of cash flow from operations (CFO) to sales. NetPPE is the ratio of net PPE to total assets. E-index is the entrenchment index (E-index) by Bebchuck et al. (2009), and E-index dummy is a binary indicator taking the value of 1 if the E-index is missing, and 0 otherwise. INST reflects the percentage of firm shares held by institutional investors, and AQ is a decreasing proxy for accounting quality. The variable Analysts reflects the number of analysts following the firm, as provided by IBES. IndAdj ROA is industry-adjusted return on assets (ROA), calculated as pretax income plus interest expense scaled by lagged total assets, minus median ROA for firms in the same FF48 industry for the year. KZ score is a financial constraint proxy based on Kaplan and Zingales (1997), taking higher values for more financially constrained firms.

Table 2 Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) INV	1.00																						
(2) Capex	0.30	1.00																					
(3) NonCapex	0.78	0.18	1.00																				
(4) HR	-0.06	-0.08	-0.03	1.00																			
(5) LnTA	-0.06	-0.16	-0.10	0.43	1.00																		
(6) Lev	-0.11	-0.27	-0.15	0.04	0.25	1.00																	
(7) Dividend	-0.16	-0.22	-0.20	0.19	0.30	0.06	1.00																
(8) ZScore	-0.14	0.08	-0.13	0.02	-0.12	-0.37	0.13	1.00															
(9) MB	0.14	0.31	0.18	-0.08	-0.28	-0.50	-0.13	0.29	1.00														
(10) OperCycle	0.14	0.03	0.25	-0.01	-0.06	-0.19	-0.02	-0.12	0.08	1.00													
(11) InvCycle%	0.30	0.08	0.01	-0.02	-0.03	0.07	-0.04	-0.07	-0.06	-0.18	1.00												
(12) LOSS	0.03	-0.07	0.07	-0.05	-0.10	0.29	-0.19	-0.37	-0.15	0.00	0.11	1.00											
(13) σ(CFO)	0.21	0.27	0.14	-0.19	-0.27	-0.20	-0.26	0.11	0.36	-0.01	0.15	0.08	1.00										
(14) σ(Sales)	0.02	0.16	-0.03	-0.17	-0.11	-0.16	-0.12	0.48	0.16	-0.15	-0.01	-0.02	0.38	1.00									
(15) σ(I)	0.09	0.09	0.08	-0.13	-0.08	0.08	-0.19	-0.17	0.02	0.08	0.03	0.11	0.12	0.08	1.00								
(16) Ind K-struct	-0.18	-0.29	-0.27	0.03	0.25	0.58	0.21	-0.20	-0.36	-0.31	0.08	0.07	-0.22	-0.13	-0.10	1.00							
(17) LnAGE	-0.02	-0.05	-0.01	0.01	0.01	0.01	0.01	0.01	-0.01	-0.02	0.01	-0.01	-0.01	0.00	-0.01	0.01	1.00						
(18) CFO	0.11	0.06	-0.03	0.03	0.12	-0.06	0.04	-0.09	0.02	-0.02	0.19	-0.18	-0.01	-0.16	0.03	0.01	0.01	1.00					
(19) NetPPE	0.01	-0.26	-0.28	0.04	0.22	0.39	0.21	-0.20	-0.28	-0.32	0.45	0.07	-0.07	-0.11	-0.06	0.53	0.01	0.21	1.00				
(20) E-index	0.00	0.03	0.00	-0.28	-0.07	-0.01	-0.10	0.02	0.04	-0.02	0.00	0.02	0.07	0.07	0.05	0.00	0.01	-0.03	-0.03	1.00			
(21) E-index dmy	0.00	0.02	-0.01	-0.30	-0.09	0.00	-0.11	0.01	0.03	-0.02	0.00	0.03	0.07	0.07	0.05	-0.01	0.00	-0.03	-0.02	0.97	1.00		
(22) INST	0.09	0.15	0.08	-0.14	-0.26	-0.08	-0.23	0.09	0.06	0.04	0.04	0.01	0.14	0.10	0.08	-0.19	0.00	-0.01	-0.16	0.03	0.04	1.00	
(23) AQ	0.03	0.10	0.07	-0.08	-0.21	-0.05	-0.13	0.08	0.17	0.05	-0.05	0.06	0.40	0.22	0.08	-0.16	0.00	-0.12	-0.19	0.04	0.04	0.08	1.00
(24) Analysts	0.17	0.18	0.08	0.13	0.29	-0.25	-0.06	0.12	0.25	0.05	0.18	-0.15	0.14	0.12	0.03	-0.20	0.00	0.13	0.03	0.03	0.03	0.09	-0.04

