How does policy uncertainty affect corporate diversification?

Khanh Hoang – National Economics University, Vietnam

Cuong Nguyen[1] - Lincoln University, New Zealand

Hailiang Zhang – Kunming University of Science and Technology, China

2019

Abstract

The research aims to investigate the linkage between corporate diversification and economic policy uncertainty (EPU) in China. We find that there is a positive association between economic policy uncertainty and corporate diversification, meaning that high economic policy uncertainty will lead to an increase of diversification for firms. This is consistent with the hypothesis that diversification is encouraged so that risk will be reduced when uncertainty increases. Our empirical results also show that the positive impact of EPU is significant for large-cap and medium cap firms, but not for small-cap ones. The findings also reveal that high EPU is associated with higher diversification, and the effect of EPU on diversification of SOEs is greater than that on non-SOEs' diversification. Our results are robust through different measures of economic policy uncertainty and corporate diversification and remain significantly unchanged when dealing with endogeneity problems.

Further, regarding information asymmetry, diversification of the firms with a high number of analyst followers and equity reports will increase during high economic policy uncertainty. Our findings suggest that diversification plays an active role in mitigating economic-policy related risks, thus enhancing firm performance. The paper provides new insights into the relationship between economic policy uncertainty and diversification at firm level.

Key words: economic policy uncertainty, diversification, information asymmetry, agency problem, risk, China.

JEL: G10, G30, G38, L25

[1] Corresponding author: Cuong.Nguyen@lincoln.ac.nz

How does policy uncertainty affect corporate diversification?

Abstract

The research aims to investigate the linkage between corporate diversification and economic policy uncertainty (EPU) in China. We find that there is a positive association between economic policy uncertainty and corporate diversification, meaning that high economic policy uncertainty will lead to an increase of diversification for firms. This is consistent with the hypothesis that diversification is encouraged so that risk will be reduced when uncertainty increases. Our empirical results also show that the positive impact of EPU is significant for large-cap and medium cap firms, but not for small-cap ones. The findings also reveal that high EPU is associated with higher diversification, and the effect of EPU on diversification of SOEs is greater than that on non-SOEs' diversification. Our results are robust through different measures of economic policy uncertainty and corporate diversification and remain significantly unchanged when dealing with endogeneity problems.

Further, regarding information asymmetry, diversification of the firms with a high number of analyst followers and equity reports will increase during high economic policy uncertainty. Our findings suggest that diversification plays an active role in mitigating economic-policy related risks, thus enhancing firm performance. The paper provides new insights into the relationship between economic policy uncertainty and diversification at firm level.

Key words: economic policy uncertainty, diversification, information asymmetry, agency problem, risk, China.

JEL: G10, G30, G38, L25

1. Introduction

Research on corporate diversification has a long tradition with investigations on the linkage between corporate diversification and profitability, firm growth, as well as economic performance (Rumelt, 1974; Berry, 1975; Rumelt, 1977; Christensen and Cynthia, 1981; Rumelt, 1982). These studies set milestones for the subsequent research on the relationship, which remains controversial in the literature, between diversification and firm value. The extant literature shows two sides of the impact of corporate diversification on firm value. First, diversification can be beneficial to firms (diversification premium), since it leads to lower taxes, lower cash-flow volatility, more efficient operation and resource allocation, and better debt capacity (Bradley et al., 1988; Porter, 1987; Kaplan and Weisbach, 1992; Fluck and Lynch, 1999; Villaonga, 2000; Hadlock et al., 2001; Whited, 2001; Mansi and Reeb, 2002; Graham & Lemmon and Wolf, 2002; Campa and Kedia, 2002, Villalonga, 2004; Santalo and Becerra, 2008; Markus and Sebastian, 2010). Second, diversification can be detrimental to firms (diversification discount) in that it causes the problems of agency between headquarter and divisional managers and shareholders, inefficient resource allocation, and lower shareholder value (Jensen, 1986; Shleifer and Vishny, 1989; Lang and Stulz, 1994; Berger and Ofek, 1995; Comment and Jarell, 1995; Liebeskind and Opler, 1995; Servaes, 1996; Shin and Stulz, 1998; Scharfstein and Stein, 2000; Denis et al., 2002; Dittmar and Shivdasani, 2003; Nejadmalayeri and Mathur, 2007; George and Kabird, 2008; Bergh, Johnson and Dewitt, 2008)

While the question of whether corporate diversification is beneficial or detrimental is still debatable, there are sporadic of studies showing that diversified firms respond better to economic uncertainty. Internal capital markets are found to function well during crises in Khanna and Tice (2001), Matvos and Seru (2014), and Kuppuswamy and Villalonga (2016), while productivity increases during crises for diversified firms in Giroud and Muller (2015) and among other studies (Rajan, Servaes, and Zingales, 2000; Gopalan and Xie, 2011; Volkov and Smith, 2015; Aivazian, Rahaman and Zhou, 2019).

Given the paramount importance of diversification to firm value and that the motivation for corporate diversification can be attributed to one of these crisis-related findings, there is as yet a study of how economic policy uncertainty (EPU) impacts corporate diversification, although there are numerous studies implying EPU's far-reaching impacts on firm –level decisions and financial markets (Pástor and Veronesi, 2012; Baker et al., 2016; Gulen and Ion, 2016; Nguyen & Phan, 2017; Kaviani et al., 2018; Tian & Ye, 2018; Hieu et al., 2019).

In this paper, inspired by the importance of diversification to firms and the literature on EPU, we investigate the impacts of EPU on corporate diversification in the Chinese market, which might represent a different form of linkage in the literature on corporate diversification.

We consider using Chinese data for the following reasons. First, it comes at a right time that the possible effects of economic policy uncertainty on firms' operation decisions in China's market are of great interest, amid the time of the on-going trade war between China and the U.S. Second, the Chinese economy with the enormous ups and downs of growth and policy changes offers an eventful data set for testing the relationship between EPU and diversification (see Figure 1). Third, the issues of shareholder protection and investment information environments have not been well addressed, which is more critical in the Chinese market than

in other developed markets. Fourth, the distinctive shareholder structure with state ownership in the Chinese market may reveal interesting and unique results for firms' reactions to EPU. This setting will provide fascinating findings, which set our research apart from the other current studies in the literature.

Our study shows that there is a positive association between economic policy uncertainty and corporate diversification, meaning that high economic policy uncertainty will lead to an increase of diversification for firms. This is consistent with the hypothesis that diversification is encouraged so that risk will be reduced when uncertainty increases. Our empirical results also show that the positive impact of EPU is significant for large-cap and medium cap firms, but not for small-cap ones. The findings also reveal that high EPU is associated with higher diversification, while low EPU is not. The results also show that the effect of EPU on diversification of SOEs is greater than that on non-SOEs' diversification. Our results are robust through different measures of economic policy uncertainty and corporate diversification and remain significantly unchanged when dealing with endogeneity problems.

Further, our analyses do not indicate that block shareholders are crucial in the decision making process to diversify in firms under the period of high economic policy uncertainty in this market. However, regarding information asymmetry, diversification of the firms with a high number of analyst followers and equity reports will increase when economic policy uncertainty is at its high stage. It is also understandable that uncertainty in economic policies could transforms into firm performance's volatility and obliquely motivates corporate diversification. Under that light, our findings suggest that diversification plays an active role in mitigating economic-policy related risks, thus enhancing firm performance.

Our main contributions and findings contribute to three specific strands of the literature. To the best of our knowledge, this is the first study investigating the connection between EPU and corporate diversification. Second, our study contributes to the rapidly growing research on the possible impacts of EPU on firm-level operation decisions. Third, the findings obtained from our study provide fresh insights into the interconnection between corporate diversification and governance under the influence of EPU in an emerging market; and implications for firms as well as investors when confronting high uncertainty of economic policies.

We organize the rest of the paper as follows. Section 2 provides a review on the literature and hypothesis development. Section 3 presents empirical models and variable construction. Section 4 summarizes our sample and data descriptive statistics. Section 5 reports the empirical results, while further tests for different influence channels are found in section 6. Section 7 concludes our research.

2. Literature review and hypothesis development

A considerable body of literature documents the positive impact of diversification on firm value. Markus and Sebastian (2010) find that using book values of debt, there is no discount for mainly equity financed firms and lower distress risk and equity volatility for diversified firms. Santalo and Becerra (2008) show that diversified firms perform better in industries with less competition. It also concludes that the traditional diversification discount may have obtained bias estimates of the average diversification effect on performance. Villalonga (2004) use a census data survey of the Business Information Tracking Services to show that a

diversification premium exists in the US economy. Campa and Kedia (2002) report that the diversification discount always drops, and sometimes turns into a premium. Graham & Lemmon and Wolf (2002) provide evidence that excess firm value does not decline when firms increase their number of business segments. Mansi and Reeb (2002) find that diversification discount stems from risk-deduction effects of diversification and all examined equity firms do not exhibit a diversification discount in the US market.

