No. 2506 [EN]

IMI Working Paper

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Does policy uncertainty affect firms' exchange rate exposure? Evidence from China*[1]

By **Qing He**, **Bailin Liang**, **Ce Zhang**[*]

November 2025

Abstract

Analyzing data from 3616 Chinese listed firms, we find a strong positive relationship between policy uncertainty and firms' exchange rate exposure. This result remains robust after controlling for macroeconomic conditions and addressing endogeneity issues. Notably, policy uncertainty's impact is significantly stronger for firms with a higher degree of international involvement and for poorly-governed firms. Interestingly, firms use financial hedging more intensively and reduce their operational hedging in high-uncertainty periods. Our results suggest that policy uncertainty exacerbates the impact of currency movements on firms' financial performance, as firms become increasingly involved in international operations. Consequently, firms should strengthen their corporate governance and make effective use of hedging tools.

JEL Classification: F23, F31, G18
Keywords: Economic policy uncertainty (EPU), International operation, Corporate governance, Hedging

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[*] Published in China Economic Review, Volume 95, November 2025.
[1] We are grateful for the insightful comments of Iftekhar Hasan, Iikka Korhonen, Zhitao Lin and Yaqi Wang for their valuable suggestions. We are also grateful for the excellent comments from participants at seminars at Bank of Finland, Jinan University, Capital University of Economics and Business, Wuhan University, and Central University of Finance and Economics, as well as the EFMA 2023 Annual Conference (Cardiff). This research is supported by the National Natural Science Foundation of China (72473146, 72101267), the Fundamental Research Funds for the Central Universities, the Research Funds of Renmin University of China (24XNN005). All remaining errors are ours.
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1. Introduction

Exchange rate risk is a key aspect of firms' daily operations (Bartram, Brown, & Minton, 2010; Bodnar, Dumas, & Marston, 2002). Indeed, exchange rate movements could significantly impact firm performance because of firms' international operations, overseas investments, and market competition (Aggarwal & Harper, 2010; Brown, 2001; He, Liang, & Liu, 2024; He, Liu, & Zhang, 2021b; TondÖoé & Gilles, 2025). Given the influence of exchange rate exposure, prior studies have focused on the magnitude and sources of this exposure.[2] This study contributes to the literature by highlighting another important factor affecting variation in firms' ERE (exchange rate exposure): economic policy uncertainty (EPU).

Research has shown that government policies have various effects on firms' operations. Firms face substantial uncertainty regarding regulations, taxation, and market competition, which has significant effects on corporate decisions (Altig et al., 2020; Bhattacharya, Hsu, Tian, & Xu, 2017; Guceri & Albinowski, 2021). In the context of exchange rate exposure, EPU is an important source of risk, as it may lead to increased uncertainty vis-à-vis firms' international operations or their ability to hedge exchange rate risks. Recent studies show that firms use hedging tools more intensively in response to increased EPU (Nguyen, Kim, & Papanastassiou, 2018), while EPU deters cross-border acquisitions (Cao, Li, & Liu, 2019).

Using data from all Chinese listed firms for the period 2010–2020 and the EPU index developed by Baker, Bloom, and Davis (2016), we empirically examine the relationship between EPU and exchange rate exposure. The choice of country is dictated as the weak evidence of previous studies on the exchange rate exposure in US corporations,[3] the rising of Chinese economy in the world economy, and many Chinese firms intensively involved in global market. Thus, Chinese data is more likely to reduce the estimation noise as Chinese firms are more sensitive to the unexpected exchange rate movements (He et al., 2021b). More importantly, China provides an important setting to investigate the impact of policy uncertainty on exchange rate exposure. During our sample period, China implemented a series of market-oriented reform, leading to a great uncertainty in economic policy. For instance, ZTE, the second-largest Chinese telecom provider in more than 160 countries and regions, became a representative victim of substantial trade policy uncertainty triggered by Sino-US trade conflicts in 2018 and 2019, with supply chains disrupted and stagnation in production and sales. It shows that uncertainty on China's trade policies, not only on its implementation, but also on its impact on firms engaging in international market. Finally, few studies have examined Chinese firms' hedging behavior, even though they actively participate in derivatives transactions.

We begin our analysis by examining EPU's effect on aggregate exchange rate exposure—measured by the average exposure of all Chinese listed firms. Specifically, we

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[2] Pioneered by Dufey (1972), the literature on exchange rate exposure has been advanced in both the quantitative and qualitative dimensions by Shapiro (1975), Dumas (1978), Hodder (1982), Adler and Dumas (1984), Jorion (1990), Allayannis (1997), He and Ng (1998), Bodnar et al. (2002), Koutmos and Martin (2003), and, more recently, Bartram (2019), Entrop and Fuchs (2019), He et al. (2021a, 2021b), and Salomao and Verela (2022).

[3] For instance, Jorion (1990) noted that only 15/287 US multinationals show significant exposure at the 5 % level. See Bodnar and Bartram (2007) for a detailed discussion of the empirical results of exchange rate exposure.

conduct a vector autoregression (VAR) analysis with aggregate exposure and use the EPU index and other macro-economic controls. Our results suggest that one standard deviation increase in the EPU index is associated with a 3.366 % increase in aggregate exposure, accounting for 12.751 % of the sample mean (sample mean: 0.262).