Note: This table reports Pearson correlation coefficients for variables presented in Table 1. For reasons of economy of space, only coefficients for the main variables of the analysis are reported

Table 3 Association between corporate investment efficiency and past investment in employee quality

	Without analysts following			With analysts following			Firm FE	Excl. 2008-2010
	INV	Capex	NonCapex	INV	Capex	NonCapex	INV	INV
HR	-0.164**	-0.013	-0.091	-0.275***	-0.170	-0.167**	-0.210*	-0.194**
	(0.068)	(0.094)	(0.056)	(0.096)	(0.132)	(0.085)	(0.113)	(0.078)
HR*OverFirm	0.394***	-0.326	0.258**	0.658***	0.146	0.411**	0.477***	0.364***
	(0.125)	(0.235)	(0.104)	(0.187)	(0.305)	(0.171)	(0.183)	(0.141)
Joint signif.	9.70***	4.55**	6.94***	10.79***	0.01	5.31**	6.04**	4.08**
E-index	1.543	3.335**	1.089	2.469	5.590	1.654	-0.457	1.570
	(1.090)	(1.536)	(0.956)	(2.388)	(3.537)	(2.314)	(1.338)	(1.133)
E-index dummy	-5.495	-10.080*	-4.999	-8.116	-19.610	-5.490	2.629	-5.184
	(5.008)	(5.962)	(4.529)	(11.190)	(14.000)	(10.930)	(5.982)	(5.209)
INST	-3.381	2.114	-5.773***	-4.569	0.762	-7.289**	-1.893	-2.244
	(2.394)	(3.570)	(1.952)	(3.247)	(5.355)	(2.922)	(4.993)	(3.062)
AQ	5.637	24.040	-9.355	-38.450**	56.530*	-37.120*	9.556	6.408
	(15.110)	(19.320)	(12.120)	(18.750)	(29.060)	(16.900)	(25.210)	(18.190)
Analysts				0.199***	0.267**	0.143**		
				(0.076)	(0.116)	(0.057)		
E-index* OverFirm	-0.221	-0.693*	-0.100	-0.160	-1.087	0.022	0.129	-0.194
	(0.212)	(0.363)	(0.193)	(0.498)	(0.825)	(0.486)	(0.251)	(0.223)
E-index dummy *OverFirm	0.564	2.086	0.284	-0.023	3.880	-0.675	-0.755	0.346
	(0.989)	(1.311)	(0.925)	(2.381)	(3.117)	(2.339)	(1.123)	(1.046)
INST*OverFirm	1.154***	0.290	1.360***	1.936***	1.064	2.112***	0.658	0.909*
	(0.432)	(0.787)	(0.348)	(0.644)	(1.318)	(0.560)	(0.775)	(0.528)
AQ*OverFirm	-1.901	-5.392	1.387	5.293	-10.150*	6.243	-0.987	-1.910
	(3.158)	(4.279)	(2.766)	(4.460)	(5.930)	(4.245)	(4.542)	(3.834)
Analysts* OverFirm				-0.027*	-0.016	-0.019		
				(0.014)	(0.024)	(0.012)		
OverFirm	-15.470	-18.340	-11.060	-14.610	-43.130	-5.767	6.483	-12.120
	(9.867)	(14.550)	(8.981)	(24.050)	(33.350)	(23.240)	(12.400)	(10.520)
LnTA	-0.648***	0.365	-0.553***	-0.723**	-0.662	-0.497	-5.688***	-0.643***
	(0.179)	(0.291)	(0.155)	(0.341)	(0.557)	(0.310)	(1.004)	(0.212)
Lev	-9.071***	-3.937*	-3.045**	-9.362***	-6.115**	-3.874**	-13.40***	-8.896***
	(1.584)	(2.040)	(1.224)	(2.378)	(2.834)	(1.818)	(3.805)	(2.010)
Dividend	-1.446***	-2.384***	-1.249***	-1.315**	-2.665***	-1.092**	0.748	-1.315***
	(0.398)	(0.573)	(0.339)	(0.607)	(0.775)	(0.524)	(0.674)	(0.474)
ZScore	-1.016***	-1.087**	-1.201***	-1.053**	-1.029	-1.175***	2.200***	-0.768*
	(0.356)	(0.521)	(0.292)	(0.444)	(0.698)	(0.455)	(0.666)	(0.440)
MB	1.129***	3.853***	0.748***	1.004***	4.007***	0.389	0.854***	1.108***
	(0.201)	(0.492)	(0.187)	(0.361)	(0.607)	(0.341)	(0.280)	(0.227)
OperCycle	0.085	-1.216	-0.031	0.251	-1.664	-0.043	2.215**	0.109
	(0.336)	(0.816)	(0.289)	(0.472)	(1.387)	(0.416)	(0.927)	(0.387)
InvCycle%	0.789***	1.164***	0.187**	0.574***	0.647***	0.134	0.010	0.844***
	(0.099)	(0.138)	(0.073)	(0.138)	(0.198)	(0.128)	(0.227)	(0.115)
LOSS	-1.431***	-3.533***	-0.505	-1.579***	-3.633***	-0.561	-0.505	-1.506**
	(0.472)	(0.764)	(0.377)	(0.583)	(0.957)	(0.533)	(0.665)	(0.586)
σ(CFO)	20.160***	55.780***	3.617	21.270**	47.440**	6.869	-5.192	24.320***
	(7.379)	(12.500)	(5.798)	(10.580)	(19.040)	(9.294)	(8.481)	(9.429)
σ(Sales)	-0.463	-0.415	-0.597	-1.496	-2.235	-1.890	-0.559	-1.235
	(1.009)	(2.224)	(0.755)	(1.492)	(3.157)	(1.304)	(1.143)	(1.202)
σ(I)	0.046***	0.067***	0.039***	0.057***	0.078***	0.049**	-0.047*	0.0596***
	(0.013)	(0.026)	(0.013)	(0.022)	(0.029)	(0.021)	(0.028)	(0.017)
Ind K-structure	-5.527**	-	1.570	-4.507	-7.826	4.164	-2.880	-8.650***
	(2.186)	(3.367)	(1.695)	(3.571)	(4.967)	(2.928)	(3.505)	(2.725)