The positive effect of diversification is also analysed and confirmed in the recent literature during the period of economic shocks and high uncertainty. Rajan, Servaes, and Zingales (2000) show that the firm value will be enhanced thanks to the competition between segments for capital and top management's efficiency in choosing promising investment in a diversified firm during financial crises. Khanna and Tice (2001) conclude that internal capital markets function well for diversified firms and that diversified firms seemingly make better investment decision in response to demand shocks. Gopalan and Xie (2011) provide evidence that segments of diversified firms confront the distress significantly easier than the non-diversified firms. Matvos and Seru (2014) suggests that some firms reallocate resources internally to significantly mediate the effect of financial shocks, meaning that diversified firms are more efficient in capital allocation through internal capital markets. The effects of financial shocks may be crucial to understanding the consequences of policy interventions.

Giroud and Muller (2015) document that, for diversified firms, aggregate productivity increases thanks to the firm-wide resource allocation when there is a positive shock to investment opportunities. Similarly, Volkov and Smith (2015) reveals a significant increase in relative value of diversified firms during recessionary periods which attributes to more efficient internal capital allocation. Kuppuswamy and Villalonga (2016) show that the value of corporate diversification increased during the 2007–2009 financial crisis, since conglomerates are more efficient in internal capital allocation. The authors also suggest that corporate diversification can serve an important insurance function for investors. Aivazian, Rahaman and Zhou (2019) find that firms' product diversification is an important mean of reducing systemic shocks.

Based on the above literature, we propose the first hypothesis of Value Enhancement Theory. It means that diversification will help to reduce the risk of policy uncertainty and improve firm value, thus creating a better look of the firm in investors' eyes in the market. Therefore, it is likely that EPU will have a positive impact on corporate diversification.

Value Enhancement Theory Hypothesis: Policy uncertainty is positively associated with corporate diversification.

In the opposite direction, there is a substantial and influential body of literature documenting the negative effect of diversification on firm value. Bergh, Johnson and Dewitt (2008) find the presence of diversification discount due to agency problems between managers and shareholders. George and Kabird (2008) provide empirical results supporting for inefficient profit redistribution explanation of the business-group discount. Singh, Nejadmalayeri and Mathur (2007) analyze the relation between corporate diversification and performance for Indian firms and find that there exists a significant negative relation between the degree of diversification and firm performance. Dittmar and Shivdasani (2003) find that firms experience a reduction in diversification discount after divestiture. Denis et al. (2002) show that global

diversification results in average valuation discounts of approximately the same magnitude as those for industrial diversification.

At the same time, the literature on EPU also shows that high policy uncertainty hinder corporate investments and other firm-level decisions. Pástor and Veronesi (2012) show that EPU increases risk premiums on stocks, while Waisman, Ye, and Zhu (2015) indicate that EPU raise corporate debt financing costs. Wang, Chen and Huang (2014) document that Chinese companies tends to lower their investments when EPU is high. Nagar, Schoenfeld and Wellman (2016) find that high economic policy uncertainty is correlated with decreased stock liquidity and lowers investors' reaction to earnings for firms with high liquidity risk. Baker et al. (2016) suggest that economic policy uncertainty affects firms' business prospects and operating decisions, equity prices and volatility. Gulen and Ion (2016) find the negative effect of policy uncertainty on corporate investments. Nguyen & Phan (2017) and Bonaime, Gulen, and Ion (2018) show that policy uncertainty hinder merger and acquisition (M&A) activities. Kaviani et al. (2018) document the greater impact of policy uncertainty for firms operating in regulation-intensive industries, paying high effective tax rates and dependent on government spending. Tian & Ye (2018) report that EPU significantly reduces venture capital investment's propensity. Hieu et al. (2019) provide evidence that policy uncertainty is positively related to firm cash holdings due to investment delays or firms' precautionary motives. Yung and Root (2019) reveal that policy uncertainty is associated with earnings management at international level, meaning that firms increase (decrease) earnings management when policy uncertainty is high (low). Most recently, business media show the influential evidence of policy-related uncertainty when reporting that a signal of Trump Mexico tariffs costs carmakers $17 billion loss in market value (Bloomberg news)[2].

While taking the negative effect of diversification into account, it is evident that firms would be precautionary in investment decisions, thus reducing or delaying their investments during the period of high policy uncertainty. Based on the above discussion, our second hypothesis is as follows:

Prudence Theory Hypothesis: Policy uncertainty is negatively associated with corporate diversification.

Additonally, in the literature, there are several studies related to diversification and EPU separately in the Chinese market. Lin and Su (2008) show that diversification in Chinese firms depends on ownership structure, past performance and government control. Li and Rwegasira (2010) find that Chinese firms diversify in order to relax financial constraints from the external capital market. Su (2010) document that diversification decisions are different in different ownership structure and corporate governance mechanism in China. Li, He, Lan and Liu (2012) report a strong positive relationship between political connection and diversification in China. Wang and Luo (2018) reveal that there is a strong connection between corporate diversification and political connection of firms at different stages of top managers. Weng and Chi (2019) show that for Chinese family firms, second-generation successors tend to diversify their business and perform better after diversification.

[2] The report is available at https://www.bloomberg.com/news/articles/2019-05-31/japanese-automobile-stocks-drop-on-trump-s-mexico-tariff-tweet

Chen, Jiang and Tong (2017) find that EPU in China leads to a significantly lower aggregate stock return. Im, Kang and Park (2017) provide evidence that economic policy uncertainty magnifies peer effects in corporate investment decisions through the information channel. However, no study focuses on the connection between EPU and corporate diversification. We made progress by first reporting the positive effect of EPU on corporate diversification in the literature in general and in the Chinese market in particular.

3. Empirical models and variable constructions

3.1. Corporate diversification measure

We use the Entropy Index (see Jiang et al., 2006; Gu et al., 2018) as the proxy for corporate diversification. The Entropy Index is calculated as follows:

$$EI1 = \sum_{i=0}^{N} P_i \ln(\frac{1}{P_i}) \quad (1)$$

where EI is the abbreviation for Entropy Index, N is the number of segments of a firm, and P_i is the percentage of revenues from segment *i* in total revenues. This index is constructed in a way that the higher the index, the more diversified the firm is. We use the number of segments of a firm (N) as the alternative proxy of corporate diversification for robustness check as suggested by Gu et al. (2018).

3.2. Economic policy uncertainty measure

The growing literature in uncertainty in economic policies has encouraged Baker, Bloom, and Davis (2012) to develop a news-based index to measure uncertainty called the Economic Policy Uncertainty (EPU) Index[3] which was originally designed for the United States.

To measure EPU Index for China, Baker, Bloom, Davis, and Wang (2013) construct a scaled frequency count of articles contains information about the policy uncertainty[4] in the South China Morning Post, the leading English-language newspaper in Hong Kong.

As the EPU Indexes are reported in monthly data, we annualize the monthly EPU Index into yearly EPU and use that proxy as the main variable of interest.

3.3. Empirical model

We perform a multivariate regression of corporate diversification on economic policy uncertainty, controlled for factors that have been discussed in prior literature. Our baseline regression model is as follows:

$$EI_{i,t+1} = \alpha + \beta EPU_{i,t} + \gamma Controls_{i,t} + \sum Year + \theta_{firm} + \varepsilon_{i,t} \quad (2)$$

[3] EPU data for China and other countries are available at http://www.policyuncertainty.com/

[4] The authors employ a text filter that count combinations of keywords in a way that may deliver policy-related uncertainty. Their filtering mechanism is well explained at http://www.policyuncertainty.com/scmp_monthly.html.

where $EI_{i,j}$ is the level of corporate diversification proxied by the Entropy Index for firm i in year t. $EPU_{i,j}$ is the level of uncertainty in economic policy in China measured by the EPU Index for China (Barker et al., 2013).

Following the previous studies, we use several control variables which are commonly used in the corporate diversification literature. We control for the size effect (firm size) as larger firms might have better resources for diversification (Dennis et al., 1997). We control for firm's financial leverage as corporate diversification is correlated to the use of debt (Zheng, 2017). Profitability is also considered as a factor that might be negatively correlated to diversification (Gu et al., 2018). Malmendier and Tate (2008) find that higher free cash flows encourage business diversification. In addition, firms with higher growth tend to have motivation and capacity to diversify (Lin and Su, 2008). Therefore. $Controls_{i,j}$ in the empirical model (1) stand for the control variables including firm size (*Size*), financial leverage (*Lev*), profitability (*ROAA*), free cash flows (*FCF*), revenue growth (*Growth*), and Tobin's Q (*Q*) of firm i in year t. Finally, we control for the year dummies (Year) and firm fixed effects (θ_{firm}). All variable definitions and calculations are explained in Appendix A.