Next, we estimate EPU's effect on firm-level exchange rate exposure. Specifically, we model the extent of a firm's exposure in quarter t as a function of EPU, as well as a set of firm-level controls in year t-1. The empirical evidence shows that EPU has a positive

and statistically significant effect on firm-level ERE. One standard deviation increase in EPU leads to a 0.022 (0.028 × 0.785) increase in exchange rate exposure. Further, we find that operational hedging ameliorates EPU's impact on exposure, while there is no such evidence for financial hedging. Our results suggest that firms' financial hedging is inadequate in emerging-market economies, e.g., China, whereas operational hedging can provide better protection during high-EPU periods.

Similar results are obtained using alternative measures for EPU and exchange rate exposure, different specifications, various macroeconomic controls and extending the sample to cover COVID-19 pandemic period. To examine whether EPU's impact depends on the policies themselves, we employ several EPU indices developed by Huang and Luk (2020), e.g., fiscal, monetary, and trade policy. The results show that fiscal and trade EPU have a stronger effect in driving firms' exchange rate exposure.

Our findings suggest a positive relationship between exchange rate exposure and policy uncertainty. However, they do not rule out the possibility of omitted variable bias, such as economic uncertainty as an explanation. We conduct two additional tests to alleviate endogeneity concerns. First, we use residual EPU, after controlling for a variety of macroeconomic variables, and foreign countries'EPU as an alternative independent variable (Kaviani, Kryzanowski, Maleki, & Savor, 2020). Second, we search for instrumental variables; specifically, we use the number of geological disasters as the instrument for EPU. To keep its society stable and its economic performance competitive, the Chinese government has enacted various policies concerning disaster relief and social stability and has postponed controversial policies that may aggravate tensions. Consequently, the Chinese government is likely to remain consistent in its economic policy. This highlights that EPU has a significantly positive effect on firms' exposure.

To uncover the channels through which policy uncertainty affects exchange rate exposure, we investigate three possibilities. First, firms have different levels of international involvement. Government policies have a direct impact on the revenue and costs of firms' international business. For such firms, an increase in EPU increases uncertainty regarding their international prospects, which could translate into higher exchange rate exposure. Second, elevated EPU may foster an opaque information environment conducive to insider rent-seeking by weakening external monitoring and blurring performance accountability (Hossain, Raghunandan, & Rama, 2020; Maffett, 2012). Information opacity and governance mechanisms are often compromised, reducing the detectability of self-serving actions (Jensen & Meckling, 2019). Managers may exploit policy uncertainty to justify rent seeking decisions by attributing poor outcomes to external factors rather than personal failure. For instance, Duchin and Schmidt (2013) find poorly governed firms are more likely to engage in empire-building and value-destroying mergers during high uncertainty periods. If EPU significantly increases insiders' rent-seeking activities, leading to a large cash flow volatility, we

expect high-EPU periods to be associated with high exposure. Finally, studies show that firms actively adopt risk management tools to manage currency risk. For instance, Bodnar, Giambona, Graham, Harvey, and Marston (2011) find that macro conditions may affect firms' willingness to hedge foreign exchange risk. If high uncertainty increases the use of both financial and operational hedging, we should observe a muted positive or negative relationship between policy uncertainty and exchange rate exposure.

To test whether EPU influences firms' exposure by increasing the risks of firms' international operations, we construct three proxies for firms' involvement in international operations: the ratio of foreign-currency loans to total loans, firms in industries that are subject to intense international competition, and the ratio of overseas revenue to operating income. We expect EPU's impacts to be more pronounced in firms heavily reliant on foreign revenue or international borrowing. Consistent with this hypothsis, we find that the relationship between EPU and exchange rate exposure is significantly stronger for firms dependent on overseas revenue and foreign currency loans, as well as those in highly competitive industries. It suggests that an increase in EPU increases the risk for firms' in ternational operation prospects, which translates into higher ERE.

To test whether policy uncertainty induces corporate insiders to seek private benefits, we examine whether there are more self-serving transactions during high-EPU periods. We compare harmful related party transactions, other account receivable,[4] executive

compensation between high- and low-EPU periods, and find more self-serving transactions in the former period. Further, we examine whether EPU's positive impact is moderated by better governance or corporate transparency.[5] We find consistently significant interactions between EPU and proxies for corporate governance and information disclosure. This is consistent with the idea that EPU increases insiders' rent-seeking activities, leading to increased cash flow volatility in response to unfavorable currency movements.

If EPU encourages firms to conduct more intensive risk management, we should observe a positive relationship between EPU and financial hedging and operational hedges. Interestingly, we find that firms increase their use of financial derivatives, while reducing their multinational activity. Given the inadequate role of financial hedging against exchange rate exposure in China, our findings support the notion that EPU might depress corporate oversea investments, hence minimizing the role of operational hedging against exchange rate risks.