LnAGE	0.095	-0.070	-0.035	0.392*	0.529	-0.072	0.062	0.030
	(0.151)	(0.264)	(0.129)	(0.233)	(0.358)	(0.205)	(0.145)	(0.177)
CFO	0.530	1.894	-1.558	0.564	-1.696	-0.501	-0.011	1.051
	(0.989)	(3.317)	(0.987)	(1.357)	(5.049)	(1.198)	(0.969)	(1.165)
NetPPE	4.919***	-	-3.257***	4.509***	-	-5.540***	0.165	4.874***
	(1.111)	(2.547)	(0.843)	(1.590)	(2.758)	(1.262)	(3.747)	-1.302
Intercept	22.502***	21.550**	21.610***	23.390*	49.730***	19.950	44.480***	21.690***
	(6.233)	(8.968)	(5.610)	(13.180)	(18.910)	(12.490)	(11.760)	(6.854)
N	5,902	5,897	5,897	2,765	2,764	2,764	5,902	4,601
R-squared	0.216	0.328	0.272	0.248	0.306	0.293	0.421	0.205
Industry FE	YES	YES	YES	YES	YES	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	YES	NO

Note: This table reports estimation results for the equation: $INV_{i,t}(Capex_{i,t}|NonCapex_{i,t}) = \alpha_0 + \alpha_1 HR\ Index_{i,t-1} + \alpha_2 OverFirm_{\ i,t-1} + \alpha_3 HR\ Index_{i,t-1} * OverFirm_{\ i,t-1} + \sum \lambda\ Controls_{i,t-1} + \varepsilon_{i,t}$. INV is a measure of total investment, Capex is capital expenditure, and NonCapex represents non-capital expenditure investment. OverFirm is a ranked variable calculated as the average of a ranked decile measure of cash and leverage. Relevant deciles are calculated according to year and Fama and French 48 (FF48) industries, rescaled from 0 to 1. Leverage is multiplied by minus one, so that both cash and leverage variables increase with the likelihood of over-investment. HR Index is an investment in employee quality index including all types of relevant corporate investment, with an explicit cost or not, as described in Appendix A. The joint significance test tests whether the sum of the coefficients α_1 and α_3 is equal to 0. The table reports results with and without controls for analysts following. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 4 Investment efficiency and past investment in employee quality - alternative HR index definitions