4. Data

4.1. Sample collection

The Chinese accounting system underwent an important reform in 2001 to reunify the diversified accounting standards into one uniform system which enables comparability between financial statements from different industry sectors. Therefore, we construct a dataset that includes all Chinese non-financial firms listed on the Shanghai and Shenzhen Stock Exchange during 2001-2017 to conduct the empirical analysis. We obtain accounting data from the China Stock Market and Accounting (CSMAR) database. Data for constructing the Entropy Index as the dependent variable is obtained from the WIND database. Economic policy uncertainty indexes are retrieved from Barker et al. (2016). We winsorize all the data by the top and bottom one percentile to minimize the impact of the extremes values in the sample.

Our final sample consists of 28,612 firm-year observations of 2,325 non-financial firms listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange during 2001-2017.

4.2. Descriptive statistics and correlation matrix

Table 1 contains the descriptive statistics and Pearson pairwise correlation matrix of all variables in the baseline model.

[Insert Table 1 about here]

The Entropy Index variable (EI) has a median of 0.232 while the median of N is 2.000, indicating that more than half of the listed firms in our sample are . Similar pattern is found in the distribution of the EPU Index variable (EPU), with the mean and median are 178.9 and 127.6, respectively.

On the other hand, China's EPU Index remains stable from 2001 to 2007 before highly fluctuating in the following period and reaches a new height of 364.8 in 2016 (see Figure 1). Figure 1 illustrates the changes in China, the United States, and the Global Economic Policy Uncertainty Index in the studied period. The figure shows that China's EPU seems to become more volatile and less related to the rest of the world in recent years.

[Insert Figure 1 about here]

Panel B of Table 1 presents pairwise correlation among all variables in our main empirical analysis. From this matrix, EI and N are highly correlated with a pairwise correlation of 0.814 at 1% level of significance. Another notable point is that EPU has a negative correlation to EI (-0.034) while it positively correlates to N (0.054), both at 1% level of significance. As both of those correlations are close to 0, this implies that N might be an alternative for EI but inferences drawn from regressions using N as dependent variable need to be treated with caution. Hence, the findings of our study are mainly based on empirical analysis using EI as the dependent variable.

5. Empirical results

5.1. Baseline regression results

Table 2 reports the regression results of our baseline empirical model (2). To make sure our model is treated for heteroskedasticity and serial correlation, we cluster the standard errors by firm, year, and both firm and year in the Column (2.1), (2.2), and (2.3) of Table 2, respectively. In the Column (2.4), we exclude all the control variables. In the Column (2.5), we employ the Paris-Winsten regression to estimate the parameters in the treatment for serial correlation. Eventually, we document consistent results in all five different regression settings.

[Insert Table 2 about here]

Our regression results report that the coefficient of current EPU is 0.000272 and statistically significant in association with one-year ahead Entropy Index at 1% significance level. This means listed firms tend to diversify more in the environment where economic policy-related uncertainty is increasing. There is a strong positive association between economic policy uncertainty and corporate diversification, meaning that high economic policy uncertainty will lead to an increase of diversification for firms. This is consistent with the hypothesis that diversification is encouraged so that risk will be reduced when uncertainty increases.

In addition, the coefficients of firm Size, Lev (financial leverage), and Growth (growth in revenues) are positive and significant at 0.01, 0.01, and 0.05 significance level, respectively. By contrast, there is a negative and significant coefficient of the ROAA. Hence, our results confirm that larger firms with a higher level of debt financing, and/or higher revenue growth engage more in diversification, and vice versa. Furthermore, lower profitability motivates firms to restructure their business and broader their segmentation.

For a better understanding of the relationship between corporate diversification and economic policy uncertainty, we divide our sample into split samples using three different benchmarks: market capitalization, EPU Index, and whether a firm is a state-owned enterprise (SOE) or not. We then run the panel regression with each of those split samples. The regression results are reported in Table 3 and Table 4.

[Insert Table 3 about here]

In Table 3, we analyze the effect of economic policy uncertainty on corporate diversification in different market capitalization groups of firms, and on two split samples of SOEs and non-SOEs. Interestingly, the relation between two factors that we found in our baseline regression analysis only exhibits in medium and large-cap split samples. To be specific, the coefficients

of EPU are positive and significant at 5% and 1% levels for medium and large-cap firms, respectively, while it is positive and statistically insignificant for small capitalization firms. Our empirical results show that the positive impact of EPU is significant for large-cap and medium cap firms, but not for small-cap ones.

On the other hand, the EPU-diversification relationship remains positive and significant in both SOEs (Column 3.4 of Table 3) and non-SOEs (Column 3.5 of Table 3) subsamples. However, the coefficient of EPU in Column (3.4) and (3.5) are respectively 0.000360 and 0.000238, insinuating that the effect of EPU on diversification is stronger for SOEs than for non-SOEs. This evidence is consistent with Chinese SOEs tend to adopt strategies for delivering administrative goals and expansionism, while non-SOEs have higher risk tolerance and tend to have higher profitability (Li and Xia, 2008).

[Insert Table 4 about here]

Table 4 reports the regression results of corporate diversification on economic policy uncertainty at different levels of EPU. Again, we document that the coefficient of EPU in the model (4.2) is positive and statistically significant in high EPU years at 1% level. On the other hand, EPU's coefficient is insignificant in the model (4.1), which investigates the relationship in years with low EPU. The findings reveal that high EPU is associated with higher diversification, while low EPU is not.

5.2. Robustness check and endogeneity diagnostics

In Section 5.1, we use Entropy Index and annualized EPU as the dependent variable and the variable of interest for the empirical analysis. In this section, we perform additional tests to confirm that our findings are robust to a wide range of proxies for EPU and diversification, and are not driven by endogeneity.

To verify our primary results, we reperform the tests using alternative measures of EI and EPU to alleviate the concern on measurement errors of our variables. Table 5 reports the regression results of N (number of segments in a firm) on EPU using the same analysis pattern as of EI in Table 2.

[Insert Table 5 about here]

Our inferences do not change after using N as the dependent variable instead of EI for models (5.1) to (5.5) whose estimation results are reported in Table 5. The coefficients of EPU in those models are consistently positive and significant at 1% level, thus confirming that our findings are robust to different measures of diversification.

Following Wu, Zhang, Wu, and Kong (in press), we extract the non-policy-related uncertainty in China by taking the residual of a time-series regression of United States' EPU on China EPU. The rationale behind this method is that shocks from the changes in the United States' macroeconomy and economic policies are likely to influence China's economic policies. Therefore, the news-based EPU index of China might be contaminated by such effects. In fact, that logic is confirmed in the current trade war between China and the United States started after Donald Trump's election as the President of the United States. We remove the contaminated component of the United States EPU Index orthogonal to China's, and define the residual as a proxy for the pure policy uncertainty generated by internal factors of China economy only. We then use this residual as an alternative measure of China's EPU and use it

for robustness check of our primary results. Table 6 shows the regression results of EI on six different alternative measures of economic policy uncertainty for China including year-end EPU, weighted EPU, Global EPU, one-year lead (F.EPU) and lag of EPU (L.EPU), and the residual from the regression of United States' EPU on China's EPU (resEPU) as suggested by Wu et al. (in press).

[Insert Table 6 about here]

Again, all the coefficients of alternative measures of EPU in Table 6 are positive and significant at 1% level. These results indicate that our primary results remain robust to alternative measures of economic policy uncertainty.

5.3. Endogeneity diagnostics

Endogeneity arises from three common sources: simultaneity, measurement errors, and omitted variables. Therefore, we employ several methodologies to alleviate these problems. First, we control for the reverse causation by revisiting our baseline analysis separately in different levels of market capitalization and EPU. Second, we compare the regression results of EI on the residual resEPU from Section 5.2 and on our primary EPU proxy. If those results are consistent, then the impact of measurement error on our variable of interest is insignificant. Third, we include the macroeconomic factors into the model to ease the concerns about omitted variables problem associating with the use of EPU in our models. Finally, we employ a Two Stages Least Square (hereafter 2SLS) regression by using instrumental variables (hereafter IVs) as the treatment to endogeneity and compare the results with our primary findings.

In Table 3 and 4 in Section 5.1, we show that the EPU-diversification relation only exhibits in split samples in which EPU is high, or the market capitalization of the firms is large enough. These findings suggest that the relation between EPU and diversification does not subject to reverse causality where these two factors can affect each other.

