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Trade policy uncertainty and financial investment: Evidence from Chinese energy firms

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ABSTRACT

This study investigates whether trade policy uncertainty impacts energy firms' financial investments. We find that trade policy uncertainty is negatively related to energy firm's financial investment, thus suggesting that energy firms prefer to reduce financial investment during periods of higher trade policy uncertainty. After adopting several robustness tests, our results remain robust. The negative correlation between trade policy uncertainty and financial investment is more significant in energy firms with less sales revenues, and lower sales growth rates. Meanwhile, energy firms with less serious competition and in areas with higher marketization are more likely to reduce financial investment when trade policy uncertainty increases. Further evidence shows that energy firms are more likely to hold more cash and increase research and development activities when trade policy uncertainty increases.

1. Introduction

The sustainable and stable supply of energy plays a significant role in China's economic development (Hughes, 2012; Lu et al., 2014; Xu and Lin, 2018; Appiah-Otoo, 2021; Liu, 2021; Bannigidadmath and Narayan, 2022). Globally, China is the largest emerging country, with the highest total primary energy consumption rate. Moreover, China's energy consumption is highly dependent on imported energy resources, particularly natural gas and crude oil. In 2021, China's import volume of crude oil was 513 million tons, and it amounted to US$ 170 billion, approximately 1.2 trillion yuan. Meanwhile, the cost of importing natural gas is approximately 360.1 billion yuan in China. Therefore, the stability of the international energy market is an important factor vis-à-vis China's energy security. However, the international trade environment has been constantly changing, and trade protectionism has risen in recent years (Davis et al., 2019). For example, some unpredictable events, such as Britain's exit from the EU (Brexit), the withdrawal of the US government from the TPP negotiations, and the Sino–US trade negotiations, bring about high uncertainty regarding trade policy and have an important impact on the overseas investment and import activities of energy firms. Energy firms must take effective actions to deal with the impact of trade policy uncertainty.

Prior studies have mainly discussed the economic consequences of trade policy uncertainty from the following two aspects. From a macro perspective, some scholars have found that trade policy uncertainty has an impact on investment share (Sudsawasd and Moore, 2006) and national employment (Pierce and Schott, 2016; Facchini et al., 2019). Based on the micro perspective, existing studies have discussed the impact of trade policy uncertainty on corporate export activities (Handley, 2014; Handley and Limao, 2015; Handley and Limao, 2017; Feng et al., 2017), import activities (Imbruno, 2019), corporate fixed asset investment, and research and development (R&D) activities (Akcigit et al., 2018; Caldara et al., 2020; Liu and Ma, 2020; Shen and Hou, 2021). Regarding energy firms, some studies have investigated the impact of trade policy uncertainty on energy firms' government subsidies (Li et al., 2021) and energy intensity (Yang and Hong, 2021), but they have not focused on how trade policy uncertainty affects the financial investment decisions of energy firms. Financial products have become an important part of investment decisions for Chinese non-financial entities (Demir, 2009; Stockhammer and Grafl, 2010). According to the China Stock Market and Accounting Research (CSMAR) database, the total value of financial assets held by Chinese non-financial listed companies increased by approximately 155 times between 2000 and 2019. Therefore, we further discuss the impact of trade

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policy uncertainty on energy firms' financial investments.

The impact of trade policy uncertainty on energy firms' financial investment is uncertain. On the one hand, energy firms may increase financial asset investments due to the high liquidity and role of the hedging risk of financial assets. On the other hand, financial products pose financial risk. This form of financial risk may be further amplified, especially in the case of the higher uncertainty of trade policies. Therefore, energy firms may choose to reduce their financial assets investments to focus better on dealing with the business risk caused by trade policy uncertainty.

This study finds that trade policy uncertainty negatively affects energy firms' financial investment, suggesting that energy firms are more likely to reduce their financial investment to avoid financial risk. We adopt several robustness tests, including considering other economic policy uncertainties, controlling company fixed effects, using a two-stage model, changing the definition of trade policy uncertainty, and modifying the sample period. Nonetheless, the results remain robust. The negative correlation between trade policy uncertainty and financial investment is more significant in energy firms with less sales revenues, and lower sales growth rates. In addition, energy firms with less serious competition and in areas with higher marketization are more likely to reduce financial investment during periods of higher trade policy uncertainty. Finally, we find that energy firms are more likely to hold more cash and increase R&D activities when trade policy uncertainty increases.