Our study makes two important contributions to the existing literature. First, we contribute to the growing body of research on the determinants of firms' exchange rate exposure (e.g., Doidge, Griffin, & Williamson, 2006; Dominguez & Tesar, 2006; Froot, Scharf stein, & Stein, 1993). While prior studies have identified determinants such as business operations, capital market access, and pass-through mechanisms (Bartram & Bodnar, 2012; Flood Jr & Lessard, 1986; Hodder, 1982), few have examined the role of macroeconomic policy factors. We extend this line of research by demonstrating that

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[4] As widely documented in the literature (Berkman, Cole, & Lawrence, 2009; Jiang et al., 2010), harmful related party transactions and other account receivables often involve the expropriation of minority shareholder interests or the pursuit of rent-seeking strategies by controlling shareholders.

[5] Better corporate governance can constrain insiders' self-serving transactions (Bonaime et al., 2018; He & Rui, 2016).

EPU constitutes a significant source of exchange rate exposure. Moreover, in contrast to the established view that financial hedging effectively mitigates foreign exchange risk (Allayannis & Weston, 2001; Bartram et al., 2010; Hutson & Laing, 2014), our findings indicate that in emerging markets with underdeveloped derivatives markets, such as China, operational hedging is more effective than financial hedging in alleviating EPU-induced exchange rate exposure.

Second, our research contributes to the literature on the effects of EPU on firms' decisions and performance. Existing studies have largely focused on how policy uncertainty influences corporate investment, dividend policies, credit spreads, and innovation (Bhattacharya et al., 2017; Bloom, 2009; Bonaime, Gulen, & Ion, 2018; Farooq & Ahmed, 2019; Francis, Hasan, & Zhu, 2014; Julio & Yook, 2012; Kaviani et al., 2020). However, little attention has been paid to whether and how EPU affects firms' exposure to exchange rate fluctuations. Our study bridges these two strands of literature by demonstrating that policy uncertainty increases the risks related to international operations, likely through diminished prospects for overseas investment and increased complexity in managing foreign-currency cash flows, thereby elevating exchange rate exposure.

Notably, we provide novel evidence that EPU influences insider rent-seeking activities, which subsequently exacerbates firms' vulnerability to exchange rate movements. We further show that better governance mechanisms can curb such self-serving behavior, thereby attenuating the positive effect of EPU on exchange rate exposure. Thus, our study underscores the importance of robust corporate governance as a key mechanism for reducing firms' sensitivity to EPU-induced exchange rate exposure.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature. Section 3 describes our data sources and summary statistics. We present our main findings in Section 4. Section 5 presents our robustness tests and addresses endogeneity concerns. Section 6 explores possible channels through which EPU may affect firms' exposure. Finally, Section 7 concludes this study.

2. Institutional background and literature review

2.1. Institutional background

China underwent several market-oriented exchange rate reforms in recent decades. Before July 2005, China adopted a fixed ex change rate regime, pegging RMB to the value of the USD. From 1994 to 2005, the RMB exchange rate held a value around 8.28. To mitigate the impact of USD on formulating RMB exchange rate policy, on 21 July 2005, the People Bank of China (PBOC) released an announcement that a managed floating exchange rate regime based on market supply and demand with reference to a basket of currencies would be adopted. The basket should be composed of currencies of the countries to which China has a prominent exposure in terms of foreign trade, external debt, and foreign direct investment. The daily trading price of USD/RMB exchange rate was allowed to fluctuate within a band of 0.3 % around the central parity. And the trading bandwidth of the RMB against the USD was extended to 0.5 % on 18 May 2007. During the 2008–2009 Global Financial Crisis, RMB was de facto pegged to the U.S. dollar with RMB/USD rate fluctuate between 6.82 and 6.84.

The market-oriented reform was resumed on June 19th, 2010, when the authorities announced that [Further Reform the RMB Exchange Rate Regime and Enhance the RMB

Exchange Rate Flexibility] and re-emphasized that [China has moved into a managed floating exchange rate regime based on market supply and demand with reference to a basket of currencies]. The trading bandwidth was further widened to 1 % on 14 April 2012 and 2 % 17 March 2014. IMF also confirmed China's exchange rate reform, and classify de facto regime from "crawl-like arrangement" to "other managed arrangement" in 2014.

To further increase the role of market forces on formulating RMB exchange rate, On 11 August 2015, the PBOC made an announcement claiming that it would [improve quotation of the central parity of RMB against U.S. dollar]. Under the new RMB/USD central parity quoting mechanism, banks were asked to submit quotes to the China Foreign Exchange Trading System (CFETS) daily before market opens considering the closing rate of the inter-bank foreign exchange market on the previous day, in conjunction with demand and supply condition in the foreign exchange market and exchange rate movement of the major currencies.[6]

The revamp of the central parity quotation system represents a major step taken by China in the transition process toward RMB exchange rate flexibility (Cheung, Hui, & Tsang, 2018). Fig. 1 shows the time varying volatility of the RMB exchange rate against four SDR major currencies. With a series of market-oriented reforms in the Chinese foreign exchange market, RMB spot exchange rate has departed from its previous trend of unilateral appreciation, becoming increasingly unpredictable and exhibiting more significant fluctuations, especially after "811 exchange rate reform" in 2015. The world witnessed a significant increase in volatility of the exchange rate of RMB against USD and other major currencies.

