Internal Control Weakness and Corporate Employment Decisions: Evidence from SOX Section 404 Disclosures

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Abstract

This study investigates the impact of material internal control weaknesses on corporate employment decisions. We find that, on average, ineffective internal control is significantly related to lower efficiency in employment decisions. We also find that firms with material internal control weaknesses are associated with both over-investment and under-investment in labour. Further analysis suggests that the negative impact of internal control weaknesses on employment decisions is predominantly driven by more severe types of weakness that have a pervasive effect on internal reporting and those related to core accounts. Moreover, our change analysis shows that the remediation of material weaknesses contributes to an improvement in labour investment efficiency. Finally, consistent with the effective monitoring role of high-skilled employees, our subsample analysis indicates that the negative impact of internal control weaknesses on labour investment efficiency is mitigated in firms with high reliance on human capital. Our findings are robust to various sensitivity checks including propensity score matching, entropy balancing, removal of observations during the financial crisis, various measures for the efficiency of investment in labour, and the adjustment for employing residuals as outcome variables. Overall, our study contributes to the ongoing debate on the net benefits of SOX 404 by highlighting the significant value of internal control systems to efficient human capital investment and provides timely implications for managers and regulators.

Keywords: Sarbanes-Oxley Section 404; internal control; material weakness; remediation; labour investment; investment efficiency

JEL Classification: G31, J63, M41, M51

1 Introduction

In this paper, we examine the impact of internal control weaknesses on labour investment efficiency. Since the implementation of Sarbanes–Oxley Section 404 (SOX 404) in 2004, which requires managers and external auditors to comment on the adequacy of the internal controls over financial reporting, there has been a contentious and ongoing debate on the effectiveness of SOX 404 amongst academics, practitioners, and regulators. On the one hand, several studies have documented the economic benefits of effective internal controls, such as better financial reporting quality (Ashbaugh - Skaife, Collins, Kinney, & LaFond, 2008; Doyle, Ge, & McVay, 2007a; Epps & Guthrie, 2010) and lower cost of capital (Dhaliwal, Hogan, Trezevant, & Wilkins, 2011; Kim, Song, & Zhang, 2011). On the other hand, other studies suggest that the disclosure of internal control weaknesses may not materially influence firms either financially or operationally (Alexander et al., 2013; Aobdia et al., 2020; Ogneva et al., 2007). On top of this, many scholars and practitioners have long been critical of the extremely high compliance costs associated with SOX 404 (DeFond & Francis, 2005), which casts further doubt on the net benefits of SOX 404.

Given the continuing controversy and inconclusive evidence on the real effects of SOX 404, in this study, we aim to contribute to this important debate by investigating the influence of effective internal control on a crucial corporate decision. Arguably, one of the most significant corporate decisions that firms have to make is their investment in labour[1]. Despite the proliferation of research on capital investment, few accounting studies have addressed the investment in labour, as a key factor of production (Falato & Liang, 2016; Jung, Lee, & Weber, 2014; Pinnuck & Lillis, 2007). Numerous previous studies highlight the economic significance of the efficiency of investment in labour and the urgent need for firms to optimize it (Ben-Nasr & Alshwer, 2016; Ghaly, Dang, & Stathopoulos, 2020; Ha & Feng, 2018; Jung et al., 2014; Khedmati, Sualihu, & Yawson, 2019; Zhang, Ntim, Zhang, & Elmagrhi, 2020). Thus, deviations from optimal labour investment in the form of either over- or under-investment can be extremely costly to firms (Ghaly et al., 2020; Jung et al., 2014). On the one hand, the expansion of the workforce beyond the optimum leads to over-capacity issues and firms need to devote scarce corporate resources to cover

[1] According to the Annual Survey of Manufacturers, expenditure on employees (including payroll and benefits) in the U.S. manufacturing sector was $913 billion in 2019, more than 5 times the capital expenditure in the same year ($179 billion). Results of the survey are available at https://www.census.gov/data/tables/time-series/econ/asm/2018-2019-asm.html.

the extra costs of excess labour. On the other hand, under-investment in labour means firms underutilize corporate resources, leading to insufficient growth and low productivity (Stein, 1989; Williamson, 1963). As human capital plays an increasingly important role in the economy (Zingales, 2000), maintaining efficient labour investment has become a top priority for modern firms.

In light of the contentious debate on the efficacy of SOX Section 404 (Aobdia et al., 2020; Feng, Li, McVay, & Skaife, 2015; Kim et al., 2011; Ogneva et al., 2007) and the economic significance of labour investment, our study examines the impact of internal control weaknesses on the efficiency of investment in labour, a major internal stakeholder that is relatively underexplored in the accounting literature. We hypothesize that internal control ineffectiveness can have a significantly adverse impact on labour investment efficiency through two dimensions: 1) erroneous internal management reports used for operational decision-making and 2) information asymmetry arising from the imperfections in the capital market. First, ineffective internal control can influence labour investment efficiency via erroneous or stale internal management reports used for employment decisions (Cheng, Goh, & Kim, 2018; Feng et al., 2015). Given managers rely on internal management reports for daily operational decision-making (Feng et al., 2015), an ineffective internal control system can undermine managers' operation decisions, including labour investment decisions. For instance, over-forecasting of sales or under-forecasting of operating expenses may misleadingly depict a high-growth trend that requires expansion of labour investment, which can potentially result in over-investment. In contrast, under-forecasting of sales or over-forecasting of operating costs may lead firms to reduce labour below the optimal level, thus resulting in under-investment. Second, we also argue ineffective internal control systems exacerbate information asymmetry, resulting in inefficient labour investment. On the one hand, managers of firms with ineffective internal control may engage in self-serving behaviours (e.g., empire-building activities) that are not in the best interests of shareholders (Jensen & Meckling, 1976), which ultimately lowers labour investment efficiency. On the other hand, firms with internal control weaknesses tend to have lower financial reporting quality and higher costs to finance labour (Altamuro & Beatty, 2010; Ashbaugh-Skaife et al., 2008, 2009; M. Cheng et al., 2013; Doyle et al., 2007a, 2007b; Feng et al., 2009; J.-B. Kim et al., 2011), which may, in turn, lead to under-investment in labour.

While the aforementioned studies seem to support our prediction that ineffective internal control can impair labour investment efficiency, it is also possible that such weaknesses might not affect the efficiency of a firm's investment in labour. For instance, Alexander et al. (2013) show that managers do not believe that SOX 404 leads to better operational decisions. Moreover, Ogneva et al. (2007) find that internal control weaknesses are not directly associated with a higher cost of equity, which suggests that adverse selection might be less relevant to the relationship between internal control weaknesses and labour investment efficiency. Given the arguments above, whether internal control effectiveness can influence the efficiency of investment in labour is ultimately an empirical question.

Using a sample of 3,028 U.S. firm-year observations over the period from 2004 to 2016, we find that firms with internal control weaknesses are associated with inefficient labour investment[2] and are likely to suffer both over- and under-investment. We also investigate the association between internal control weakness and labour investment efficiency by considering the severity of material weaknesses. Given the negative effect of internal control weakness on labour investment efficiency, severe material weaknesses are expected to play a key role. Following Cheng et al. (2018), we define two types of severe internal control weakness: 1) pervasive weakness and 2) core accounting-related weakness. In line with these arguments, our results show that the adverse influence of internal control weaknesses on labour investment efficiency is primarily driven by those two types of severe internal weaknesses.

To corroborate our main results, we follow extant literature (Cheng et al., 2018; Feng et al., 2015) and conduct a change analysis to investigate the influence of remediation of material weaknesses on the change in labour investment efficiency. If ineffective internal control systems contribute to lower efficiency of investment in labour, we expect efficiency to improve if firms remediate their internal control weaknesses. Consistent with our prediction, we find that the remediation of internal control weaknesses is associated with a significant increase in labour investment efficiency, lending additional support to our main finding that internal control weaknesses result in inefficient labour investment.

Subsample analysis using multiple proxies for a firm's human capital intensity provides

[2] Follow the prior literature (Ben-Nasr & Alshwer, 2016; Ghaly et al., 2020; Jung et al., 2014; Zhang et al., 2020), we calculate the abnormal net hiring, which captures the absolute deviation from the optimal level of employment justified by economic fundamentals, as an inverse measure of labor investment efficiency. More details about the construction of abnormal net hiring are provided in Section 3.2.

consistent evidence that the impact of internal control weaknesses on labour investment efficiency is concentrated in firms in low-skilled industries, whereas the impact is mitigated in human-capital-intensive firms, consistent with high-skilled employees playing an effective internal governance role.

We conduct a battery of additional tests to alleviate endogeneity concerns and check the robustness of our findings. First, we employ propensity score matching (PSM) by matching firms (control group) with firms that report internal control weaknesses (treated group) based on the full set of control variables in our main model. For each treated firm, we select the nearest neighbour in the same industry (2-digit SIC) and the same year. We find the results support our main findings and show that firms with internal control weaknesses have significantly higher abnormal net hiring (i.e., inefficient employment decisions) than firms without internal control weaknesses. Second, to supplement our PSM analysis and ensure our results are not sensitive to a particular matching technique, we also employ an entropy balancing approach to ensure covariate balance between firms with internal control weaknesses and firms without internal control weaknesses. We obtain consistent results when repeating the analysis using an entropy-balanced sample. Third, to rule out the potential confounding effect that our results may be driven by non-labour investment or the occurrence of the financial crisis, we re-run our analyses and find our results remain unchanged after considering the potential effect of non-labour investments and the financial crisis. Fourth, our results are robust to various alternative measures of labour investment efficiency used in previous studies (Ben-Nasr & Alshwer, 2016; Ghaly et al., 2020; Jung et al., 2014). Fifth, Chen et al. (2018) show that employing residuals (i.e., the unexpected or abnormal component) as outcome variables leads to biased coefficient estimates and unreliable t-statistics, which can result in wrong inferences. In light of the solutions proposed by Chen et al. (2018), we include all the regressors of the two-step regression procedure in our model to alleviate the concern of employing residuals as the outcome variables. Our results still hold after the inclusion of additional regressors. Finally, we also use different fixed effects and clustered at both firm and year levels and we find our results are largely unchanged.

Our study contributes to the literature in multiple ways. First, it concerns the economic consequences of ineffective internal control and contributes to the ongoing debate on the net benefit of SOX 404. Although previous studies have highlighted the negative consequences of internal control weaknesses (Altamuro & Beatty, 2010; Ashbaugh-Skaife et al., 2008; Doyle et al., 2007a, 2007b; Feng et al., 2009), our study is noticeably distinct from their studies by extending our knowledge regarding the implications of internal control weaknesses to investment efficiency in labour, an important production factor and internal stakeholder within businesses. To the best of our knowledge, our paper is the first study that attempts to fill this void in the literature by focusing on the relationship between internal control weaknesses and labour investment efficiency. By doing so, our study adds to the stream of literature on internal control weakness by highlighting the adverse influence of internal control weaknesses on labour investment efficiency, which distinguishes the contributions of our study from previous studies.

Second, different from the prior literature, which largely focuses on the quality of external financial information, our study adds to the understanding of the unique role that internal financial information can play in facilitating efficient business decisions. Specifically, while a number of studies have shown how the external financial reporting quality may affect corporate investment decisions (e.g., Biddle et al. 2009; Biddle and Hilary 2006; Jung et al. 2014), our study provides new insights into the value of internal information for an important corporate investment, that is human capital investment.

Third, previous research in accounting and finance primarily pays attention to capital investment but overlooks labour investment (Jung et al., 2014). Different from capital investment, as an important factor of production, labour investment typically represents two-thirds of economy-wide added value (Hamermesh & Pfann, 1996) and more than 5 times of the capital investment amongst US firms. Given the economic significance of labour, our study sheds light on how accounting information systems can influence labour investment decisions. Specifically, our paper shows that the negative impact of internal control weaknesses extends beyond capital investment, thus providing important insights regarding the efficient allocation of resources from the perspective of labor investment.

Finally, our study is highly relevant and timely to managers, accounting professionals, policymakers, and the wider capital market participants that have interests in internal information systems and corporate investment decisions. Given the critiques and inconclusive evidence on the value of SOX 404 as part of the regulatory framework, our paper offers a new insight that is highly relevant to policymakers. We directly contribute to the ongoing debate on the costs and benefits of SOX 404 reporting by revealing a significant and yet unexplored economic benefit of effective internal control, namely, efficient investment in human capital. Additionally, our finding also adds to the emerging literature on the potential positive spillover effect of regulation compliance (Cheng et al., 2018; Shroff, 2017) by showing that the process of compliance with regulatory change related to information systems (i.e., SOX 404) can improve the internal information quality and result in better investment decisions.