The existing literature mainly discusses the economic consequences of trade policy uncertainty on energy firms from the perspective of government subsidies (Li et al., 2021) and energy intensity (Yang and Hong, 2021). However, little attention has been paid to whether trade policy uncertainty affects the financial investment decisions of energy firms. This study adds to the literature on the impact of trade policy uncertainty on energy firms' investment decisions, especially from the perspective of financial products. Second, this paper extends the literature on the factors influencing financial investment from a policy uncertainty perspective. Recent studies have discussed the impact of mixed ownership and green credit policy on a company's financial investment (Wang et al., 2021; Jiang et al., 2022). This study investigates how energy firms undertake financial investment during periods of high trade policy uncertainty and emphasizes that trade policy uncertainty is also an important factor related to an energy firm's financial investment.

The remainder of this paper is organized as follows: Section 2 develops the theoretical analysis and research hypotheses. Section 3 discusses our research methods, including research design and sample selection. Section 4 presents our empirical results. Section 5 concludes the paper.

2. Theoretical analysis and hypothesis development

Prior studies have mainly discussed the economic consequences of trade policy uncertainty from macro and micro perspectives. From a macroeconomic perspective, Sudsawasd and Moore (2006) point out that the volatility of trade policy is closely related to the investment share based on the macro data of more than 100 countries from 1960 to 2000. Trade policy uncertainty has a significant impact on domestic employment. Pierce and Schott (2016) found that when the US eliminated the enforcement of potential tariffs on China, the employment rate of the manufacturing industry in the US decreased. Facchini et al. (2019) suggested that the decline in trade policy uncertainty led to an increase in internal in-migration rates, and internal migrants found jobs in the places where they migrated to.

Further investigation on the impact of trade policy uncertainty is based on the micro perspective. Existing studies believe that a decrease in trade policy uncertainty reduces the export difficulty of a company and increases its foreign trade export business. For example, Handley (2014) demonstrates that the establishment of the WTO reduces trade uncertainty and promotes the export business of Australian companies from 1993 to 2001. Handley and Limao (2015) investigate the impact of Portuguese enterprises' exports after Portugal's accession to the European Community. They find that after joining the European Community, the uncertainty of trade policy decreases and the export of Portuguese enterprises increases. Subsequently, Handley and Limao (2017) discuss the impact of China's accession to the WTO on the export business and obtain similar findings: a decline in trade policy uncertainty promotes a corporation's exports. Feng et al. (2017) further establish the impact of trade policy uncertainty on the export behavior of companies and emphasize that after China's accession to the WTO, companies providing higher quality products at lower prices enter the foreign trade export market, while companies providing higher prices and lower quality products withdraw from the foreign trade export market.

Some studies have focused on the impact of trade policy uncertainty on import activities. Imbruno (2019) finds that China's accession to the WTO encourages more Chinese manufacturers and trade intermediaries to expand the import of materials and commodities from overseas and enables more enterprises and consumers to enjoy the potential benefits of imports. Additionally, several studies focus on the impact of trade policy uncertainty and corporate investment activities. For example, Caldara et al. (2020) insist that increased trade policy uncertainty leads to a decrease in corporate investments. Akcigit et al. (2018) point out that trade policy uncertainty seriously inhibits the progress of high-tech industries and has a negative effect on corporate innovation. Similarly, Liu and Ma (2020) investigate the relationship between trade policy uncertainty and innovation in Chinese enterprises and suggest that after the reduction in trade policy uncertainty, the number of patent applications of Chinese enterprises increases significantly. However, some scholars support the opposite argument. For example, Shen and Hou (2021) demonstrate that the uncertainty of trade policy is positively correlated with R&D investment and patent output, using the data of new energy vehicle companies in China from 2007 to 2018, which means that companies are more incentivized to stimulate innovation activities to obtain growth when the uncertainty of trade policy increases.

The energy industry is one of the pillars of China's national security and economic development (Narayan, 2019; Iyke et al., 2021; Jiang and Kong, 2021; Yu et al., 2021). Owing to the increasing energy consumption, China's energy dependence on overseas imports is also gradually increasing, especially regarding overseas natural gas and crude oil. Therefore, trade policy uncertainty has a strong impact on energy firms' business activities. Li et al. (2021) find that when trade policy uncertainty increases, energy firms receive more government subsidies to ensure energy supply. Additionally, energy firms reduce their energy intensity to reduce carbon emissions in response to trade policy uncertainty (Yang and Hong, 2021). However, these studies only investigate the impact of trade policy uncertainty on the fixed asset investment of energy firms and do not consider whether trade policy uncertainty affects energy firms' financial investment decisions. Therefore, this paper further discusses the impact of trade policy uncertainty on energy firms' financial asset investment decisions.