	HR-Costly			HR-Cash-based			Firm FE	Firm FE
	INV	Capex	NonCapex	INV	Capex	NonCapex	INV	INV
HR-Costly	-0.288**	0.069	-0.160*				-0.383**	
	(0.113)	(0.153)	(0.095)				(0.169)	
HR-Costly *OverFirm	0.687***	-0.529	0.442**				0.857***	
	(0.213)	(0.386)	(0.179)				(0.292)	
HR-Cash-based				-0.369***	0.134	-0.211**		-0.428**
				(0.128)	(0.172)	(0.106)		(0.181)
HR-Cash-based*OverFirm				0.813***	-0.731	0.553***		0.918***
				(0.245)	(0.448)	(0.205)		(0.315)
Joint signif.	10.24***	3.08*	7.02***	9.52***	3.73*	7.54***	7.52***	6.99***
E-index	1.590	3.290**	1.121	1.567	3.266**	1.117	-0.391	-0.405
	(1.083)	(1.536)	(0.948)	(1.079)	(1.532)	(0.944)	(1.338)	(1.336)
E-index dummy	-5.696	-9.819	-5.138	-5.638	-9.641	-5.161	2.313	2.431
	(4.932)	(5.972)	(4.446)	(4.903)	(5.948)	(4.412)	(5.953)	(5.925)
INST	-3.283	1.833	-5.691***	-3.250	1.899	-5.698***	-1.828	-1.786
	(2.384)	(3.604)	(1.943)	(2.378)	(3.603)	(1.941)	(4.999)	(4.998)
AQ	6.405	22.630	-8.816	6.739	22.990	-8.777	10.160	10.350
	(15.130)	(19.390)	(12.140)	(15.170)	(19.400)	(12.160)	(25.520)	(25.510)
E-index *OverFirm	-0.233	-0.682*	-0.108	-0.228	-0.678*	-0.107	0.114	0.117
	(0.211)	(0.363)	(0.191)	(0.210)	(0.361)	(0.190)	(0.251)	(0.251)
E-index dummy *OverFirm	0.617	2.037	0.321	0.601	2.001	0.325	-0.682	-0.706
	(0.971)	(1.314)	(0.906)	(0.964)	(1.306)	(0.898)	(1.115)	(1.109)
INST*OverFirm	1.133***	0.361	1.341***	1.126***	0.345	1.344***	0.651	0.644
	(0.428)	(0.798)	(0.344)	(0.427)	(0.797)	(0.343)	(0.775)	(0.774)
AQ*OverFirm	-2.090	-5.088	1.249	-2.115	-5.183	1.264	-1.139	-1.180
	(3.173)	(4.305)	(2.779)	(3.177)	(4.302)	(2.783)	(4.605)	(4.603)
OverFirm	-15.610*	-18.930	-11.100	-15.650*	-17.670	-11.490	6.060	6.368
	(9.445)	(14.750)	(8.529)	(9.273)	(14.530)	(8.357)	(12.250)	(12.110)
LnTA	-0.632***	0.187	-0.536***	-0.602***	0.188	-0.528***	-5.685***	-5.679***
	(0.167)	(0.288)	(0.145)	(0.166)	(0.284)	(0.143)	(1.007)	(1.005)
Lev	-9.095***	-3.861*	-3.069**	-9.080***	-3.851*	-3.064**	-	-
	(1.584)	(2.047)	(1.225)	(1.583)	(2.048)	(1.225)	(3.808)	(3.807)
Dividend	-1.457***	-2.423***	-1.251***	-1.461***	-2.416***	-1.255***	0.736	0.742
	(0.399)	(0.576)	(0.341)	(0.399)	(0.576)	(0.341)	(0.674)	(0.674)
ZScore	-1.011***	-1.146**	-1.195***	-1.005***	-1.131**	-1.197***	2.192***	2.197***
	(0.353)	(0.523)	(0.289)	(0.354)	(0.523)	(0.289)	(0.665)	(0.666)
MB	1.128***	3.837***	0.748***	1.134***	3.834***	0.751***	0.852***	0.851***
	(0.201)	(0.493)	(0.187)	(0.200)	(0.492)	(0.187)	(0.281)	(0.281)
OperCycle	0.095	-1.214	-0.024	0.096	-1.221	-0.022	2.219**	2.230**
	(0.336)	(0.816)	(0.289)	(0.336)	(0.816)	(0.290)	(0.926)	(0.926)
InvCycle%	0.788***	1.156***	0.187***	0.789***	1.158***	0.187***	0.010	0.011
	(0.098)	(0.138)	(0.073)	(0.098)	(0.138)	(0.072)	(0.226)	(0.226)
LOSS	-1.422***	-3.582***	-0.497	-1.416***	-3.573***	-0.498	-0.525	-0.524
	(0.471)	(0.767)	(0.377)	(0.472)	(0.765)	(0.377)	(0.666)	(0.665)
σ(CFO)	20.280***	56.190***	3.670	20.130***	56.230***	3.605	-5.206	-5.241
	(7.399)	(12.550)	(5.801)	(7.378)	(12.550)	(5.802)	(8.490)	(8.478)
σ(Sales)	-0.475	-0.246	-0.611	-0.489	-0.291	-0.601	-0.523	-0.490
	(1.007)	(2.216)	(0.756)	(1.009)	(2.218)	(0.756)	(1.144)	(1.146)
σ(I)	0.046***	0.068***	0.039***	0.046***	0.068***	0.039***	-0.047*	-0.047*
	(0.013)	(0.026)	(0.013)	(0.013)	(0.026)	(0.013)	(0.028)	(0.028)
Ind K-structure	-5.537**	-	1.579	-5.567**	-	1.568	-2.871	-2.815