Furthermore, in light of the economic significance of labour as a factor of production, our study also has important implications for managers and practitioners. Most importantly, our study has profound implications for corporate internal control and efficient allocation of resources. Specifically, our findings suggest that managers and accounting professionals should devote more resources and effort to the timely identification and remediation of internal control weaknesses to improve investment efficiency in labour.

In particular, in the context of the severe disruption caused by the COVID-19 pandemic to both business operations and the way employees work and communicate internal information (e.g., Work from Home and virtual meetings), it is more important than ever that managers should invest in a more robust and reliable internal control system to help businesses to sail through this turbulent period and guide post-pandemic economic recovery. Thus, our study also serves a timely and relevant to the managers and regulators. For example, given the importance of internal control, the managers and regulators may consider appointing dedicated internal audit personnel to strengthen the internal control system.

The remainder of the paper is organized as follows. In Section 2, we review related literature and formulate our main hypothesis. In Section 3, we explain the data collection and empirical design. In Section 4, we discuss our empirical results, followed by a series of robustness tests in Section 5. Section 6 concludes the study.

2 Literature review and hypothesis development

Prior studies have investigated the implications and consequences of material internal control weaknesses (Altamuro & Beatty, 2010; Ashbaugh-Skaife et al., 2008, 2009; M. Cheng et al., 2013; Q. Cheng et al., 2018; Costello & Wittenberg-Moerman, 2011; Dhaliwal et al., 2011; Epps & Guthrie, 2010; Feng et al., 2015). Firms with internal control weaknesses generally have been found to have significantly higher idiosyncratic risk, systematic risk, cost of capital and lower financial reporting quality (Ashbaugh-Skaife et al., 2008, 2009; Dhaliwal et al., 2011). Apart from the negative impact of ineffective internal control on corporate financing, some studies also examine the effect on operational decisions. For instance, Feng et al. (2015) consider the influence of ineffective internal control on inventory management and find that ineffective control over inventories leads to suboptimal order quantities, which further causes higher inventory levels and holding costs. Moreover, they find firms with inventory-related material weaknesses in internal control suffer lower inventory turnover and higher inventory impairments. Cheng et al. (2018) find that firms with material weaknesses in internal control have lower operational efficiency relative to firms without such weaknesses.

Building upon the theoretical framework used in the prior literature, we hypothesize that internal control weaknesses can affect labour investment efficiency through 1) poor internal information quality via erroneous internal management reports used for operational decisions; 2) information asymmetry arising from the imperfections in the capital market. Hence, in the following paragraphs, we elaborate on how internal control weaknesses can affect labour investment efficiency before formulating our main hypothesis.

First and most directly, ineffective internal control may affect labour investment efficiency via erroneous internal management reports used for operational decision-making (Cheng et al., 2018; Feng et al., 2009, 2015). Unlike year-end financial statements that are externally audited, the internal management reports are rarely audited or hardly checked by audit committees. Therefore, any errors or incomplete information in the internal management reports due to ineffective internal control are likely to remain undetected in the short term and will directly undermine managerial operation decisions. For instance, flawed IT systems are more susceptible to erroneous records of raw transactions, and incompetent personnel of internal control would fail to provide relevant internal information that is needed for managers' decisions in a timely manner (Feng et al. 2009). Given internal management reports serve as a critical basis to facilitate managers' daily operational decision-making (Feng et al., 2015), internal control effectiveness can influence managers' operation decisions, including labour investment decisions, based on internal management reports. More specifically, Cheng et al. (2018) argue that internal control ineffectiveness can harm a firm's efficiency in operations via its influence on sales forecast reports. For instance, internal control weaknesses over revenue recognition can undermine the accuracy of sales forecasts, which could, in turn, lead to flawed budgeting and suboptimal resource allocation made by managers[3]. Over-forecasting of sales can potentially result in over-investment in labour whereas under-forecasting of sales may result in under-investment in labour. In both cases, labour investment inefficiency arises due to the erroneous sales forecast reports caused by ineffective internal control.

Second, based on prior studies on the influence of ICW on operational decisions (Cheng et al., 2018; Feng et al., 2015), we argue that ineffective internal control can also influence labour investment through the misreporting of operating expenses. In particular, if labour cost is mistakenly reported because working hours and workload allocation are not accurately recorded, then it is likely that firms will have excessive or inadequate personnel, resulting in over-investment in labour (e.g., over-hiring) or under-investment in labour (e.g., under-hiring). Having an effective internal control system that generates more accurate and timely data related to labour investment, including workload, payroll, pension, and other fringe benefits, facilitates firms to manage their labour investment more efficiently and enables the proper functioning of human resources. In contrast, when a firm has ineffective control, the operational data used for labour investment will be inaccurate, contributing to suboptimal labour investment decisions. Taken together, when sales forecast and operating expenses are not accurately tracked, larger deviations are likely to occur between the optimal labour levels estimated based on the company's internal management reports and the actual level of labour currently working for the firm. Therefore, having an effective internal control system can also generate more accurate and up-to-date information regarding the day-to-day operations and future prospects of the firm, which enables managers to make corrective adjustments in resource allocation to optimize operations in a timely fashion, should unexpected events occur.

In addition, extant studies have shown that moral hazard and adverse selection are the two primary imperfections in the capital market that lead to firms' departure from the optimal investment level. On the one hand, in the absence of effective internal control and monitoring, managers can more readily engage in opportunistic behaviour, which ultimately lowers labour

[3] For instance, the management of QuikSilver Inc disclosed in its 10-K filing (Amendement No.1) for the fiscal year 2015 that the company suffered material internal control weaknesses due to incompetent and unethical internal control personnel, "In our North America wholesale operations, accurate information regarding actual shipment routing and customer delivery was not consistently maintained in our ERP system in accordance with our procedures. As a result, certain net revenues recorded in the prior period did not meet the criteria for revenue recognition at that time but instead should have been recognized in the following quarter." This material weakness can lead to an over-forecasting of revenue, resulting in over-investment in production factors including labor, thus leading to suboptimal labor investment.

investment efficiency. For instance, inefficient labour investment can happen if managers engage in empire-building and overinvestment in labour by growing their firms beyond the optimal levels (Bertrand & Mullainathan 2003; Blanchard et al. 1994; Jensen 1986; Lambert et al. 2007; Richardson 2006; Stiglitz & Weiss 1981). On the other hand, due to adverse selection, when facing weak monitoring and internal control, outside capital suppliers are more likely to charge a higher cost of capital for firms with material internal control weaknesses (Ashbaugh-Skaife et al. 2009; Dhaliwal et al. 2011). Hence, given that firms require external capital to finance their labour investment, adverse selection can also cause under-investment in labour, which results in lower labour investment efficiency. Therefore, without effective internal control, managers of firms with internal control weaknesses are potentially more prone to inefficient labour investment.

In sum, we hypothesize that a firm's weak internal control system can cause inefficient labour investment by impairing the operational decision-making and the quality of internal information, which causes firms to engage in the suboptimal level of labour investment. Thus, we develop the following hypothesis:

Hypothesis: Internal control weakness is negatively associated with labour investment efficiency.

3 Research design

3.1 Sample selection

In line with prior studies, we obtain information on firms' disclosures of their internal control from the AuditAnalytics database. To calculate the predicted value of labour investment from the model of Pinnuck and Lillis (2007) (Model 1), we obtain accounting data from COMPUSTAT and security price and return information from the Center for Research in Security Prices (CRSP). We also further require the availability of the labour investment variables and control variables used in our baseline regression. For control variables, we collect institutional ownership data from Thomson Financial Institutional Holdings (13f) database and obtain the industry-level rate of union membership and coverage data from UNIONSTATS. We exclude firm-year observations that are from the financial and utilities industries. Our final sample contains 3,028 firm-year observations from 2004 to 2016.

3.2 Measure of labour investment efficiency

Following prior literature (e.g., Ben-Nasr & Alshwer, 2016; Jung et al., 2014; Khedmati et al., 2019), we measure the expected level predicted by economic fundamentals following the model of Pinnuck and Lillis (2007) (Model 1). Our proxy for labour investment inefficiency, abnormal net hiring, is calculated as the absolute deviation of actual net hiring from its expected level. The higher the value of abnormal net hiring, the lower the labour investment efficiency.[4] In the sensitivity test, we also use other alternative proxies for labour investment efficiency to ensure that our findings are robust.

$$NET\_HIRE_{it} = \beta_0 + \beta_1 SALESGROWTH_{it-1} + \beta_2 SALESGROWTH_{it} + \beta_3 \Delta ROA_{it} + \beta_4 \Delta ROA_{it-1} + \beta_5 ROA_{it} + \beta_6 RETURN_{it} + \beta_7 SIZE_{it} + \beta_8 LIQ_{it-1} + \beta_9 \Delta LIQ_{it-1} + \beta_{10} \Delta LIQ_{it} + \beta_{11} LEV_{it} + \beta_{12} LOSSBIN1_{it-1} + \beta_{13} LOSSBIN2_{it-1} + \beta_{14} LOSSBIN3_{it-1} + \beta_{15} LOSSBIN4_{it-1} + \beta_{16} LOSSBIN5_{it-1} + \text{Industry Fixed Effects} + \varepsilon_{it} \quad (1)$$

where *NET_HIRE* is the percentage change in employees; *SALESGROWTH* is the percentage change in revenue; *ROA* is the return on assets; *RETURN* is the annual stock return; *SIZE* is the percentile of firm size measured as the natural log of market value; *LIQ* is the ratio of cash and short-term investments plus receivables to current liabilities; *LEV* is the leverage ratio measured as long-term debt plus debt in current liabilities, scaled by total assets; and *LOSSBIN1* to *LOSSBIN5* are five dummy variables with each 0.005 interval of prior-year profitability from 0 to -0.025. For example, LOSSBIN1 is a dummy variable equal to 1 if the firm's prior-year ROA is between -0.005 and 0, and 0 otherwise. LOSSBIN2 is a dummy variable equal to 1 if the firm's prior-year ROA is between -0.010 and -0.005, and 0 otherwise. In all cases, i indicates the firm and t indicates the year. Following Jung et al. (2014), we winsorize continuous variables at the 1st and 99th percentiles to lower the impact of outliers.

[4] We report the descriptive statistics of the variables in the model of Pinnuck and Lillies (2007) and the results of the regression from Pinnuck and Lillies (2007 in the Online Appendices.

3.3 Empirical models

To examine the relationship between internal control weakness and labour investment efficiency, we develop our baseline regression as follows:

$$AB\_NETHIRE_{it} = \beta_0 + \beta_1 ICW_{it} + \beta_2 MTB_{it-1} + \beta_3 SIZE_{it-1} + \beta_4 LIQ_{it-1} + \beta_5 LEV_{it-1} + \beta_6 DIVD_{it-1} + \beta_7 TANGIBLES_{it-1} + \beta_8 LOSS_{it-1} + \beta_9 LABINT_{it-1} + \beta_{10} SD\_CFO_{it-1} + \beta_{11} SD\_SALES_{it-1} + \beta_{12} SD\_NETHIRE_{it-1} + \beta_{13} UNION_{it-1} + \beta_{14} AB\_INVEST_{it} + \beta_{15} INSTI_{it-1} + \beta_{14} FRQ_{it-1} + \text{Industry-by-Year Fixed Effects} + \varepsilon_{it} \quad (2)$$

As defined in Section 3.2, *AB_NETHIRE* is calculated as the absolute deviation of actual net hiring from a firm's expected level; We set *ICW* equal to one if internal control weaknesses are reported in year t, and 0 otherwise; In line with previous studies on labour investment efficiency (Ben-Nasr & Alshwer, 2016; Jung et al., 2014; Khedmati et al., 2019), we also incorporate a group of explanatory variables that are likely to be associated with corporate labour investment efficiency, including market-to-book ratio, firm size, liquidity, leverage, dividend payouts, tangibility, loss dummy variables, labour intensity, the volatilities of cash flow, sales revenue and net hiring, unionization, abnormal non-labour investments, and institutional ownership respectively. We provide detailed definitions of these variables in Appendix A in this paper. We also include industry-by-year fixed effects and cluster standard errors at the firm level. In the robustness section, we also employ alternative fixed effects and cluster standard errors at both firm and year levels.

3.4 Descriptive statistics and univariate results

Panel A of Table 1 gives detailed descriptions of variables in our main model. The dependent variable, *AB_NETHIRE*, has a mean of 0.146 and a median of 0.085 with one standard deviation of 0.195. We also decompose abnormal net hiring into two subgroups depending on the sign. Positive *AB_NETHIRE* implies that a firm's observed value for labour investment is greater than the predicted value (i.e., over-investment in labour, *OVER LABOR*) whereas negative *AB NETHIRE* implies that observed value for labour investment is less than the predicted value (i.e., under-investment in labour, *UNDER LABOR*). The variable of interest, *ICW*, has a mean of 0.110 and a median of 0 with one standard deviation of 0.313.