Panel A of Fig.2 illustrates the time-varying volatilities of the USD and RMB exchange rate indices.[7] Preceding the year 2010, movements in the RMB index closely mirrored the fluctuations observed in the USD index, particularly during the Global Financial Crisis of 2008–2009, owing to the de facto pegging of the RMB to the U.S. dollar. Subsequent to the resumption of reforms on June 19th, 2010, the volatility pattern of the RMB exhibited notable deviations from that of the USD. Notably, RMB index volatility began to significantly surpass that of the USD after 2015, specifically in July 2018 and May 2019. To further elucidate these dynamics, we computed the ratio of RMB index volatility to USD index volatility, and the results are presented in Panel B of Fig. 2. Consistently, our findings indicate that, on average, this ratio remained substantially below 1 before 2010. However, post-2010, the ratio ranged from 0.23 to 3.26, signifying an independent and heightened volatility of the RMB index in relation to the USD index.

With the increased flexibility of the RMB exchange rate, Chinese enterprises find themselves increasingly susceptible to exchange rate risk. A survey conducted by the People's Bank of China in 2011 in the regions of Shandong, Zhejiang, and Qingdao

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[6] Available at http://www.pbc.gov.cn/en/3688110/3688181/a13b2cb0/index89.html.

[7] Since 2015, the China Foreign Exchange Trade System (CFETS) has disseminated an RMB currency index, serving as a comprehensive proxy for the Chinese RMB exchange rates relative to a currency basket comprising 13 nations, encompassing both emerging and developed economies. This index is computed as the mean of the daily CNY Central Parity Rate, with each foreign currency's weight determined by its contribution to in ternational trade denominated in said currency. In 2017, the CFETS expanded the basket's currency count from 13 to 27. Consequently, we have formulated a trade-weighted index encompassing currencies from developed, emerging, and all countries based on the 27 currencies within the CFETS basket.

revealed that, in the face of RMB appreciation exceeding 10 %, no firms surveyed could withstand such impact. Furthermore, 40 % of these enterprises had not implemented any risk management measures for mitigating exchange rate risk, and 24.28 % expressed skepticism regarding the efficacy of foreign exchange derivatives launched by banks in reducing exposure to exchange rate fluctuations (Li, Guo, & Zhao, 2011). The repercussions of the escalating volatility in the RMB exchange rate are also discernible in the financial statements of listed companies. As indicated in Appendix B, prior to 2010, less than 60 % of listed companies disclosed the extent to which exchange rate movements influenced the company's cash flow. This percentage witnessed a rapid increase, reaching 80 % after the year 2020.

