

Does economic policy uncertainty matter in labour investment efficiency? Evidence from China

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Abstract

Purpose – This study aims to examine the effect of economic policy uncertainty (EPU) on Chinese firms' labour investment inefficiency (ABIE).

Design/methodology/approach – The authors run regressions to test out hypothesis with several endogeneity and robustness checks.

Findings – The authors find a significant positive relationship between China EPU and a firm's ABIE, supporting the managerial entrenchment theory that suboptimal labour investment occurs when the economy is uncertain due to agency problems. Furthermore, the mechanism of the result is through a firm's underinvestment in labour. The mitigating effect suggests that state-owned enterprises and firms with political connections may suffer less labour investment inefficiency when EPU is high. Next, the results of firms' heterogeneities show that the impact of EPU on a firm's ABIE is only significant for firms with more financial constraints and weaker corporate governance. The authors also find that labour law protection can significantly reduce the negative effect of EPU on labour investment efficiency. Finally, the result remains significant after alleviating the endogeneity concerns and robustness tests.

Originality/value – The authors enrich the literature on labour investment efficiency. Most of the existing literature on labour investment efficiency focuses on the impact of micro-economic factors on labour investment efficiency. New evidence to support the conservative labour investment. The study enriches the literature in EPU.

Keywords Economic policy uncertainty, Labour investment inefficiency, Managerial entrenchment theory, China

Paper type Research paper

1. Introduction

It is, perhaps, a truism that any organisation's human capital or talent is its most important asset. Labour investment is argued to be of paramount importance for a firm to remain competitive and profitable (Becker, 1962). The feature of labour investment – some degree of irreversibility, further highlights the importance of labour investment decisions. A good labour investment decision could stabilise the firm's financial planning. This is because labour investment involves “incurring an immediate cost in the expectation of future



rewards” and is treated as a sunk cost that cannot be redeployed to other uses (McWilliams and Siegel, 2000). A few studies like Merz and Yashiv (2007) and Ghaly *et al.* (2015) find that efficient labour investment can increase a firm’s financial stability, and benefit to the firm’s future operating performance and shareholders’ wealth. Given the value-added effect of labour investment efficiency, prior literature document several determinants of labour investment efficiency, including stock price informativeness, quality account reporting, corporate governance and labour marketisation level (Ben-Nasr and Alshwer, 2016; Jung *et al.*, 2014; Ghaly *et al.*, 2015; Khedmati *et al.*, 2019; Yuan *et al.*, 2023). However, how macroeconomic factors influence labour investment efficiency remains largely unexplored. Therefore, we aim to fill the gap by investigating how economic policy uncertainty (EPU) affect labour investment efficiency.

It is expected that EPU creates economic uncertainty on a firm’s investment decisions since the uncertain operational environment posits challenges on investment timing and directions (Gulen and Ion, 2016; Wu *et al.*, 2020). This is of particular relevance for firm investment that is irreversible and aiming for long-term benefits. Chan *et al.* (2021) assert that the increases in government policy uncertainty could significantly negatively impact a firm’s employment and output, thus, shaking the firm’s financial stability. Firms should pay attention to policy uncertainty, especially when making long-term and irreversible investments, to ensure the firm’s financial stability. Therefore, we expect that uncertainty created by EPU can impact the optimality of labour investment (labelled as labour investment efficiency).

There are two competing arguments of how EPU affect labour investment efficiency. The market discipline theory argues that EPU increases firm operational risk with higher external financing costs and volatile cash flow (Lee *et al.*, 2017), which in turn, trigger discipline effect on managers to focus more on corporate investment efficiency (Pinnuck and Lillis, 2007; Vo and Le, 2017). However, the managerial entrenchment theory argues that suboptimal labour investment may occur owing to self-serving managerial interests. For example, economic uncertainty could distract the shareholder’s focus on managerial decisions on corporate investment, and, therefore, motivates the manager’s desire to engage in empire-building activities by overinvesting in labour, reducing the labour investment efficiency (Williamson, 1963). We are, therefore, motivated by the competing argument in the literature to examine the impact of EPU on labour investment efficiency.

We choose to examine the relation between EPU and labour investment efficiency in China, as this unique setting can first mitigate the endogenous nature of EPU and labour investment efficiency. The economic policy is most likely exogenous to firms in China because firms do not have a channel to lobby the government to implement a favourable economic policy. The 14th National Congress of the Communist Party of China held in 1992 set economic transition targets to separate government function from the enterprises. This indicates that enterprises owners and managers have little influence on policy-making. Such prohibition between policymakers and firms suppresses the influence from enterprises to economic policies and shapes EPU as exogenous shocks. Secondly, China is still transitioning with a relatively weak legal environment and law enforcement. In the Chinese labour market, independent unions are illegal, reducing collective bargaining power and employee rights. As such, firms have greater power over labour-related decisions.

Using a sample of Chinese listed firms from 2005 to 2023, we investigate the impact of EPU on a firm’s labour investment efficiency. Following Jung *et al.* (2014) and Ben-Nasr and Alshwer (2016), we use the absolute value of abnormal net hiring (ABLIE) as the proxy for labour investment inefficiency. We find a positive relationship between EPU and ABLIE, which indicates that a high EPU reduces the firm’s labour investment efficiency. This is

consistent with the managerial entrenchment theory that suboptimal labour investment occurs when the economy is uncertain due to agency problems. Moreover, we find the effect is more pronounced in firms under-hire employees. This strengthens the argument that firms implement conservative strategy in labour investment during high uncertainty period of economics and policy.

While it is unlikely that firm-level decisions can affect EPU, endogeneity concerns may still exist, such as omitted variables and measurement errors. We use three methods to mitigate the endogeneity issues. Firstly, we use high-profile corruption cases of the local governors and President Xi's election to conduct an instrumental variable test. Secondly, we use a high dimensional fixed effect to control time-invariant firm-specific characteristics correlated with omitted explanatory variables. Thirdly, we follow [Gulen and Ion's \(2016\)](#) method to extract the component of the China EPU index orthogonal to the US EPU index and rerun the baseline regression to mitigate measurement errors. Our main results remain robust after addressing potential endogeneity issues.

Moreover, we find that the negative relationship between EPU and labour investment efficiency is mainly driven by underinvestment in labour. Next, the mitigating effect also works in firms with greater government influence, such as state-owned enterprises (SOEs) and firms with political connections. The results indicate that firms with greater government influence may suffer fewer operational challenges caused by EPU; thus, its labour investment is less inefficient. Furthermore, the firm's heterogeneity analysis further shows that firms with more financial constraints and weaker corporate governance are more likely to experience managerial entrenchment on suboptimal labour investment when EPU is high.

Finally, we find that labour law protection can significantly reduce the negative effect of EPU on labour investment efficiency by using the enactment of updated labour contract law in China in 2008 as an exogenous shock. This indicates that labour law enforcement strengthens the employment process, which in turn mitigate the adverse effect of EPU on labour investment efficiency.

We make three contributions to the literature. Firstly, we enrich the literature on labour investment efficiency. Most of the existing literature on labour investment efficiency focuses on the impact of micro-economic factors on labour investment efficiency. For example, labour investment is less efficient when the firm has weak corporate governance ([Khedmati et al., 2019](#); [Cohen et al., 2008](#)) and poor accounting information quality ([Jung et al., 2014](#)). We focus on EPU, a crucial macroeconomic factor, and find evidence that firms are more prone to have inefficient labour investment when economic policy is uncertain.