In Panel B of Table 1, we compare the descriptive statistics of firms that have internal control weaknesses (ICW Firms) with firms without internal control weaknesses (Non-ICW Firms). The results show that firms with internal control weaknesses have a higher mean (median) abnormal net hiring of 0.184 (0.116) than those without internal control weaknesses, of 0.141 (0.083). These differences in the mean and median are statistically significant at the 1% level.

[Insert Table 1 near here]

Table 2 provides the Pearson correlation coefficients for variables in our main model. Our results suggest that internal control weakness (*ICW*) is positively related to abnormal net hiring (*AB NETHIRE*), suggesting that firms with ineffective internal control are more likely to have lower labour investment efficiency. The relations among other variables are generally in line with prediction. For example, our results show that firms with more investment opportunities (*MTB*), higher volatilities for cash flow, sales and net hiring (*SD_CFO, SD_SALES, SD_NETHIRE*) and higher abnormal non-labour investments (*AB_INVEST*) tend to suffer lower efficiency of investment in labour. In contrast, firms paying dividends (*DIVD*) and firms having higher institutional ownership and financial reporting quality are more likely to have higher labour investment efficiency.

[Insert Table 2 near here]

4 Empirical results

4.1 The impact of internal control weaknesses on labour investment efficiency

Table 3 reports the main results. Column 1 presents the results of our main model using the absolute value of the residual, *AB_NETHIRE,* as the outcome variable. We find *ICW* is positive and significantly associated with abnormal net hiring, suggesting that firms with material internal control weaknesses are inclined to suffer low labour investment efficiency. In the next two columns, we re-run our main model by dividing our sample into two subgroups: firms that over-invest in labour (i.e., positive residuals, observed net hiring greater than predicted) and under-invest in labour (i.e., negative residuals, observed net hiring less than predicted). We keep using the absolute values for both dependent variables for ease of interpretation and our results show that a firm with material internal control weaknesses suffers both over- and under-investment problems. In Column 4, we employ the Fama-MacBeth approach to estimate our main model and we find the results are similar to the main results in Column 1.

[Insert Table 3 near here]

4.2 Severity of material weaknesses: pervasive ICW and core accounts-related ICW

In this section, we further investigate whether the negative effect of ICW on labour investment efficiency shown in our baseline results varies with the severity of material weaknesses. Prior literature (Cheng et al., 2018) shows two types of severe material weaknesses in internal control systems: 1) pervasive weakness and 2) core accounting-related weakness. Generally, pervasive weaknesses are those pertaining to the security of information technology and the competency of accounting personnel, which can lead to systematic errors that fundamentally undermine the reliability of all accounting information reported both internally to managers and externally to investors and other market participants (Cheng et al., 2018). Therefore, the repercussions of such material weaknesses are considered most damaging and pervasive, casting doubt potentially on the entire information system of a particular firm. Another type of severe material weakness is ICW affecting individual core accounts. These core account weaknesses are identified within specific accounts that report vital information (e.g., sales revenue, inventory) that managers rely heavily upon for operational decisions, in contrast with weaknesses affecting other accounts that are not as relevant[5]. These two types of severe ICW are likely to harm labour investment efficiency to a greater extent, relative to other weaknesses.

Similar to Cheng et al. (2018), we classify internal control weaknesses into pervasive weaknesses (*PERASIVE_ICW*), and core account-related weaknesses (*CORE_ICW*), based on the reason keys recorded in the AuditAnalytics database[6]. In addition, we construct an indicator

[5] Please see page 1130-1136 in Cheng et al. (2018) for detailed discussion on how weakness in each type of core account can adversely affect corporate decisions.

[6] We follow the definitions of pervasive weaknesses and core accounts weaknesses in Cheng et al. (2018). Detailed definitions of both types of weakness are provided in Appendix A.

variable *BOTH_ICW* equal to one if there is at least one pervasive weakness and at least one core-account-related weakness for each firm-year observation. To enable comparison of the effect between the severe weaknesses and other weaknesses, we also include an indicator variable for other weaknesses, *OTHER_ICW*, which is coded as one if neither pervasive nor core account-related weaknesses are reported for the firm-year observation, in the regressions.

Table 4 presents the results. We find consistent evidence that severe material ICW is associated with significantly higher inefficiency in labour investment, as proxied by abnormal net hiring. Specifically, in Column 1, we find that *PERVASIVE_ICW* is positive and statistically significant at 1%, suggesting that firms with pervasive weaknesses have, on average, poorer efficiency in labour investment. Similarly, *CORE_ICW* in Column 2 is positively associated with abnormal net hiring, showing that firms with weaknesses related to core accounts are also subject to lower labour investment efficiency. It is also important to note that the effect of *PERVASIVE_ICW* is stronger than *CORE_ICW* in terms of both statistical significance and magnitude, which is consistent with Cheng et al. (2018) in that pervasive weaknesses can have a more profound effect on firms than core-accounts-related weaknesses. Finally, in Column 3, we repeat the analysis using *BOTH_ICW* to consider cases where both types of severe weakness are identified within a firm for a particular year and our results remain robust to this additional specification.

Notably, the positive and significant effect of severe ICW is in contrast with the insignificant, albeit positive, coefficient for *OTHER_ICW* in all three models, suggesting that our main results are predominantly driven by the more severe weaknesses in internal control systems. Overall, in line with our prediction that severe internal control weaknesses are more detrimental to firms, we document consistent evidence that firms with severe weaknesses have significantly lower labour investment efficiency.

[Insert Table 4 near here]

4.3 Remediation of internal control material weaknesses

So far, our results show that firms with material internal control weaknesses are likely to have lower labour investment efficiency. We then follow the specification employed in prior studies

(Cheng et al., 2018; Feng et al., 2015) to conduct a change analysis to investigate the influence of remediation of material weaknesses on the change in labour investment efficiency. If lower labour investment efficiency is a result of internal control weaknesses, the remediation of internal control material weaknesses is expected to increase the efficiency of investment in labour. The change analysis for the remediation test can not only corroborate the main results but also uses the same firm as its own control and thus alleviates the omitted correlated variable concern by controlling for time-invariant firm characteristics (Cheng et al., 2018). To test the influence of remediation of material weakness on labour investment efficiency, we estimate the following change regression:

$$\Delta AB\_NETHIRE_{it} = \beta_0 + \beta_1 REMEDIATION_{it} + \beta_2 \Delta MTB_{it-1} + \beta_3 \Delta SIZE_{it-1} + \beta_4 \Delta LIQ_{it-1} + \beta_5 \Delta LEV_{it-1} + \beta_6 \Delta DIVD_{it-1} + \beta_7 \Delta TANGIBLES_{it-1} + \beta_8 \Delta LOSS_{it-1} + \beta_9 \Delta LABINT_{it-1} + \beta_{10} \Delta SD\_CFO_{it-1} + \beta_{11} \Delta SD\_SALES_{it-1} + \beta_{12} \Delta SD\_NETHIRE_{it-1} + \beta_{13} \Delta UNION_{it-1} + \beta_{14} \Delta AB\_INVEST_{it} + \beta_{15} \Delta INSTI_{it-1} + \beta_{14} \Delta FRQ_{it-1} + AB\_NETHIRE\_LAGGED_{it-1} + \text{Industry-by-year Fixed Effects} + \varepsilon_{it} \quad (3)$$

We follow Feng et al. (2015) and Cheng et al. (2018) and measure *ΔAB_NETHIRE* as the change in labour investment efficiency from year t to year t+2 because Feng et al. (2015) suggest that using one-year changes makes it unclear when in year t+1 the material weaknesses were remediated. *REMEDIATION* is set to one if material weaknesses are disclosed in year t but no material weaknesses in year t+1 (i.e., material weaknesses have been remediated). All the control variables are also the changes from year t to t+2. Following Feng et al. (2015), we also include abnormal net hiring from year t-1.

Table 5 reports the results of the remediation test. We find that the coefficient on *REMEDIATION* is negative and significant. Thus, the results suggest that the remediation of internal control weaknesses leads to an improvement in labour investment efficiency, which corroborates our main results.

[Insert Table 5 near here]

4.4 Subsample analysis: role of human-capital-intensive firms

In this section, we conduct a subsample analysis to examine whether the relation between internal control weakness and labour investment efficiency varies with firms' reliance on high-skilled labour. Prior literature has established that employees can play an important role in the corporate governance mechanism through intense scrutiny of managerial behaviour and corporate decisions (Chyz, Leung, Li, & Rui, 2013; Faleye, Mehrotra, & Morck, 2006; Fauver & Fuerst, 2006; Huang, Jiang, Lie, & Que, 2017; Lin, Schmid, & Xuan, 2018). As internal stakeholders directly participating in firms' day-to-day operations, employees have a long-term financial claim in the form of salaries and pensions (Campello et al., 2018). Therefore, they have a strong incentive to closely monitor the management (Huang et al., 2017) and the financial transparency of their employers (Hamm et al., 2018; Siu et al., 2009).

Relative to low-skilled employees, several studies have shown that high-skilled employees are more effective in deterring managerial misbehaviour due to stronger participation in corporate decisions (Aguilera & Jackson, 2003; Kim, Maug, & Schneider, 2018) and greater financial incentives (Hochberg & Lindsey, 2010; Kroumova & Sesil, 2006). Hence, given high-skilled employees' greater information demand and better educational background than low-skilled counterparts, we argue that high-skilled employees are more motivated and equipped to identify potential irregularities and ensure the reliability of information reporting systems. Furthermore, Goh (2009) shows that non-accounting financial expertise and education are relevant attributes to facilitate timely remediation of material weakness, thus effectively suppressing the adverse effect of internal control weaknesses on firms. Hence, we predict that, in the event of material weaknesses, high-skilled employees, who possess higher levels of education and expertise, as well as financial interests in the firms, would contribute both directly and indirectly to faster remediation of material internal control weaknesses, relative to low-skilled employees. Therefore, the negative effect of ICW on labour investment decisions is expected to be at least partially mitigated by more timely remediation and intense monitoring within in human-capital-intensive firms whose workforce are primarily high-skilled employees. In other words, we argue that impact of ICW on labor investment efficiency should be more pronounced in low-skilled firms, where employee monitoring is perceived to be weaker.

However, we concur that it is also possible that the negative influence of ICW on labour investment efficiency could be exacerbated in human-capital-intensive firms. Prior studies point out that labour adjustment costs are significantly higher for human-capital-intensive firms due to higher costs involved in recruitment, retention and training (Cao & Rees, 2020; Dixit, 1997; Ghaly, Dang, & Stathopoulos, 2017; Ghaly et al., 2020). Therefore, firms that are highly dependent on high-skilled labour would require a significant amount of capital to finance their investment in human capital (Campello et al., 2010; Michaels et al., 2019). However, several studies suggest that firms with internal control weaknesses are penalized by both investors and lenders and thus face higher costs of capital, due to perceived poor financial reporting quality and higher information asymmetry (Dhaliwal et al., 2011; Kim et al., 2011; Ogneva et al., 2007). In addition, Jung et al. (2014) find that firms with better financial reporting quality enjoy higher labour investment efficiency. Therefore, faced with higher labour adjustment costs, human-capital-intensive firms with material internal control weaknesses are likely to suffer more as a result of rising financing costs, which would significantly impede them from investing in their human capital more efficiently. Overall, the above arguments point to two competing predictions on how human capital intensity might alter the relation.

Table 6 presents the results of our subsample analyses on firms' reliance on human capital. In Columns 1 and 2, we divide our sample based on the median of human capital reliance measured as the ratio of R&D expenditure to total sales. Thus, firms are considered human-capital-intensive if they have an above-median ratio, whereas those with a below-median ratio are categorized as firms with lower reliance on human capital. As we can see from the first two columns, there is a positive and significant relationship between ICW and abnormal net hiring in the low human-capital-intensity group (0.0572) in Column 2, where employees tend to play a much weaker role in monitoring. In contrast, such an influence is effectively mitigated in human-capital-intensive firms, as evidenced by the insignificant and much smaller coefficient (0.0016) in Column 1. We find that the coefficients of *ICW* are significantly different at the 5% level between the two subsamples.