When trade policy uncertainty increases, the manner in which energy firms make financial investment decisions is uncertain. On the one hand, energy firms may treat financial investment as a hedging instrument, choose to increase investment in financial assets, and take the initiative to deal with trade policy uncertainty. Financial assets have high liquidity and can be converted into cash assets in the capital market quickly, which is an important way for energy firms to maintain capital liquidity (Demir, 2009). Meanwhile, financial assets have the function of hedging risks. Energy firms may purchase some specific energy-derivative financial products to effectively hedge the impact of rising costs on overseas energy imports (Bollen, 2013; Duarte et al., 2007). In addition, financial products are an important channel for corporate investment. When the uncertainty of trade policy increases, enterprises' overseas businesses shrink rapidly, and energy firms have difficulty achieving the predetermined performance objectives and may choose to

invest part of their cash in the financial market to obtain capital gains and reduce the impact of overseas business risks on their business conditions (Chernenko and Faulkender, 2011; Bartram, 2019).

On the other hand, energy firms may treat financial investment as risky investment, reduce financial investment in the period of higher trade policy uncertainty and resist the business risks occasioned by trade policy uncertainty in a relatively passive way. Although financial assets may help energy firms to gain profits in the short term, they also pose potential financial risks (Demir, 2009; Narayan and Nasiri, 2020). It is more difficult to judge the financial investment direction and more likely to gain loss, especially in the case of higher uncertainty in trade policy (Orhangazi, 2008; Demir, 2009; Alvarez, 2015; Moosa, 2018). Therefore, when energy firms do not want to face high operational and financial risks at the same time, they prefer to reduce financial investment in matters with higher uncertainty of trade policy to reduce possible financial risks. Accordingly, we propose the following hypothesis:

Hypothesis 1a. *Trade policy uncertainty increases energy firms' financial investment.*

Hypothesis 1b. *Trade policy uncertainty decreases energy firms' financial investment.*

3. Research design

3.1. Empirical model

To test Hypothesis 1, regarding the relationship between trade policy uncertainty and energy firms' financial investment, we estimate the following ordinary least squares regression model (according to the variables described below):

$$Fin_{it} = \alpha_0 + \alpha_1\, TPU_{it} + \alpha_2\, Baseline\ Controls_{it} + \varepsilon. \quad (1)$$

The dependent variable, *Fin*, is the ratio of total financial investment to total assets at the end of the current year. Tradable financial assets, derivative financial assets, available financial assets for sale, held-to-maturity investment, and investment in real estate are regarded as financial investments (Wang et al., 2021; Jiang et al., 2022; Li et al., 2021). Following Li et al. (2021), *TPU* is measured as the natural logarithm of the average monthly trade policy uncertainty index in a certain year, as provided by Davis et al. (2019) to represent annual trade policy uncertainty. This index is a monthly index focusing on the frequency of trade-policy-related terms and joint occurrences of "uncertainty" and "trade policy" in Renmin Daily and Guangming Daily, which are the two main mainland Chinese newspapers. The greater the value of *TPU*, the higher the uncertainty of trade policy uncertainty (Li et al., 2021).

Following the literature on the determinants of financial investment (Wang et al., 2021; Jiang et al., 2022; Li et al., 2021), the control variables include: company size (*Size*), which is equal to the natural logarithm of total assets (CNY); gearing ratio (*LEV*), which is equal to total liabilities divided by total assets; return on equity (*ROA*), which is equal to company's net profit divided by total assets; cash flow from operating activities (*Cash_Flow*), which is equal to company's net cash flow from operating activities divided by total assets; company age (*Age*), which is equal to the natural logarithm of company age; fixed assets (*PPE*), which is equal to net fixed assets divided by total assets; accounts receivable (*REC*), which is equal to net accounts receivable divided by total assets; Board member (*Board*), which is the natural logarithm of the number of board members; and auditor type (*Big10*), if the auditor is top 10 auditors, then *Big10* equals one, otherwise *Big10* equals zero. The definitions of these variables are presented in Table 1. In our main analyses, we include year- and industry-fixed effects based on the CSRC industry classification code to capture variations in audit fees across industries and over time. To remove the effects of extreme values, all the continuous variables are winsorized at 1% and 99%. Finally, we adjust the standard errors for heteroskedasticity and clustering by firm.

Table 1
ariable definitions and constructions.

Variables	Variable definitions
Dependent variables	
Fin	The ratio of total financial investment to total assets at the end of the current year. Tradable financial assets, derivative financial assets, available for sale financial assets, held-to-maturity investment and investment real estate are regarded as financial investment.
Independent variables	
TPU	The natural logarithm of average monthly trade policy uncertainty index provided by Davis et al. (2019).
Control variables	
Size	The natural logarithm of total assets (CNY).
LEV	The ratio of total liabilities to total assets at the end of the current year.
ROA	Net profit divided by total asset.
Cash_Flow	Net cash flow from operating activities divided by total assets.
Age	The natural logarithm of company's age.
PPE	Net fixed assets divided by total assets.
REC	Net trade receivables divided by total assets.
Board	The natural logarithm of the number of board members
Big10	Dummy variable equaling one if the audit firm is among the 10 largest audit firms in China, and zero otherwise.