Table 6 shows that resEPU's coefficient is 0.059 and significant at 1% level of significance. On the other hand, all the control variables except to FCF and Q are also significant at 1% level. These results match our primary results and those which use other EPU proxies, thus confirming that our results are not driven by the measurement errors.

To further address the potential endogeneity concerns arising from the fact that economic policy uncertainty measures might contain the impacts of macroeconomic factors, we perform a panel regression of EI on a set of explanatory variables including EPU, the control variables and additional macroeconomic variables to control for uncontrolled confounding factors, namely CPI and GDP growth as suggested by Gulen and Ion (2015). However, as the correlation between GDP growth and EPU is quite high (-0.6735), we take the first difference of GDP growth as the control variable instead. This measure lowers the absolute pairwise correlation between our GDP growth proxy and EPU to 0.2544. Table 7 then reports the estimation results of the baseline regression adding macroeconomic control variables.

[Insert Table 7 about here]

EPU's coefficient remains positive and significant at 1% level while the value, signs, and significance of the coefficients of other control variables in the model (7) do not change much from their equivalents reported in the model (2.1) to (2.5) in Table 2. We hereby confirm that

EI is a suitable measure for corporate diversification, and the potential omitted variables bias is addressed.

After addressing three sources of endogeneity, we perform 2SLS regression using two IVs to alleviate potential endogeneity problems. We use the first difference and the fifth difference of EPU as the instrumental variables for the IV regression. Table 8 reports the 2SLS/IV regression results. The first stage results show that our IVs are significantly and positively associated with EPU at 1% level and pass all the diagnostic tests. In the second stage, the coefficient of EPU remains significant and positive after controlling for endogeneity issues. The results hence confirm the validity of our main findings.

[Insert Table 8 about here]

6. Mechanism tests

We provide new insight into the positive relationship between corporate diversification and economic policy-related uncertainty. Our empirical evidence from the baseline regression are strong and consistent to a wide range of variable measurements and methodologies. Section 6 presents our further investigation into the impact of EPU on diversification and provides explanations for the potential mechanisms of that relationship. Following the existing literature in corporate diversification and economic policy uncertainty, we identify three potential channels through which EPU can influence firms' diversification operations, including shareholder intervention, firm risk, and information asymmetry.

6.1. Blockholder control channel

Recent studies in the corporate diversification literature suggest that block holders tend to motivate diversification. According to Hautz, Mayer, and Stadler (2013), ownership concentration positively associates with product diversification while negatively affect international diversification of European firms. Nguyen (2018) argue that the presence of block holders encourages corporate diversification in Vietnamese conglomerates which operate in a similar regulatory and cultural environment to those in the Chinese market. Gu et al. (2018) argue that non-controlling block holders in Chinese firms have strong monitoring incentives, thus strengthening corporate governance and stimulate diversification. However, no prior research has been conducted to investigate the impact of block holders on diversification at different levels of economic policy-related uncertainty.

To test whether EPU increases diversification through block holders' intervention, we include interaction terms of EPU and block holder ownership's proxies into the baseline regression model, which has been revised in Table 7. Following Gu et al. (2018), we proxy block holder ownership using three variables. The first variable, *NcBlock*, which is a dummy documenting the presence of a non-controlling block holder, equals 1 if there is a non-controlling shareholder who owns more than 10 percent of total shares outstanding, and 0 vice versa. The second variable records the number of non-controlling block holders holding more than 10 percent of the total outstanding shares (*N_NcBlock*). In addition, we add a direct proxy for block holders' ownership, *BlockHolding*, which is the total holding of non-controlling shareholders as the third proxy.

[Insert Table 9 about here]

Table 9 reports our estimation results. EPU's coefficient remains positive, almost unchanged in value, and significant at 1% level in all there regressions. On one hand, Column (9.1) and (9.2) of Table 9 show that *NcBlock* and *N_NcBlock* are both positive and significant at 10% level of significant while Column (9.3) reports that *BlockHolding* is positive and statistically insignificant. These results suggest that the presence of non-controlling block holders indeed support corporate diversification as a countermeasure for their lack of controlling shares. On the other hand, all interaction terms in Table 9 are insignificant, implying that EPU has no incremental effect on the relationship between block holder ownership and diversification.

Overall, our analyses do not indicate that block holders are crucial in the decision-making process to diversify in firms under the period of high economic policy uncertainty in the Chinese market.

6.2. Firm performance channel

As EPU is the measure of policy-related uncertainty and strongly connected to macroeconomic factors, it might transform into volatility in firm performance and obliquely motivates corporate diversification. There is a number of literature to support this argument. Pandya and Rao (1998) find that on average, diversification positively associates with firm performance in highly diversified firms on both risks and return dimensions, despite diversification results in lower profitability compared to non-diversified firms. These findings parallel Hitt, Hoskisson, and Kim (1997)'s evidence showing diversified firms tend to perform better and have less performance risk than non-diversified firms.

Furthermore, Zhang, Tang, and He (2012) show that the performance of Chinese state-owned enterprises is positively associated with macroeconomic factors after privatization. Similarly, Lee (2014) provide evidence on the positive effects of economic growth on financial performance of firms in the Taiwanese property-liability insurance industry, which is extremely sensitive to uncertainty in economic policies. However, there is no prior study investigating the causal effects of economic policy uncertainty to diversification through firm performance.

To verify the effects of EPU on diversification through firm risk channel, we run two regressions to assess that relationship using proxies for firm performance and firm performance volatility. We use the natural logarithm *total operating revenues* (*lnRevenues*) and *profit margin ratio* (*ProfitMargin*) to proxy for firm performance. We measure volatility in firm performance by the rolling standard deviations of a firm's total operating revenues and profit margin in 3-year and 5-year periods.

First, we separately perform two 2SLS regressions of diversification on firm revenues and profit margin using EPU measures as the instrument variables. This setting is to examine the causal effect of EPU on diversification via firm performance as an interference (see Figure 2). Second, we regress proxies for performance volatility on corresponding lags of EPU to evaluate the time-variant association between two factors. The estimation results of the 2SLS regressions are reported in Table 10 and 11.

[Insert Figure 2 about here]

In Table 10, we regress diversification on total operating revenues using one-year lag (L.EPU) and three-year lag (L3.EPU) of China's annualized EPU as the IVs. The first stage of the

regression shows that both of the IVs positively associate with lnRevenues at 1% level. In the second stage, we document a strong positive relation between lnRevenues and EI at 1% level. In addition, our IVs pass all diagnostic tests, and lnRevenues is confirmed to be endogenous by the Durbin-Wu-Hausman (DWH) test (p-value = 0.000).

[Insert Table 10 about here]

Similarly, using the same set of IVs from Table 10 for the 2SLS regression of diversification on profit margin provides interesting hints on how EPU indirectly influence diversification. Table 11 reports the regression results.

[Insert Table 11 about here]

From the first stage, we document significant negative coefficients of L.EPU and L3.EPU at 1% level. Again, we observe another negative association between EI and ProfitMargin, which is instrumented by L.EPU and L3.EPU in the second stage regression, at 1% level. Our DWH test indicates that ProfitMargin is endogenous at p-value = 0.000, and our IV set remains strong and satisfies all the diagnostic tests as reported in Table 11. This means that our IVs are effective in treatment for endogeneity issues arising in our mechanism tests.

Our analysis results in Table 10 and 11 suggest that EPU indirectly influence diversification via firm performance as a channel. An increasing EPU means higher macroeconomic uncertainty and diversification, where we document increasing revenue and decreasing profitability. In common sense, increasing revenue is definitely not a bad signal, but what if higher EPU associates with higher volatility in firm performance? To address this question, we perform further analysis of the relationship between EPU and volatility in firm performance.

Considering that the effect of EPU on volatility in firm performance might be time-variant, we model this association using rolling standard deviations of performance proxies, namely lnRevenues_sd3, ProfitMargin_sd3, lnRevenues_sd5, and ProfitMargin_sd5 to measure volatility over 3-year and 5-year periods. Moreover, we also choose 3-year and 5-year lags of EPU (L3.EPU and L5.EPU) as the explanatory variables to match with the time frame of the proxies for performance volatility in separate regressions. Our research models are presented as follows:

$$Performance\_SD(n)_{ij} = \beta_0 + \beta_1 EPU_{j-n} + \sum Year + \theta_{firm} + \nu_{ij}$$

where *Performance_SD(n)*$_{ij}$ stands for the rolling standard deviation of firm *i* at time *j* over a period of *n-consecutive* years; *EPU*$_{j-n}$ is the n^{th} lags of *EPU*. In this panel regression, we control for year dummies ($\sum Year$) and firm fixed effects (θ_{firm}).
Table 12 presents our regressions of performance volatility on EPU over different periods of time.