Secondly, we provide new evidence to support the conservative labour investment. That is, when EPU is high, the agency problem can be evoked to prioritise cost-saving rather than long-term productivity maximisation ([Hall, 2016](#); [Prabowo, Hooghiemstra and Veen-Dirks, 2018](#); [Yuan et al., 2023](#)), such as under-investment in labour. Tremendous studies document the adverse impact of conservative investment behaviors on firm valuation and performance ([La Porta et al., 1999](#); [Claessens et al., 2000](#); [Faccio and Lang, 2002](#); [Dyck and Zingales, 2004](#)). It is of high importance to identify the drivers that motivate such practices. Prior literature reveals that concentrated ownership structure and weak corporate governance are the main determinants of agency problems ([John and Senbet, 1998](#); [La Porta et al., 1999](#); [Chae et al., 2009](#); [Denis et al., 2012](#)). Our study adds a new driver in the context of EPU.

Thirdly, our study enriches the literature in EPU. Previous studies mainly focus on the effect of EPU on corporate financial policies and investment ([D'Mello and Toscano, 2020](#); [Goodell et al., 2021](#); [Guedhami et al., 2021](#); [Paudyal et al., 2021](#)). A high EPU reduces the financial stabilities for both firms and investors. For example, [Paudyal et al. \(2021\)](#) find that an increased EPU lower the numbers of inbound cross-border mergers and acquisitions, and,

thus, causes a significant financial instability for firms and investors. We extend the field by investigating whether EPU has a significant impact on labour investment efficiency, another dimension of corporate investment related to employees, an essential type of stakeholder.

The rest of the paper is organised as follows: Section 2 reviews key literature and develops research hypotheses. Section 3 describes the sample and variables in this study. Section 4 presents and discusses the empirical results. Section 5 concludes the paper.

2. Literature review and hypothesis development

2.1 Labour investment efficiency

Labour investment efficiency captures a lot of attention from recent literature. Unlike capital investment, labour investment is an output of firms' operating cash flows, neither debt nor equity financing (Taylor *et al.*, 2019). The inefficient labour investment may result in poor operating profitability and hence becomes a concern for the firm's sustainability in the long run (Cameron *et al.*, 1991; Cameron, 1994).

The literature documents a battery of micro-economic factors to impact labour investment efficiency. For example, weakened corporate information transparency (Jung *et al.*, 2014; Jiang *et al.*, 2022) and corporate governance (Khedmati *et al.*, 2019) may decrease labour investment efficiency. More specifically, the decreased information transparency causes moral hazard problems, leading to inefficient investment in labour as managers may act in their own manners and avoid investing in profitable investment (Jensen, 1986; Taylor *et al.*, 2019). Moreover, the CEO-director tie, defined as the same network between CEOs and independent directors, may induce independent directors to be reluctant to monitor or challenge CEOs' decision-makings (Cohen *et al.*, 2008), resulting in suboptimal investment behaviour such as managers empire-building (Fracassi and Tate, 2012; Khedmati *et al.*, 2019). Apart from accounting information quality and corporate governance, stock price informativeness (Ben-Nasr and Alshwer, 2016), accounting conservatism (Ha and Feng, 2018), promotion incentives of local politicians (Kong *et al.*, 2018), labour-friendly treatment (Cao and Rees, 2020), institutional investors' horizons (Ghaly *et al.*, 2020) and short selling (Ding *et al.*, 2021) could influent labour investment efficiency significantly. However, few studies examine how macroeconomic factors influence a firm's labour investment efficiency in the literature. Our study is filling in the gap to investigate the influence of EPU on a firm's labour investment efficiency.

2.2 Economic policy uncertainty

EPU refers to the risk arising from uncertain changes in politics, monetary and fiscal policies (Baker *et al.*, 2016). Several pieces of literature document the impact of EPU on capital markets and individual firms.

A number of studies document the impact of EPU on firm investment behaviours. Zhang *et al.* (2015) and Gulen and Ion (2016) document a significant negative relationship between a firm's capital expenditure and the level of EPU. Gulen and Ion (2016) further suggest that firms with a high degree of investment irreversibility or heavy reliance on government spending will be susceptible to policy changes. This finding is consistent with Bernanke (1983), which states that the increased uncertainty heights the cost of undertaking projects and, therefore, firms tend to delay investment and hiring. Facing the deteriorating financial environment, firms' future cash flows will be more volatile, resulting in higher external financing costs (Chan *et al.*, 2021). This uncertainty of financing results in firms having a lower leverage ratio (Lee *et al.*, 2017), more cash holdings (Goodell *et al.*, 2021) and decreased trade credit (D'Mello and Toscano, 2020; Jory *et al.*, 2020). According to Bloom *et al.* (2007), EPU can also depress economic growth by decreasing corporate investment

because firms tend to be more conservative in making investment decisions (Julio and Yook, 2012). The decrease in corporate investment includes exporting investment (Handley and Limao, 2015), the sensitivity of investment to the cost of capital (Drobetz *et al.*, 2018), foreign investment (Wu *et al.*, 2020), M&A activities (Nguyen and Phan, 2017; Sha *et al.*, 2020) and corporate innovation (Bhattacharya *et al.*, 2017; Narayan *et al.*, 2017; Xu, 2020).

2.3 Hypothesis development

Compared to other types of corporate investment, labour investment is less cost sticky. That is, labour investment can be flexible and easily adjusted to incorporate different cycles of the business stage in the context of macroeconomic and firm-specific operating conditions. Moreover, labour investment is not homogenous. It involved bilateral selection between managers and job applications (Luo *et al.*, 2020). In a nutshell, economic uncertainty, such as government officials turnover and economic downturn, plays a significant role in labour investment. It affects the cost of labour at the firm-specific level and labour supply and demand at the socio-economic level.

It is expected that EPU plays an important role in determining labour investment efficiency, but the effect can be twofold. According to managerial entrenchment theory, agency problems would be evoked during EPU. Firstly, the theory posits that firm performance will be heavily driven by market conditions in a high uncertainty period, which weakens the shareholders' expectations of managers' performance. As such, shareholders leave more room for managers in relation to the firm operation. Secondly, Nagar *et al.* (2019) find that EPU decreases the quality of firms' information environments. Such information asymmetry incentivises managers to conduct value deteriorated activities, such as building business empires through excessive employment during uncertainty. As discussed above, the agency problem is one of the critical determinants for labour investment efficiency. Therefore, it is expected that EPU adversely affects labour investment efficiency.

Furthermore, the depressed economic growth resulting from EPU is associated with lower investment levels (Bloom *et al.*, 2007). This would include conservative investment in labour, such as over firing or under hiring, which leads to labour investment inefficiency. Based on the analysis above, we propose the following hypotheses:

H1a. There is a significantly negative relationship between a firm's labour investment efficiency and EPU in China.

In contrast, under the market discipline hypothesis, it is argued that during a high EPU period, firms face more significant operating challenges with the increasing cost of capital and volatile market returns (Baker *et al.*, 2016). This could lead firms to adopt a more focused and disciplined approach to create alpha during uncertainty. Accordingly, firms use their resources efficiently and, therefore, labour investment efficiency improves (Pinnuck and Lillis, 2007; Vo and Le, 2017). In addition, this market discipline theory also applies to agency problems. During a high EPU period, firms' cost management strategy may extend to managers' compensation, increasing the sensitivity between manager compensation and performance (Luo *et al.*, 2020). To avoid losing jobs, managers may be more disciplined, and in turn, the interest divergence between managers and shareholders will be reduced. Thus, EPU may drive managers to invest more efficiently in labour:

H1b. There is a significantly positive relationship between a firm's labour investment efficiency and EPU in China.

3. Sample and variables construction

3.1 Sample

We retrieve the data of all listed A shares from the China Securities Market and Accounting Research (CSMAR) database, including firms' financial information (e.g. total sales, return on assets (ROA), marketisation, quick ratio, leverage ratio, dividend payout ratio, total asset, total tangible asset and total operating cash flow), ownership information (e.g. the largest shareholding and state ownership), corporate governance (e.g. the number of employees) and director information (e.g. the number of independent directors and CEO duality). We exclude financial firms and firms with a missing value in a particular year. The sample period covers from 2005 to 2023. To mitigate the influence of outliers, we winsorise all continuous variables at the 1st and the 99th percentiles. Our final sample consists of 34,177 firm-year observations with 3,385 individual firms.