3.2. Data and sample

We estimate the baseline regression model using data from the CSMAR database. Consistent with prior research, we focus on the following six industries: (1) coal mining and washing; (2) oil and gas exploitation; (3) petroleum processing, coking, and nuclear fuel processing; (4) electrical machinery and equipment manufacturing; (5) power and heat production and supply; and (6) gas production and supply industry (Li et al., 2021). We also delete observations with missing data on the variables used in Eq. (1). For the data on trade policy uncertainty available in 2000, our sample covers 2000 to 2019 and includes 3483 firm-year observations (based on 414 unique firms).

4. Empirical results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics for the full sample. *Fin* has a mean of 0.062, and 25th and 75th percentiles of 0.005 and 0.081, respectively, indicating that there is a significant difference in the financial investment of the energy firms in the sample. The mean values of accounting performance (*ROA*) and financial leverage (*Leverage*) are 0.032 and 0.474, respectively. Approximately 46.1% of the sample energy firms are audited by Big 10 auditors (*Big10*).

Table 2
Descriptive statistics.

Variable	Number	Mean	StdDev	25%	Median	75%
Fin	3483	0.062	0.088	0.005	0.030	0.081
TPU	3483	4.677	1.040	3.885	4.554	5.671
Size	3483	22.169	1.384	21.142	21.950	23.013
LEV	3483	0.474	0.200	0.327	0.485	0.623
ROA	3483	0.032	0.065	0.012	0.034	0.063
Cash_Flow	3483	0.055	0.070	0.014	0.053	0.093
Age	3483	2.616	0.466	2.398	2.708	2.944
PPE	3483	0.314	0.207	0.142	0.252	0.468
REC	3483	0.135	0.113	0.040	0.104	0.207
Board	3483	2.207	0.220	2.079	2.197	2.303
Big10	3483	0.461	0.499	0.000	0.000	1.000

4.2. Baseline results

Table 3 reports the estimation results of Eq. (1). We find that the coefficient of *TPU* is −0.019, significant at the 1% level, suggesting that energy firms regard trade policy uncertainty as a potential risk and decrease their financial investments during periods of higher trade policy uncertainty. Additionally, the above-mentioned results show that energy firms prefer to treat financial investment as a risky investment rather than a hedging instrument. The coefficients of the control variables, wherever significant, are consistent with those of other studies (e.g., Wang et al., 2021; Li et al. 2022). For example, we find that financial investment is higher for energy firms that are larger (larger *Size*) or have poorer performances (lower *ROA*). We further find that older energy firms (larger *Age*) have more financial investment.

4.3. Robustness tests

4.3.1. Endogenous problem

Our results may be influenced by some endogeneity problems. To alleviate the influence of possible omitted firm-level variables, we control for firm-fixed effects in the regression. Column (1) in Table 4 reports the estimation results. We find that the estimated coefficient of *TPU* is −0.019, significantly negative at the 5% level, thereby suggesting that our result is not related to the possibility of omitted variables at the firm level. As for the impact of reverse causality, we believe that certain energy firms' financial investment decisions do not have sufficient influence on trade policy uncertainty at the country level; therefore, reverse causality may have little impact on our result. Following Li et al. (2021), we use a two-stage model to address the reverse causality issue. The trade policy uncertainty in the US and the trade policy uncertainty in China have strong correlations, but trade policy uncertainty in the US does not have a direct impact on the financial investment of Chinese firms. Therefore, we use the US trade policy uncertainty as the exogenous instrumental variable in the two-stage model (Li et al., 2021). Column (2) of Table 5 reports the estimation results for the second stage in the two-stage model. We find that the estimated coefficient of *TPU* is −0.031, significantly negative at the 1% level, suggesting that our results are not affected by the reverse causality problem.

Table 3
Trade policy uncertainty and financial investment: Baseline results.

	Fin
	(1)
TPU	**−0.019*** **
	(−3.27)
Size	0.010***
	(3.29)
LEV	−0.048**
	(−2.29)
ROA	−0.080*
	(−1.84)
Cash_Flow	−0.064**
	(−1.98)
Age	0.043***
	(5.11)
PPE	−0.188***
	(−6.81)
REC	−0.238***
	(−6.67)
Board	−0.011
	(−0.70)
Big10	−0.001
	(−0.19)
Constant	−0.059
	(−0.80)
Industry effects	Yes
Year effects	Yes
Observations	3483
Adjust R^2	0.243

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

Table 4
Trade policy uncertainty and financial investment: Endogenous problem.