	(2.189)	(3.381)	(1.698)	(2.188)	(3.382)	(1.698)	(3.514)	(3.517)
LnAGE	0.094	-0.074	-0.036	0.094	-0.072	-0.037	0.062	0.062
	(0.151)	(0.265)	(0.129)	(0.151)	(0.265)	(0.129)	(0.145)	(0.145)
CFO	0.489	2.114	-1.603	0.490	2.113	-1.600	-0.035	-0.047
	(0.988)	(3.332)	(0.989)	(0.989)	(3.332)	(0.989)	(0.970)	(0.969)
NetPPE	4.925***	-32.74***	-3.263***	4.968***	-	-3.260***	0.262	0.280
	(1.110)	(2.561)	(0.843)	(1.118)	(2.548)	(0.847)	(3.742)	(3.744)
Intercept	22.400***	23.030**	21.460***	22.190***	22.450**	21.570***	44.760***	44.750***
	(6.019)	(9.068)	(5.394)	(5.937)	(8.985)	(5.322)	(11.610)	(11.620)
N	5,902	5,897	5,897	5,902	5,897	5,897	5,902	5,902
R-squared	0.216	0.327	0.272	0.217	0.327	0.272	0.421	0.421
Industry FE	YES	YES	YES	YES	YES	YES	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	YES	YES

Note: This table reports estimation results for Equation (1), as reported in text. INV is a measure of total investment, Capex is capital expenditure, and NonCapex represents non-capital expenditure investment. OverFirm is a ranked variable calculated as the average of a ranked decile measure of cash and leverage. Relevant deciles are calculated according to year and Fama and French 48 (FF48) industries, rescaled from 0 to 1. Leverage is multiplied by minus one, so that both cash and leverage variables increase with the likelihood of over-investment. HR-Costly and HR-Cash-based are investment in employee quality indices, incorporating corporate practices with either a cash-based or an opportunity cost (HR-costly); or practices with a cash-based cost only (HR-Cash-based), as described in Appendix A. The joint significance test jointly tests whether the sum of the coefficients α_1 and α_3 of Equation (1), reported in text, is equal to 0. Robust standard errors are reported in parentheses below each coefficient value. All variables are as previously defined, and detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 5 Investment efficiency and firm investment in employee quality - alternative investment inefficiency measure