3.2 The measure of inefficient labour investment

Following Jung *et al.* (2014), Ben-Nasr and Alshwer (2016) and Luo *et al.* (2020), we calculate a firm's inefficient labour investment by regressing *net_hiring* (the percentage change in the number of employees) over a set of firm economic variables [see equation (1)]:

$$\begin{aligned} net_hire_{it} = & \beta_0 + \beta_1 sales_growth_{it-1} + \beta_2 sales_growth_{it} + \beta_3 \Delta roa_{it} + \beta_4 \Delta roa_{it-1} + \beta_5 roa_{it} \\ & + \beta_6 return_{it} + \beta_7 firm_size_{it-1} + \beta_8 quick_ratio_{it-1} + \beta_9 \Delta quick_ratio_{it-1} \\ & + \beta_{10} \Delta quick_ratio_{it} + \beta_{11} leverage_{it-1} + \beta_{12} AUR_{it-1} + \beta_{13} loss_dum1_{it-1} \\ & + \beta_{14} loss_dum2_{it-1} + \beta_{15} loss_dum3_{it-1} + \beta_{16} loss_dum4_{it-1} + \beta_{17} loss_dum5_{it-1} \\ & + IndustryFE + \varepsilon_{it} \end{aligned} \quad (1)$$

where *sales_growth* is the percentage change in sales; *roa* is the net income over total assets; *return* is annual stock return; *firm_size* is the natural logarithm of total assets; *quick_ratio* is the sum of cash, short-term investment and receivables over current liabilities; *leverage* total liability over total assets; *AUR* is the ratio of sales over total assets; and *loss_dums* are five indicators representing each interval of *roa* in the previous year of length 0.005 from 0 to -0.025. For example, *loss_dum1* equals one if *roa* in the previous year is between -0.005 and 0; otherwise is zero, and *loss_dum2* equals one if *roa* in the previous year is between -0.010 and -0.005, otherwise is zero. We also include industry fixed effects (*IndustryFE*) in the regression.

The regression results are presented in Appendix 1. We then extract the residual from the regression and define it as abnormal net hiring. The absolute value of abnormal net hiring (*ABLIE*) is the proxy for inefficient labour investment. Therefore, a high value of abnormal net hiring (*ABLIE*) indicates a firm with more inefficient labour investment.

3.3 Measure of economic policy uncertainty

We adopt the China EPU index generated by Baker *et al.* (2016) as our primary independent variable. The index is based on the number of articles on EPU and published in a leading English newspaper, namely, *South China Morning Post* (SCMP). To identify the articles related to EPU in China, Baker *et al.* (2016) first count in all the articles that obtain at least one keyword from the lexicons relevant to EPU in China, such as *economy*, *uncertainty*, *policy*, *political*, *reform* and *China*. Next, Baker *et al.* (2016) scale the selected articles by the total number of articles published in SCMP in the same month to construct the Chinese EPU

index. In comparison with other measures of EPU [1], Baker *et al.*'s (2016) index captures the comprehensive policy uncertainty in the economy and is widely used in previous studies (e.g. Gulen and Ion, 2016; D'Mello and Toscano, 2020; Wu *et al.*, 2020). Given that the index is reported monthly, we create an annual index by scaling the EPU index with mean, median and geometric mean values (Wu *et al.*, 2020).

3.4 Descriptive statistics

Table 1 reports the descriptive statistics of the variables used in the baseline regression. Firstly, the mean of the ABLIE is 0.3298 with a standard deviation of 0.4774, indicating the sample contains a large scale of ABLIE. Secondly, the EPU measures $EPU_{mean_{t-1}}$, $EPU_{median_{t-1}}$ and $EPU_{gmean_{t-1}}$ have the mean values of 5.7565, 5.7125 and 5.7005, respectively. Next, the average firm size is 22.3709, about 5,194m RMB. The sample firm achieved 2.6% of ROA on average during the testing period. The average leverage ratio for the sample firms is about 47%, and 23% of total assets are tangible assets. Nearly 63% of sample firms paid dividends over the sample period. Moreover, Table 1 also shows the ownership information for the sample firms. For example, 46% of sample firms are SOE, and the largest shareholder holds 33% of the total share outstanding on average. The average board has nine members, and 37% are independent directors. About 21% of CEOs for the

Table 1 Statistics summary

Sample market	A-share listed in the Chinese SSE and SZSE							
Sampel stocks	3,385 stocks (Excluding *ST, ST and PT stocks, financial stocks)							
Sample period	2005 ~ 2023							
	Obs.	Mean	Std.	Min.	25%	Median	75%	Max.
ABLIE	34,177	0.3298	0.4774	0.0045	0.1103	0.2229	0.3746	3.8892
EPU_mean	34,177	5.7565	0.7897	4.1744	5.1397	5.8994	6.4616	6.6746
EPU_median	34,177	5.7125	0.8304	4.1352	4.9416	5.7621	6.5582	6.6280
EPU_gmean	34,177	5.7005	0.8134	4.0909	4.8846	5.8496	6.4372	6.6584
Leverage	34,177	0.4734	0.2011	0.0693	0.3212	0.4765	0.6239	0.9169
Firm size (log)	34,177	22.3709	1.3294	19.5486	21.4710	22.2245	23.1421	26.3553
roa	34,177	0.0261	0.0651	-0.2769	0.0080	0.0277	0.0550	0.1917
top1	34,177	0.3328	0.1498	0.0810	0.2159	0.3058	0.4340	0.7382
Labor_intensity	34,177	0.3456	0.0474	0.1974	0.3188	0.3498	0.3775	0.4460
indep	34,177	0.3738	0.0541	0.3000	0.3333	0.3333	0.4286	0.5714
Bsize (log)	34,177	2.1425	0.2037	1.6094	1.9459	2.1972	2.1972	2.7081
tangible	34,177	0.2308	0.1722	0.0015	0.0940	0.1955	0.3338	0.7207
Std._cfo	34,177	5.0669	4.3989	0.0000	0.5381	7.4775	9.2249	11.6776
Std._sales	34,177	0.3351	0.2885	0.0444	0.1598	0.2533	0.4020	1.7700
Std._net_hire	34,177	0.4315	1.2592	0.0135	0.0711	0.1370	0.2901	10.4227
Other_invest	34,177	0.0350	0.0301	0.0007	0.0159	0.0302	0.0428	0.1810
div	34,177	0.6286	0.4832	0.0000	0.0000	1.0000	1.0000	1.0000
soe	34,177	0.4625	0.4986	0.0000	0.0000	0.0000	1.0000	1.0000
duality	34,177	0.2129	0.4094	0.0000	0.0000	0.0000	0.0000	1.0000
GDP_growth	34,177	0.0980	0.0547	0.0022	0.0572	0.0907	0.1280	0.2434
M2 Supply	34,177	32.5958	0.6249	31.0281	32.2100	32.7531	33.1045	33.3087
Inflation	34,177	-0.0021	0.0182	-0.0650	-0.0108	-0.0020	0.0069	0.0455

Note(s): Table 1 shows the summary statistics of variables used in the regression estimated by the full sample consists of firm-year observations. Variable definitions are provided in Appendix 2, and correlation matrix is provided in Appendix 3

Source(s): Authors' own work

sample firms are also the chairperson in the firm. Finally, [Table 1](#) also shows the macroeconomic variables used in the current study.