Furthermore, to ensure that our findings are not driven by a particular measure of human capital intensity, we use another four alternative proxies to check robustness. First, we partition our sample into two subgroups, based on whether a firm operates in an industry with high reliance on human capital. Consistent with previous studies (Ben-Nasr & Ghouma, 2018; Cao & Rees, 2020; Ghaly et al., 2015), we consider firms belonging to healthcare, high-tech, and telecommunications industries[7] as human-capital-intensive firms. As illustrated in Columns 3 and 4, the coefficient of *ICW* is positive and significant only in low-skilled industries (Column 4), in contrast with the insignificant result in human-capital-intensive industries (Column 3). We also test the coefficient difference and find that the coefficient of *ICW* is statistically different at the 1% level across the two subgroups.

Second, Eisfeldt and Papanikolaou (Eisfeldt & Papanikolaou, 2013) suggest that firms with high levels of organisational capital tend to be more human-capital-intensive and invest heavily in key talents. Following prior literature (Chen, Leung, & Evans, 2016; Eisfeldt & Papanikolaou, 2013), organization capital is defined as capitalized selling, general and administrative (SG&A) expenses scaled by total assets. We thus categorize firms into high-organization-capital firms and low-organization-capital firms based on the sample median of organization capital. Similarly, we find that *ICW* remains positively significant in firms with low organization capital (Column 6) whereas its coefficient becomes insignificant in high-organization-capital firms.

Third, we partition our sample based on the knowledge capital of a firm, as defined by Peters and Taylor (Peters & Taylor, 2017). According to results in Columns 7 and 8, we find that the negative impact of ICW on labour investment efficiency is indeed more pronounced in firms with below-median knowledge capital (Column 8). Finally, in Columns 9 and 10, we use the industry-specific labour skill index developed by Ghaly et al. (2017) to proxy for a firm's reliance on high-skilled labour and document consistent evidence that the effect of ICW on abnormal net hiring is significant only in low-skilled industries (Column 10).

Overall, using various proxies for a firm's reliance on human capital, our subsample analyses present robust evidence that the negative effect of internal control weakness is attenuated in firms with high reliance on human capital. In comparison, the negative impact of ICW on labour investment efficiency is concentrated in firms in low-skilled industries.[8] Taken together, the above findings are consistent with the view that high-skilled employees play a stronger monitoring role, which significantly mitigates the negative impact of internal control weaknesses on the efficiency of labor investment.

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[7] Two-digit and three-digit SIC codes for these industries are 283, 357,36, 384, 48 and 80.

[8] US economic statistics show that low-skilled industries are also economically important to the US economy. According to lastest figure from US Bureau of Labor Statistics, the number of employees working in low-skill industries accounts for approximately 1/3 (32.7%) of total US employment. Data on US employment can be accessed via https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm.

[Insert Table 6 near here]

5 Robustness tests

To ensure the robustness of our main result, we conducted a series of additional tests. We further employ the PSM procedure by matching control firms with firms reporting material internal control weaknesses based on the full set of explanatory variables in our main model (Shipman et al., 2016). Our PSM results support our main results, suggesting ineffective internal control weakness is associated with labour investment inefficiency. Second, to corroborate our results based on propensity-score-matched samples and ensure our results are not sensitive to the choice of a particular matching algorithm, in this section, we resort to entropy balancing[9] (Chahine et al., 2020; Hainmueller, 2012; J. Kim & Valentine, 2021; King & Nielsen, 2019; Wilde, 2017) and find consistent results. Third, to further alleviate the concern regarding whether labour investment is merely a reflection of corporate non-labour investments[10], we also follow prior studies (Ben-Nasr & Alshwer, 2016; Jung et al., 2014) and empirically demonstrate how our study is distinct from previous studies developed in the context of investments and that our results are not solely driven by non-labour investments. Our results suggest that labour investment is not merely a byproduct of other non-labour investments and the influence of internal control weaknesses on labour investment efficiency we documented earlier is not driven by non-labour investments. Fourth, our results are also robust to various alternative measures of labour investment efficiency and model specifications. Finally, to eliminate the potential confounding effect due to the financial crisis, we repeat our main analysis by removing the observations during the financial crisis period of 2007-2009 and we find our results are similar. Full details of the robustness tests in Section 5 can be found in the Online Appendices.

6 Conclusion

In this study, we investigate the impact of material internal control weaknesses on firms' investment efficiency in one of the important production factors, namely human capital. Using a

[9] We thank the anonymous reviewer for suggesting this test.

[10] We thank the reviewer for raising this issue that inspires us to empirically test the role of non-labor investment.

sample of US firms from 2004 to 2016, we document robust evidence that firms with internal control weaknesses are associated with inefficient employment decisions, arising from both over-investment and under-investment in labour. Further analyses reveal that the detrimental effect of internal control weakness is primarily driven by the most severe types of material internal control weakness, namely pervasive weakness and core-accounts-related weakness. To further support our main finding, our change analysis confirms that the remediation of material weaknesses significantly improves labour investment efficiency. Moreover, our subsample analyses present consistent evidence that the negative impact of internal control weakness is mitigated in human-capital-intensive firms where the monitoring effect of employees is perceived to be stronger. Finally, our results are robust to a PSM approach, an entropy balancing approach, controlling for the role of non-labour investment and financial crisis, as well as various alternative labour investment efficiency measures and fixed effects specifications.

Our study contributes to the literature on several fronts. First, by investigating the role of effective internal control in labour investment efficiency, our study directly contributes to the contentious debate on the net benefits of SOX 404. In particular, while several previous studies have examined the adverse consequences of internal control weaknesses (Altamuro & Beatty, 2010; Ashbaugh-Skaife et al., 2008; Doyle et al., 2007a, 2007b; Feng et al., 2009), our study highlights the value of effective internal control by investigating the impact of material internal control weaknesses on investment efficiency in human capital, as a valuable intangible asset.

Second, prior empirical studies in accounting and finance fields primarily focus on capital investment but neglect labour investment (Biddle et al. 2009; Biddle and Hilary 2006; Jung et al. 2014). Considering the economic significance of labour, our study provides empirical evidence that suggests how accounting information systems shape corporate labour investment decisions. By highlighting that the negative influence of internal control weaknesses extends beyond capital investment, our study offers important insights into the efficient allocation of resources from the perspective of labour investment.

Finally, in light of the economic significance of labour as a factor of production, our study has multiple important and practical implications. Our results suggest that managers and accounting professionals should devote more resources to the timely identification and remediation of internal control weaknesses to improve corporate efficiency. In addition, our study also adds to the ongoing debate on the costs and benefits of SOX 404 reporting from the human capital investment perspective. Overall, our study has timely implications for managers, accounting professionals, policymakers, and the wider capital market participants that have interests in accounting information systems and corporate investment decisions. Particularly, in the context of the severe disruption caused by the COVID-19 pandemic to both the actual business operations and internal information communication within the firms, our study suggests that managers should dedicate more resources to ensure an effective internal control system, which would generate valuable internal information to inform the post-pandemic economic recovery.

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Table 1
Descriptive statistics of variables in the baseline regression.
Table 1 presents the descriptive statistics of the main variables. All variables are defined in Appendix A.

Panel A						
	N	Mean	Median	Std.Dev	25th Percentile	75th Percentile
AB_NETHIRE	3028	0.146	0.085	0.195	0.04	0.175
OVER_LABOR	1,083	0.159	0.078	0.256	0.032	0.165
UNDER_LABOR	1,945	-0.139	-0.091	0.150	-0.182	-0.044
ICW	3,028	0.110	0.000	0.313	0.000	0.000
MTB	3,028	1.909	1.262	3.236	0.758	2.186
SIZE	3,028	3.500	3.534	0.969	2.851	4.111
LIQ	3,028	2.293	1.443	2.587	0.855	2.624
LEV	3,028	0.151	0.072	0.212	0.000	0.228
DIVD	3,028	0.175	0.000	0.380	0.000	0.000
TANGIBLES	3,028	0.197	0.122	0.203	0.050	0.273
LOSS	3,028	0.519	1.000	0.500	0.000	1.000
LABINT	3,028	0.009	0.005	0.024	0.003	0.009
SD_CFO	3,028	0.101	0.071	0.110	0.044	0.115
SD_SALES	3,028	0.217	0.169	0.183	0.096	0.277
SD_NETHIRE	3,028	0.219	0.147	0.289	0.083	0.240
UNION	3,028	0.094	0.078	0.071	0.041	0.095
AB_INVEST	3,028	0.117	0.099	0.160	0.054	0.132
INSTI	3,028	0.195	0.151	0.179	0.051	0.289
FRQ	3,028	-0.103	-0.069	0.118	-0.132	-0.031

Table 1
Panel B of Table 1 compares the average values of the firm characteristics for firms with ineffective internal control systems (ICW firms) and firms without material weaknesses (Non-ICW firms). The significance of the differences in means and medians between ICW firms and Non-ICW firms. All variables are defined in Appendix A.

Panel B	ICW Firms (A)			Non-ICW Firms (B)			Difference Tests (A-B) p-value	
	N	Mean	Median	N	Mean	Median	t-test	Wilcoxon Test
AB_NETHIRE	333	0.184	0.116	2,695	0.141	0.083	< 0.001	< 0.001
MTB	333	2.132	1.162	2,695	1.881	1.273	0.182	0.061
SIZE	333	3.354	3.356	2,695	3.518	3.560	0.048	< 0.001
LIQ	333	1.827	1.229	2,695	2.350	1.481	< 0.001	< 0.001
LEV	333	0.190	0.113	2,695	0.147	0.068	< 0.001	< 0.001
DIVD	333	0.111	0.000	2,695	0.183	0.000	0.001	0.001
TANGIBLES	333	0.202	0.139	2,695	0.196	0.120	0.634	0.279
LOSS	333	0.583	1.000	2,695	0.511	1.000	0.014	0.014
LABINT	333	0.009	0.005	2,695	0.009	0.005	0.828	0.557
SD_CFO	333	0.107	0.078	2,695	0.101	0.070	0.2917	0.006
SD_SALES	333	0.224	0.175	2,695	0.216	0.169	0.442	0.268
SD_NETHIRE	333	0.257	0.175	2,695	0.215	0.142	0.011	< 0.001
UNION	333	0.104	0.091	2,695	0.093	0.076	0.008	0.014
AB_INVEST	333	0.105	0.091	2,695	0.118	0.100	0.180	0.413
INSTI	333	0.151	0.110	2,695	0.200	0.159	< 0.001	< 0.001
FRQ	333	-0.116	-0.077	2,695	-0.102	-0.068	0.038	0.076

Table 2
Correlation matrix.
This table reports the Pearson pair-wise correlation between all variables in the baseline regression. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. AB_NETHIRE	1																
2. ICW	0.068***	1															
3. MTB	0.072***	0.024	1														
4. SIZE	-0.028	-0.036**	0.170***	1													
5. LIQ	0.063***	-0.063***	-0.020	0.021	1												
6. LEV	0.009	0.064***	-0.002	0.058***	-0.300***	1											
7. DIVD	-0.085***	-0.059***	0.003	0.169***	0.052***	-0.079***	1										
8. TANGIBLES	-0.022	0.009	-0.043**	0.042**	-0.160***	0.288***	0.021	1									
9. LOSS	0.140***	0.045**	0.039**	-0.203***	-0.093***	0.039**	-0.287***	-0.016	1								
10. LABINT	0.021	-0.004	0.003	-0.072***	-0.093***	0.007	-0.010	0.014	-0.052***	1							
11. AB_INVEST	0.196***	-0.024	0.045**	-0.014	0.005	-0.001	-0.028	-0.015	0.058***	-0.011	1						
12. SD_CFO	0.189***	0.019	0.124***	-0.122***	0.054***	-0.095***	-0.149***	-0.183***	0.232***	-0.036**	0.321***	1					
13. SD_SALES	0.060***	0.014	0.072***	-0.113***	-0.097***	0.012	-0.070***	-0.165***	0.073***	0.055***	0.065***	0.271***	1				
14. SD_NETHIRE	0.186***	0.046**	0.022	-0.034*	-0.037**	0.156***	-0.119***	-0.030	0.114***	0.080***	0.074***	0.137***	0.150***	1			
15. UNION	-0.038**	0.048***	-0.040**	0.013	0.02	-0.004	0.039**	0.022	0.003	-0.072***	-0.035*	-0.056***	-0.091***	-0.029	1		
16. INSTI	-0.047***	-0.086***	-0.036**	0.310***	-0.028	-0.049***	0.098***	-0.060***	-0.068***	-0.039**	-0.021	-0.106***	0.016	-0.043**	-0.035*	1	
17. FRQ	-0.137***	-0.038**	-0.047***	0.067***	0.051***	-0.063***	0.112***	0.041**	-0.197***	0.041**	-0.130***	-0.295***	-0.173***	-0.133***	0.010	0.091***	1