	INV_INEFF	INV_INEFF	INV_INEFF	Capex_INEFF	Capex_INEFF	Capex_INEFF	NonCapex_INEFF	NonCapex_INEFF	NonCapex_INEFF
HR	0.106*			-0.042			0.097**		
	(0.057)			(0.126)			(0.046)		
HR-Costly		0.152*			-0.100			0.136*	
		(0.092)			(0.191)			(0.075)	
HR-Cash-			0.174*			-0.119			0.160*
			-0.102			(0.215)			(0.086)
LnTA	0.297	0.358	0.360	0.252	0.276	0.279	0.146	0.206	0.204
	(0.272)	(0.260)	(0.259)	(0.480)	(0.449)	(0.439)	(0.209)	(0.197)	(0.196)
Lev	-2.740	-2.779	-2.771	-1.792	-1.830	-1.840	-1.717	-1.757	-1.746
	(1.712)	(1.713)	(1.712)	(2.961)	(2.982)	(2.972)	(1.395)	(1.400)	(1.397)
ZScore	-0.407	-0.391	-0.393	-0.719	-0.707	-0.704	0.064	0.081	0.077
	(0.304)	(0.304)	(0.305)	(0.776)	(0.774)	(0.775)	(0.282)	(0.283)	(0.284)
MB	0.266	0.267	0.271	0.205	0.210	0.208	-0.090	-0.088	-0.085
	(0.246)	(0.246)	(0.246)	(0.340)	(0.339)	(0.338)	(0.179)	(0.179)	(0.179)
LOSS	0.770	0.782	0.777	1.946	1.968	1.974	0.389	0.403	0.397
	(0.824)	(0.827)	(0.826)	(1.679)	(1.689)	(1.690)	(0.656)	(0.662)	(0.661)
IndAdj	-0.564	-0.540	-0.539	-6.652	-6.652	-6.651	2.246	2.264	2.264
	(3.473)	(3.470)	(3.470)	(4.771)	(4.770)	(4.770)	(3.032)	(3.029)	(3.029)
CFO	0.067	0.060	0.059	-0.062	-0.062	-0.062	0.065	0.059	0.059
	(0.137)	(0.136)	(0.137)	(0.109)	(0.108)	(0.108)	(0.087)	(0.086)	(0.087)
NetPPE	1.235	1.228	1.189	1.044	1.119	1.152	-0.415	-0.416	-0.458
	(1.580)	(1.588)	(1.586)	(4.325)	(4.322)	(4.298)	(1.304)	(1.312)	(1.304)
KZ Score	0.061***	0.061***	0.061***	-0.164**	-0.164**	-0.164**	0.055***	0.054***	0.054***
	(0.014)	(0.014)	(0.014)	(0.079)	(0.079)	(0.079)	(0.014)	(0.014)	(0.014)
σ(CFO)	-3.655	-4.078	-4.101	0.045	0.125	0.131	1.811	1.432	1.422
	(8.801)	(8.821)	(8.822)	(15.540)	(15.590)	(15.590)	(7.229)	(7.247)	(7.244)
σ(Sales)	0.781	0.744	0.742	-2.605	-2.631	-2.634	-1.507	-1.545	-1.543
	(1.353)	(1.348)	(1.348)	(2.560)	(2.554)	(2.555)	(1.029)	(1.024)	(1.026)
LnAGE	-1.873***	-1.870***	-1.870***	-4.318***	-4.319***	-4.320***	-0.381	-0.378	-0.378
	(0.336)	(0.335)	(0.335)	(0.938)	(0.938)	(0.938)	(0.303)	(0.303)	(0.303)
Intercept	0.368	-0.008	-0.038	-3.411	-3.626	-3.639	-1.677	-2.055	-2.052
	(3.015)	(2.965)	(2.964)	(6.481)	(6.446)	(6.482)	(2.638)	(2.590)	(2.599)

N	5,183	5,183	5,183	5,170	5,170	5,170	5,176	5,176	5,176
R-squared	0.028	0.028	0.028	0.041	0.041	0.041	0.019	0.019	0.019
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports estimation results for the equation: $INV\_INEFF_{i,t} = \alpha_0 + \alpha_1 HR\ Index_{i,t} + \sum \lambda\ Controls_{i,t} + \varepsilon_{i,t}$. INV_INEFF is an investment inefficiency measure, calculated as in Biddle et al. (2009), by taking the residual from an investment model predicting the level of investment based on growth opportunities, as measured by sales growth, estimated cross-sectionally for each FF48 industry with at least 20 observations in a given year. Capex_INEFF is a Capex investment inefficiency measure, calculated as INV_INEFF, when defining investment as capital expenditure. NonCapex_INEFF is a NonCapex investment inefficiency measure, also calculated as INV_INEFF, when defining investment in the form of non-capital expenditures. HR Index can either take the form of HR, HR-Costly or HR-Cash-based, which are investment in employee quality indices including all types of corporate practices (HR); or corporate practices with either a cash-based or an opportunity cost (HR-costly); or practices with a cash-based cost only (HR-Cash-based), as described in Appendix A. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 6 Investment efficiency and firm investment in employee quality - alternative investment inefficiency measure - absolute values