4. Empirical test and results

4.1 Baseline regression model

To investigate the relation between EPU and labour investment efficiency, we apply the following model:

$$\begin{aligned}
 ABLIE_{it} = & \beta_0 + \beta_1 EPU_{it-1} + \beta_2 leverage_{it-1} + \beta_3 firm_size_{it-1} + \beta_4 roa_{it-1} + \beta_5 top1_{it-1} \\
 & + \beta_6 labor_intensity_{it-1} + \beta_7 indep_{it-1} + \beta_8 bsize_{it-1} + \beta_9 tangible_{it-1} \\
 & + \beta_{10} Std_cfo_{it-1} + \beta_{11} Std_sales_{it-1} + \beta_{12} Std_net_hire_{it-1} + \beta_{13} other_invest_{it} \\
 & + \beta_{14} div_{it-1} + \beta_{15} soe_{it-1} + \beta_{16} duality_{it-1} + \beta_{17} GDP_growth_{it-1} + \beta_{18} M2_{it-1} \\
 & + \beta_{19} inflation_{it-1} + IndustryFE + ProvinceFE + \varepsilon_{it}
 \end{aligned} \tag{2}$$

where *ABLIE* is the proxy of inefficient labour investment extracted from [equation \(1\)](#). *EPU* represents the mean, median and geometric mean value of the EPU index measured by [Baker et al. \(2016\)](#). We control for firm characteristics and economic variables following [Jung et al. \(2014\)](#), [Ben-Nasr and Alshwer \(2016\)](#) and [Luo et al. \(2020\)](#). All variables have been introduced in sub-section 3.1 and defined in [Appendix 2](#). The equation is fixed at the industry and province-level with standard errors clustered by firm.

Firstly, [Table 2](#) shows that the coefficient of *EPU_mean* is 0.0228 and statistically significant at the 1% level. Also, both coefficients of *EPU_median* and *EPU_gmean* are positive and significant at the 1% level, which is 0.0167 and 0.0232, respectively. The results indicate that Chinese firms' labour investment is less efficient with increased EPU. For example, Column (1) shows that a one standard deviation increase in EPU is associated with an approximately 0.31% increase in inefficiency labour investment [\[2\]](#). This finding supports *H1a* that EPU hurts a firm's labour investment efficiency. Our results are consistent with the managerial entrenchment theory. Secondly, [Table 2](#) observes significant negative coefficients of ROA, suggesting that firms with low profitability have a highly inefficient labour investment ([Khedmati et al., 2019](#); [Cao and Rees, 2020](#)). Also, firms paying fewer dividends are likely inefficient in investing in labour capital because a high investment in labour capital will reduce a firm's dividends distribution ability ([Ben-Nasr and Alshwer, 2016](#)). There is a significant negative relationship between a firm's labour intensity and inefficient labour investment, meeting our expectations. Moreover, we also observed a negative correlation between a firm's inefficient labour investment and the growth of money supply from central bank, but results are only significant in Columns (1) and (3). Thirdly, [Table 2](#) shows significant positive relationships between a firm's characteristics and inefficient labour investment, including *top1* and *Std_sale*. This suggests that firms with concentrated shareholders are more likely to overinvest in the labour capital. Moreover, results in [Table 2](#) also show that the coefficients of other investment are significantly positive, suggesting that high proportion of non-labour investment may result in less hiring in labour. Finally, [Table 2](#) does not show any significant coefficients between a firm's inefficient labour investment and board characteristics controls, indicating that board monitoring does not play a vital role in labour investment efficiency.

Table 2. Baseline results

	(1)	(2)	(3)
		ABLIE	
<i>EPU_mean</i>	0.0228*** (3.75)		
<i>EPU_median</i>		0.0167*** (3.02)	
<i>EPU_gmean</i>			0.0232*** (4.00)
<i>leverage</i>	-0.3110*** (-22.62)	-0.3113*** (-22.65)	-0.3109*** (-22.61)
<i>Firm size</i>	0.0624*** (24.86)	0.0625*** (24.90)	0.0624*** (24.85)
<i>roa</i>	-0.3038*** (-7.66)	-0.3052*** (-7.69)	-0.3034*** (-7.65)
<i>top1</i>	0.0409** (2.55)	0.0407** (2.54)	0.0409** (2.55)
<i>Labor_intensity</i>	-0.2663*** (-4.21)	-0.2671*** (-4.22)	-0.2661*** (-4.20)
<i>indep</i>	0.0022 (0.05)	0.0018 (0.04)	0.0023 (0.05)
<i>bsize</i>	-0.0122 (-0.92)	-0.0124 (-0.93)	-0.0122 (-0.92)
<i>tangible</i>	-0.0152 (-0.90)	-0.0153 (-0.91)	-0.0151 (-0.90)
<i>Std_cfo</i>	0.0006 (1.10)	0.0006 (1.05)	0.0006 (1.12)
<i>Std_sales</i>	0.1173*** (13.97)	0.1176*** (14.00)	0.1173*** (13.96)
<i>Std_net_hire</i>	0.0834*** (45.63)	0.0833*** (45.55)	0.0834*** (45.64)
<i>Other_invest</i>	0.1842** (2.56)	0.1858*** (2.58)	0.1840** (2.55)
<i>div</i>	-0.0513*** (-9.55)	-0.0515*** (-9.58)	-0.0512*** (-9.54)
<i>soe</i>	0.0017 (0.33)	0.0017 (0.32)	0.0017 (0.33)
<i>duality</i>	-0.0076 (-1.41)	-0.0077 (-1.42)	-0.0076 (-1.41)
<i>GDP_growth</i>	0.0643 (1.10)	0.0619 (1.06)	0.0654 (1.12)
<i>M2</i>	-0.0145* (-1.73)	-0.0094 (-1.15)	-0.0159* (-1.93)
<i>inflation</i>	0.0332 (0.27)	0.0406 (0.33)	0.031 (0.25)
<i>Cons.</i>	0.8324*** (3.21)	0.7039*** (2.74)	0.8776*** (3.42)
Province FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Obs.	34,177	34,177	34,177
Adj.R ²	0.3454	0.3454	0.3454

Note(s): Table 2 presents the baseline results. The dependent variable is ABLIE and the test variables are EPU_mean, EPU_median and EPU_gmean, respectively. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by industry and province and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

4.2 Endogeneity concerns

Although the one-year lag approach in the regression can potentially reduce the endogeneity bias, we still acknowledge the potential existence of endogeneity between EPU and labour investment efficiency. This means the estimates in the baseline regression may be biased, suffering from reverse causality, omitted variables or unobservable heterogeneity. Therefore, we adopt three methods to address potential endogeneity concerns.

4.2.1 Two-stage least squares test. Firstly, we use the two-stage least squares (2SLS) method using two instrument variables (IV) to mitigate potential endogeneity problems, such as reverse causality and omitted variables.

Literature documents that the anti-corruption campaign initiated by President Xi can create short- and long-term impacts on firm policy uncertainty (Chen *et al.*, 2018; Xie *et al.*, 2019). We identify high-profile corruption cases of the local governors as a potential shock that increase economic policy uncertainties in the local province. We expect that high-profile corruption cases of the local governors and EPU are highly correlated. Thus, we adopt the variable *corruption* as the first IV, which is the number of corruption cases for firms

headquarters’ high-profile provincial bureaucrats were announced in the observation year, otherwise is zero.

Prior work suggests that political elections and EPU are highly correlated (Julio and Yook, 2012; Bhattacharya *et al.*, 2017). The only nationwide political election covered in our sample period was the 18th National Congress of the Communist Party of China of 2012 when the China Communist Party selected a new general secretary – President Xi Jinping. As such, we apply a dummy variable of the *election*, which equals one if the observation year is over 2012, otherwise 0, to denote the election year as the second IV in a 2SLS regression.

Table 3 presents the 2SLS regression results. The first-stage results show a significant positive relationship between our I.V.s and *EPU_mean* at the 1% level. In addition, the value of *F*-test is over 10 and significant, conducting that our instrumental variables are valid and not weak. The second stage results show that the relationship between *EPU_mean* and *ABLIE* remains significantly positive. The result suggests that our main finding that EPU exacerbates labour investment efficiency remains consistent after accounting for the endogenous biases [3].

