

Economic Policy Uncertainty and Corporate Inefficient Investment: A Research Based on Fixed Effects Model with Evidence from China

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Abstract. Investment decision-making is the core of corporate financial decision-making, which has a vital influence on investment income and shareholder wealth. This paper will use the fixed effects model to study the relationship between policy certainty and inefficient investment of enterprises, and the data of Chinese companies used are from the CSMAR database. This article first studies the correlation between inefficient investment and policy uncertainty. Based on the research on the relationship between economic policy uncertainty and corporate inefficient investment, this paper finds that economic policy uncertainty has a negative impact on the investment efficiency of enterprises. This conclusion is still valid after a series of robustness tests, including adding some omitted variables and fixed effects of the research year and industry. And through heterogeneous analysis, this paper finds that the investment efficiency of small-scale and low-quality auditing companies is more affected by economic policy uncertainty.

Keywords: Corporate inefficient investment; economic policy uncertainty; firm size; audit quality.

1. Introduction

The investment decision is the core of enterprise financial decision, which can determine the financing behavior of enterprise and has a vital impact on investment income and the shareholder's wealth. The investment decision can be reflected from the enterprise investment efficiency. It plays a significant role in corporate development to measure the worth of different investment decisions. As a unique indicator, factors affecting corporate investment efficiency have attracted wide attention in public and academia. For instance, the existing research found that female CEOs, government subsidies, and accounting conservatism have a certain impact on enterprise efficiency [1-3]. However, few scholars examine the role of economic policy uncertainty on the efficiency of enterprise investment. Therefore, we aim to suggest enterprise governance and development by examining enterprise investment efficiency.

Economic policy uncertainty is broadly defined as uncertainty about government actions that affect the economic environment. Due to the difficulty of quantifying the policy uncertainty, Baker et al. used a news-based index to capture the frequency of newspaper articles containing key policy uncertainty-related words and both short- and long-term concerns [4]. Some previous studies have shown the significant impact of economic policy uncertainty on enterprise innovation behavior, governance behavior, and acquisition behavior [5-7]. As an essential behavior for sustainable development, economic policy uncertainty will also play a role in enterprise investment behavior. Economic policy uncertainty may increase the difficulty of enterprises to choose investment opportunities, management decision-making may become more conservative, and the efficiency of

resource allocation may decrease. Thus, we anticipate that the economic policy uncertainty has a positive influence on corporate inefficient investment.

We use Chinese listed companies for research for two reasons. First, Chinese companies are a vital research sample on the association of investment efficiency and economic policy uncertainty. Policy uncertainty will increase expected costs and reduce long-term investment and output [8]. Rodrik pointed out that, especially in developing countries, the rationality of business owners prevents them from increasing investment in the face of policy uncertainty until the uncertainty associated with policy reforms is eliminated [9]. As a representative of developing countries, using Chinese companies as research samples can well complement existing research for developed countries. Furthermore, China is still seen as a period of economic transition from a planned economy to a market economy. The results of examining the impact of economic policy uncertainty on corporate investment may be different from those of market-based developed economies.

Second, the Chinese market system is weak. Unlike the American capital market, which achieves the level of weak efficiency, the Chinese market is much less efficient [10]. The information in the Chinese market is insufficient and untimely. Besides, the Chinese economy is currently in a critical transformation period that requires high-quality instead of high-speed growth [5]. As the socialism with Chinese characteristics, the governments (central, provincial, and city) play important roles in the Chinese market. In contrast, the decisions made by the governments are almost impossible to be got by the companies before executing. Consequently, the economic policy uncertainty in China's market tends to be more unpredictable than other ones, which provides an ideal stage to carry out the research.