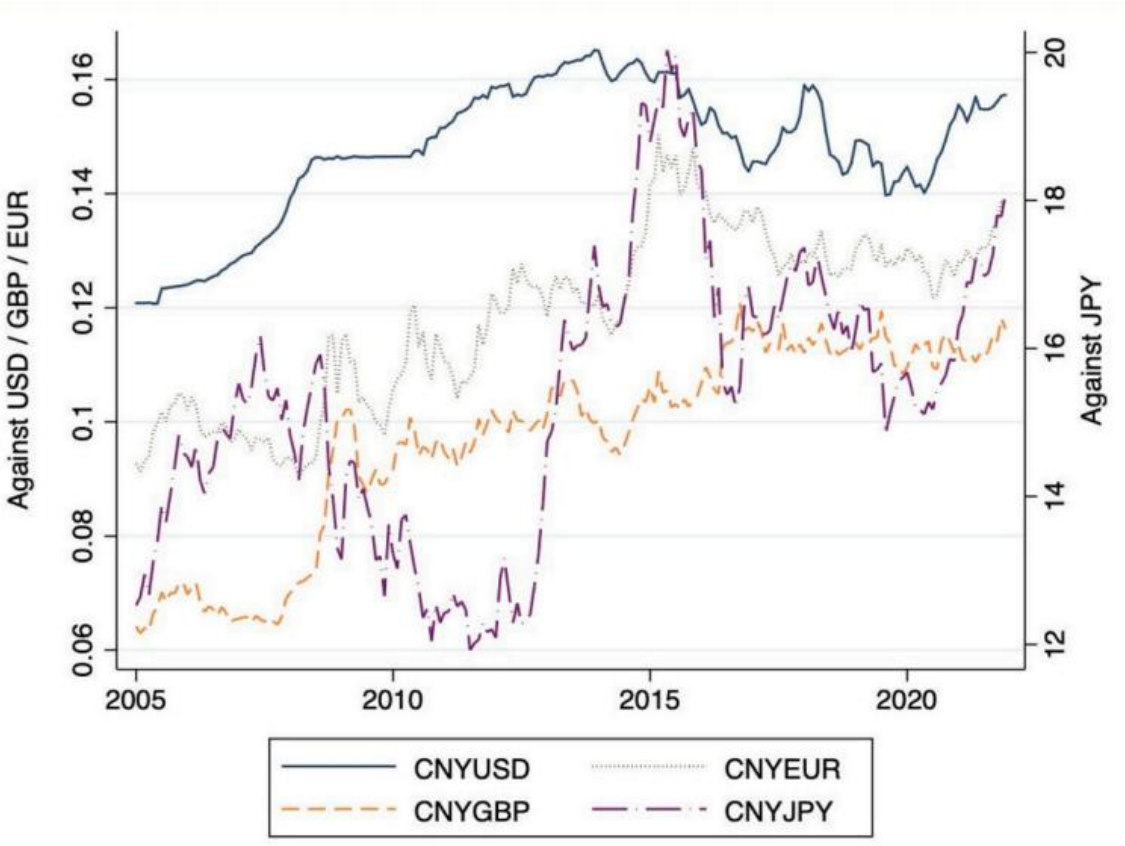

Fig. 1. RMB Spot Exchange Rates.
Note: This figure shows the time trend of RMB spot exchange rate against other SDR currencies, namely USD, EUR, JPY, GBP.

2.2. Literature review

2.2.1. Determinants of exchange rate exposure

It is important to understand the sources of exchange rate exposure's variation because foreign exchange rate risk shapes inter national trade, equity costs, and international investments (Carrieri, Errunza, & Majerbi, 2006; Choi, Hiraki, & Takezawa, 1998; Hekman, 1985). Adler and Dumas (1984) were among the first scholars to theoretically define the concept of foreign exchange rate exposure and implement it in the context of public firms. This strand of the literature has continued to grow through the discussion on exchange rate exposure's determinants. First, exchange rate exposure is related to

business operations. Enterprises with overseas revenues and international borrowing are more susceptible to exchange rate fluctuations (Dominguez & Tesar, 2006; He & Lilian, 1998; Hutson & Laing, 2014). Exchange rate changes—resulting in increased short-term cash flow volatility—make firms more likely to give up investment opportunities, which results in underinvestment problem (Froot et al., 1993). Underinvestment makes com panies with high leverage ratio or good growth opportunities more vulnerable to currency-related risks. Liquidity alleviates under investment problems—it reduces the likelihood of financial distress, thereby mitigating cash flow fluctuations due to exchange rate changes (He et al., 2021b; Hutson & Stevenson, 2010; Nance, Smith Jr, & Smithson, 1993; Wei & Starks, 2013). Second, firms' operational and financial hedging can reduce exposure. For instance, Nance et al. (1993) claim that there are economies of scale in the area of hedging cost. Lower hedging cost and greater hedging benefits incentivize large enterprises to conduct hedging activities, resulting in lower exchange rate exposure. Wei and Starks (2013) argue that it is more difficult for companies in financial distress to enter the financial market to manage exchange rate risk via foreign exchange derivatives, inevitably amplifying the effect of exchange rate fluctuation. Hedging costs are particularly high in emerging-market countries due to their lack of hedging tools, which leads to significant exposure to unfavorable currency movements (He et al., 2021b).

Finally, macroeconomic factors are also relevant to firm-level exchange rate exposure, as they influence firms' international operations and hedging activities considerably. Chaieb and Mazzotta (2013) demonstrated that the foreign exchange rate exposure of multinational and domestic firms varies with the host country's macroeconomic condition, increasing during economic downturns. Underdeveloped financial markets and limited financial openness make it more difficult for firms to hedge risk through pricing (Campa, González, & Mínguez., 2006; Devereux & Yetman, 2010). Additionally, financial instability could increase financial derivatives' cost (Ehlers & Packer, 2013).

We contribute to this ongoing discussion by showing that EPU—a factor that has not been investigated in prior studies—is an important source of exchange rate exposure variation, even after controlling for traditional determinants and macroeconomic conditions. We show that EPU has a direct effect on the revenue and costs of firms' international business and induces insiders' to pursue self-serving transactions, thereby amplifying the effect of exchange rate movements on firms' value. Moreover, consistent with recent studies (Nguyen et al., 2018), we find that EPU increases firms' use derivatives. However, the underdevelopment of derivative markets limits financial hedging's role in mitigating exposure.

2.2.2. EPU and corporate outcomes

Policy uncertainty is relevant to real economic outcomes, affecting corporate investment (Bloom, 2009; Bonaime et al., 2018; Julio & Yook, 2012), corporate cash holding (Han & Qiu, 2007), dividend policy (Farooq & Ahmed, 2019), bank lending (Francis et al., 2014), merging-and-acquisition decisions (Bonaime et al., 2018), initial public offering decisions (Çolak, Durnev, & Qian, 2017), credit spreads (Kaviani et al., 2020), and corporate innovation (Bhattacharya et al., 2017). EPU also impacts corporate governance and can worsen conflicts between controlling and minority shareholders by incentivizing controlling shareholders to engage in tunneling (Ongsakul et al., 2021).