[Insert Table 12 about here]

From Column (12.1) and (12.2) in Table 12, the coefficients of EPU is positive and significant at 1% level, indicating that higher EPU has a positive impact on volatility in firm performance in the following three years. When we observe this association in a longer period (e.g., 5 years), the coefficients of EPU changes from positive to negative and remain significant at 1% level. In the light of our primary results reported in Table 2, we suggest that the positive effect of EPU on performance volatility wares off in long-run and is mitigated by diversification.

Overall, our detailed empirical analysis reveals that EPU motivates diversification through firm

risk channel. We conclude that diversification plays an active role in mitigating economic-policy related risk and thus enhancing firm performance.

6.3. Information asymmetry

Other than shareholders disciplines, the corporate diversification literature suggests that external monitoring mechanism plays a crucial role in supervising managerial performance and helps alleviating value-reducing diversification decisions (Denis, Denis, and Sarin, 1997). Furthermore, firms with higher levels of information disclosure (e.g., lower information asymmetry) are usually less diversified (Gu et al., 2018). On other words, information asymmetry tend to encourage diversification as it helps concealing opportunistic managerial decisions. The presence of external monitoring systems, including analyst coverage and external auditor, is attributable to a more transparent information environment to outsiders (see Zuckerman, 2000; Choi and Lee, 2013).

However, analyst forecast might not always be reliable, especially under higher levels of policy uncertainty. Baloria and Mamo (2015) indicate that uncertainty in policy increases the complexity of the forecasting task for analysts, resulting in lower accuracy of analyst reports and higher levels of information asymmetry. Under that light, we expect the positive impact of information asymmetry on corporate diversification to be more prominent during periods with high uncertainty in economic policy.

To verify this argument, we follow the literature and use three proxies for information asymmetry which are widely adopted in the literature, including number of analysts following a firm (*Analyst*), number of analysts' reports covering a firm (*Report*), and a dummy variable, Auditor, which equals 1 if the external auditor of a firm is one of Big 4 auditor firms, and 0 otherwise (see Derrien and Kecskés, 2013; Gu et al., 2018). The higher the value of these three proxies, the lower level of information asymmetry of the firm.

To investigate the information deterioration mechanism of EPU on diversification, we perform panel regression of diversification proxies (EI) on EPU, information asymmetry's proxies (Analyst, Report, and Auditor), and their interaction terms.

[Insert Table 13 about here]

Table 13 reports the estimation results. *EPU*'s coefficient remains positive, and statistically significant in all there regressions. From Column (13.1) of Table 13, coefficient of *Auditor* and its interaction terms with *EPU* is statistically insignificant. In Column (13.2) and (13.3), Analyst and Report are negative and significant at 1% level, while their interaction terms with EPU are positive and significant at 10% level. These results suggest that EPU detoriorate accuracy of analysts and thus encouraging corporate managers to make diversification decisions, regardless of whether those decisions would reduce firm value or not. Moreover, auditor quality seems not to have any significant effect on diversification decision-making of corporate managers.

In general, our findings from Table 13 confirm our prediction that the positive effect of information asymmetry and corporate diversification become stronger under an increasing level of EPU.

7. Conclusion

Recent literature documents various impacts of economic policy uncertainty (EPU) on corporate investment. However, little attention has been paid to the impact of EPU on corporate diversification. Given the fact that the influence of diversification has been found in the literature on firm value, firm performance, cost of capital, cash holdings, productivity, organizational structure, etc., our research aims to investigate the linkage between corporate diversification and economic policy uncertainty in China, which is the second biggest economy worldwide and also where state-ownership structure strongly exists.

We find that there is a positive association between EPU and corporate diversification, meaning that high EPU will lead to an increase of diversification for firms. This is consistent with the hypothesis of value enhancement that diversification is encouraged so that risk will be reduced when uncertainty increases. Our empirical results also show that the positive impact of EPU is significant for large-cap and medium cap firms, but not for small-cap ones. The findings also reveal that high EPU is associated with higher diversification, while low EPU is not. Our analyses also indicate that the effect of EPU on diversification of SOEs is greater than that on non-SOEs' diversification. Our results are robust through different measures of economic policy uncertainty and corporate diversification and remain significantly unchanged when dealing with endogeneity problems.

Further, our analyses do not indicate that block shareholders are crucial in the decision making process to diversify in firms under the period of high economic policy uncertainty in this market. However, regarding information asymmetry, diversification of the firms with a high number of analyst followers and equity reports will increase when policy uncertainty is at its high stage. It is also understandable that uncertainty in economic policies could transforms into firm performance's volatility and obliquely motivates corporate diversification. Under that light, our findings suggest that diversification plays an active role in mitigating economic-policy related risks, thus enhancing firm performance. This is the first research to document the positive influence of EPU on corporate diversification. Our findings enrich the literature on and provide insights into the relationship between economic policy uncertainty and diversification at firm level.

References

Baker, S., Nicholas B., Steven J.D., and Wang,X. (2013). A Measure of Economic Policy Uncertainty for China. work in progress, University of Chicago

Baloria, V.P., and Mamo, K. (2015). Policy Uncertainty and Analyst Performance. 2015 Canadian Academic Accounting Association (CAAA) Annual Conference. Available at SSRN: https://ssrn.com/abstract=2533049 or http://dx.doi.org/10.2139/ssrn.2533049

Becker, S.O. (2016). Using instrumental variables to establish causality. IZA World of Labor. doi: 10.15185/izawol.250

Choi, J., and Lee, W. (2013). Association between Big 4 auditor choice and cost of equity capital for multiple-segment firms. Accounting & Finance, 54, 135-163.

Denis, D.J., Denis, D.K., and Sarin, A. (1997). Agency problems, equity ownership, and corporate diversification. Journal of Finance, 52(1), 135-160.

Gu, L., Wang, Y., Yao, W., and Zhang, Y. (2018). Stock liquidity and corporate diversification: Evidence from China's split share structure reform. Journal of Empirical Finance, 49, 57-80.

Gulen, H., and Ion, M. (2016). Policy uncertainty and corporate investment. The Review of Financial Studies, 29(3), 523-564.

Hautz, J., Mayer, Mcj., and Stadler, C. (2013). Ownership identity and concentration: A study of their joint impact on corporate diversification. British Journal of Management, 24(1), 102-126.

Hitt, M.A., Hoskisson, R.E., and Kim, H. (1997). International diversification: Effect on innovation and firm performance in product-diversified firms. Academy of Management Journal, 40(4), 767-798.

Lee, C. (2014). The effects of firm-specific factors and macroeconomics on profitability of property-liability insurance industry in Taiwan. Asian Economic and Financial Review, 4(5), 681-691.

Li, S., and Xia, J. (2008). The roles and performance of state firms and non-state firms in China's economic transition. World Development, 3691), 39-54.

Nguyen, T.X.T. (2018). Corporate governance and conglomerate diversification strategy – evidence from Vietnam. International Journal of Emerging Markets, 13(6), 1578-1596.

Pandya, A.M., and Rao, N.V. (1998). Journal of Financial and Strategic Decisions, 11(2), 67-81.

Wu, J., Zhang, J., Wu, Y., and Kong, D. (in press). When to go aboard: economic policy uncertainty and Chinese firms' overseas investment. Accounting & Finance. First published: 13th April 2019.

Zhang, X., Tang, Z., and He, J. (2012). Impact of macro and firm-specific characteristics on post-privatization performance: Evidence from China. The Chinese Economy, 45(5), 50-91.

Zuckerman, E.W. (2000). Focusing the corporate product: Securities analysts and de-diversification. Administrative Science Quarterly, 45(3), 591-619.

Hieu, V.P., Nam, H.N., Hien, T.N., Shantaram, H. 2019. Policy uncertainty and firm cash holdings. Journal of Business Research, 95, Pages 71-82.

Kenneth,Y. & Andrew, R. 2019. Policy uncertainty and earnings management: International evidence. Journal of Business Research, 100, Pages 255-267.

Bonaime, A. A., Gulen, H., & Ion, M. 2018. Does policy uncertainty affect mergers and acquisitions? Journal of Financial Economic, advance online publication May 16. https://doi.org/10.1016/j.jfineco.2018.05.007

Julio, B., & Yook, Y. 2016. Policy uncertainty, irreversibility, and cross-border flows of capital. Journal of International Economics, 103: 13-26.

Nguyen, N. H., & Phan, H. V. 2017. Policy uncertainty and mergers and acquisitions. Journal of Financial and Quantitative Analysis, 52: 613-644.