In our study, we discover that there is a positive association between economic policy uncertainty and company inefficient investment, which means that higher economic policy uncertainty contributes to the increasing possibility of making inefficient investment decisions. This outcome is consistent with the hypothesis the economic policy uncertainty improves corporate inefficient investment levels. We conducted a series of robustness tests, including considering other possible omitted variables and using firm fixed effects with industry–year interactions. Our research also shows that the influences posed by economic policy uncertainty are more significant in smaller corporate. At the same time, the research reveals that the firms with higher audit quality are more likely to confront economic policy uncertainty with less loss.

The research contributions of this paper are as follows. First, Richardson believes that agency problems or financial constraints cause inefficient investment [11]. This article focuses on the impact of economic policy uncertainty on company investment efficiency. Most of the existing studies focus on the impact of economic policy uncertainty on corporate stocks or large environmental capital investment, and not much focus on enterprise-level inefficient investment. This article will supplement the impact of economic policy uncertainty on the investment efficiency of individual companies.

Second, in addition to studying the impact of economic policy uncertainty on company investment, we use heterogeneity analysis to investigate the further positive impact of economic policy uncertainty on inefficient investment in companies of different sizes and audits. The empirical results show that the impact of economic policy uncertainty on the inefficient investment of enterprises is more significant in small enterprises than in large ones. At the same time, we also found that the impact of economic policy uncertainty on inefficient investment of enterprises is more pronounced in companies with low audit quality than in companies with high audit quality. In general, from these perspectives, we supplement the relevant literature on economic policy uncertainty and corporate governance.

The remainder of this paper proceeds as follows. We review the previous literature and develop our hypothesis in Section 2. Section 3 provides details of the research design, including sample selection, data descriptions, and model specification. Section 4 discusses the baseline regression results, robustness check, and heterogeneity analysis. Finally, Section 5 offers conclusions and suggestions.

2. Literature Review and Hypothesis Analysis

There are two traditional explanations of investment efficiency (IE). The first one said investment efficiency is a function of the risk, return, and total cost of investment management, subject to the constraints within which investors must operate [12]. While the second defined IE as the expected monetary value (EMV) divided by the expectation of exploration and production costs [13]. Although the definitions may be different, the elements which will impact IE are similar. To be specific, when we only consider from the microeconomic level, the main constraints include firm size, firm financial leverage, ROA, and firm cash flow [14]. From the macroeconomic perspective, the most significant element is the macropolicy, which includes economic, politics, society, and many other aspects [15].

Economic policy is one of the most direct factors included in macropolicy that may impact corporate investment efficiency. And in a recent paper, the authors proved that more frequent and ambiguous economic policy adjustments increase economic policy uncertainty [16]. In fact, the high level of economic policy uncertainty always comes with a lot of economic policies, which come up almost at the same time. At that moment, as the policies being proposed too fast, sometimes there are self-contradictions among them. How to differentiate the policies' value and make the right investment decision based on the valuable policies become challenging for the corporate. They are more likely to make an inefficient investment under such conditions. From a paper written by Huang, we know that management forecast errors are positively associated with abnormal investment [17]. In reality, to avoid the loss caused by inefficient investment, some corporations may choose to decrease the investment and delay their investment until the economic policy becomes certain. However, such decreasing and delaying also means they may lose some optimal chances provided by the newly introduced policies. The final results they will face up with are still investing inefficiently. Therefore, we raise the following hypothesis:

H1. Economic policy uncertainty improves corporate inefficient investment levels.

Previous studies suggest that larger size companies have better corporation governance because of the potentially larger agency problems [18] and the high level of disclosure [19]. However, regarding the issue of firm size and investment efficiency, they have not reached a consensus. Saad and Zantout stated that large-size companies are more likely to over-invest in acquiring new technologies [20]. At the same time, Zhang and Yin found that large firms are more efficient in investments because of the higher level of financial development [21]. We argue that small firms are inferior to large firms in identifying risks [22] and have higher financing constraints [23]. Therefore they are more likely to make inefficient investments. Hence, we propose the second hypothesis:

H2. The promoting effect of economic policy uncertainty on corporate inefficient investment is more pronounced in small-size firms.