Table 3
Internal control weakness and abnormal net hiring.
This table reports the results of regressions of abnormal net hiring (*AB_NETHIRE*) on internal control weakness (*ICW*). Column 1 shows the results of regressing abnormal net hiring on internal control weakness and control variables. Column 2 shows the results regressing labour over-investment (*OVER_LABOR*) on internal control weakness and control variables. Column 3 shows the results regressing labour under-investment (*UNDER_LABOR*) on internal control weakness and control variables. Column 4 presents the results of a Fama-MacBeth regression. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	AB_NETHIRE	*OVER_LABOR*	*UNDER_LABOR*	*AB_NETHIRE*
ICW	0.0457***	0.0687***	0.0338***	0.0273**
	(3.36)	(2.72)	(2.75)	(2.37)
MTB	0.0026	0.0058	-0.0011	0.0005
	(1.06)	(1.22)	(-0.69)	(0.24)
SIZE	0.0222	0.0648	0.0234	0.0277
	(0.44)	(0.68)	(0.48)	(0.78)
LIQ	0.0053***	0.0143**	0.0031*	0.0042
	(2.71)	(2.35)	(1.65)	(1.27)
LEV	-0.0030	0.0203	0.0066	0.0167
	(-0.11)	(0.27)	(0.31)	(0.96)
DIVD	-0.0060	0.0020	0.0026	-0.0167
	(-0.56)	(0.07)	(0.29)	(-1.29)
TANGIBLES	-0.0016	0.0209	-0.0203	-0.0120
	(-0.06)	(0.32)	(-0.78)	(-0.59)
LOSS	0.0325***	0.0142	0.0447***	0.0326***
	(4.53)	(0.84)	(5.69)	(4.94)
LABINT	0.2661***	0.4251	0.2431***	0.3095
	(2.91)	(1.42)	(2.84)	(1.23)
AB_INVEST	0.1613***	0.1989***	0.1455**	0.2243**
	(3.34)	(3.06)	(2.58)	(3.02)
SD_CFO	0.1333**	0.0855	0.2111***	0.0656
	(2.27)	(0.60)	(3.41)	(0.69)
SD_SALES	-0.0160	-0.0303	0.0019	-0.0142
	(-0.68)	(-0.58)	(0.08)	(-0.64)
SD_NETHIRE	0.0943***	0.1626***	0.0614***	0.0835***
	(4.19)	(3.58)	(3.06)	(4.43)
UNION	0.0365	0.1067	0.1710	-0.0530
	(0.16)	(0.17)	(0.87)	(-1.40)
INSTI	-0.0107	0.0094	-0.0188	-0.0136
	(-0.42)	(0.14)	(-0.83)	(-0.77)
FRQ	-0.0977***	-0.1137	-0.0780	-0.1287**
	(-2.67)	(-1.44)	(-1.57)	(-2.74)
Industry-by-Year Fixed Effect	Yes	Yes	Yes	No
N	3,028	1,083	1,945	3,028
Adj.R2	10.0%	8.9%	14.8%	31.7%

Table 4
The severity of material weaknesses: Internal control weakness and abnormal net hiring.
This table reports the results of regressions of abnormal net hiring (*AB_NETHIRE*) on internal control weakness (*ICW*) based on the severity of material weaknesses. Column 1 shows the results regressing abnormal net hiring on internal control weaknesses that have a more pervasive effect on internal reporting (*PERVASIVE_ICW*). Column 2 shows the results regressing abnormal net hiring on internal control weaknesses related to core accounts that are more likely to lead to errors in the internal reports that managers rely on to make operational decisions (*CORE_ICW*). Column 3 shows the results regressing abnormal net hiring on internal control weakness that at least contains one pervasive weakness and one core accounts weakness (*BOTH_ICW*). *OTHER_ICW* is the internal control weaknesses that are neither pervasive weaknesses nor core accounts weaknesses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	AB_NETHIRE	*AB_NETHIRE*	*AB_NETHIRE*
PERVASIVE_ICW	0.0463***		
	(2.97)		
CORE_ICW		0.0402**	
		(2.46)	
BOTH_ICW			0.0395**
			(2.04)
OTHER_ICW	0.0418	0.0389	0.0381
	(0.86)	(0.80)	(0.78)
MTB	0.0026	0.0026	0.0026
	(1.08)	(1.05)	(1.06)
SIZE	0.0225	0.0171	0.0173
	(0.44)	(0.33)	(0.34)
LIQ	0.0052***	0.0053***	0.0052***
	(2.69)	(2.73)	(2.70)
LEV	-0.0036	-0.0012	-0.0017
	(-0.13)	(-0.04)	(-0.06)
DIVD	-0.0060	-0.0065	-0.0065
	(-0.56)	(-0.60)	(-0.61)
TANGIBLES	-0.0004	-0.0037	-0.0026
	(-0.01)	(-0.13)	(-0.09)
LOSS	0.0326***	0.0328***	0.0329***
	(4.55)	(4.56)	(4.57)
LABINT	0.2620***	0.2625***	0.2591***
	(2.85)	(2.86)	(2.81)
AB_INVEST	0.1619***	0.1594***	0.1598***
	(3.32)	(3.28)	(3.28)
SD_CFO	0.1325**	0.1352**	0.1345**
	(2.25)	(2.28)	(2.26)
SD_SALES	-0.0163	-0.0155	-0.0157
	(-0.69)	(-0.66)	(-0.66)
SD_NETHIRE	0.0943***	0.0956***	0.0956***
	(4.19)	(4.19)	(4.19)
UNION	0.0129	0.0265	0.0056
	(0.06)	(0.11)	(0.02)

INSTI	-0.0113	-0.0152	-0.0158
	(-0.45)	(-0.60)	(-0.63)
FRQ	-0.0973***	-0.1010***	-0.1007***
	(-2.66)	(-2.78)	(-2.77)
Industry-by-Year Fixed Effect	Yes	Yes	Yes
N	3,028	3,028	3,028
Adj.R2	9.9%	9.7%	9.7%

Table 5

Change analysis: The effect of remediation of material weaknesses.

This table reports the results from regressing the change of abnormal net hiring (*AB_NETHIRE*) on the remediation of material weakness and the change in the determinants of labour investment efficiency. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	⊿AB_NETHIRE
REMEDIATION	-0.0696**
	(-2.15)
⊿MTB	0.0049**
	(2.14)
⊿SIZE	-0.0909
	(-0.62)
⊿LIQ	0.0076**
	(2.10)
⊿LEV	0.0401
	(0.38)
⊿DIVD	0.0337
	(1.49)
⊿TANGIBLES	-0.0162
	(-0.15)
⊿LOSS	0.0286**
	(2.24)
⊿LABINT	-1.4441
	(-0.29)
⊿AB_INVEST	0.1269
	(0.85)
⊿SD_CFO	0.0535
	(0.21)
⊿SD_SALES	0.2216***
	(2.70)
⊿SD_NETHIRE	1.3025***
	(10.60)
⊿UNION	2.8371**
	(2.33)
⊿INSTI	-0.1330
	(-1.12)
⊿FRQ	-0.0766
	(-0.89)
AB_NETHIRE_LAGGED	-0.0964**
	(-2.31)
Industry-by-Year Fixed Effect	Yes
N	1,513
Adj.R2	10.8%

Table 6
Human capital intensity, organization capital, knowledge capital and labour skills.
Table 6 reports the results of OLS regressions for subsamples based on human capital intensity, organization capital, knowledge capital, and labour skills. The robust standard errors clustered at the firm level are reported in parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	Dependent Variable: *AB_NETHIRE*									
	Human Capital Intensive Firms		Human Capital Intensive Industries		Organization Capital		Knowledge Capital		Labor Skills	
	High	Low	High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ICW	0.0016	0.0572***	-0.0184	0.0784***	-0.0033	0.0380**	0.0099	0.0593***	0.0110	0.0353*
	(0.11)	(3.68)	(-1.23)	(4.38)	(-0.20)	(2.20)	(0.63)	(3.29)	(0.71)	(1.71)
MTB	-0.0015	0.0070***	0.0006	0.0060***	0.0004	0.0036**	-0.0009	0.0104***	-0.0008	0.0061***
	(-1.19)	(4.03)	(0.37)	(3.85)	(0.23)	(2.28)	(-0.67)	(5.27)	(-0.52)	(3.48)
SIZE	0.1121**	-0.0330	0.0118	-0.0021	-0.0627	0.0662	-0.0217	-0.0423	0.1321**	-0.0383
	(1.97)	(-0.66)	(0.18)	(-0.04)	(-1.18)	(0.86)	(-0.37)	(-0.69)	(2.13)	(-0.59)
LIQ	0.0066***	0.0025	0.0057***	0.0028	0.0074**	0.0069***	0.0048**	0.0023	0.0055***	0.0042
	(3.56)	(1.13)	(2.78)	(1.26)	(2.27)	(3.50)	(2.36)	(0.97)	(2.63)	(1.59)
LEV	0.0103	-0.0885***	-0.0131	-0.0697**	-0.0079	-0.0084	-0.0008	-0.0821***	0.0261	-0.0552
	(0.39)	(-3.58)	(-0.46)	(-2.50)	(-0.31)	(-0.24)	(-0.03)	(-2.77)	(0.93)	(-1.65)
DIVD	-0.0052	-0.0033	0.0026	0.0000	-0.0004	0.0136	-0.0045	0.0160	-0.0073	0.0062
	(-0.34)	(-0.27)	(0.15)	(0.00)	(-0.03)	(0.68)	(-0.26)	(1.06)	(-0.43)	(0.37)
TANGIBLES	-0.0245	0.0848***	-0.0623	0.1029***	0.0222	0.1035**	-0.0267	0.1533***	0.0179	0.0634
	(-0.64)	(2.80)	(-1.31)	(2.95)	(0.49)	(2.46)	(-0.63)	(3.85)	(0.44)	(1.35)

LOSS	0.0191*	0.0233**	0.0140	0.0183*	0.0239**	0.0054	0.0106	0.0149	0.0262**	0.0129
	(1.93)	(2.20)	(1.27)	(1.71)	(2.34)	(0.44)	(1.01)	(1.29)	(2.51)	(1.00)
LABINT	-0.0386	0.0892	-0.7336	0.1981	0.1675	-1.3170*	-1.3125	0.1834	-0.0422	-0.0359
	(-0.04)	(0.61)	(-0.76)	(1.26)	(1.06)	(-1.74)	(-1.21)	(1.10)	(-0.06)	(-0.20)
AB_INVEST	0.0929***	0.3107***	0.0655**	0.2555***	0.1666***	0.1189***	0.0757***	0.3342***	0.1157***	0.2683***
	(3.80)	(6.06)	(2.31)	(6.46)	(4.57)	(3.83)	(3.09)	(5.97)	(4.43)	(4.64)
SD_CFO	0.1286***	0.1539**	0.1312***	0.0776	0.0372	0.1154***	0.1227***	0.1670**	0.1331***	0.1477*
	(3.44)	(2.38)	(3.15)	(1.35)	(0.56)	(2.65)	(3.22)	(2.24)	(3.31)	(1.86)
SD_SALES	0.0092	0.0439*	-0.0218	0.0533*	0.0341	0.0017	-0.0557*	0.1042***	0.0006	0.0068
	(0.27)	(1.80)	(-0.67)	(1.94)	(1.20)	(0.05)	(-1.73)	(3.46)	(0.02)	(0.19)
SD_NETHIRE	0.2875***	0.2218***	0.3861***	0.2037***	0.1884***	0.3529***	0.3738***	0.2046***	0.1848***	0.3181***
	(12.65)	(14.08)	(15.02)	(12.55)	(10.38)	(15.03)	(13.27)	(12.42)	(8.26)	(15.26)
UNION	-0.3333*	0.2204	-0.1728	0.1250	-0.3108	0.1562	-0.2936	0.1323	-0.1168	0.1804
	(-1.83)	(0.99)	(-0.87)	(0.59)	(-1.51)	(0.75)	(-1.56)	(0.60)	(-0.65)	(0.59)
INSTI	0.0129	-0.0237	0.0017	-0.0141	0.0121	-0.0603	0.0240	-0.0114	-0.0548	0.0346
	(0.44)	(-0.83)	(0.05)	(-0.45)	(0.44)	(-1.29)	(0.79)	(-0.32)	(-1.60)	(0.95)
FRQ	-0.0562	-0.0104	-0.0643*	-0.0368	-0.0722	-0.0246	-0.0723*	0.0058	-0.0388	0.0465
	(-1.54)	(-0.21)	(-1.69)	(-0.76)	(-1.57)	(-0.60)	(-1.92)	(0.12)	(-1.03)	(0.81)
Difference p-value	0.015**		< 0.001***		0.090*		0.040**		0.289	
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,510	1,518	1,398	1,630	1,514	1,514	1,518	1,510	1,335	1,385
Adj.R2	19.8%	24.6%	23.8%	24.3%	20.3%	27.1%	21.6%	31.0%	18.2%	24.7%

Appendix A
Variable definition.