	INV_INEFF_ABS	INV_INEFF_ABS	INV_INEFF_ABS	INV_INEFF1_ABS	INV_INEFF1_ABS	INV_INEFF1_ABS
HR	0.093**			0.081*		
	(0.046)			(0.043)		
HR-Costly		0.148**			0.122*	
		(0.075)			(0.072)	
HR-Cash-based			0.167**			0.124
			(0.084)			(0.079)
LnTA	0.070	0.106	0.109	0.279	0.319	0.337
	(0.221)	(0.211)	(0.210)	(0.231)	(0.220)	(0.220)
Lev	-0.286	-0.301	-0.294	-1.406	-1.425	-1.438
	(1.412)	(1.414)	(1.412)	(1.410)	(1.412)	(1.412)
ZScore	-0.109	-0.101	-0.103	-0.149	-0.138	-0.134
	(0.223)	(0.223)	(0.224)	(0.221)	(0.221)	(0.222)
MB	0.002	0.002	0.005	-0.020	-0.019	-0.014
	(0.193)	(0.193)	(0.193)	(0.207)	(0.207)	(0.207)
LOSS	0.149	0.150	0.146	-0.333	-0.327	-0.321
	(0.681)	(0.684)	(0.683)	(0.655)	(0.657)	(0.656)
IndAdj ROA	0.271	0.289	0.291	1.697	1.716	1.718
	(2.683)	(2.681)	(2.682)	(2.841)	(2.840)	(2.840)
CFO	0.136*	0.131*	0.130	0.111	0.107	0.105
	(0.079)	(0.080)	(0.080)	(0.111)	(0.111)	(0.111)
NetPPE	1.522	1.490	1.455	1.929	1.912	1.909
	(1.320)	(1.328)	(1.324)	(1.248)	(1.259)	(1.263)
KZ Score	-0.038***	-0.038***	-0.038***	-0.018	-0.018	-0.018
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
σ(CFO)	5.397	5.056	5.031	4.325	4.010	3.965
	(7.177)	(7.192)	(7.191)	(7.195)	(7.218)	(7.220)
σ(Sales)	0.621	0.604	0.600	0.215	0.194	0.178
	(1.030)	(1.024)	(1.025)	(1.044)	(1.039)	(1.039)
LnAGE	-1.852***	-1.849***	-1.849***	-1.966***	-1.963***	-1.962***
	(0.290)	(0.290)	(0.290)	(0.235)	(0.235)	(0.235)
Intercept	9.206***	9.008***	8.968***	8.339***	8.096***	7.948***
	(2.649)	(2.605)	(2.609)	(2.724)	(2.680)	(2.672)
N	5,183	5,183	5,183	5,123	5,123	5,123
R-squared	0.032	0.032	0.033	0.032	0.032	0.032
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Note: This table reports estimation results for Equation (2), as reported in text. INV_INEFF_ABS is an investment inefficiency measure, calculated as in Biddle et al. (2009), by taking the absolute residual from an investment model predicting the level of investment based on growth opportunities. Capex_INEFF_ABS and NonCapex_INEFF_ABS are unsigned investment inefficiency measures when defining investment in the form of capital expenditures and non-capital expenditures, respectively. INV_INEFF1_ABS, Capex_INEFF1_ABS, and NonCapex_INEFF1_ABS are unsigned total investment, capital expenditure and non-capital expenditure investment inefficiency measures, respectively, following a model specification based on McNichols and Stubben (2008), as described in Appendix B. HR Index can either take the form of HR, HR-Costly or HR-Cash-based, which are investment in employee quality indices including all types of corporate practices (HR); or corporate practices with either a cash-based or an opportunity cost (HR-Costly); or practices with a cash-based cost only (HR-Cash-based), as described in Appendix A. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 7 Investment efficiency and firm investment in employee quality - lagged/squared HR Index specifications

	Indep. Variables lagged by two years			HR Index in quadratic form		
	HR	HR-Costly	HR-Cash-based	HR	HR-Costly	HR-Cash-based
HR	-0.171**			-0.005		
	(0.085			(0.003)		
HR*OverFirm	0.357**			0.014***		
	(0.157)			(0.005)		
HR-Costly		-0.298**			-0.018**	
		(0.139)			(0.009)	
HR-Costly *OverFirm		0.598**			0.050***	
		(0.259)			(0.017)	
HR-Cash-based			-0.368**			-0.031***
			(0.158)			(0.011)
HR-Cash-based*OverFirm			0.696**			0.075***
			(0.291)			(0.023)
Joint signif.	4.14**	4.98**	3.85**	7.77***	10.49***	10.85***
Controls	YES	YES	YES	YES	YES	YES
N	5,243	5,243	5,243	5,902	5,902	5,902
R-squared	0.183	0.183	0.183	0.216	0.216	0.216
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO

Note: This table reports estimation results for Equation (1), as reported in text, when all independent variables (including the HR Index) are lagged by two (instead of one) years; and when the HR Index is taken in quadratic (squared) form. The dependent variable INV is a measure of total investment. HR Index can either take the form of HR, HR-Costly or HR-Cash-based, which are investment in employee quality indices including all types of corporate practices (HR); or corporate practices with either a cash-based or an opportunity cost (HR-costly); or practices with a cash-based cost only (HR-Cash-based), as described in Appendix A. The joint significance test jointly tests whether the sum of the coefficients α_1 and α_3 of Equation (1), reported in text, is equal to 0. For brevity, estimation results for control variables are not reported. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 8 Investment efficiency and firm investment in employee quality - CEO entrenchment, firm complexity, and debt and equity issuance