	Fin	
	Firm fixed effects	*2SLS (the second-stage)*
	(1)	(2)
TPU	**−0.019** **	**−0.031*** **
	(−2.36)	**(−3.27)**
Size	−0.008	0.012***
	(−1.12)	(3.63)
LEV	−0.011	−0.052**
	(−0.47)	(−2.48)
ROA	−0.041	−0.082*
	(−1.06)	(−1.90)
Cash_Flow	−0.034	−0.077**
	(−1.46)	(−2.29)
Age	0.059***	0.050***
	(4.37)	(5.08)
PPE	−0.130***	−0.200***
	(−6.07)	(−6.97)
REC	−0.196***	−0.244***
	(−4.00)	(−6.75)
Board	0.002	−0.019
	(0.09)	(−1.18)
Big10	0.006	0.003
	(1.33)	(0.48)
Constant	0.313**	−0.007
	(2.30)	(−0.09)
Firm effects	Yes	No
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	3483	3483
Adjust R^2	0.646	0.243

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

4.3.2. Alternative measure of trade policy uncertainty

To rule out the negative relationship between trade policy uncertainty and energy firms' financial investments related to the definition of trade policy uncertainty, we use three other methods to define trade policy uncertainty. *TPU2* is measured as the natural logarithm of the median value provided by Davis et al.'s (2019) monthly trade policy uncertainty index in a certain year. *TPU3* is measured as the natural

Table 5
Trade policy uncertainty and financial investment: Alternative measure of trade policy uncertainty.

	Fin		
	(1)	(2)	(3)
TPU2	**−0.018*** **		
	(−3.27)		
TPU3		**−0.021*** **	
		(−3.27)	
TPU4			**−0.036*** **
			(−3.27)
Size	0.010***	0.010***	0.010***
	(3.29)	(3.29)	(3.29)
LEV	−0.048**	−0.048**	−0.048**
	(−2.29)	(−2.29)	(−2.29)
ROA	−0.080*	−0.080*	−0.080*
	(−1.84)	(−1.84)	(−1.84)
Cash_Flow	−0.064**	−0.064**	−0.064**
	(−1.98)	(−1.98)	(−1.98)
Age	0.043***	0.043***	0.043***
	(5.11)	(5.11)	(5.11)
PPE	−0.188***	−0.188***	−0.188***
	(−6.81)	(−6.81)	(−6.81)
REC	−0.238***	−0.238***	−0.238***
	(−6.67)	(−6.67)	(−6.67)
Board	−0.011	−0.011	−0.011
	(−0.70)	(−0.70)	(−0.70)
Big10	−0.001	−0.001	−0.001
	(−0.19)	(−0.19)	(−0.19)
Constant	−0.068	−0.043	0.038
	(−0.94)	(−0.58)	(0.45)
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Observations	3483	3483	3483
Adjust R^2	0.243	0.243	0.243

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU2* represents the natural logarithm of the median trade policy uncertainty index in a certain year provided by Davis et al. (2019); *TPU3* represents the natural logarithm of the last month trade policy uncertainty index in a certain year provided by Davis et al. (2019); *TPU4* represents the natural logarithm of the average monthly trade policy uncertainty index in a certain year provided by Huang and Luk (2020). *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

logarithm of the last month provided by Davis et al.'s (2019) monthly trade policy uncertainty index in a certain year. *TPU4* is measured as the natural logarithm of the average monthly value provided by Huang and Luk (2020) monthly trade policy uncertainty index in a certain year. In addition, the greater the value of *TPU2, TPU3*, or *TPU4*, the higher the trade policy uncertainty (Li et al., 2021). The estimation results are presented in Table 5. We find that the estimated coefficients of *TPU2, TPU3*, and *TPU4* are −0.018, −0.021, and − 0.036, respectively, which are significantly negative at the 1% level, thus suggesting that our results are not affected by the different definitions of trade policy uncertainty.

4.3.3. Special year

As mentioned in Li et al. (2021), the Chinese trade policy uncertainty levels in 2006, 2007, and 2014 are relatively lower than those in other years. We suspect that trade policy uncertainty may have been affected by other important incidents, such as the financial crisis. Our results may also have been driven by such important events. We employed two methods to deal with this issue: (1) With reference to Li et al. (2021), this study also removes these years from the sample and reruns the regression. (2) We define the dummy variable *Special_Year* as equal to one if the firm is in 2006, 2007, or 2014, and zero otherwise. Columns (1) and (2) in Table 6 report the regression results for the changing sample. The coefficients of *TPU* are −0.019 and − 0.019, both significant at the 1% level, which is consistent with the findings of previous studies.