4.2.2 *Firm fixed effect.* We exploit the panel dimension of our data set to control for time-invariant firm-specific characteristics that may be correlated with omitted explanatory variables. Following Chen *et al.* (2018), we run regressions with the firm fixed effect. The inclusion of firm fixed effects in the regression model addresses the cross-sectional correlation between EPU and ABLIE.

Table 4 reports the results. The coefficients of the *EPU_mean*, *EPU_median* and *EPU_gmean* are all positively and significantly associated with *ABLIE* at the 1% level, indicating that EPU has a reverse effect on a firm’s labour investment efficiency. This is consistent with our baseline regression results and further supports our argument that EPU evokes a firm’s agency problems.

4.2.3 *Elimination of measurement errors.* We further examine whether other economic uncertainty sources may affect policy-driven uncertainty in China. Gulen and Ion (2016) and

Table 3. Endogeneity test I: two-stage least squares test

	<i>EPU_mean</i> (First stage)	<i>ABLIE</i> (Second stage)
<i>Est. EPU_mean</i>		0.0197*** (3.61)
<i>election</i>	1.4036*** (171.31)	
<i>corruption</i>	−0.0020*** (−84.05)	
<i>Cons.</i>	5.8102*** (102.89)	0.3629*** (5.17)
Controls	Yes	Yes
Province FE	Yes	Yes
Industry FE	Yes	Yes
F-statistic	2620.12	
<i>p</i> -value	(0.00)	
Obs.	34,177	34,177
Adj. <i>R</i> ²	0.7655	0.3454

Note(s): Table 3 presents the results of IV test. The instrumental variable (IV), the new election is defined as the dummy variable which takes value of 1 for years over 2012, otherwise 0; the corruption is defined as the number of serious corruption cases each year. The dependent variable is ABLIE and the test variables are *EPU_mean*. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by industry and province and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors’ own work

Table 4. Endogeneity test II: Firm fixed effect

	ABLIE		
	(1)	(2)	(3)
<i>EPU_mean</i>	0.0205*** (3.20)		
<i>EPU_median</i>		0.0152*** (2.61)	
<i>EPU_gmean</i>			0.0212*** (3.49)
<i>leverage</i>	-0.2317*** (-10.74)	-0.2325*** (-10.78)	-0.2314*** (-10.73)
<i>Firm size</i>	0.0346*** (6.83)	0.0349*** (6.89)	0.0345*** (6.80)
<i>roa</i>	-0.1565*** (-3.43)	-0.1580*** (-3.47)	-0.1559*** (-3.42)
<i>top1</i>	0.1170*** (3.55)	0.1162*** (3.53)	0.1175*** (3.57)
<i>Labor_intensity</i>	0.1745 (1.54)	0.1731 (1.52)	0.1753 (1.54)
<i>indep</i>	-0.1610*** (-2.35)	-0.1613** (-2.35)	-0.1607** (-2.34)
<i>bsize</i>	-0.0254 (-1.15)	-0.0256 (-1.16)	-0.0253 (-1.14)
<i>tangible</i>	-0.0409 (-1.49)	-0.0412 (-1.50)	-0.0408 (-1.49)
<i>Std_cfo</i>	0.0015** (2.03)	0.0014** (1.99)	0.0015** (2.06)
<i>Std_sales</i>	0.1040*** (10.01)	0.1043*** (10.03)	0.1040*** (10.00)
<i>Std_net_hire</i>	0.0785*** (34.64)	0.0784*** (34.59)	0.0785*** (34.66)
<i>Other_invest</i>	0.1143 (1.39)	0.1151 (1.39)	0.1139 (1.38)
<i>div</i>	-0.0336*** (-5.09)	-0.0339*** (-5.11)	-0.0335*** (-5.06)
<i>soe</i>	-0.007 (-0.91)	-0.0071 (-0.91)	-0.007 (-0.90)
<i>duality</i>	0.0691 (1.15)	0.0646 (1.08)	0.0716 (1.19)
<i>GDP_growth</i>	0.0076 (0.80)	0.0119 (1.28)	0.0062 (0.66)
<i>M2</i>	0.0262 (0.21)	0.0334 (0.26)	0.0263 (0.21)
<i>Cons.</i>	0.0114 (0.05)	-0.0934 (-0.40)	0.0539 (0.23)
<i>Firm FE</i>	Yes	Yes	Yes
<i>Obs.</i>	34,177	34,177	34,177
<i>Adj.R²</i>	0.0934	0.0935	0.0933

Note(s): Table 4 presents the results with firm fixed effects. Firm-level fixed effect is to control for time-invariant firm-specific characteristics that may be correlated with omitted explanatory variables. The dependent variable is ABLIE and the test variables are *EPU_mean*, *EPU_median* and *EPU_gmean*, respectively. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

Wu *et al.* (2020) argue that the EPU index may only capture economic uncertainty but not policy uncertainty, affecting corporate investments. To mitigate such potential measurement error biases, we resort to Gulen and Ion's (2016) method by extracting the component of the China EPU index orthogonal to the EPU index in other countries, such as the USA, Australia and UK, by running the following annual time-series regression, respectively:

$$\begin{aligned}
 EPUmean_{t-1} = & \beta_0 + \beta_1 EPU \text{ Other countries}mean_{t-1} + \gamma X_{t-1} + IndustryFE \\
 & + ProvincialFE + \varepsilon_{it}
 \end{aligned}
 \quad (3)$$

where *EPU Other countries* $mean_{t-1}$ proxies the natural logarithm of the annual mean value of EPU index in the USA, Australia (AUS) or the UK, respectively; X_{t-1} represents a set of control variables used in equation (2). We then use the residual term ε_{it} to present a pure measure of Chinese EPU and reperform equation (2) to examine the relationship between EPU and labour investment efficiency.

Table 5 reports the results. Results in Columns (1), (3) and (5) show a significantly positive relationship between China EPU and EPU in other countries, including the USA, Australia and UK, respectively. Furthermore, results in Columns (2), (4) and (6) show that the residual EPU – a pure measure of Chinese EPU, remains positive and significant after alleviating measurement error bias.

4.3 Overinvestment versus underinvestment

Given that labour investment inefficiency is categorised into overinvestment (the actual labour investment is higher than estimated) and underinvestment (the actual labour investment is lower than estimated), we further examine the impact of EPU on labour investment efficiency by separating the ABLIE between overinvestment and underinvestment. We define over/under investment as a dummy variable equals 1 if the firm-year observation is over/under investment, otherwise 0. We then interact the dummy variable with our EPU measures. The results are reported in Table 6. Given the results for scaled EPU are pretty similar, we only report the result of EPU scaled by the mean value. The coefficient for *EPU_mean* is only positive and significant at the 1% level in underinvesting firms, and negative and significant at the 1% level in overinvesting firms. This suggests that EPU reduces firms' labour investment efficiency by underinvesting in labour, which is consistent with our hypothesis that firms implement conservative strategy in labour investment during high uncertainty period of economics and policy.

4.4 The government intervention

This section tests how government intervention impacts the relationship between EPU and a firm's labour investment efficiency, which is proxied by SOEs and political connections. China has a unique institutional background as the government plays a dominant role in corporate investment and financing (Pan and Tian, 2017).

Firstly, compared to non-SOEs, SOEs receive additional subsidies and are protected by the government from competition with their rivals (Faccio *et al.*, 2006; Khwaja and Mian, 2005). Therefore, SOEs may observe up-to-date policy changes immediately and respond efficiently to economic policy changes, which may help them alleviate the negative effect of EPU on their labour investment efficiency. Consequently, we would expect that non-SOEs are more sensitive to EPU in terms of labour investment efficiency than SOEs. We perform our baseline regression for SOEs and non-SOEs separately, and the results are reported in Panel A of Table 7. Panel A of Table 9 shows that the coefficient of *EPU_mean* is only significantly positive at the 1% level for non-SOEs, but insignificantly positive for SOEs. Results confirm our hypothesis that the EPU only causes an inefficient labour investment for non-SOEs but not for SOEs.