Pástor, L., & Veronesi, P. 2012. Uncertainty about government policy and stock prices. Journal of Finance, 67: 1219-1264.

Tian, X., & Ye, K. 2017. How does policy uncertainty affect venture capital? DOI: 10.2139/ssrn.2910075

Waisman, M., Ye, P. & Zhu, Y. 2015. The effect of political uncertainty on the cost of corporate debt. Journal of Financial Stability, 16: 106-117.

TABLES

Table 1.

Descriptive statistics and pairwise correlation matrix. Panel A reports the descriptive statistics of variables used in the baseline analysis. Panel B reports the Pearson pairwise correlation matrix. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

Panel A. Descriptive statistic

VARIABLES	Obs	Mean	Stdev	Min	Max	p1	p50	p99
EI	25,091	0.386	0.411	0	1.431	0	0.232	1.431
N	28,612	2.149	1.537	0	5	0	2	5
EPU	28,612	178.9	100.8	64.96	364.8	64.96	127.6	364.8
Size	28,610	21.63	1.192	18.99	25.36	18.99	21.50	25.36
Lev	24,360	0.175	0.151	0	0.612	0	0.153	0.612
ROAA	28,611	0.0388	0.0726	-0.225	0.316	-0.225	0.0260	0.316
FCF	26,086	0.00659	0.124	-0.514	0.319	-0.514	0.0182	0.319
Growth	27,326	0.00262	2.472	-6.922	6.888	-6.922	0.0176	6.888
Q	28,612	2.132	1.957	0.214	11.49	0.214	1.538	11.49
Number of firms	2,325	2,325	2,325	2,325	2,325	2,325	2,325	2,325

Panel B. Pearson correlation matrix

Variable	EI	N	EPU	Size	Lev	ROAA	FCF	Growth	Q
EI	1.000								
N	0.814***	1.000							
EPU	-0.034***	0.054***	1.000						
Size	0.104***	0.200***	0.158***	1.000					
Lev	0.131***	0.075***	-0.121***	0.099***	1.000				
ROAA	-0.036***	0.023***	0.126***	0.284***	-0.292***	1.000			
FCF	0.003	0.013**	0.003	0.055***	-0.026***	0.139***	1.000		
Growth	0.002	0.030***	-0.001	0.449***	0.038***	0.309***	0.048***	1.000	
Q	-0.132***	-0.145***	0.112***	-0.442***	-0.305***	0.067***	-0.062***	-0.256***	1.000

Table 2

Panel regression of corporate diversification on economic policy uncertainty.
*, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)
EPU	0.000272***	0.000272***	0.000272***	0.000213***	4.62e-05**
	(0.000100)	(4.88e-05)	(8.28e-05)	(2.02e-05)	(2.03e-05)
Size	0.0365***	0.0365***	0.0365***		0.0295***
	(0.00860)	(0.00549)	(0.00513)		(0.00377)
Lev	0.166***	0.166***	0.166***		0.0661***
	(0.0365)	(0.0257)	(0.0223)		(0.0203)
ROAA	-0.108**	-0.108***	-0.108***		-0.0330
	(0.0457)	(0.0232)	(0.0342)		(0.0271)
FCF	0.00232	0.00232	0.00232		-0.00370
	(0.0159)	(0.0117)	(0.0162)		(0.0116)
Growth	0.00235**	0.00235***	0.00235***		0.000397
	(0.00106)	(0.000688)	(0.000903)		(0.000665)
Q	0.000911	0.000911	0.000911		-7.44e-05
	(0.00268)	(0.00158)	(0.00190)		(0.00136)
Intercept	-0.450**	-0.450***	-0.450***	0.364***	-0.257***
	(0.179)	(0.113)	(0.108)	(0.00354)	(0.0815)
Firm FE	Yes	Yes	Yes	Yes	No
Year dummies	Yes	Yes	Yes	Yes	No
Clustered/Robust SE	Firm	Year	Two-way	Two-way	Robust
Observations	18,227	18,227	18,227	22,883	18,227
R-squared	0.033	0.033	0.033	0.005	0.053
Number of firms	2,256	2,256	2,256	2,535	

Table 3

The relation between EPU and corporate diversification in different levels of market capitalisation, and in SOEs and non-SOEs. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

	Small-cap	**Medium-cap**	**Large-cap**	SOEs	Non-SOEs
VARIABLES	(3.1)	(3.2)	(3.3)	(3.4)	(3-5)
EPU	0.000159	0.000325**	0.000549***	0.000360**	0.000238**
	(0.000155)	(0.000135)	(0.000144)	(0.000180)	(9.36e-05)
Size	0.0248	0.00252	0.0212**	0.0184*	0.0422***
	(0.0164)	(0.0107)	(0.00880)	(0.0109)	(0.00582)
Lev	0.187***	0.216***	0.0970***	0.128**	0.172***
	(0.0444)	(0.0372)	(0.0373)	(0.0499)	(0.0248)
ROAA	0.0676	-0.157***	-0.163***	-0.0430	-0.129***
	(0.0845)	(0.0589)	(0.0460)	(0.0617)	(0.0407)
FCF	0.0319	0.0158	-0.0311	0.0412	-0.00887
	(0.0269)	(0.0259)	(0.0290)	(0.0283)	(0.0194)
Growth	0.00301*	0.00293**	0.00323**	0.000695	0.00289***
	(0.00176)	(0.00146)	(0.00142)	(0.00180)	(0.00104)
Q	-0.00425	-0.00442	0.000870	-0.000199	0.00119
	(0.00385)	(0.00424)	(0.00352)	(0.00377)	(0.00220)
Intercept	-0.167	0.298	-0.181	-0.168	-0.536***
	(0.337)	(0.225)	(0.191)	(0.230)	(0.123)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Clusterred/Robust SE	Two-way	Two-way	Two-way	Two-way	Two-way
Observations	5,502	6,262	6,463	4,591	13,629
R-squared	0.038	0.034	0.043	0.030	0.036
Number of unit_id	1,356	1,446	1,096	589	1,666

Table 4

The relation between EPU and corporate diversification in different levels of economic policy uncertainty. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	**Low EPU** (4.1)	**High EPU** (4.3)
EPU	0.000164	0.000201***
	(0.000273)	(6.98e-05)
Size	0.0343***	0.0490***
	(0.00648)	(0.00872)
Lev	0.180***	0.0847**
	(0.0279)	(0.0389)
ROAA	-0.146***	-0.00564
	(0.0457)	(0.0556)
FCF	0.0160	0.0164
	(0.0213)	(0.0246)
Growth	0.00207*	0.00302*
	(0.00111)	(0.00167)
Q	0.00166	0.00173
	(0.00271)	(0.00272)
Intercept	-0.388***	-0.734***
	(0.138)	(0.184)
Firm FE	Yes	Yes
Year dummies	Yes	Yes
Clustered SE	Two-way	Two-way
Observations	12,163	6,064
R-squared	0.029	0.049
Number of unit_id	2,115	2,241

Table 5

Robustness check using number of segments (N) as the alternative proxy for corporate diversification. The Table 5 reports the relationship between EPU and corporate diversification using one-way, two-way clustered standard errors in panel OLS regression (Columns 5.1 to 5.4), and Paris-Winsten regression (Column 5.5) to mitigate serial correlation and heteroskedasticity. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)
EPU	0.00519***	0.00519***	0.00519***	0.00605***	0.000208***
	(0.000328)	(0.000135)	(0.000260)	(0.000211)	(7.53e-05)
Size	0.190***	0.190***	0.190***		0.194***
	(0.0313)	(0.0181)	(0.0182)		(0.0140)
Lev	0.369***	0.369***	0.369***		0.0925
	(0.139)	(0.0897)	(0.0803)		(0.0754)
ROAA	-0.291	-0.291*	-0.291**		-0.174
	(0.184)	(0.149)	(0.131)		(0.109)
FCF	0.128**	0.128*	0.128**		0.122***
	(0.0622)	(0.0602)	(0.0609)		(0.0438)
Growth	0.0114***	0.0114***	0.0114***		0.00301
	(0.00411)	(0.00362)	(0.00353)		(0.00262)
Q	0.00688	0.00688	0.00688		0.00529
	(0.00982)	(0.00574)	(0.00690)		(0.00452)
Intercept	-3.484***	-3.484***	-3.484***	0.419***	-2.066***
	(0.648)	(0.391)	(0.380)	(0.0714)	(0.304)
Firm FE	Yes	Yes	Yes	Yes	No
Year dummies	Yes	Yes	Yes	Yes	No
Clustered/ Robust SE	Firm	Year	Two-way	Two-way	Robust
Observations	20,413	20,413	20,413	25,622	20,413
R-squared	0.110	0.110	0.110	0.089	0.062
Number of unit_id	2,277	2,277	2,277	2,567	