Variable	Description (COMPUSTAT data items in parentheses)
Model (1) Variables:	
NET_HIRE	Percentage change in the number of employees (EMP) from year t-1 to year t for firm i.
SALESGROWTH	Percentage change in sales (REVT) in year t for firm i.
ROA	Return on assets (NI / lag(AT)) in year t for firm i.
⊿ROA	Change in return on assets in year t for firm i.
RETURN	Total stock return during fiscal year t for firm i.
SIZE	Natural log of market value (CSHO* PRCC_F) at the end of fiscal year t-1 for firm i.
SIZE_P	Percentile rank of *SIZE* in year t for firm i.
LIQ	Quick ratio ((CHE + RECT) / LCT) at the end of year t -1 for firm i.
⊿LIQ	Percentage change in the quick ratio in year t for firm i.
LEV	Leverage for firm i, measured as the sum of debt in current liabilities and total long-term debt (DLC + DLTT) at the end of year t-1, divided by year t-1 total assets.
LOSSBIN	There are five separate loss bins to indicate each 0.005 interval of ROA from 0 to -0.025 in period t-1 for firm i. LOSSBIN1 is equal to 1 if ROA ranges from -0.005 to 0.
Model (2) Variables:	
AB_NETHIRE	Abnormal net hiring is the absolute value of the difference between the observed level of labour investment and that justified by economic fundamentals based on Pinnuck and Lillis (2007).
ICW	Indicator variable for ineffective internal control that takes a value of one if a firm reports a material weakness in internal control in fiscal year t for firm i, and zero otherwise.
MTB	Market-to-book ratio (CSHO * PRCC_F / SEQ) in year t-1 for firm i.
DIVD	Indicator variable coded as 1 if the firm paid dividends (DVPSPS_F) in year t-1 for firm i.
TANGIBLES	Property, plant and equipment (PPENT) at the end of year t-1, divided by total assets at year t-1, for firm i.
LOSS	Indicator variable coded as 1 if a firm I had negative ROA for year t-1 firm i.
LABINT	Labour intensity, measured as the number of employees divided by total assets at the end of year t-1 for firm i.
AB_INVEST	Abnormal other (nonlabor) investments, defined as the absolute magnitude of the residual from the following model: $INVEST_{it} = \beta_0 + \beta_1 SALESGROWTH_{it-1} + \varepsilon_{it}$, where INVEST is the sum of capital expenditure (CAPX), acquisition expenditure (AQC), and research and development expenditure (XRD), fewer cash receipts from the sale of property, plant, and equipment (SPPE), all scaled by lagged total assets.
SD_CFO	Standard deviation of firm i's cash flows from operation (OANCF) from year t-5 to t-1.
SD_SALES	Standard deviation of firm i's sales from year t-5 to t-1.

SD_NETHIRE	Standard deviation of firm i's change in the number of employees from year t-5 to t-1.
UNION	Industry-level rate of labour unionization for year t-1. We obtain the industry-level rate of industry unionization from the website of UNIONSTATS which provides estimates of union membership and coverage data by industry.
INSTI	Institutional shareholders at the end of year t-1 for firm i.
FRQ	Discretionary accrual is estimated by using the performance-adjusted modified Jones model suggested in Kothari et al. (2005). We estimate the model for every industry classified by two-digit SIC code for each year and capture the residuals. The absolute value of discretionary accrual, *AB_DISC*, is used as the proxy for financial reporting quality. The larger value of the absolute value of discretionary accrual, the lower level of financial reporting quality. We further multiply *AB_DISC* by -1 so that a larger value of *AB_DISC* indicates a higher quality of financial reporting.
Other Variables:	
PERVAISVE_ICW	Indicator variable coded as 1 if there is at least one pervasive weakness for the firm-year observation. Pervasive weaknesses are defined as those related to information technology, software, security, and access issues (Audit Analytics Reason Key 22) and accounting personnel resources, competency/training issues (Reason Key 44).
CORE_ICW	Indicator variable coded as 1 if there is at least one weakness related to the core accounts for the firm-year observation. Core accounts weaknesses are defined as those related to revenue recognition issues (Reason Key 39); expense recording (payroll, SG&A) issues (Reason Key 29); liabilities, payables, reserves, and accrual estimation failures (Reason Key 33); inventory, vendor, and cost of sales issues (Reason Key 32); depreciation, depletion, or amortization issues (Reason Key 28); PPE, intangible, or fixed asset (value/diminution) issues (Reason Key 16); capitalization of expenditure issues (Reason Key 14); lease, FAS 5, legal, contingency, and commit issues (Reason Key 3); lease, leasehold, and FAS 13 (98) issues (Reason Key 73); accounts/loans receivable, investments and cash issues (Reason Key 15); and tax issues (Reason Key 41).
BOTH_ICW	Indicator variable coded as 1 if there is at least one pervasive weakness and at least one core accounts weakness for the firm-year observation.
OTHER_ICW	Indicator variable coded as 1 if there is neither pervasive weakness nor core accounts weakness for the firm-year observation.
HUMAN CAPITAL INTENSIVE FIRMS	Indicator variable coded as 1 if firms with above median R&D expenditure to total sales, and 0 otherwise.
HUMAN CAPITAL INTENSIVE INDUSTRIES	Indicator variable coded as 1 for firms that belong to all subcategories of the telecommunications, high-tech and healthcare industries by two- and three-digit SIC codes., and 0 otherwise.

LABOR SKILLS	Labour skill data is from Belo and Lin (2013) and we use the industry average number of employees working in occupations with a JobZones index equal to 4 or 5 as a proxy for the degree of reliance on skilled labour. JobZones data from Occupational Information Network (O*Net), available at http://www.onetonline.org/find/zone. Data on the number of employees by occupation are from the Occupational Employment Statistics (OES) program of the Bureau of Labor Statistics.
KNOWLEDGE CAPITAL	Knowledge capital data is from Peters and Taylor (2017) that estimates a firm's knowledge capital by accumulating past R&D spending using the perpetual inventory method.
ORGANIZATION CAPITAL	Organization capital data is from Peters and Taylor (2017) that estimates a firm's organization capital by accumulating a fraction of past SG&A spending using the perpetual inventory method.
GDP	Logarithm of GDP per capita.
CAPX	Capital expenditures scaled by total assets.
R&D	Research and development expenditures scaled by total assets.
AQC	Acquisition expenditures scaled by total assets.

Online Appendices

Internal Control Weakness and Corporate Employment Decisions: Evidence from SOX Section 404 Disclosures

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This section provides supplementary information and additional analyses as described below:

Appendix 1: Descriptive statistics of variables in the model of Pinnuck and Lillies (2007).

Appendix 2: Results of the regression from Pinnuck and Lillies (2007).

Appendix 3: Internal control weakness and abnormal net hiring: Propensity score matching approach (PSM).

Appendix 4: Internal control weakness and abnormal net hiring: Entropy balancing approach.

Appendix 5: The role of non-labour investments.

Appendix 6: Alternative measures of labour investment efficiency.

Appendix 7: Adjustment for employing residuals as outcome variables and alternative fixed effects.

Appendix 8: The role of the financial crisis.

Appendix 1. Descriptive statistics of variables in the model of Pinnuck and Lillies (2007).
This table reports the descriptive statistics of variables in the model of Pinnuck and Lillies (2007). All variables are defined in Appendix A of the paper.

Panel A						
	N	Mean	Median	Std.Dev	25th Percentile	75th Percentile
NET_HIRE	75,574	0.067	0.018	0.337	-0.063	0.127
SALESGROWTH	75,574	0.172	0.064	0.683	-0.057	0.213
SALESGROWTH_LAG	75,574	0.241	0.078	0.795	-0.043	0.25
ROA	75,574	-0.099	0.024	0.445	-0.099	0.079
⊿ROA	75,574	0.015	0.006	0.281	-0.044	0.051
⊿ROA_LAG	75,574	0.006	0.006	0.274	-0.047	0.051
RETURN	75,574	0.191	-0.001	0.975	-0.329	0.356
LIQ	75,574	2.064	1.229	2.614	0.725	2.282
⊿LIQ	75,574	0.163	-0.017	1.046	-0.235	0.222
⊿LIQ_LAG	75,574	0.234	-0.007	1.192	-0.228	0.252
SIZE	75,574	5.535	5.606	2.608	3.701	7.334
LEV	75,574	0.283	0.189	0.373	0.018	0.383

Appendix 2. Results of the regression from Pinnuck and Lillies (2007).
This table reports the regression results of Pinnuck and Lillies (2007). All variables are defined in Appendix A of the paper.

Panel B	*NET_HIRE (EXPECTED SIGN)*	*NET_HIRE (COEFFICIENT)*
SALESGROWTH	+	0.1697***
		(39.27)
SALESGROWTH_LAG	+	0.0258***
		(9.68)
ROA	+	0.0352***
		(6.62)
⊿ROA	-	-0.1232***
		(-16.65)
⊿ROA_LAG	+	0.0171**
		(2.47)
RETURN	+	0.0337***
		(20.48)
SIZE_P	+	0.0908***
		(20.90)
LIQ	+	0.0070***
		(11.00)
⊿LIQ	+/-	0.0006
		(0.29)
⊿LIQ_LAG	+	0.0177***
		(10.63)
LEV	+/-	0.0005
		(0.10)
LOSSBIN1	-	-0.0162**
		(-2.04)
LOSSBIN2	-	-0.0199**
		(-2.53)
LOSSBIN3	-	-0.0179**
		(-1.99)
LOSSBIN4	-	-0.0184*
		(-1.96)
LOSSBIN5	-	-0.0373***
		(-4.67)
Industry Fixed Effect		Yes
N		75,574
Adjusted R2		17.5%

Appendix 3. Internal control weakness and abnormal net hiring: Propensity score matching approach.

We further employ the PSM procedure by matching control firms with firms reporting material internal control weaknesses based on the full set of explanatory variables in our main model (Shipman et al. 2016). To ensure the quality of matching, in addition to the comparability of firm characteristics, we also require the treated firms and the control firms to be in the same sector (2-digit SIC) and year when matching. We consider firms that report material internal control weaknesses as treated firms and select control firms with the closest propensity scores and match firms without replacement.[1] However, matching without replacement may result in lower-quality matches, whereas matching with replacement reduces bias because each treated observation matches with the most similar control observation (Roberts and Whited 2012; Shipman et al. 2016). Therefore, we also match control firms with replacement. In Panel A and Panel B of Appendix 4, we report the results of matching without and with replacement. Our results show that the difference between the two groups for each control variable is insignificant, suggesting that the treated group and control group are comparable in terms of firm characteristics and our matching is successful[2]. In contrast, our results show that the mean of abnormal net hiring (*AB_NETHIRE*) for firms with ICW is 0.1745 (0.1794) without (with) replacement and is significantly higher than the control group of 0.1246 (0.1231). Hence, our PSM results support our main results, suggesting ineffective internal control weakness is associated with labour investment inefficiency.

In Panel C of Appendix 4, we further include all the control variables in our baseline model and re-estimate the regression model based on our PSM samples to make sure our PSM results are robust. Specifically, the variable of interest, *TREATED*, is a dummy variable set equal to 1 if a firm reports a material internal control weakness, and 0 for the control group. For the robustness of our results, we also match control firms with and without replacement and report the results separately. We find the estimated coefficients on *TREATED* are both positive and statistically significant in both columns, which further confirms that firms with material internal control weaknesses suffer low investment efficiency in labour.

[1] To restrict the maximum allowable distance between propensity scores for a successful match, we impose a caliper distance of 0.01 when matching. Our PSM results remain similar if we impose a caliper distance of 0.05.

[2] All 15 covariates are balanced and comparable between treated group and control groups when comparing the mean of each covariate. In addition, the differences in terms of medians of the control variables are also largely insignificant, except for *SD_NETHIRE*. However, the difference in the median of 1 out of 15 variables in the post-matching sample should not materially undermine our PSM analysis as, in Panel C of Table 7, we control for all the covariates including *SD_NETHIRE* in the multi-variate regression model using the PSM samples and obtain consistent and robust results.