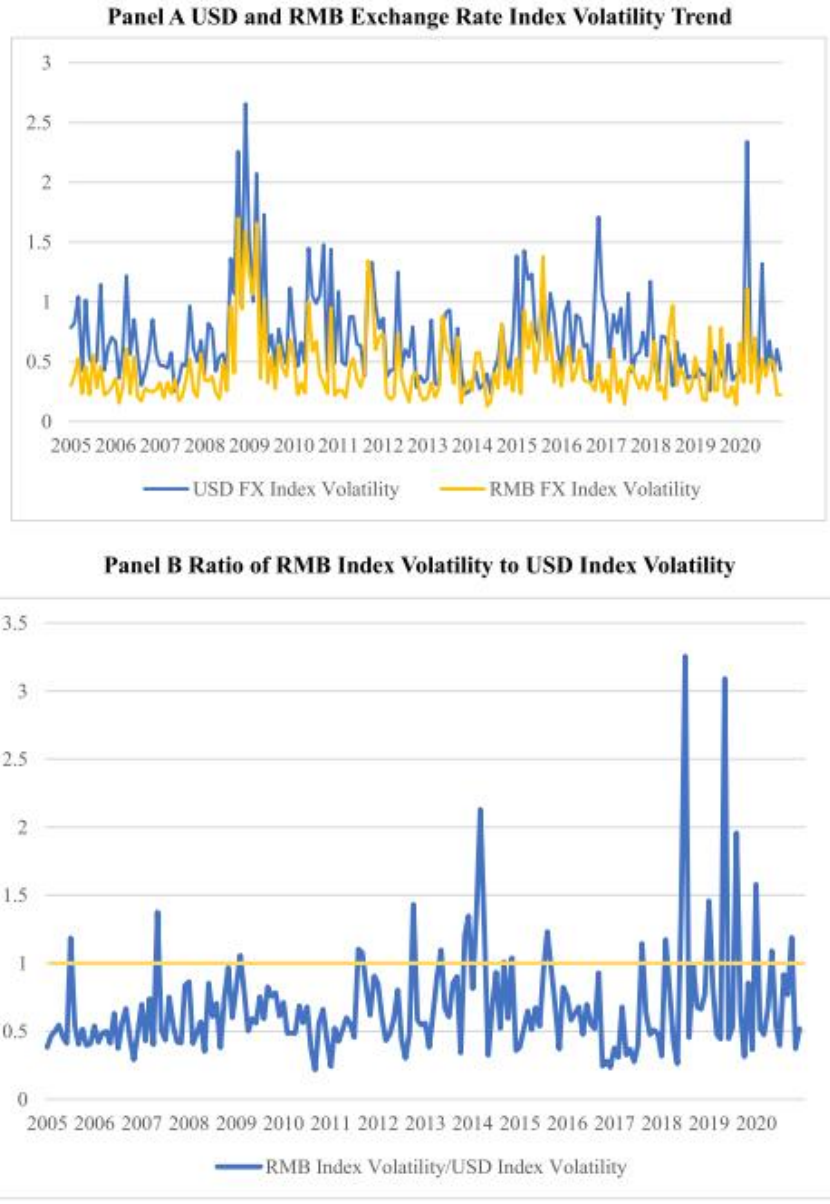

Fig. 2. Comparison of the Volatility of RMB Exchange Rate Index and USD Exchange Rate Index.

Note: Panel A displays a chronological representation of the volatility in the USD exchange rate index and RMB exchange rate index. In order to make the comparison results more intuitive, Panel B presents the ratio of RMB exchange rate index volatility to USD exchange rate index volatility. The volatility is measured by the monthly standard deviation of daily USD exchange rate index and RMB exchange rate index. RMB exchange rate index is estimated manually according to the rules issued by CFETS on the end of 2021, due to the limited data availability. The base periods of USD exchange rate index and RMB exchange rate index are Mar. 1973 and Dec. 2014, respectively.

Panel A USD and RMB Exchange Rate Index Volatility Trend.

Panel B Ratio of RMB Index Volatility to USD Index Volatility.

We establish an important link between the two aforementioned research strands. However, the relationship between EPU and exchange rate exposure has been largely overlooked in previous studies. Nguyen et al. (2018) find that EPU is positively related to firm level foreign direct investment, while firms use more derivatives when EPU increases. Consistent with Nguyen et al. (2018), we find that EPU increases the use of derivatives; however, the use of derivatives does not mitigate EPU's effects on firms' exchange rate exposure in emerging markets (e.g., China). In addition, EPU is negatively related with corporate overseas investments, thereby reducing the effect of operational hedging on firms' exchange rate exposure.

3. Data and variables construction

3.1. Measures of economic policy uncertainty

Using contents of news article, BBD construct news-based economic policy uncertainty (EPU) indices for world major economies. To measure China's EPU index, BBD performs text searches on a Hong Kong-based English-language newspaper, the South China Morning Post (SCMP). Specifically, beginning in 1995, the number of China-related articles containing at least one term from each of the three term sets (i.e., economics, policy, and uncertainty) is registered each month. This count is then scaled by the number of total SCMP articles that month. The resulting index is normalized to have a mean value of 100, from 1995 to 2011. Following the literature, we average the monthly BBD index in each quarter and take the logarithm as our primary measure (EPU).