Prior literature suggests that the quality of accounting reports can improve investment efficiency [24-26]. According to Bushman and Smith, high-quality financial reporting information allows shareholders to better monitor the investment behaviors of managers [27]. Furthermore, Biddle and Hilary found that higher quality accounting reduces information asymmetry and mitigates the inefficiencies in investment decisions [24]. In addition, better-audited firms are less influenced by market conditions on both financial decisions and capital structures [25]. In light of the studies above, we think that high audit quality enhances outside monitoring and corporate governance, which will reduce the impact of economic policy uncertainty on investment efficiency. Therefore, we propose:

H3. The promoting effect of economic policy uncertainty on corporate inefficient investment is more pronounced in firms with low audit quality.

3. Research Design

3.1 Sample and Data

Enterprise-level characteristics data are collected from the CSMAR database. Our sample includes listed companies in China from 2008 to 2017. Financial companies and companies marked with ST

are excluded from our sample, and to alleviate concerns about extreme observations, we have winsorized the observed data by 1% each. Our final sample consists of 9211 observations.

3.2 Measurement of Corporate Inefficient Investment

To measure corporate inefficient investment, this paper refers to the research model of Richardson and Wang et al. [11, 28]:

$$Invest_{i,t} = \beta_0 + \beta_1 TobinQ_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 Cash_{i,t-1} + \beta_5 Age_{i,t-1} + \beta_6 RET_{i,t-1} + \beta_7 Invest_{i,t-1} + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (1)$$

Among them, $Invest_{i,t}$ represents the new investment expenditure of the i -th company in year t . We also measure the company's growth opportunities by measuring the company's Tobin Q value ($TobinQ_{i,t-1}$). We control other lagging variables, such as the cash holdings ($Cash_{i,t-1}$), the year the company was listed at the beginning of the year ($Age_{i,t-1}$), as well as the company's stock returns at the beginning of the year ($RET_{i,t-1}$). $\sum Industry$ and $\sum Year$ are industry and year fixed effects. Finally, inefficient investment ($Ine_Inv_{i,t}$) is calculated as the absolute value of the above regression residual.

3.3 Measurement of Economic Policy Uncertainty

Baker et al. constructed an economic policy uncertainty index [4]. This new economic policy uncertainty index is based on the frequency of newspaper reports. In this paper, we collect average monthly data based on Baker et al.'s economic policy uncertainty index and divide them by 100 [4].

3.4 Model Specification

To study the relationship between economic policy uncertainty and corporate inefficient investment in listed companies in China, we conduct the following model as we showed before.

$$Ine_Inv_{i,t} = \beta_0 + \beta_1 EPU_{i,t} + \beta_2 Size_{i,t} + \beta_3 LEV_{i,t} + \beta_4 ROA_{i,t} + \beta_5 TobinQ_{i,t} + \beta_6 Age_{i,t} + \beta_7 Cash_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

$Ine_Inv_{i,t}$ as the dependent variable represents the inefficient investment of the listed company. The higher the value, the less efficient the corporate investment. In addition to economic policy uncertainty, we add the company characteristics that affect the investment efficiency as control variables, including firm size ($Size_{i,t}$), leverage level ($LEV_{i,t}$), return on asset ($ROA_{i,t}$), Tobin's Q ($TobinQ_{i,t}$), company age ($Age_{i,t}$) and cash holdings amount ($Cash_{i,t}$). Like the above model, when testing the relationship between the company's investment and policy uncertainty, we also add the year and industry fixed effects.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of inefficient investment, economic policy uncertainty, and control variables. We note that the average of $Ine_Inv_{i,t}$ is 0.110, and its standard deviation is 0.095. The average and standard deviation of $EPU_{i,t}$ are 2.036 and 0.974, respectively.