4.4. Cross-sectional analysis

4.4.1. Corporate characteristic, trade policy uncertainty, and financial investment

Trade policy uncertainty increases the risk of corporate sales, and larger energy firms have a strong ability to resist business risk arising from trade policy uncertainty. They may even increase risk-taking when facing higher policy uncertainty (Shen and Hou, 2021; Li et al., 2021). We suspect that smaller energy firms are more likely to decrease their financial investments when trade policy uncertainty increases. To test the moderating effect of energy firm size, we divide the sample based on the annual median percentage of the sales revenue of energy firms and rerun the regression separately. Columns (1) and (2) of Table 7 present the regression results. The coefficient of *TPU* is significantly negative at the 1% level only in the subsample with less sales revenue (Column (1)), and the estimated coefficients of the two groups are significantly different at the 10% level, suggesting that energy firms with less sales

Table 6
Trade policy uncertainty and financial investment: Special year.

	Fin	
	(1)	(2)
TPU	**−0.019*** **	**−0.019*** **
	(−3.40)	**(−3.27)**
Special_Year		−0.055***
		(−4.08)
Size	0.009***	0.010***
	(2.97)	(3.29)
LEV	−0.038*	−0.048**
	(−1.74)	(−2.29)
ROA	−0.058	−0.080*
	(−1.38)	(−1.84)
Cash_Flow	−0.079**	−0.064**
	(−2.24)	(−1.98)
Age	0.044***	0.043***
	(5.31)	(5.11)
PPE	−0.186***	−0.188***
	(−6.56)	(−6.81)
REC	−0.246***	−0.238***
	(−6.75)	(−6.67)
Board	−0.009	−0.011
	(−0.57)	(−0.70)
Big10	−0.001	−0.001
	(−0.16)	(−0.19)
Constant	−0.049	−0.059
	(−0.66)	(−0.80)
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	2994	3483
Adjust R^2	0.235	0.243

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Special_Year* represents a dummy variable of year 2006, 2007 and 2014; *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

Table 7
Corporate characteristic, trade policy uncertainty and financial investment.

	Fin			
	Less Sales Revenue	More Sales Revenue	Lower Sales Growth	Higher Sales Growth
	(1)	(2)	(3)	(4)
TPU	**−0.027*** **	**−0.007**	**−0.031*** **	**−0.010**
	(−3.27)	**(−1.03)**	**(−3.18)**	**(−1.50)**
Size	0.024***	0.012***	0.013***	0.007*
	(2.67)	(3.05)	(3.81)	(1.65)
LEV	−0.009	−0.101***	−0.054**	−0.053*
	(−0.34)	(−4.01)	(−2.58)	(−1.78)
ROA	−0.073	−0.073	−0.050	−0.086
	(−1.22)	(−1.59)	(−1.15)	(−1.08)
Cash_Flow	−0.069*	−0.046	−0.125***	−0.008
	(−1.69)	(−1.22)	(−2.78)	(−0.21)
Age	0.052***	0.032***	0.046***	0.034***
	(4.72)	(3.25)	(3.67)	(4.28)
PPE	−0.232***	−0.135***	−0.215***	−0.175***
	(−6.28)	(−4.62)	(−6.32)	(−6.08)
REC	−0.298***	−0.168***	−0.282***	−0.212***
	(−6.32)	(−4.18)	(−6.23)	(−5.68)
Board	−0.033	0.009	−0.010	−0.010
	(−1.44)	(0.56)	(−0.54)	(−0.56)
Big10	0.004	−0.003	0.008	−0.010*
	(0.53)	(−0.54)	(1.25)	(−1.87)
Constant	−0.264	−0.192**	−0.051	−0.015
	(−1.42)	(−2.07)	(−0.57)	(−0.17)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	1740	1741	1643	1644
Adjust R^2	0.280	0.243	0.281	0.215
Between-group Diffence	*P* Value =0.05*		P Value =0.04**	

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

revenue are strongly impacted by trade policy uncertainty and are more likely to reduce their financial investment during periods of higher trade policy uncertainty.