Appendix 3. Internal control weakness and abnormal net hiring: PSM approach.
Panel A reports the post-match results when we match treated observations with control observations without replacement. Panel B reports the post-match results when we match treated observations with control observations with replacement. In Panel C of Table 4, we further produce a matched sample to estimate the results using OLS regressions. The variable of interest, *TREATED*, is a dummy variable set equal to 1 if a firm reports a material internal control weakness, and we set the dummy variable equal to 0 for the control group. All other variables are defined in Appendix A of the paper. Column 1 of Panel C reports the results of matching without replacement and Column 2 reports the results of matching with replacement. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A	Post-Match Results: Treated Group vs Control Group (Matching without replacement)						
	TREATED GROUP (MEAN)	*CONTROL GROUP (MEAN)*	*TREATED GROUP (MEDIAN)*	*CONTROL GROUP (MEDIAN)*	*DIFFERENCE (MEAN)*	*DIFFERENCE (MEDIAN)*	*N*
AB_NETHIRE	0.1745	0.1246	0.0985	0.0744	0.0499**	0.0241***	402
MTB	1.9656	1.6368	1.1913	1.2075	0.3288	-0.0162	402
SIZE	0.1649	0.1629	0.1465	0.1442	0.0020	0.0023	402
LIQ	1.9203	1.8650	1.3942	1.3656	0.0553	0.0286	402
LEV	0.1406	0.1446	0.0673	0.0888	-0.0040	-0.0215	402
DIVD	0.0847	0.0678	0.0000	0.0000	0.0169	0.0000	402
TANGIBLES	0.1956	0.1855	0.1313	0.1275	0.0101	0.0038	402
LOSS	0.6020	0.5622	1.0000	1.0000	0.0398	0.0000	402
LABINT	0.1041	0.1038	0.0051	0.0056	0.0003	-0.0005	402
AB_INVEST	0.0980	0.0967	0.0914	0.0945	0.0013	-0.0031	402
SD_CFO	0.2088	0.2365	0.0753	0.0754	-0.0277	-0.0001	402
SD_SALES	0.2159	0.1886	0.1726	0.1867	0.0273	-0.0141	402
SD_NETHIRE	0.1023	0.1022	0.1614	0.1474	0.0001	0.0140***	402
UNION	0.0088	0.0088	0.0761	0.0761	0.0000	0.0000	402
INSTI	0.1597	0.1624	0.1231	0.1269	-0.0027	-0.0038	402
FRQ	-0.1182	-0.1174	-0.0756	-0.0802	-0.0008	0.0046	402

Panel B	Post-Match Results: Treated Group vs Control Group (Matching without replacement)						
	TREATED GROUP (MEAN)	*CONTROL GROUP (MEAN)*	*TREATED GROUP (MEDIAN)*	*CONTROL GROUP (MEDIAN)*	*DIFFERENCE (MEAN)*	*DIFFERENCE (MEDIAN)*	*N*
AB_NETHIRE	0.1794	0.1231	0.0985	0.0775	0.0563**	0.0210***	382
MTB	1.9406	1.8867	1.1925	1.1632	0.0539	0.0293	382
SIZE	0.1661	0.1665	0.1465	0.1432	-0.0004	0.0033	382
LIQ	1.9336	1.8614	1.3942	1.4109	0.0722	-0.0167	382
LEV	0.1363	0.1333	0.0712	0.0881	0.0030	-0.0169	382
DIVD	0.0943	0.0566	0.0000	0.0000	0.0377	0.0000	382
TANGIBLES	0.1925	0.1824	0.1313	0.1249	0.0101	0.0064	382
LOSS	0.6087	0.5761	1.0000	1.0000	0.0326	0.0000	382
LABINT	0.0089	0.0090	0.0052	0.0056	-0.0001	-0.0004	382
AB_INVEST	0.1050	0.1064	0.0906	0.0957	-0.0014	-0.0051	382
SD_CFO	0.0971	0.0943	0.0759	0.0754	0.0028	0.0005	382
SD_SALES	0.2134	0.2329	0.1726	0.1801	-0.0195	-0.0075	382
SD_NETHIRE	0.2219	0.1888	0.1589	0.1468	0.0331	0.0121***	382
UNION	0.0999	0.0987	0.0761	0.0761	0.0012	0.0000	382
INSTI	0.1647	0.1642	0.1223	0.1386	0.0005	-0.0163	382
FRQ	-0.1193	-0.1222	-0.0764	-0.0785	0.0029	0.0021	382

Panel C	Matching without Replacement (1) *AB_NETHIRE*	Matching with Replacement (2) *AB_NETHIRE*
TREATED	0.0568***	0.0612***
	(3.08)	(3.23)
MTB	0.0061	0.0063
	(1.07)	(1.09)
SIZE	-0.0231	-0.0299
	(-0.15)	(-0.19)
LIQ	-0.0030	-0.0035
	(-0.42)	(-0.49)
LEV	-0.0777	-0.0682
	(-0.93)	(-0.75)
DIVD	-0.0561	-0.0589*
	(-1.57)	(-1.68)
TANGIBLES	0.1389*	0.1236
	(1.85)	(1.62)
LOSS	-0.0004	0.0017
	(-0.02)	(0.10)
LABINT	-0.4133	-0.1038
	(-0.65)	(-0.15)
AB_INVEST	0.6095***	0.6013***
	(2.95)	(2.78)
SD_CFO	0.2488	0.1861
	(1.54)	(1.10)
SD_SALES	0.0105	0.0135
	(0.14)	(0.17)
SD_NETHIRE	0.0692	0.0620
	(1.17)	(1.01)
UNION	0.2516	0.6001
	(0.47)	(1.18)
INSTI	0.2380*	0.2603*
	(1.70)	(1.72)
FRQ	-0.0255	-0.0352
	(-0.22)	(-0.28)
Industry-by-Year Fixed Effect	Yes	Yes
N	402	382
Adj.R2	27.6%	26.5%

Appendix 4. Internal control weakness and abnormal net hiring: Entropy balancing approach.

To corroborate our results based on propensity-score-matched samples and ensure our results are not sensitive to the choice of a particular matching algorithm, in this section, we resort to entropy balancing, a more flexible matching technique that allows us to ensure the comparability between treated group and control group based on a vector of covariates without significantly compromising the sample size as in propensity score matching[3] (Chahine et al. 2020; Hainmueller 2012; Kim and Valentine 2021; King and Nielsen 2019; Wilde 2017). Specifically, following the prior studies (Chahine et al. 2020; Wilde 2017), we match firms with internal control weaknesses (*ICW*=1) (i.e., treated group) to firms without internal control weaknesses (*ICW*=0) (i.e., control group) based on all the control variables in our main regression along the first and second moments.

Panel A reports the descriptive statistics of treated and control groups and demonstrates the covariate balance between the treated group and control group, thus confirming the matching quality of our entropy-balanced sample. Panel B of Appendix 5 reports our regression results based on the entropy-balanced sample. Consistent with our results from both baseline regression and PSM analyses, we find that *ICW* is positively significant at the 1% level, lending further support to our main finding that firms suffering internal control weaknesses are less efficient in labor investment.

[3] We thank the anonymous reviewer for suggesting this test.

Appendix 4. Internal control weakness and abnormal net hiring: Entropy balancing approach.
This table reports regression results for the effect of internal control weakness on abnormal net hiring using an entropy balancing approach. Panel A reports the descriptive statistics of the control variables for the treatment group and control group after entropy balancing. Panel B reports the regression results on the relation between internal control weakness (*ICW*) and abnormal net hiring (*AB_NETHIRE*) based on the entropy balancing sample. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A of the paper.

Panel A: Comparability of covariates after entropy balancing

	Treatment Group			Control Group		
	Mean	Variance	Skewness	Mean	Variance	Skewness
MTB	2.1320	16.3000	3.6080	2.1320	16.2900	3.2250
SIZE	0.1753	0.0148	1.7000	0.1753	0.0148	2.2300
LIQ	1.8270	5.0890	4.3220	1.8270	5.0870	4.1680
LEV	0.1900	0.0608	3.1580	0.1900	0.0608	2.9890
DIVD	0.1111	0.0991	2.4750	0.1114	0.0991	2.4690
TANGIBLES	0.2019	0.0374	1.4500	0.2019	0.0374	1.5090
LOSS	0.5826	0.2439	-0.3349	0.5823	0.2433	-0.3339
LABINT	0.0088	0.0002	5.8270	0.0088	0.0002	7.1220
AB_INVEST	0.1054	0.0113	6.6040	0.1054	0.0114	6.9580
SD_CFO	0.1073	0.0110	3.6080	0.1073	0.0110	3.3700
SD_SALES	0.2242	0.0356	2.2950	0.2242	0.0356	2.1130
SD_NETHIRE	0.2575	0.0861	4.2000	0.2574	0.0861	3.4850
UNION	0.1043	0.0056	1.2440	0.1043	0.0056	1.2110
INSTI	0.1510	0.0247	1.6700	0.1510	0.0247	1.6210
FRQ	-0.1218	0.0210	-3.1780	-0.1218	0.0210	-3.0750

Panel B: Regression results based on the entropy balancing sample

	AB_NETHIRE
ICW	0.0369***
	(3.57)
Control	Yes
Industry-by-Year Fixed Effect	Yes
N	2,946
Adj.R2	31.5%

Appendix 5. The role of non-labour investments.

To further alleviate the concern regarding whether labour investment is merely a reflection of corporate non-labour investments[4], we also empirically demonstrate how our study is distinct from previous studies developed in the context of investments and that our results are not solely driven by non-labour investments.

Admittedly, internal control weaknesses can potentially influence labour investments via the impact on other non-labour investments. Thus, labour could merely be a complement to other non-labour investments and the influence of internal control weaknesses on labour investment efficiency can be driven by other non-labour investments. To mitigate this concern, our baseline regression model incorporates "Other abnormal non-labour investments (*AB_INVEST*)" as a control variable to control for the potential effect of other non-labour investments. In addition, we employ an additional test in the revised manuscript to further alleviate the concern that the influence of internal control weaknesses is purely driven by other contemporaneous non-labour investments.

In line with prior studies (Ben-Nasr & Alshwer, 2016; Jung et al., 2014), we investigate the influence of four different types of non-labour investments: capital expenditures, R&D expenditures, advertising expenditures, and acquisition expenditures. For each type of non-labour investment, we split our sample into three subsamples depending on the relationship between labour investment and each type of non-labour investment: 1) a positive relationship between labour and non-labour investments, POSITIVE (i.e., an increase (decrease) in labour investments is accompanied by an increase (decrease) in non-labour investments); 2) a negative relationship between labour and non-labour investments, NEGATIVE (i.e., an increase (decrease) in labour investments is accompanied with a decrease (increase) in non-labour investments), and 3) missing values for non-labour investments (ZERO OR MISSING). If the influence of internal control weakness on labour investment is purely driven by other non-labour investments or labour investment is merely a complement to other non-labour investments, then we would observe that the significant results are concentrated only in the subsamples with a positive relationship between labour and non-labour investments.

We report the results on the role of non-labour investment in Appendix 6. Our test for

[4] We thank the reviewer for raising this issue that inspires us to empirically test the role of non-labor investment.

non-labour investment shows that the estimated coefficients on internal control weaknesses (ICW) are generally positive and significant, not only for the subsamples with a positive relationship between labour and each non-labour investment (POSITIVE) but also for the subsamples with a negative relationship between labour and each non-labour investment (NEGATIVE) and the subsamples with missing values for non-labour investments (ZERO OR MISSING). Collectively, the above results suggest that labour investment is not merely a byproduct of other non-labour investments and the influence of internal control weaknesses on labour investment efficiency we documented earlier is not driven by non-labour investments.

Appendix 5. Role of non-labour investments.

This table reports regression results for the relationship between internal control and labour investment by taking into account the potential implications of non-labour investments: (1) capital expenditure; (2) research and development expenditure; (3) advertising expenditure and (4) acquisition expenditure. For each type of non-labour investment, we categorize our sample into three distinctive scenarios: a) POSITIVE, where an increase (decrease) in labour investments is accompanied by an increase (decrease) in non-labour investments; b) NEGATIVE, where an increase (decrease) in labour investments is accompanied with a decrease (increase) in non-labour investments; c) ZERO OR NOT REPORTED, where the corresponding non-labour expenditure is either zero or not reported. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A of the paper.

	(1) CAPITAL EXPENDITURES			**(2) RESEARCH & DEVELOPMENT EXPENDITURES**		
	POSITIVE	NEGATIVE	ZERO OR NOT REPORTED	POSITIVE	NEGATIVE	ZERO OR NOT REPORTED
	AB_NETHIRE	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*
ICW	0.0360**	0.0465**	-0.0126	0.0510***	0.0078**	0.1129***
	(2.09)	(2.07)	(-0.53)	(3.08)	(2.02)	(3.80)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,667	1,141	220	1,442	1,121	465
Adjusted R2	12.2%	11.1%	21.8%	8.9%	12.5%	26.1%
	(3) ADVERTISING EXPENDITURES			**(4) ACQUISITION EXPENDITURES**		
	POSITIVE	NEGATIVE	ZERO OR NOT REPORTED	POSITIVE	NEGATIVE	ZERO OR NOT REPORTED
	AB_NETHIRE	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*
ICW	0.0680***	0.0043*	0.0231	0.0138	0.0705**	0.0275**
	(3.13)	(1.77)	(1.14)	(0.39)	(2.03)	(2.31)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,345	1,321	252	504	323	2,201
Adjusted R2	8.9%	6.1%	14.1%	24.9%	35.3%	20.4%

Appendix 6. Alternative measures of labour investment efficiency.