Table 1. Descriptive statistics

Variables	N	Mean	Std. dev.	Min	Median	Max
<i>Ine_Invi,t</i>	9211	0.110	0.095	0.002	0.096	0.766
<i>EPU_{i,t}</i>	9211	2.036	0.974	0.989	1.790	3.648
<i>Size_{i,t}</i>	9211	22.117	1.399	19.884	21.847	27.79
<i>LEV_{i,t}</i>	9211	0.399	0.210	0.030	0.385	0.934
<i>ROA_{i,t}</i>	9211	0.043	0.052	-0.148	0.037	0.208
<i>TobinQ_{i,t}</i>	9211	2.282	1.873	0.119	1.780	10.13
<i>Age_{i,t}</i>	9211	1.914	0.501	1.099	1.946	2.833
<i>Cash_{i,t}</i>	9211	0.202	0.166	0.013	0.153	0.868

This table reports the descriptive statistics of the variables. The sample includes 9211 firm-year observations listed in Shanghai Stock Exchange and Shenzhen Stock Exchange from 2008 to 2017. We estimate the mean, standard deviation, minimum, median, maximum for each variable.

To test if there is potential multicollinearity among the selected variables, we introduce the variance inflation factor (VIF) test, and the results of the test are shown in Table 2. We can see that the VIFs of all the explanatory variables are smaller than 10, indicating no multicollinearity among our variables.

Table 2. VIF tests of key variables

	VIF	1/VIF
<i>EPU_{i,t}</i>	1.052	0.951
<i>Size_{i,t}</i>	1.712	0.584
<i>LEV_{i,t}</i>	1.835	0.545
<i>ROA_{i,t}</i>	1.307	0.765
<i>TobinQ_{i,t}</i>	1.522	0.657
<i>Age_{i,t}</i>	1.182	0.846
<i>Cash_{i,t}</i>	1.221	0.819
Mean	VIF	1.404

This table reports the VIF test results. The sample includes 9211 firm-year observations listed in Shanghai Stock Exchange and Shenzhen Stock Exchange from 2008 to 2017.

4.2 The Effect of Economic Policy Uncertainty on Corporate inefficient Investment

Table 3 reports the results of the baseline regression. Among the variables, *EPU_{i,t}* is the core variable, and the other is the control variable. We also control fixed effects of year and industry, respectively. Column (1) in table 3 shows that the coefficient of *EPU_{i,t}* is 0.021, which means that economic policy uncertainty significantly influences the inefficient investment at the 1% level. Column (2) in Table 3 reports the results with control variables. The coefficient of *EPU_{i,t}* is still significantly positive. Through the results, we can read that these control variables still significantly affect inefficient investment. Among them, only the size of corporate has a significant negative influence on inefficient investment, which is consistent with the conclusion of Wang and Song [29].

Table 3. The influence of EPU investor ownership on corporate inefficient investment

Dependent variable=	<i>Ine_Inv_{i,t}</i>	
	(1)	(2)
<i>EPU_{i,t}</i>	0.021*** (18.51)	0.021*** (12.37)
<i>Size_{i,t}</i>		-0.022*** (-24.56)
<i>LEV_{i,t}</i>		0.025*** (7.64)
<i>ROA_{i,t}</i>		0.038*** (4.11)
<i>TobinQ_{i,t}</i>		0.004*** (10.53)
<i>Age_{i,t}</i>		0.032*** (15.26)
<i>Cash_{i,t}</i>		0.025*** (8.51)
Constant	0.022 (1.61)	0.422*** (19.90)
Year	Yes	Yes
Industry	Yes	Yes
Observations	9211	9211
Adjusted R ²	0.513	0.568

This table reports the influence of $EPU_{i,t}$ on firms' inefficient investment listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2008 to 2017. Column (1) reports the baseline regression result without adding any control variables, and column (2) introduces the outcome when considering the influence caused by the control variables. Inefficient investment ($Ine_Inv_{i,t}$) is the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq (1). All other variables are defined in Appendix. *, **, and *** indicate significance at the 10 %, 5 %, and 1 % confidence levels, respectively.

4.3 Robustness Checks

1) The inclusion of some omitted variables.