Note that the SCMP may not fully capture the wide range of EPU in China. Further, it is difficult to construct an EPU index with different policy categories based on a single newspaper (Huang & Luk, 2020). Using the same BBD news-based method, Davis, Liu, and Sheng (2019) construct the EPU index (EPU_ML) based on two mainland Chinese newspapers: the Renmin Daily and the Guangming Daily. Moreover, Huang and Luk (2020) construct an overall EPU index (EPU_H&L) and uncertainty indices for four policy categories using 10 Chinese mainland leading newspapers. We include these alternative measures of China news-based EPU index for a robustness check.[8]

3.2. Measures of exchange rate exposure

We use firm stock returns' sensitivity to changes in the foreign exchange rate, controlling for market return, as a proxy for exchange rate exposure (Bartram et al., 2010; He & Lilian, 1998; Hutson & Laing, 2014). Specifically, we empirically assess foreign exchange exposures using the following regression model:

$$R_{id} = \alpha_i + \beta_i R_{md} + \gamma_i R_{sd} + \varepsilon_{id} \# \quad (1)$$

[8] To our knowledge, there are three main methods to measure economic policy uncertainty. The first is to set a dummy variable based on a certain political event implying considerable uncertainty, such as a national election or war (Alesina & Perotti, 1996; Julio & Yook, 2012). Despite the distinctive advantage of exogeneity, lacking in consistency and continuity makes such method less useful for government and corporate policy decisions. The second is to select a single indicator highly related to the policy change, such as changes in credit spreads (Gilchrist et al., 2014). This method is largely criticized for its arbitrariness and, more importantly, its reflection on the ex-post consequence of economic policy uncertainty, rather than ex-ante prediction. The third method (which is used in our study and is the most widely accepted) is to build a comprehensive index.

where R_{id} is the daily stock return in excess of the risk-free rate, whereas R_{md} is the daily return of the stock market index in excess of the risk-free rate. The risk-free rate is the three-month benchmark saving rate released by the People's Bank of China (PBOC). The market index is the CSI300 of China's stock market. R_{sd} is the log difference in the daily RMB weighted index (R_{sd} is positive when exchange rate index rises). Following He, Li, and Liu (2022), we construct the RMB weighted index using the SDR currency basket (USD, EUR, JPY, and GBP) weighted by annual bilateral trade volume in the four foreign currencies. All data are drawn from Bloomberg and the PBOC. Our sample spans from 2010Q3 to 2020Q4.[9]

To create a quarterly series of estimated exposure for each firm, we estimate exposure over a series of four-quarter windows, according to Eq.(1). Specifically, γ_{it} is the exchange rate exposure coefficient of firm i in quarter t, estimating a four-quarter window, from the current quarter to the following three quarters. Following Wei and Starks (2013) and He, Liu, and Zhang (2021a); He et al. (2021b), we take its absolute value.

3.3. Other variables

Given a large set of potential determinants of foreign exchange exposure, we include various firm-level and macroeconomic controls suggested by prior studies in our regression.

Bodnar, Franco, and Wong. (2003) find that large firms have considerable exposure in the international environment and face higher exchange rate exposure. In contrast, He and Lilian (1998) find that firm size is negatively related with exposure, as large firms are more motivated to hedge exchange rate risks (He et al., 2021b; Hutson & Laing, 2014). We use the logarithm of a firm's total assets (size) as the proxy of its size. Highly indebted firms and firms with inadequate liquidity are vulnerable to financial shocks and are therefore more likely to hedge the foreign exchange risk (Nance et al., 1993; Wei & Starks, 2013). We use the debt-to-asset ratio (leverage) to measure leverage and the quick ratio (quick) as the proxy of firm liquidity. Growing firms that have more serious underinvestment problems require a stable cash flow and are more sensitive to foreign exchange rates' fluctuations (He & Lilian, 1998; Wei & Starks, 2013). We use book-to-market value of equity (BM) as a proxy of a firm's growth opportunities. Firms' international involvement has direct and significant effects on their exchange rate exposure (He & Lilian, 1998; Hutson & Laing, 2014). We use foreign sales (overseas) and foreign loans (floan), both scaled by total asset, as proxies for a firm's international involvement. We also control for several macroeconomic variables to address the underlying concern that our results may be driven by general economic conditions or economic uncertainty (Bhattacharya et al., 2017; Bonaime et al., 2018; Kaviani et al., 2020). The macroeconomic variables in our main results include inflation, interest spread, business cycle, foreign currency bank loan, and exchange rate fluctuation. All consistent

[9] We concentrate on this period because RMB was de facto pegged to the US dollar at a price of 6.82–6.84 per US dollar during the global financial crisis. On June 19, 2010, the PBOC made an announcement declaring further reform of the RMB exchange rate regime; since then, the RMB ex change rate sped up its marketization, which means that currency price is a consequence of market supply and demand.

variables have been winsorized at both the 1 % and 99 % levels. We provide a detailed description of all variables used in Appendix A.

3.4. Summary statistics

Table 1 presents the summary statistics on our main variables. Overall, the average exposure (absolute value of γ_i) is 0.262, consistent with the findings of He et al. (2021b). Table 1 also presents the summary statistics on EPU indices and control variables. All variables show significant variations over our sample period. We divide the sample into high- and low-EPU periods based on the median EPU value (as shown in Table 2). It shows that mean (median) values of exchange rate exposure increase from 0.238 (0.182) in low EPU periods to 0.280 (0.207) in high EPU periods. Both the mean and median tests for the differences are statistically significant, suggesting that policy uncertainty and exchange rate exposure are positively correlated.