Secondly, we measure government intervention with firms' political connections. We split all non-SOEs into politically connected and non-politically connected firms by following Li *et al.* (2020). The politically connected firms are defined as if either the CEO or chairman is (1) a current or former officer of either the central or local government or military; (2) have worked for the People's Congress or the People's Political Consultative Conference (Fan *et al.*, 2007; Li *et al.*, 2020). Likewise, we expect the effect of EPU on a firm's labour investment efficiency is more pronounced in non-politically connected firms than politically connected firms.

Panel B of Table 7 reports the regression results. The coefficient of *EPU_mean* is only positive and significant at the 1% level in the subsample of non-politically connected firms, indicating that labour investment efficiency is more likely to be affected by EPU in firms without political connection.

Table 5. Elimination of measurement errors

	EPU_mean (1)	ABLIE (2)	EPU_mean (3)	ABLIE (4)	EPU_mean (5)	ABLIE (6)
EPU_US	0.7690*** (122.69)					
Res_EPU_US		0.0237*** (3.23)				
EPU_UK						
Res_EPU_UK			0.4574*** (79.70)	0.0168** (2.53)	0.2899*** (50.28)	0.0201*** (3.19)
EPU_AU						0.1439 (0.78)
Res_EPU_AU						Yes
Cons.	-25.7095*** (-182.82)	0.1439 (0.78)	-29.3424*** (-195.40)	0.1439 (0.78)	-29.2091*** (-184.23)	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	34,177	34,177	34,177	34,177	34,177	34,177
Adj.R ²	0.8689	0.3453	0.8406	0.3452	0.824	0.3453

Note(s): Table 5 presents the results of common economic shocks with EPU in USA, Australia and U.K., respectively. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. t-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

Table 6. Mechanism analysis: overinvestment vs. underinvestment

	(1)	(2)	(3)	(4)
<i>EPU_mean</i> × <i>under investment</i>				
<i>EPU_mean</i> × <i>over investment</i>		0.0565*** (8.80)		-0.0565*** (-8.80)
<i>Under investment</i>	-0.2174*** (-39.85)	-0.5314*** (-14.72)		
<i>Over investment</i>			0.2174*** (39.85)	0.5314*** (14.72)
<i>EPU_mean</i>	0.0372*** (6.23)	-0.0104 (-1.29)	0.0372*** (6.23)	0.0461*** (7.63)
Cons.	0.8905*** (3.51)	0.9787*** (3.86)	0.6731*** (2.65)	0.4473* (1.75)
Control	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Obs.	34,177	34,177	34,177	34,177
Adj.R ²	0.3745	0.3759	0.3745	0.3759

Note(s): Table 6 presents the results of over and under investment. The over/under investment is defined as a dummy variable equals 1 if the firm-year observation is over/under investment, otherwise 0. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

Table 7. Government intervention

Panel A	SOEs	ABLIE	Non-SOEs
<i>EPU_mean</i>	0.006 (0.70)		0.0381*** (4.34)
<i>Cons.</i>	0.6868* (1.86)		0.7707** (2.03)
Controls	Yes		Yes
Province FE	Yes		Yes
Industry FE	Yes		Yes
Obs.	18,371		15,806
Adj. <i>R</i> ²	0.3627		0.3292
Panel B	Political connection		Non-political connection
<i>EPU_mean</i>	0.0071 (0.68)		0.0513*** (4.52)
<i>Cons.</i>	0.3329 (1.00)		0.8972 (1.55)
Controls	Yes		Yes
Province FE	Yes		Yes
Industry FE	Yes		Yes
Obs.	20,510		13,667
Adj. <i>R</i> ²	0.4459		0.2544

Note(s): Table 7 presents the results of the different effect of EPU on LIE with government intervention. Panel A shows the SOEs and private firms subsample results of EPU and LIE relation. Panel B shows the political connection subsample results of EPU and LIE relation. The dependent variable is ABLIE and the test variables are *EPU_mean*. Fixed effects are controlled by industry and province and standard errors are clustered by firm across models. The variable descriptions are reported in Appendix 2. The superscripts *, ** and *** demonstrate significance at the 90, 95 and 99% confidence levels, respectively

Source(s): Authors' own work

Overall, our results indicate that government intervention moderates the negative effect of EPU on labour investment efficiency.

4.5 Firm heterogeneity tests

This section investigates possible mechanisms through which economic and policy-related uncertainty impact corporate labour investment efficiency. Firstly, we examine whether our main results are affected by the propensity of a firm's financial constraints. Garmaise (2008) argue that compared to financially unconstrained firms, firms with financial constraints are less attractive to new employees, resulting in a lower possibility of labour adjustments (e.g. replacing existing employees and firing low-skilled workers). When EPU is high, firms may suffer from financial constraints due to higher external financing costs (Gilchrist *et al.*, 2014; Pástor and Veronesi, 2013). Therefore, we anticipate that the negative effect of EPU on labour investment efficiency is stronger for financially constrained firms.

Following D'Mello and Toscano (2020) and Jory *et al.* (2020), we measure financial constraints using the *firm size* and *Whited–Wu index* (Whited and Wu, 2006). A firm is regarded as financially constrained if its *firm size* is below the sample median or the *Whited–Wu index* value above the sample median. Panel A and B of Table 8 report the *firm size* and *Whited–Wu index* results, respectively. The coefficient of *EPU_mean* is only positively significant for firms with smaller *firm size* and higher *Whited–Wu index* values, indicating that financial constraints are a reason for the reduced labour investment efficiency during high EPU periods.

Table 8. Firm heterogeneity test

Panel A	ABLIE	
	Big firms	Small firms
<i>EPU_mean</i>	-0.0147 (-1.62)	0.0222** (2.44)
<i>Cons.</i>	-0.434 (-1.29)	-0.5592 (-1.48)
Controls	Yes	Yes
Province FE	Yes	Yes
Industry FE	Yes	Yes
Obs.	16,921	17,256
Adj. <i>R</i> ²	0.4516	0.2163
Panel B	High financial distress	Low financial distress
<i>EPU_mean</i>	0.0350*** (3.82)	0.0065 (0.79)
<i>Cons.</i>	1.4234*** (3.66)	0.5202 (1.50)
Controls	Yes	Yes
Province FE	Yes	Yes
Industry FE	Yes	Yes
Obs.	16,298	16,308
Adj. <i>R</i> ²	0.2868	0.4212
Panel C	Big4 auditing	Non-Big4 auditing
<i>EPU_mean</i>	0.0173 (0.71)	0.0249*** (3.94)
<i>Cons.</i>	0.3273 (0.28)	1.0314*** (3.64)
Controls	Yes	Yes
Province FE	Yes	Yes
Industry FE	Yes	Yes
Obs.	2,205	31,080
Adj. <i>R</i> ²	0.2947	0.3479
Panel D	High independent director	Low independent director
<i>EPU_mean</i>	0.0162 (1.60)	0.0304*** (3.51)
<i>Cons.</i>	0.427 (1.17)	1.2974*** (3.46)
Controls	Yes	Yes
Province FE	Yes	Yes
Industry FE	Yes	Yes
Obs.	17,203	16,974
Adj. <i>R</i> ²	0.304	0.3843

Note(s): Table 8 presents the results of the different effect of EPU on LIE among different firm factors. Panel A shows the firm size effect on the relation of EPU and LIE. Panel B shows the financial distress effect on the relation of EPU and LIE. Panel C shows the Big four effect on the relation of EPU and LIE. Panel D shows the independent directors size effect on the relation of EPU and LIE. The dependent variable is ABLIE and the test variables are EPU_mean. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

Secondly, a firm's corporate governance may affect the negative relationship between EPU and labour investment efficiency. Nagar *et al.* (2019) argue that the information asymmetry will be increased during the high EPU periods. In addition, Fracassi and Tate (2012) highlight that weak board monitoring may lead to managerial opportunism, decreasing the efficiency of investment. For firms with weak corporate governance, managers may engage in empire-building due to

serious agency problems during a period of high EPU. Therefore, we expect firms with weak corporate governance are associated with high labour investment inefficiency when EPU is high.