To further control the impact of the omitted variables on the results, we introduce the duality of CEO and COB and the proportion of independent directors. Duality ($Dual_{i,t}$) is a relatively centralized leadership structure in which is the enterprise CEO serves as the chairman of the board. A dummy variable equals 1 if the CEO and chairman are the same people on firm i in year t and 0 otherwise. Besides, the proportion of independent directors ($INDP_{i,t}$) is the proportion of independent directors in the number of board of directors. Follow Table 4, we use the baseline analysis with the two situations separately, which is the first column results only add $Dual_{i,t}$, and the second column is the result of two omitted variables ($Dual_{i,t}$ and $INDP_{i,t}$) adding.

As shown in the table, the coefficients of $EPU_{i,t}$ in both column (1) and column (2) are 0.021 and are both statistically significant at the 1% level. It shows that economic policy uncertainty will still improve the inefficiency investment level of enterprises, under the influence of controlling $Dual_{i,t}$ and $INDP_{i,t}$, and the above results are stable.

Besides, the estimated coefficients of $Dual_{i,t}$ in the two columns are both negative, equaling to -0.001, while the results are not significant. The estimated coefficients of $INDP_{i,t}$ in column (2) are positive and significant, which indicates that the proportion of independent directors has a strongly negative effect on inefficient investment.

Table 4. Robustness checks: The inclusion of some omitted variables

Dependent variable=	<i>Ine_Inv_{i,t}</i>	
	(1)	(2)
<i>EPU_{i,t}</i>	0.021*** (12.38)	0.021*** (12.30)
<i>Size_{i,t}</i>	-0.022*** (-24.57)	-0.022*** (-24.60)
<i>LEV_{i,t}</i>	0.025*** (7.65)	0.026*** (7.77)
<i>ROA_{i,t}</i>	0.038*** (4.12)	0.039*** (4.13)
<i>TobinQ_{i,t}</i>	0.004*** (10.53)	0.004*** (10.42)
<i>Age_{i,t}</i>	0.032*** (15.21)	0.032*** (15.22)
<i>Cash_{i,t}</i>	0.025*** (8.52)	0.025*** (8.55)
<i>Dual_{i,t}</i>	-0.001 (-0.46)	-0.001 (-0.66)
<i>INDP_{i,t}</i>		0.033*** (3.17)
Constant	0.423*** (19.90)	0.411*** (19.08)
Year	Yes	Yes
Industry	Yes	Yes
Observations	9211	9211
Adjusted R ²	0.568	0.569

This table reports the results of robustness analysis on the inclusion of some omitted variables. The results of column (1) only add *Dual_{i,t}*, and column (2) is the result of two omitted variables (*Dual_{i,t}* and *INDP_{i,t}*) adding. Inefficient investment (*Ine_Inv_{i,t}*) is the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq (1). All other variables are defined in Appendix. *, **, and *** indicate significance at the 10 %, 5%, and 1% confidence levels, respectively.

2) Firm fixed effects with industry-year interactions

In this section, we choose to further examine the firm fixed effects with industry-year interactions. Results for the firm fixed effects with industry-year interactions are reported in the column (1) and (2) of Table 5. Column (1) of Table 5 reports the results without control variables and adding all control variables in the second column. To summarize the results, the coefficients of *EPU_{i,t}* remain positive and statistically significant. Therefore, our baseline results still hold.

This table reports the results of robustness analysis on the firm effects with industry-year interactions. Columns (1) of Table 5 reports the results without control variables and adding all control variables in the second column. Inefficient investment (*Ine_Inv_{i,t}*) is the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq (1). All other variables are defined in Appendix. *, **, and *** indicate significance at the 10 %, 5%, and 1% confidence levels, respectively.