	CEO tenure			No of segments			ΔDebt/Sales$_{t-1}$			ΔEquity/Sales$_{t-1}$		
	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High
HR	0.033	-0.161	-0.400**	-0.251*	-0.306*	0.033	0.020	-0.081	-0.398*	-0.086	-0.115	-0.285
	(0.112)	(0.179)	(0.155)	(0.132)	(0.178)	(0.159)	(0.073)	(0.085)	(0.206)	(0.110)	(0.118)	(0.180)
HR*OverFirm	-0.078	0.583*	0.854***	0.490**	0.684**	0.027	-0.044	0.300**	0.791**	0.264	0.128	0.695**
	(0.211)	(0.328)	(0.285)	(0.238)	(0.330)	(0.311)	(0.144)	(0.149)	(0.392)	(0.201)	(0.224)	(0.338)
Joint signif	0.13	4.61**	7.25***	2.94*	3.92**	0.10	0.08	7.03***	2.81*	2.22	0.01	4.32**
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2,054	1,579	1,765	2,458	1,169	1,663	1,968	1,968	1,966	1,968	1,967	1,967
R-squared	0.282	0.195	0.277	0.253	0.220	0.223	0.407	0.454	0.197	0.314	0.248	0.220
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Note: This table reports estimation results for Equation (1), as reported in text, according to terciles (low, mid, high) of CEO tenure (the number of years the CEO has held that position; source: Execucomp) as a proxy for managerial entrenchment, number of segments (business and geographical; source: Compustat) in which the firm operates in a given year as a proxy for firm complexity, and debt and equity issuance (defined as in García Lara et al., 2016). ΔDebt issuance (ΔDebt/Sales$_{t-1}$) is defined as change in new debt issuance from the previous year, scaled by lagged sales, where debt issuance is Long-term debt issuance +Long-term debt reduction - Current debt changes; ΔEquity issuance (ΔEquity/Sales$_{t-1}$) is defined as the change in new equity issuance from the previous year, scaled by lagged sales, where equity issuance is Sale of common and preferred stock - Purchase of common and preferred stock. The dependent variable INV is a measure of total investment. HR Index is an investment in employee quality index including all types of relevant corporate investment, with an explicit cost or not, as described in Appendix A. The joint significance test tests whether the sum of the coefficients α_1 and α_3 is equal to 0. For brevity, estimation results for control variables are not reported. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.

Table 9 Investment efficiency and firm investment in employee quality - decomposed HR index definitions

	Compensation	Training-Costly	Training	Work design-Costly	Work design	Job security	Diversity
Compensation	-0.531**						
	(0.225)						
Compensation *OverFirm	1.334***						
	(0.443)						
Training-Costly		-0.542**					
		(0.252)					
Training-Costly*OverFirm		0.947**					
		(0.464)					
Training			-0.329*				
			(0.186)				
Training*OverFirm			0.654*				
			(0.338)				
Work design-Costly				-0.783			
				(0.595)			
Work design-Costly*OverFirm				1.865			
				(1.204)			
Work design					-0.362*		
					(0.198)		
Work design*OverFirm					0.765*		
					(0.420)		
Job security						0.333	
						(0.997)	
Job security*OverFirm						-0.314	
						(1.601)	
Diversity							-1.513**
							-0.728
Diversity*OverFirm							3.736***
							(1.329)
Joint signif.	10.06***	2.39	2.95*	2.55	2.50	0.00	9.50***
Controls	YES	YES	YES	YES	YES	YES	YES
N	5,902	5,902	5,902	5,902	5,902	5,902	5,902
R-squared	0.217	0.216	0.216	0.216	0.216	0.215	0.216
Industry FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO

Note: This table reports estimation results for Equation (1), as reported in text, for decomposed HR index definitions, for the categories of Compensation, Training, Work Design, Job Security, and Diversity, as defined in Appendix A. Training and Diversity indices can take either a comprehensive, or a purely costly (consisting of only five and three questions, respectively) form, as defined in Appendix A. The dependent variable INV is a measure of total investment. HR Indices, according to different categories, are investment in employee quality indices including all types of relevant corporate investment, with an explicit cost

or not, as described in Appendix A, unless specified otherwise (for Training-Costly and Work Design-Costly). The joint significance test tests whether the sum of the coefficients α_1 and α_3 is equal to 0. For brevity, estimation results for control variables are not reported. Robust standard errors are reported in parentheses below each coefficient value. Detailed variable definitions are provided in Appendices A and B. The symbols ***, **, and * denote two sided significance at the level of 1%, 5%, and 10%, respectively.