We also investigate whether energy firms at different development stages have different attitudes toward trade policy uncertainty. Mature energy firms are more able to take risks and are more likely to increase financial investment when policy uncertainty increases because they are usually larger and can easily resist the risk. However, some scholars have found that mature energy firms have lower growth rates and are more reluctant to take risks (Habib and Hasan, 2017). To test the moderating effect of the energy firm's development stage, we divide the sample based on the annual median percentage of the sales growth rate of energy firms and rerun the regression separately. Columns (3) and (4) of Table 7 present the regression results. The coefficient of *TPU* is significantly negative at the 1% level only in the subsample with a lower sales growth rate (Column (3)), and the estimated coefficients of the two groups are significantly different at the 5% level, suggesting that energy firms with a lower sales growth rate are strongly impacted by trade policy uncertainty and are more likely to reduce financial investment during periods of higher trade policy uncertainty.

4.4.2. External environment, trade policy uncertainty, and financial investment

The existing literature shows that the external environment has a significant impact on financial investment (Wang et al., 2021; Jiang et al., 2022; Li et al., 2021). The degree of product market competition is highly related to corporate sales and may influence an energy firm's attitude toward trade policy uncertainty. For example, energy firms with lower product market competition prefer to spend more money to develop in the domestic market, for example, they will spend more money to collect information about domestic energy demand, and expand their influence in domestic market through advertisings. When trade policy uncertainty increases, these energy firms lose foreign businesses, and they have to pay more attention to the domestic market. Energy firms have to spend more on developing the domestic market and are more likely to develop in domestic market through decreasing financial investment and this phenomenon will be more common for energy firms in less serious competition. To test the moderating effect of product market competition on the relationship between trade policy uncertainty and financial investment, we divide the sample based on the annual extent of product market competition among energy firms and rerun the regression separately. Product market competition is defined using the Herfindahl–Hirschman Index (Masulis et al., 2007; Giroud and Mueller, 2010; Jain et al., 2013). Columns (1) and (2) of Table 8 report the regression results. The coefficient of *TPU* is significantly negative at the 1% level only in the subsample with less serious competition

Table 8
External Environment, trade policy uncertainty and financial investment.

	Fin			
	Less serious competition	More serious competition	Low marketization	High marketization
	(1)	(2)	(3)	(4)
TPU	−0.018***	0.024	−0.022***	0.043**
	(−2.68)	(1.44)	(−3.16)	(2.26)
Size	0.011***	0.010***	0.006	0.014***
	(3.18)	(2.81)	(1.19)	(3.70)
LEV	−0.060***	−0.036	−0.041	−0.045*
	(−2.69)	(−1.40)	(−1.18)	(−1.88)
ROA	−0.101	−0.063	−0.040	−0.128**
	(−1.62)	(−1.38)	(−0.55)	(−2.50)
Cash_Flow	−0.059*	−0.095*	−0.067	−0.079*
	(−1.74)	(−1.89)	(−1.51)	(−1.67)
Age	0.041***	0.046***	0.038***	0.046***
	(4.24)	(4.58)	(2.88)	(4.57)
PPE	−0.182***	−0.196***	−0.181***	−0.196***
	(−6.09)	(−5.73)	(−4.28)	(−6.03)
REC	−0.183***	−0.295***	−0.217***	−0.249***
	(−4.33)	(−6.30)	(−4.35)	(−5.30)
Board	−0.012	−0.009	−0.010	−0.014
	(−0.59)	(−0.50)	(−0.45)	(−0.72)
Big10	−0.005	0.002	−0.000	−0.004
	(−0.77)	(0.36)	(−0.03)	(−0.53)
Constant	−0.079	−0.355***	0.053	−0.546***
	(−0.91)	(−2.70)	(0.48)	(−3.87)
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	1826	1657	1741	1742
Adjust R^2	0.269	0.228	0.241	0.249
Between-group Diffence	P Value =0.02**		P Value =0.00**	

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Fin* represents ratio of total financial investment to total assets; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

(Column (1)), and the estimated coefficients of the two groups are significantly different at the 5% level. This suggests that energy firms with less serious competition are strongly impacted by trade policy uncertainty and are more likely to reduce financial investment during periods of higher trade policy uncertainty.

In China, energy firms face different levels of investor protection, financing difficulties, and supervision environments because of different levels of marketization (Gao and Hafsi, 2015; Hou et al., 2021). Thus, the marketization level of an area may influence the financial investment decisions of energy firms. In areas with lower marketization, energy firms cannot get adequate external funding to support themselves in developing in the domestic market, so they are more likely to decrease financial investment when facing an increase in trade policy uncertainty. To test the moderating effect of marketization level on the relationship between trade policy uncertainty and energy firms' financial investment, we divide the sample based on the annual marketization index of the region provided by Fan et al. (2016) and rerun the regression separately (Hou et al., 2021). Columns (3) and (4) of Table 8 report the regression results. The coefficient of *TPU* is significantly negative at the 1% level in the subsample with lower marketization (Column (3)) but significantly positive at the 5% level in the subsample with higher marketization (Column (4)). The estimated coefficients of the two groups are significantly different at the 5% level, suggesting that energy firms in areas with lower marketization are strongly affected by trade policy uncertainty and are more likely to reduce financial investment. However, energy firms in areas with higher marketization find it easier to obtain outside funding and prefer to increase financial investment during periods of high trade policy uncertainty.