Table 5. Robustness checks: Firm fixed effects with industry–year interactions

Dependent variable=	<i>Ine_Inv_{i,t}</i>	
	(1)	(2)
<i>EPU_{i,t}</i>	0.036*** (3.99)	0.017** (1.98)
<i>Size_{i,t}</i>		-0.021*** (-20.23)
<i>LEV_{i,t}</i>		0.028*** (8.57)
<i>ROA_{i,t}</i>		0.052*** (5.71)
<i>TobinQ_{i,t}</i>		0.003*** (8.98)
<i>Age_{i,t}</i>		0.058*** (19.91)
<i>Cash_{i,t}</i>		0.035*** (11.98)
Constant	-0.018 (-0.55)	0.363*** (9.94)
Firm	Yes	Yes
Industry*Year	Yes	Yes
Observations	9211	9211
Adjusted R ²	0.567	0.620

4.4 Heterogeneity Analysis

According to Kang et al., economic policy uncertainty seems not to affect the investment behaviors of large firms (top 20% of the listed firms) [22]. In addition, Cui et al. found that the positive effect of economic policy uncertainty is more obvious in firms with weak external monitoring, for example, firms with non-Big-4-Auditors [30]. Therefore, we utilize heterogeneity analysis to further study whether the positive effect of economic policy uncertainty on corporate inefficient investment is more pronounced in small-size firms and low audit quality firms.

1) Firm size

To further examine whether the firms' sizes impact the relationship between economic policy uncertainty and corporate inefficient investment, we divide the sample into two sub-samples: large-size and small-size. Specifically, firms with an average return on sizes above (below) the sample median are in the large-size (small-size) sub-sample. We re-estimate the baseline analysis with the two sub-samples separately. The results are shown in Table 6. The estimated coefficients of *EPU_{i,t}* in column (1) and column (2) are both positive and significant. However, the coefficient of *EPU_{i,t}* in column (2) is 0.030, which is larger than the coefficient of *EPU_{i,t}* in column (1). This suggests that the positive effect of economic policy uncertainty on corporate inefficient investment is more pronounced in small-size firms than in large-size firms.

This table reports the results of heterogeneity analysis on firm size. The sample is divided into two groups based on the sample median of average return on sizes. Column (1) reports the analysis of large-size firms, and column (2) reports the analysis of small-size firms. A year and industry fixed effects are shown in the table. Inefficient investment (*Ine_Inv_{i,t}*) is the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq (1). The descriptions of other variables can be found in Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% confidence level, respectively.

Table 6. Heterogeneity analysis: Firm size

Dependent variable=	<i>Ine_Inv_{i,t}</i>	
	Large-Size	Small-Size
<i>EPU_{i,t}</i>	0.015*** (6.25)	0.030*** (14.58)
<i>Size_{i,t}</i>	-0.014*** (-10.57)	-0.028*** (-23.00)
<i>LEV_{i,t}</i>	0.011** (2.31)	0.052*** (13.91)
<i>ROA_{i,t}</i>	0.015 (0.99)	0.050*** (5.16)
<i>TobinQ_{i,t}</i>	0.002** (2.48)	0.003*** (8.43)
<i>Age_{i,t}</i>	0.009*** (2.85)	0.047*** (19.24)
<i>Cash_{i,t}</i>	0.041*** (8.39)	0.017*** (5.67)
Constant	0.298*** (8.84)	0.497*** (18.30)
Year	Yes	Yes
Industry	Yes	Yes
Observations	4605	4606
Adjusted R ²	0.366	0.792

2) Audit quality

Table 7. Heterogeneity analysis: Audit quality

Dependent variable=	<i>Ine_Inv_{i,t}</i>	
	High audit quality	Low audit quality
<i>EPU_{i,t}</i>	0.019** (2.39)	0.023*** (14.39)
<i>Size_{i,t}</i>	0.000 (0.06)	-0.028*** (-30.67)
<i>LEV_{i,t}</i>	-0.019 (-1.30)	0.033*** (10.43)
<i>ROA_{i,t}</i>	-0.122** (-2.22)	0.049*** (5.58)
<i>TobinQ_{i,t}</i>	0.001 (0.48)	0.003*** (10.06)
<i>Age_{i,t}</i>	-0.046*** (-4.52)	0.039*** (19.19)
<i>Cash_{i,t}</i>	0.028 (1.45)	0.029*** (10.61)
Constant	0.137 (1.05)	0.523*** (24.86)
Year	Yes	Yes
Industry	Yes	Yes
Observations	613	8598
Adjusted R ²	0.112	0.654