We use *big4* and *indep* as the proxies for corporate governance. A firm is considered as having weak corporate governance if the auditor of the firm is a non-*big4* auditor or the *indep* value is below the sample median. We report the results in Panel C and D of Table 8, respectively. The coefficient of *EPU_mean* is only positively significant for firms with the non-*big4* auditor and lower *indep* value, suggesting that during the high EPU periods, the decline of labour investment efficiency is more significant for firms with weak corporate governance.

4.6 Robustness tests

4.6.1 The effect of labour law. In 2008, the Chinese Government implemented labour contract law which requires the labour contract to include a certain amount of information such as working location, working hours, compensation and job protection (Article 17, International Labour Organization). The labour contract law benefits employees through strengthening employees' social insurance in the form of pensions, work injury insurance and unemployment insurance (Gao *et al.*, 2012), resulting in a significant increase in labour costs for Chinese firms (Cui *et al.*, 2013; Cui *et al.*, 2018). Given such labour protection, managers may be more disciplined before hiring employees as the costs of hiring or firing have substantially increased. Therefore, we expect the enactment of labour contract law can alleviate the negative impact of EPU on labour investment efficiency.

To purely investigate the effect of labour contract law on the relationship between EPU and labour investment efficiency, we only capture the firm-year observations three years before and three years after 2008, excluding 2008. We create a dummy variable, *labour contract*, to denote the enactment of labour contract law. The variable *labour contract* equals to 1 during the period between 2009 and 2011, otherwise 0. We also construct interaction terms between *labour contracts* and the measures of EPU [4]. According to Table 9, the coefficients of the interaction terms between *labour contract* and the measures of EPU are all negatively and significantly related to *ABLIE* at the 1% level, indicating that the enactment of labour contract law can mitigate the negative EPU effect on labour investment efficiency.

4.6.2 Model verification. We apply two approaches to check the robustness. Firstly, Chen *et al.* (2018) argue that implementing the two-step procedure in empirical research (i.e. use residuals from an ordinary least squares regression as the dependent variable in a second regression) may cause biased coefficients and standard errors. The solution from Chen *et al.* (2018, p. 782) is "to regress the residual from a first-step regression on the combination of all the second-step regressors and all the first-step regressors. Both of these two-step procedures generate unbiased estimates of the coefficient of interest and reliable t-statistics, that is, the same coefficients and t-statistics obtained from a single regression." Thus, we include all the regressors from equation (1) in our baseline model as control variables. Secondly, following Ben-Nasr and Alshwer (2016), we run equation (2) separately for each industry of our sample. We then define the additional proxy for labour investment inefficiency (*Add_ABLIE*) as the difference between the actual value of *net_hire* and the residuals from the industry-level version of equation (2). The results are presented in Table 10. The coefficients of *EPU_mean* are significantly positive at the 1% and 5% level across the two models, respectively. Collectively, our results indicate that our finding that EPU reduces labour investment efficiency is robust.

5. Conclusion

We examine the impact of EPU on a firm's labour investment efficiency in China. On the one hand, labour investment efficiency is one of the most significant components for a firm, increasing the competitive advantage and maintaining profitability. On the other hand, a

Table 9. The effect of labour contract law

	ABLIE		
	(1)	(2)	(3)
<i>Labour contract × EPU_mean</i>	-0.1318*** (-5.27)		
<i>EPU_mean</i>	0.0100*** (3.46)		
<i>Labour contract × EPU_median</i>		-0.1356*** (-5.15)	
<i>EPU_median</i>		0.0074*** (2.72)	
<i>Labour contract × EPU_gmean</i>			-0.1839*** (-6.67)
<i>EPU_gmean</i>			0.0095*** (3.41)
<i>Labour contract</i>	0.6167*** (5.07)	0.6276*** (4.94)	0.8472*** (6.48)
<i>Cons.</i>	0.2053*** (5.75)	0.2203*** (6.25)	0.2079*** (5.88)
Controls	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Obs.	34,177	34,177	34,177
Adj. <i>R</i> ²	0.2652	0.2651	0.2655

Note(s): Table 9 presents the results of the effect of labour contract law. The dependent variable is ABLIE and the test variables are the interactions between labour contract and the concurrent form of EPU measures, respectively. The variable labour contract equals to 1 during the period between 2009 and 2011, otherwise 0. The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

firm's labour investment has features, such as irreversible and long-term investment. However, to the best of our knowledge, this is the first paper that investigates how macroeconomic factors influence a firm's labour investment efficiency.

Our result indicates a significantly negative relationship between EPU and a firm's labour investment efficiency. Notably, labour investment efficiency will decrease by 0.31% with a one

Table 10. Robustness test

	ABLIE (1)	Add_ABLIE (2)
<i>EPU_mean</i>	0.0092*** (3.21)	0.1558** (2.13)
<i>Cons.</i>	0.2681*** (7.45)	1.6539 (0.53)
Controls	Yes	Yes
First-step regressor	Yes	No
Province FE	Yes	Yes
Industry FE	Yes	Yes
Obs.	34,177	27,984
Adj. <i>R</i> ²	0.3558	0.0654

Note(s): Table 10 presents the results of robustness test. The dependent variable is ABLIE and Add_ABLIE and the test variables are EPU_mean. In Column 1, we add all of the independent variables in equation (1) into our regression model in equation (2). In Column 2, we first rerun equation (2) by each industry, the variable Add_ABLIE is measured as the difference between actual value of net_hire and the residuals from industry-level version of equation (2). The variable descriptions are reported in Appendix 2. Fixed effects are controlled by firm and standard errors are clustered by firm across models. *t*-statistics are in parentheses. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Source(s): Authors' own work

standard deviation increase in EPU. Furthermore, we find the negative relationship between EPU and a firm's labour investment efficiency only existing in firms with underinvestment in labour capital. More importantly, we find that the government intervention has a significant impact on our main finding. For example, the coefficients of *EPU_mean* are only significantly positive for non-SOEs and non-politically connected firms. Results suggest that labour investment efficiency is more likely to be affected by EPU in firms without government intervention.

Furthermore, we find that financially constraint firms and firms with weak corporate governance have a low labour investment efficiency when EPU increases. Our results are survived in several endogeneity tests. Finally, we perform various robustness tests to check the stability and consistency of our main result.

Our findings suggest that the stability of the economy and policy development is crucial for firms to efficiently invest in labour, which is beneficial to policymakers for other policy-making. Our study benefits investors as firms' labour investment efficiency may reflect the level of firms' financial constraints and the quality of corporate governance.

Notes

- [1.] For example, [Xie et al. \(2019\)](#) use China's five-year plan as a measure of EPU.
- [2.] To calculate economic significance, we use the formula as follows: coefficient of the variable $\times$ standard deviation of the variable/average value of the variable.
- [3.] We only report the result of EPU scaled by mean value. The results of other two measures of EPU are qualitatively as same as what we reported here. To save space, we do not report them. However, both results are available upon request. This also applied to the rest of all tables.
- [4.] We use concurrent form of variables to avoid the potential bias caused by global financial crisis in 2008.

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Appendix 1

Table A1.