To ensure the robustness of our results, we consider alternative proxies for abnormal net hiring. In line with Cella (2020), we adopt the median value of net hiring of each industry as the measure for optimal net hiring. Moreover, we also consider labour investment as a function of sales growth and use the absolute value of the residuals as the alternative abnormal net hiring proxy (Biddle et al. 2009). Third, we extend the model of Pinnuck and Lillis (2007) with extra control variables including GDP per capita, unionization level, and expenditures for acquisitions, R&D, and capital investment. Finally, we employ the Pinnuck and Lillis (2007) model with year and industry fixed effects. Appendix 7 shows that our results are robust to alternative labour investment efficiency measures.

Appendix 6. Alternative proxies for labour investment efficiency.

This table reports the results from regressing alternative proxies for abnormal net hiring on internal control weakness. The p-values in parentheses are based on robust standard errors clustered at the firm level. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A of the paper.

	Cella (2020)	Biddle (2009)	Extended P&L (2007) Model	P&L (2007) Model with Year and Industry FE
	AB_NETHIRE	*AB_NETHIRE*	*AB_NETHIRE*	*AB_NETHIRE*
ICW	0.0556***	0.0485***	0.0497***	0.0448***
	(3.86)	(3.51)	(3.32)	(3.28)
MTB	0.0022	0.0026	0.0032	0.0025
	(0.87)	(1.06)	(1.19)	(1.02)
SIZE	0.0275	0.0421	0.0138	0.0267
	(0.50)	(0.79)	(0.25)	(0.52)
LIQ	0.0027	0.0023	0.0060***	0.0056***
	(1.39)	(1.16)	(2.96)	(2.80)
LEV	-0.0191	-0.0089	-0.0128	0.0022
	(-0.66)	(-0.32)	(-0.45)	(0.08)
DIVD	-0.0034	-0.0040	-0.0032	-0.0051
	(-0.29)	(-0.35)	(-0.26)	(-0.47)
TANGIBLES	0.0309	0.0175	0.0147	-0.0014
	(1.07)	(0.61)	(0.47)	(-0.05)
LOSS	0.0311***	0.0289***	0.0289***	0.0312***
	(4.06)	(3.94)	(3.86)	(4.43)
LABINT	0.2107**	0.2467**	0.2566***	0.2698***
	(2.09)	(2.43)	(2.62)	(2.89)
AB_INVEST	0.1338**	0.1068*	0.1341**	0.1411***
	(2.41)	(1.85)	(2.37)	(2.78)
SD_CFO	0.0266	0.1511**	0.1440**	0.1336**
	(0.42)	(2.34)	(2.15)	(2.26)
SD_SALES	0.0388	-0.0205	-0.0050	-0.0128
	(1.44)	(-0.85)	(-0.19)	(-0.55)
SD_NETHIRE	0.1047***	0.1028***	0.1031***	0.0921***
	(4.16)	(4.56)	(4.10)	(4.16)
UNION	0.1538	0.0163	0.0958	0.0430
	(0.55)	(0.06)	(0.36)	(0.18)
INSTI	-0.0195	-0.0122	-0.0165	-0.0097
	(-0.70)	(-0.46)	(-0.63)	(-0.39)
FRQ	-0.0602	-0.1172***	-0.1676***	-0.1445***
	(-1.41)	(-2.58)	(-3.18)	(-2.99)
Industry-by-Year Fixed Effect	Yes	Yes	Yes	Yes
N	3,028	3,028	3,028	3,028
Adj.R2	6.8%	9.0%	10.8%	10.5%

Appendix 7. Adjustment for employing residuals as outcome variables and alternative fixed effects.

In this final section, we run a series of robustness tests by using alternative fixed effects and addressing the concern regarding the use of residuals as our dependent variable. Notably, we cluster standard errors at both firm and year levels across all the models to account for potential serial correlations within the firm as well as the year groups, as suggested by Petersen (2009).

Appendix 8 reports the results of our robustness tests. In Column 1, we replace industry-by-year fixed effects with both industry fixed effects and year fixed effects and find that *ICW* remains statistically significant at the 1% level. To alleviate the concern of omitted variable bias, we further include firm fixed effects to control for any unobservable time-invariant firm characteristic that may affect a firm's investment efficiency in labour. As presented in Column 2, our variable of interest, *ICW*, remains significant at the 5% level after including firm fixed effects as well as industry-by-year fixed effects in the regression.

Next, we alleviate the concern arising from adopting residuals as the outcome variable, since our outcome variable, abnormal net hiring, is the residual derived from Pinnuck and Lillis' (2007) model. Specifically, following the solution proposed in Chen et al. (2018), we regress abnormal net hiring on all the explanatory variables of the two-step regression procedure (i.e., regressors in both Model 1 and Model 2). In addition, we also incorporate all the extra first-step control variables in the extended model of Pinnuck and Lillis (2007) as discussed in Section 5.1. In Columns 3-5, we find that our key variable *ICW* is consistently positive and significant under different combinations of industry, year and firm fixed effects.

Overall, we find our main results still hold when we include various combinations of fixed effects, additional control variables, and address the concern regarding the use of residuals as dependent variables

Appendix 7. Adjustment of employing residuals as outcome variables and different fixed effects.
This table reports the results from regressing abnormal net hiring on internal control weakness and additional control variables under various fixed effects. Instead of employing a one-way cluster at the firm level, we estimate our model by using robust standard errors clustered at both firm and year levels across the models. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A of the paper.

	AB_ NETHIRE	*AB_ NETHIRE*	*AB_ NETHIRE*	*AB_ NETHIRE*	*AB_ NETHIRE*
ICW	0.0392***	0.0415**	0.0370**	0.0433***	0.0346**
	(3.17)	(2.46)	(2.94)	(3.56)	(2.30)
MTB	0.0025	0.0062*	0.0022	0.0022	0.0067**
	(1.16)	(2.13)	(1.07)	(1.00)	(2.59)
SIZE	0.0280	-0.0317	0.0190	0.0164	0.0604
	(0.57)	(-0.35)	(0.43)	(0.33)	(0.46)
LIQ	0.0053**	0.0027	0.0047**	0.0047**	0.0010
	(2.98)	(0.78)	(2.61)	(2.40)	(0.27)
LEV	-0.0144	0.0391	-0.0099	-0.0080	0.0786
	(-0.49)	(0.78)	(-0.39)	(-0.29)	(1.67)
DIVD	-0.0085	0.0408	0.0003	0.0023	0.0395
	(-0.70)	(1.76)	(0.03)	(0.19)	(1.62)
TANGIBLES	-0.0017	-0.1691**	0.0105	0.0124	-0.1613**
	(-0.06)	(-2.20)	(0.42)	(0.50)	(-2.26)
LOSS	0.0316***	0.0159	0.0185*	0.0216**	0.0140
	(5.58)	(1.66)	(2.10)	(2.42)	(1.30)
LABINT	0.2535	-2.1433***	0.2872	0.3051	0.3810
	(1.30)	(-3.89)	(1.45)	(1.47)	(0.21)
AB_INVEST	0.1673***	0.1805**	0.0980*	0.0997*	0.0680
	(3.57)	(2.34)	(2.12)	(2.13)	(1.01)
SD_CFO	0.1347***	0.0653	0.0839	0.0864	0.0767
	(3.57)	(0.53)	(1.36)	(1.47)	(0.58)
SD_SALES	-0.0087	-0.0473	-0.0018	-0.0087	-0.0330
	(-0.35)	(-1.03)	(-0.08)	(-0.34)	(-0.74)
SD_NETHIRE	0.0851***	-0.1822**	0.0857***	0.0911***	-0.1510*
	(4.54)	(-2.58)	(4.85)	(4.91)	(-1.95)
UNION	-0.1102	0.1430	-0.0968	0.0630	0.2497**
	(-1.44)	(0.88)	(-1.52)	(0.81)	(2.31)
INSTI	-0.0102	0.0207	-0.0134	-0.0137	-0.0205
	(-0.40)	(0.22)	(-0.61)	(-0.55)	(-0.24)
FRQ	-0.0930*	-0.0643	-0.0996*	-0.1043*	-0.1000**
	(-1.92)	(-1.48)	(-1.87)	(-1.99)	(-2.39)
SALESGROWTH			0.0791***	0.0841***	0.0691***
			(4.49)	(4.49)	(3.36)
SALESGROWTH_LAG			-0.0269*	-0.0258**	-0.0424**
			(-1.86)	(-2.25)	(-2.44)
ROA			-0.0643**	-0.0572**	-0.0743*

			(-2.69)	(-2.37)	(-1.90)
ΔROA			-0.0320	-0.0431	-0.0442
			(-0.97)	(-1.32)	(-1.16)
ΔROA_LAG			-0.0096	-0.0082	-0.0018
			(-0.48)	(-0.37)	(-0.07)
RETURN			0.0156***	0.0161***	0.0184**
			(4.02)	(3.67)	(2.95)
ΔLIQ			-0.0028	-0.0033	0.0029
			(-0.54)	(-0.52)	(0.53)
ΔLIQ_LAG			0.0010	-0.0002	0.0048
			(0.23)	(-0.03)	(0.59)
LOSSBIN1			0.0056	0.0154	0.0572
			(0.18)	(0.45)	(1.74)
LOSSBIN2			-0.0240	-0.0218	0.0088
			(-1.28)	(-1.07)	(0.37)
LOSSBIN3			-0.0294	-0.0455	-0.0393
			(-1.35)	(-1.63)	(-1.50)
LOSSBIN4			-0.0346**	-0.0398*	-0.0261
			(-2.30)	(-2.03)	(-1.01)
LOSSBIN5			-0.0233*	-0.0383**	-0.0156
			(-2.15)	(-2.35)	(-0.59)
GDP			-0.6325***	-0.6228**	-0.8364***
			(-3.28)	(-3.02)	(-3.46)
CAPX			-0.0003	-0.0003	0.0000
			(-1.30)	(-1.76)	(0.04)
R&D			0.0008*	0.0007	0.0088**
			(1.79)	(1.22)	(2.60)
AQC			0.0001***	0.0001***	0.0052***
			(16.38)	(15.81)	(4.76)
Firm Fixed Effect	No	Yes	No	No	Yes
Industry Fixed Effect	Yes	No	Yes	No	No
Year Fixed Effect	Yes	No	Yes	No	No
Industry-by-Year Fixed Effect	No	Yes	No	Yes	Yes
Firm and Year Cluster	Yes	Yes	Yes	Yes	Yes
N	3,028	3,028	3,028	3,028	3,028
Adj.R2	10.5%	25.2%	16.8%	16.8%	28.8%

Appendix 8. The role of the financial crisis.

Since our sample period of 2004-2016 covers the global financial crisis, one might be concerned that our results could somehow be confounded by the financial crisis or contaminated by the inclusion of observation during the years of the financial crisis. For example, it is possible that during the period of the financial crisis, more internal control weaknesses are revealed due to greater market scrutiny while due to adverse economic environment that firms are likely to have excessive labour that they cannot immediately dismiss, resulting in higher inefficiency (i.e., overinvestment) in labour investment during the financial crisis. Assuming this is the case, then the main finding we document could simply be spuriously driven by the financial crisis.

Hence, to eliminate the potential confounding effect due to the financial crisis[5] and ensure the robustness of our results, we repeat our main analysis by removing the observations during the financial crisis period of 2007-2009. Our untabulated results indicate that our variable of interest *ICW* remains highly significant at the 1% level, confirming that our main results are not driven by the occurrence of the financial crisis in 2007-09. Furthermore, we also directly test whether financial crisis plays any role in the relation between internal control weakness and labour investment effects by interacting our variable of interest *ICW* with *CRISIS,* an indicator variable equal to one if the fiscal year is during the 2007-2009 crisis period. In the untabulated analysis, we find that the interaction term *ICW * CRISIS* is insignificant, suggesting that financial crisis does not have any material influence on the relationship between internal control weakness and investment efficiency in labour. Overall, our analysis of the financial crisis not only confirms that our results are robust to the removal of observations during the financial crisis but also rules out the concern that our results may be confounded or at least partially influenced by the financial crisis.

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[5] We thank the anonymous reviewer for suggesting this test.

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