Table 6

Robustness check using different measures of EPU including year-end China EPU (China EPU in December every year), Weighted EPU as suggested by XXXXX, Global EPU, one-year lead and lag of China EPU, and the residual effect of US's EPU on China EPU (resEPU), respectively. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(6.1)	(6.2)	(6.3)	(6.4)	(6.5)	(6.6)
Year-end EPU	0.000126***					
	(3.83e-05)					
Weighted EPU		0.000174***				
		(5.28e-05)				
Global EPU			0.000863***			
			(0.000263)			
F.EPU				0.000268***		
				(8.15e-05)		
L.EPU					0.000692***	
					(0.000161)	
resEPU						0.0590***
						(0.0180)
Size	0.0365***	0.0365***	0.0365***	0.0365***	0.0387***	0.0489***
	(0.00513)	(0.00513)	(0.00513)	(0.00513)	(0.00525)	(0.00527)
Lev	0.166***	0.166***	0.166***	0.166***	0.155***	0.137***
	(0.0223)	(0.0223)	(0.0223)	(0.0223)	(0.0226)	(0.0226)
ROAA	-0.108***	-0.108***	-0.108***	-0.108***	-0.0994***	-0.115***
	(0.0342)	(0.0342)	(0.0342)	(0.0342)	(0.0343)	(0.0342)
FCF	0.00232	0.00232	0.00232	0.00232	-0.00116	0.00158
	(0.0162)	(0.0162)	(0.0162)	(0.0162)	(0.0171)	(0.0162)
Growth	0.00235***	0.00235***	0.00235***	0.00235***	0.00215**	0.00233***
	(0.000903)	(0.000903)	(0.000903)	(0.000903)	(0.000905)	(0.000903)
Q	0.000911	0.000911	0.000911	0.000911	0.00111	0.00160
	(0.00190)	(0.00190)	(0.00190)	(0.00190)	(0.00190)	(0.00190)
Intercept	-0.432***	-0.452***	-0.514***	-0.448***	-0.642***	-0.660***
	(0.109)	(0.108)	(0.108)	(0.108)	(0.114)	(0.120)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	Two-way	Two-way	Two-way	Two-way	Two-way	Two-way
Observations	18,227	18,227	18,227	18,227	17,463	18,227
R-squared	0.033	0.033	0.033	0.033	0.034	0.033
Number of firm	2,256	2,256	2,256	2,256	2,227	2,256

Table 7.

Treatment for endogeneity. Incluing macroeconomic variables as a solution to mitigate endogeneity arising from the omitted variable bias of EPU. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(7)
EPU	0.000624***
	(8.44e-05)
Size	0.0387***
	(0.00525)
Lev	0.155***
	(0.0226)
ROAA	-0.0994***
	(0.0343)
FCF	-0.00116
	(0.0171)
Growth	0.00215**
	(0.000905)
Q	0.00111
	(0.00190)
Intercept	-0.630***
	(0.112)
Macroeconomic variables	Yes
Firm FE	Yes
Year dummies	Yes
Clustered SE	Two-way
Observations	17,463
Number of unit_id	2,227
R-squared	0.034

Table 8

2SLS regression of corporate diversification on EPU. The instrumental variables used in this regression include the first difference and the fifth difference of EPU. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

First stage regression		
VARIABLES	Coefficients	Standard errors
D.EPU	0.676***	(0.00726)
D5. EPU	0.00295***	(0.00072)
Size	21.293***	(1.0393)
Lev	-92.88***	(5.1296)
ROAA	23.157***	(8.1844)
FCF	0.0723	(4.220)
Growth	0.299*	(0.220)
Q	-2.776***	(0.403)
F test of excluded instruments		
F(2, 9406)	4942.56	
Prob > F	0.0000	
SW Chi-squared p-value	0.0000	
Underidentification test		
Kleibergen-Paap rk LM statistic	4009.78	
Kleibergen-Paap rk LM statistic Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald rk F statistic	4942.56	
10% maximum IV size	19.93	

Second stage (IV) regression		
VARIABLES	Coefficients	Standard errors
EPU	0.000165***	(3.84e-05)
Size	0.0317***	(0.0061)
Lev	0.0828***	(0.0274)
ROAA	-0.0880**	(0.0407)
FCF	-0.0173	(0.0209)
Growth	0.00367**	(0.00109)
Q	0.00017	(0.0022)
Underidentification test		
Kleibergen-Paap rk LM statistic	4009.78	
Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald F statistic	4942.56	
10% maximal IV size	16.38	
Hansen-J test statistics	0.666	
Chi-squared p-value	0.4145	
Durbin-Wu-Hausman test for endogeneity Chi-squared	15.606	
Chi-squared p-value	0.0001	
Instrumented variable	EPU	
Instrumental variables	D.EPU, D5.EPU	
Observations	10,938	
Number of firms	1,524	

Table 9

Mechanism test: Blockholder intervention channel. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(9.1)	(9.2)	(9.3)
EPU	0.000275***	0.000274***	0.000264***
	(8.14e-05)	(8.10e-05)	(8.02e-05)
NcBlock	0.0202*		
	(0.0105)		
EPU_NcBlock	-1.90e-05		
	(5.32e-05)		
N_NcBlock		0.0159*	
		(0.00825)	
EPU_N_NcBlock		-5.11e-06	
		(4.02e-05)	
BlockHolding			0.000276
			(0.000279)
EPU_BlockHolding			5.18e-07
			(1.32e-06)
Size	0.0318***	0.0316***	0.0317***
	(0.00529)	(0.00529)	(0.00529)
Lev	0.183***	0.183***	0.182***
	(0.0223)	(0.0223)	(0.0222)
ROAA	-0.0513	-0.0520	-0.0526
	(0.0341)	(0.0341)	(0.0341)
FCF	-0.0124	-0.0125	-0.0123
	(0.0173)	(0.0173)	(0.0173)
Growth	0.00214**	0.00212**	0.00214**
	(0.000887)	(0.000887)	(0.000887)
Q	-0.000371	-0.000338	-0.000383
	(0.00201)	(0.00201)	(0.00201)
Intercept	-0.373***	-0.369***	-0.367***
	(0.112)	(0.112)	(0.112)
Control for macro factor (D.GDP, CPI)	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Clustered SE	Two-way	Two-way	Two-way
Observations	17,198	17,198	17,198
R-squared	0.031	0.031	0.031
Number of unit_id	2,226	2,226	2,226

Table 10

Mechanism test: performance risk. Table 10 reports the results of the 2SLS/IV regression of corporate diversification on total operating revenues with lags of EPU as the instrumental variables. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

First stage regression		
VARIABLES	Coefficients	Standard errors
L.EPU	0.0058***	(0.00016)
L3. EPU	0.0067***	(0.00216)
Size	0.433***	(0.0285)
Lev	-1.930***	(0.114)
ROAA	1.537***	(0.204)
FCF	0.267***	(0.092)
Growth	0.268***	(0.0083)
Q	-0.0667***	(0.0079)
F test of excluded instruments		
F(2, 13063)	783.56	
Prob > F	0.0000	
SW Chi-squared p-value	0.0000	
Underidentification test		
Kleibergen-Paap rk LM statistic Chi-squared	1164.44	
Kleibergen-Paap rk LM statistic Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald rk F statistic	783.56	
10% maximum IV size	19.93	

Second stage (IV) regression		
VARIABLES	Coefficients	Standard errors
lnRevenues	0.0258***	(0.0051)
Size	0.0143**	(0.00636)
Lev	0.224***	(0.0238)
ROAA	-0.0548**	(0.0283)
FCF	-0.02	(0.0190)
Growth	-0.0051***	(0.0017)
Q	0.00014	(0.00194)
Underidentification test		
Kleibergen-Paap rk LM statistic	1164.438	
Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald F statistic	783.564	
10% maximal IV size	19.93	
Hansen-J test statistics	0.008	
Chi-squared p-value	0.9291	
Durbin-Wu-Hausman test for endogeneity Chi-squared		
Chi-squared p-value		
Instrumented variable	lnRevenues	
Instrumental variables	L.EPU, L3.EPU	
Observations	15,073	
Number of firms	2,002	

Table 11

Mechanism test: performance risk. Table 11 reports the results of the 2SLS/IV regression of corporate diversification on profit margin with lags of EPU as the instrumental variables. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