	Net hiring
<i>Sale Growth_{t-1}</i>	0.0001 (0.04)
<i>Sale growth_t</i>	0.0323*** (66.33)
ΔROA_t	-0.2138 (-0.80)
ΔROA_{t-1}	-0.0270 (-0.26)
<i>ROA_t</i>	0.2142 (0.80)
<i>Ret_{t-1}</i>	-0.0003 (-0.01)
<i>Size_{t-1}</i>	0.1009*** (3.57)
<i>Quick Ratio_{t-1}</i>	-0.0222 (-1.54)
$\Delta Quick Ratio_{t-1}$	0.0096 (0.66)
$\Delta Quick ratio_t$	-0.0842*** (-4.46)
<i>Leverage_{t-1}</i>	-0.6126*** (-2.73)
<i>AUR_{t-1}</i>	-0.0340 (-0.49)
<i>Loss1_{t-1}</i>	-0.1594 (-0.40)
<i>Loss2_{t-1}</i>	0.2357 (0.51)
<i>Loss3_{t-1}</i>	-0.2212 (-0.46)
<i>Loss4_{t-1}</i>	0.0456 (0.09)
<i>Loss5_{t-1}</i>	0.1610 (1.25)
<i>Cons.</i>	-1.8357 (-0.54)
Industry FE	Yes
Obs.	48,224
Adj. <i>R</i> ²	0.0879

Note(s): This table shows the result of [equation \(1\)](#). The *t*-statistics are reported in parentheses. *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. The dependent variable is net hiring. All variable definitions are contained in [Appendix 2](#)

Source(s): Authors' own work

Table A2.

Variables	Definition
<i>ABLIE</i>	Labour investment efficiency. It is the absolute value of the residuals from equation (1)
<i>Add_ABLIE</i>	The difference between the observed value of labour investment and the residuals from the industry-level version of equation (1)
<i>EPU</i>	The mean, median and geometric mean values of Economic Policy Uncertainty index (Baker et al., 2016)
<i>leverage</i>	Total liability over total assets
<i>firm_size</i>	The natural logarithm of total assets
<i>roa</i>	The net income over total assets
<i>top1</i>	The largest shareholding over the number of shares outstanding
<i>labor_intensity</i>	The number of employees over total assets at the end of $t - 1$
<i>indep</i>	The number of independent directors over the total number of directors on the board
<i>bsize</i>	The natural logarithm of total number of directors on the board
<i>tangible</i>	The ratio of net fixed assets over total assets
<i>Std_cfo</i>	Standard deviation of the cash flow from operations in the previous five years (year $t - 5$ to $t - 1$)
<i>Std. Sales</i>	Standard deviation of the sales in the previous five years (year $t - 5$ to $t - 1$)
<i>Std_net_hire</i>	Standard deviation of the change in the number of employees in the previous five years (year $t - 5$ to $t - 1$)
<i>Other_invest</i>	The absolute value of the residuals from the regression model of non-labour investments [i.e. (cash payments for fixed assets, intangible assets and other long-term assets minus the cash receipts from selling these assets)/total assets] versus sales growth
<i>div</i>	A dummy variable that equals 1 if a firm pays dividend, otherwise 0
<i>soe</i>	A dummy variable that equals 1 if the ultimate controller of the firm is the state or state-owned enterprises, otherwise 0
<i>duality</i>	A dummy variable that equals 1 if a firm's chairman and CEO are the same person, otherwise 0
<i>GDP_growth</i>	The growth of provincial GDP each year
<i>inflation</i>	The provincial inflation rates each year
<i>M2</i>	The growth of money supply from Central bank each year

Note(s): This table shows variable definition for all variables in the baseline regression

Source(s): Authors' own work

Table A3.

	ABLE	EPU_mean	EPU_median	EPU_gmean	leverage	Firm size	roa	top1	Labor_intensity	indep	bsize	tangible
ABLE												
EPU_mean	0.0993***											
EPU_median	0.0963***	0.9942***										
EPU_gmean	0.0978***	0.9991***	0.9958***									
Leverage	-0.0647***	-0.1270***	-0.1228***	-0.1251***								
Firm size (log)	0.2721***	0.2150***	0.2120***	0.2120***	0.3353***							
roa	-0.0282***	-0.0303***	-0.0277***	-0.0304***	-0.3542***	0.1046***						
top1	0.0680***	-0.1374***	-0.1361***	-0.1365***	0.0786***	0.2082***	0.1386***					
Labor_intensity	0.0120**	-0.0590***	-0.0586***	-0.0588***	0.1664***	0.4318***	0.1356***	0.1553***				
indep	0.0379***	0.1266***	0.1244***	0.1251***	-0.0186***	0.0307***	-0.0411***	-0.0075	-0.0497***			
bsize (log)	0.0412***	-0.1760***	-0.1725***	-0.1740***	0.1272***	0.1851***	0.0545***	0.0720**	0.1973***	-0.5281***		
tangible	-0.0053	-0.1587***	-0.1570***	-0.1569***	0.0154***	-0.0121**	-0.0319***	0.1001***	0.2783***	-0.0678***	0.1472***	
Std_cfo	-0.0487***	-0.0176***	-0.0181***	-0.0185***	0.2127***	-0.0462***	-0.3010***	-0.0564***	-0.1863***	0.0357**	-0.0872***	-0.3004**
Std_sales	0.0416***	-0.0768***	-0.0711***	-0.0746***	0.0987***	0.0101*	0.0585***	-0.0180***	-0.1415***	0.006	-0.0301***	-0.1591***
Std_net_hire	0.1194***	-0.1232***	-0.1254***	-0.1236***	0.0677***	-0.0498***	-0.0290***	-0.0506***	-0.1077***	0.0262**	-0.0648***	-0.1463**
Other_invest	0.0212***	-0.0903***	-0.0829***	-0.0869***	0.0962**	-0.0740***	-0.0641***	0.0039	-0.1879***	0.0033	-0.0113**	-0.0969***
div	-0.0061	0.0640***	0.0617**	0.0620**	-0.1789***	0.3146***	0.5098***	0.1758**	0.1827***	-0.0218***	0.0796***	-0.0357**
soe	0.0708***	-0.2290***	-0.2246***	-0.2265***	0.2039***	0.1852***	-0.0037	0.2993***	0.1636***	-0.0651***	0.2683***	0.1631***
duality	-0.0454***	0.1124***	0.1102**	0.1111***	-0.0876***	-0.0911**	-0.0271***	-0.1278***	-0.0630***	0.1064**	-0.1897***	-0.0803**
GDP_growth	-0.0776***	-0.6585***	-0.6286***	-0.6482***	0.0892***	-0.1704***	0.0643***	0.0855***	0.0441***	-0.0961***	0.1350***	0.1119***
inflation	-0.0001	-0.0083	0.0009	-0.0003	0.0109**	-0.0153***	0.0491***	0.0115**	0.0026	-0.0096*	0.0246***	0.0021
M2	0.0910***	0.8626***	0.8562***	0.8571***	-0.1340***	0.2279***	-0.0452***	-0.1498***	-0.0683***	0.1405***	-0.1973***	-0.1697***

Note(s): This table shows the Spearman correlation coefficients between each pair of variables in the sample

Source(s): Authors' own work

(continued)

Table A3. Continued

	Std_cfo	Std_sales	Std_net_hire	Other_invest	div	soe	duality	GDP_growth	inflation	M2
ABJIE										
EPU_mean										
EPU_median										
EPU_gmean										
leverage										
Firm size (log)										
roa										
top1										
Labor_intensity										
indep										
bsize (log)										
tangible										
Std_cfo	0.1885***									
Std_sales	0.1435***	0.3877***								
Std_net_hire	0.0843***	0.0999***	0.0572***							
Other_invest	-0.2133***	-0.0755***	-0.1168***	-0.1048***						
div	-0.0165***	-0.0842***	-0.1276***	0.0302***	0.0261***					
soe	0.0172***	0.0221***	0.0451***	-0.0162***	-0.0099*	-0.2542***				
duality	-0.0018	0.0837***	0.0847***	0.0868***	-0.0637***	0.1656***	-0.0880***			
GDP_growth	-0.0140***	0.0244***	0.0264***	0.0155***	-0.0248***	0.0363***	-0.0223***	0.1768***		
inflation	-0.0096*	-0.0955***	-0.1510***	-0.0840***	0.0762***	-0.2559***	0.1341***	-0.6361***	-0.1634***	
M2										