4.5. Additional analysis

4.5.1. How energy firms use the money from the reduced financial investment

Finally, we investigate how energy firms use the money from reduced financial investments. We believe that energy firms can implement the following two measures. From the passive aspect, we suspect that energy firms may choose to hold some of the money as cash to prevent potential risk from trade policy uncertainty (Opler et al., 1999; Duchin et al., 2010; Song and Lee, 2012). From a proactive perspective, we suspect that energy firms may choose to use some of the money for R&D activities so that companies may be less likely to be influenced by trade policy uncertainty in the future. Therefore, we examine the relationship between trade policy uncertainty and cash holdings. *Cash* is measured as the ratio of cash and cash equivalents to net assets, which is equal to total assets minus cash and cash equivalents. Column (1) of Table 9 reports the estimation results. We find that the coefficient of *TPU* is 0.016 and significant at the 5% level, suggesting that energy firms are more likely to hold more cash when trade policy uncertainty increases. We also examine the relationship between trade policy uncertainty and R&D activities. *R&D* is measured as the ratio of R&D expenses to sales revenue. Column (2) of Table 9 reports the estimation results. We find that the coefficient of *TPU* is 0.006, significant at the 1% level, suggesting that energy firms are more likely to increase R&D activities during periods of high trade policy uncertainty.

Table 9
The impact of trade policy uncertainty on cash holdings and innovation.

	Cash	*R&D*
	(1)	(2)
TPU	**0.016****	**0.006*****
	(2.10)	**(5.29)**
Size	−0.008***	0.001
	(−2.86)	(1.26)
LEV	−0.137***	−0.008
	(−5.85)	(−1.51)
ROA	0.070	−0.015
	(1.60)	(−1.53)
Cash_Flow	0.300***	0.009
	(7.78)	(1.44)
Age	−0.045***	−0.003
	(−5.12)	(−1.38)
PPE	−0.300***	−0.011***
	(−12.30)	(−2.79)
REC	−0.252***	−0.008
	(−7.45)	(−0.76)
Board	0.010	−0.000
	(0.58)	(−0.12)
Big10	−0.007	0.001
	(−1.20)	(0.62)
Constant	0.488***	−0.028**
	(6.79)	(−1.98)
Industry effects	Yes	Yes
Year effects	Yes	Yes
Observations	3483	3483
Adjust R^2	0.444	0.318

*Notes:*T-statistics reported in parentheses are robust to firm clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. *Cash* represents the ratio of cash and cash equivalents to net assets, which equals total assets minus cash and cash equivalents; *R&D* represents the ratio of and research and development expenses to sales revenue; *TPU* represents the natural logarithm of average monthly trade policy uncertainty index in a certain year provided by Davis et al. (2019); *Size* represents the natural logarithm of total assets (CNY); *Leverage* represents the ratio of total liabilities to total assets; *ROA* represents net profit divided by total assets; *Cash_Flow* represents net cash flow from operating activities divided by total assets; *Age* represents the natural logarithm of company's age; *PPE* represents net fixed assets divided by total assets; *REC* represents Net trade receivables divided by total assets; *Board* represents the natural logarithm of the number of board members; *Big10* represents a dummy variable of the ten largest audit firms in China.

5. Conclusion

This study investigates the relationship between trade policy uncertainty and energy firms' financial investment. Our results show that trade policy uncertainty has a negative impact on energy firms' financial investments. We adopt several robustness tests, including considering other economic policy uncertainties, controlling company fixed effects, using a two-stage model, changing the definition of trade policy uncertainty, and modifying the sample period. The results remain robust. The negative correlation between trade policy uncertainty and financial investment is more significant in energy firms with less sales revenues, and lower sales growth rates. In addition, energy firms with less serious competition and in areas with higher marketization are more likely to reduce their financial investment during periods of higher trade policy uncertainty. Finally, we find that energy firms are more likely to hold more cash and increase R&D activities when trade policy uncertainty increases.

This study provides empirical evidence of how energy firms deal with trade policy uncertainty by decreasing financial investment. Energy firms should pay more attention to their main business and use the money from reduced financial investment for cash holdings and R&D activities to resist the risk from trade policy uncertainty.

Author statement

Mengzhe Li: Conceptualization, Data curation, Methodology, Writing-original draft preparation, Writing-reviewing and editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.

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