To further study if audit quality affects the positive relationship between economic policy uncertainty and corporate inefficient investment, we divide the sample into two subsets: high audit quality firms whose auditors are from Big 4 Auditors and low audit quality firms whose auditors are not from Big 4 Auditors. We reconduct the baseline analysis with the two subsets separately. The results are shown in Table 7. The estimated coefficient in column (1) is 0.019, significant at 5% level, and the estimated coefficient in column (2) is 0.023, significant at 1% level. This indicates that the impact of economic policy uncertainty on corporate inefficient investment is more pronounced in low-audit quality firms than in high audit quality firms.

This table reports the results of heterogeneity analysis on audit quality. The Sample is divided into two subsets based on whether the firm appoints the Big 4 Auditors to provide auditing service. Column (1) reports the analysis of high audit quality firms, and column (2) reports the analysis of low audit quality firms. Year and industry fixed effects are shown in the table. Inefficient investment ($Ine_Inv_{i,t}$) is the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq (1). All other variables are defined in Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% confidence level, respectively.

5. Conclusion

Using the data on the obvious factor economic policy uncertainty and else factors (in tables) changes in recent years (2008-2017), we analyze the relationship between economic policy uncertainty and corporate inefficient investment. Ultimately, we find that economic policy uncertainty has a significantly positive impact on corporate inefficient investment, and the impact can be affected by the firm size and audit quality. After a series of robustness checks that include some omitted variables and firm fixed effects with industry-year interactions, the results are still established.

Based on the above results of research, we provide some suggestions for listed companies. The conclusion, which is the uncertainty of economic policy, relates negatively to corporate investment efficiency of corporate is suggested that policy makers pay attention to the span, scope, and variation of economic policy changes when making policies or making policy adjustments. For instance, policy makers should strengthen the depth and breadth of understanding in corporate take targeted policies and enhance transparency to create a fair business environment for enterprises. Meanwhile, in the face of these economic policy changes, the company's management should take some exact measures according to the corresponding policy adjustments. In addition, the impact of economic policy uncertainty on companies with different enterprise size and audit quality is different. For small firms, such firms are inferior to large firms in identifying risks and have higher financing constraints. In that case, the small companies that are more vulnerable to economic policy uncertainty are suggested that such companies should improve their forecasting capabilities and strengthen effective investment. As for the firms with low audit quality, the impact of economic policy uncertainty is easier to illustrate to show more significantly on such companies with low audit quality. In that case, they should take supporting measures like developing the relevant provisions of the audit system and improving the authority of the company's audit.

Appendix

Definitions of variables

Variables	Definitions
$Ine_Inv_{i,t}$	Inefficient investment, the deviation from the optimal level of investment, which is the absolute value of the residual error of the Eq. (1).
$EPU_{i,t}$	Economic policy uncertainty, the average monthly data of the economic policy uncertainty index constructed by Baker et al. (2016) divided by 100.
$Size_{i,t}$	Firm size, the natural logarithm value of the book value of total assets of firm i in year t .

$LEV_{i,t}$	Firm financial leverage, calculated as the book value of total debt divided by the book value of total assets of firm i in year t .
$ROA_{i,t}$	Return on assets, calculated as net profit divided by the book value of total assets of firm i in year t .
$TobinQ_{i,t}$	Tobin's Q, the ratio of total market value of equity to total book value of equity on firm i in year t .
$Age_{i,t}$	The listing age, calculated as the natural logarithm of the current year minus the year of listing of firm i in year t .
$Cash_{i,t}$	Cash holding, the ratio of cash and equivalents to total assets of firm i in year t .

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