First stage regression		
VARIABLES	Coefficients	Standard errors
L.EPU	-0.0028***	(0.00029)
L3. EPU	-0.0037***	(0.00043)
Size	0.287***	(0.0594)
Lev	0.159	(0.2454)
ROAA	7.189***	(0.513)
FCF	-0.191	(0.219)
Growth	-0.286***	(0.0175)
Q	0.0781***	(0.0202)
F test of excluded instruments		
F(2, 13063)	54.86	
Prob > F	0.0000	
SW Chi-squared p-value	0.0000	
Underidentification test		
Kleibergen-Paap rk LM statistic Chi-squared	106.72	
Kleibergen-Paap rk LM statistic Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald rk F statistic	54.86	
10% maximum IV size	19.93	

Second stage (IV) regression		
VARIABLES	EI	Standard errors
ProfitMargin	-0.050***	(0.0109)
Size	0.040***	(0.0054)
Lev	0.182***	(0.0276)
ROAA	-0.346***	(0.0912)
FCF	-0.022	(0.0221)
Growth	-0.012***	(0.0033)
Q	0.002	(0.0022)
Underidentification test		
Kleibergen-Paap rk LM statistic	106.724	
Chi-squared p-value	0.0000	
Weak identification test		
Kleibergen-Paap rk Wald F statistic	54.86	
10% maximal IV size	19.93	
Hansen-J test statistics	0.129	
Chi-squared p-value	0.7194	
Durbin-Wu-Hausman test for endogeneity Chi-squared	25.543	
Chi-squared p-value	0.0000	
Instrumented variable	ProfitMargin	
Instrumental variables	L.EPU, L3.EPU	
Observations	15,073	
Number of firms	2,002	

Table 12

Mechanism test: performance risk channel. Table 11 examines the relationship between volatility in firm performance and economic policy uncertainty in different period lengths. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(1) lnrevenues_sd3	(2) profitmargin_sd3	(3) lnrevenues_sd5	(4) profitmargin_sd5
Intercept	-3.066***	-4.311***	0.499***	1.136***
	(0.569)	(1.411)	(0.0574)	(0.142)
L3.EPU	0.0271***	0.0381***		
	(0.00453)	(0.0111)		
L5.EPU			-0.000656***	-0.00262***
			(0.000207)	(0.000554)
Firm FE	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	19,613	19,619	15,095	15,101
R-squared	0.106	0.039	0.154	0.047
Number of unit_id	2,201	2,201	2,087	2,087

Table 13

Mechanism test: the information asymmetry channel. *, **, and *** represent significance at 10%, 5% and 1% levels, respectively.

VARIABLES	(12.1)	(12.2)	(12.3)
EPU_w	0.000411***	0.000276*	0.000316**
	(8.20e-05)	(0.000164)	(0.000160)
Auditor	0.0199		
	(0.0220)		
EPU_Auditor	-2.88e-05		
	(8.09e-05)		
Analyst		-0.0213***	
		(0.00629)	
EPU_Analyst		4.97e-05*	
		(2.88e-05)	
Report			-0.0167***
			(0.00504)
EPU_Report			4.33e-05*
			(2.29e-05)
Size	0.0317***	0.0470***	0.0431***
	(0.00517)	(0.00653)	(0.00643)
Lev	0.188***	0.124***	0.117***
	(0.0216)	(0.0273)	(0.0272)
ROAA	-0.0388	-0.0204	-0.0262
	(0.0334)	(0.0390)	(0.0386)
FCF	-0.0102	-0.00693	-0.0109
	(0.0169)	(0.0194)	(0.0192)
Growth	0.00209**	0.00196*	0.00189*
	(0.000879)	(0.00103)	(0.00101)
Q	-0.000996	0.00409*	0.00458*
	(0.00200)	(0.00241)	(0.00243)
Intercept	-0.380***	-0.728***	-0.657***
	(0.109)	(0.147)	(0.145)
Control for macroeconomic factors	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Clustered SE	Two-way	Two-way	Two-way
Observations	18,014	12,565	12,811
R-squared	0.038	0.045	0.043
Number of unit_id	2,269	2,169	2,186

APPENDIXES AND FIGURES

Appendix A.

Variable definition

Variable	Definition
EI	The Entropy Index. $EI = \sum_{j=0}^{n} \ln(\frac{1}{Revenues_j})$, where $Revenues_j$ is the percentage of revenues from segment j in total revenues of a firm.
EPU	The Economic Policy Uncertainty Index introduced by Baker, Bloom, and Davis (2012).
Size	Measuring firm size by taking the natural logarithm of the book value of total assets at the end of a fiscal year.
ROAA	Return on average assets. It is defined as the ratio of net income to the average total assets in a fiscal year.
Leverage	Financial leverage. The ratio of total debt to the book value of total assets at the end of a fiscal year.
FCF	Free cash flows ratio. The ratio of free cash flows to the firm to the book value of total assets.
Growth	Revenues growth rate. The natural logarithm of ratio of the total operating revenues to its one-year lag.
Q	Tobin's Q. The ratio of the market value of equity of a firm to its book value at the end of a fiscal year.
NcBlock	A dummy variable that reports the presence of non-controlling block holders. It equals 1 if the second largest shareholder of the firm owns more than 10% of total shares at the end of a fiscal year.
N_NcBlock	The number of non-controlling block holders of the firm.
BlockOwnership	The total percentage of shares owned by non-controlling block holders.
Revenues	Natural logarithm of firm's total operating revenues.
PM	Profit margin ratio. The ratio of net income to total operating revenues.
Revsd3	Performance volatility. 3-year rolling standard deviation of Revenues.
Revsd5	Performance volatility. 5-year rolling standard deviation of Revenues.
PMsd3	Performance volatility. 3-year rolling standard deviation of PM.
PMsd5	Performance volatility. 5-year rolling standard deviation of PM.
Big4	A dummy variable that equals 1 if a firm is audited by one of the Big Four auditor firms, and 0 otherwise.
Analyst	Number of analyst following the firm. It is calculated by taking the natural logarithm of 1 plus the number of analyst following the firm at the end of a fiscal year
Report	Number of research reports covering the firm. It is calculated by taking the natural logarithm of 1 plus the number of research reports issued by securities companies covering the firm in one fiscal year.

Figure 1
China, United States, and the Global Economic Policy Uncertainty Index in the period from 2001 to 2017.

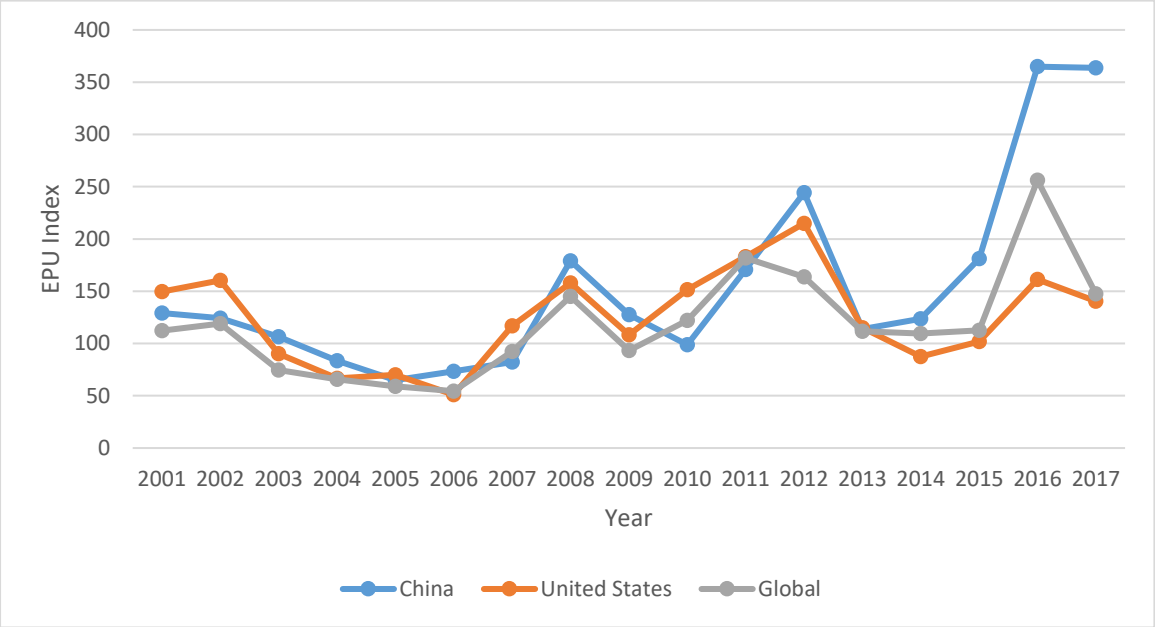

Figure 2

Schematic depiction of 2SLS/IV regression – Effect of economic policy uncertainty on corporate diversification via firm performance channel. Framework adopted from Becker (2016).