Table 1
Summary Statistics of the Main Variables.

Variable	Observation	Mean	Std. Dev.	25th percentile	Median	75th percentile
Economic Policy Uncertainty Index						
EPU	41	5.543	0.758	4.970	5.557	6.134
EPU_R	41	0.000	0.259	−0.212	0.009	0.195
EPU_ML	41	5.046	0.517	4.636	4.870	5.402
EPU_H&L	41	4.951	0.142	4.841	4.957	5.034
EPU_fsc	41	4.875	0.334	4.670	4.866	5.026
EPU_mn	41	4.818	0.379	4.521	4.849	4.989
EPU_ec	41	4.735	0.537	4.300	4.814	5.091
EPU_trd	41	4.974	0.641	4.551	4.812	5.242
Firm-level Exchange Rate Exposure						
Exposure	101,008	0.262	0.286	0.090	0.196	0.360
Firm Control Variables						
size	29,677	3.535	1.342	2.561	3.371	4.310
leverage	29,677	0.426	0.212	0.256	0.417	0.584
quick	29,702	2.045	2.576	0.724	1.206	2.184
BM	26,868	0.937	0.983	0.350	0.607	1.110
floan	29,722	0.031	0.112	0.000	0.000	0.000
overseas	29,722	0.112	0.194	0.000	0.007	0.141
Macro Control Variables						
CPI	41	2.634	1.191	2.000	2.300	2.900
IntSpread	41	2.371	0.777	1.842	2.321	2.987
FGDP	41	0.524	0.133	0.417	0.537	0.642
Exloan	41	0.020	0.042	−0.013	0.017	0.053
REER	41	0.005	0.022	−0.004	0.003	0.019

Note: The data are from the third quarter of 2010 to the fourth quarter of 2020. Economic policy uncertainty index data are quarterly time series data. Firm-level exchange rate exposure data are quarterly panel data. Firm control variables data are yearly panel data, which are obtained from the annual financial statements of the previous year. Macro control variables are quarterly data.

Table 2
Descriptive Statistics for Exposure in High- and Low-EPU Categories.

	Observations	Mean	Median
High EPU	59,524	0.280	0.207
Low EPU	41,484	0.238	0.182
Difference (High-Low)		0.041	0.026
Diff(t-stat/z-stat)		24.251***	21.415***

Note: Descriptive statistics for exposure, separately for periods of high- and low-EPU, based on the time-series median. Student's t-test and the Wilcoxon-Mann-Whitney Utest are used to examine the significance of the differences in the means and medians of

exposure between the two groups, defined by EPU. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

In Fig. 3, we plot the average firm-level exchange rate exposure in each quarter via the quarterly EPU. Clearly, both plots have similar patterns, suggesting that high-EPU periods are accompanied with high exposure. The correlation between EPU and average exposure is 0.428, which is statistically significant at 1 % confidence level. This positive correlation seems to be pervasive over whole sample periods. Additionally, EPU spikes around the events that are ex ante expected to cause an increase in EPU, e.g., the National Congress of the Communist Party of China in 2012Q4 and 2017Q4, the US-China trade conflict in 2018Q2, and the COVID-19 pandemic in 2020Q1. It also exhibits substantial variations between these important events. Fig. 3 suggests that EPU has an independent impact on firms' exchange rate exposure.

To conduct a formal test of the relationship between the average exposure and policy uncertainty, we estimate a quarterly VAR model with average exposure, EPU, and macroeconomic controls.[10] Our VAR model is as follows[11]:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \varepsilon_t \# \quad (2)$$

where Y_t is a vector of endogenous variables, including the natural logarithm of BBD's measure of EPU (EPU), growth rate of RMB real effective exchange rate index (REER), interest spread between China and United States (IntSpread), onshore and offshore USDCNY exchange rate spread (ExchSpread), foreign currency bank loan growth rate (Exloan), fixed asset investment growth rate (FixInv), international trade deficit (Deficit), growth rate of producer price index (PPI), and the average ERE level.

To isolate an EPU shock's effect on average exposure, we further impose an order with which shocks propagate through the variables in our VAR analysis. Specifically, the average exposure impulse response function (IRF) is estimated in the following ordering system: the natural logarithm of EPU, REER, IntSpread, ExchSpread, Exloan, FixInv, Deficit, PPI, and average exposure.[12]

The estimated IRF in Fig. 4 shows that EPU shocks have a positive significant impact on average exchange rate exposure, lasting up to four quarters. A 1 % increase in EPU is associated with an estimated 1.605 % increase in average exposure over the second quarter. This effect is economically large, considering that the mean of exposure is 0.262. One standard deviation increase in EPU is associated with a 1.481 % increase in average exposure, accounting for 6 % of the sample mean. This implies that on average, EPU will amplify currency movements' impact on firms' fundamental values.

[10] Macro variables are consistent with our previous regression model.
[11] Due to the short time periods, we only include on lag in our specification.
[12] To examine the robustness of the impulse response functions (IRFs) to the imposed variable ordering, in unreported results we verify that our results are consistent across a wide array of alternative causal orderings. We thank a referee for pointing this out.

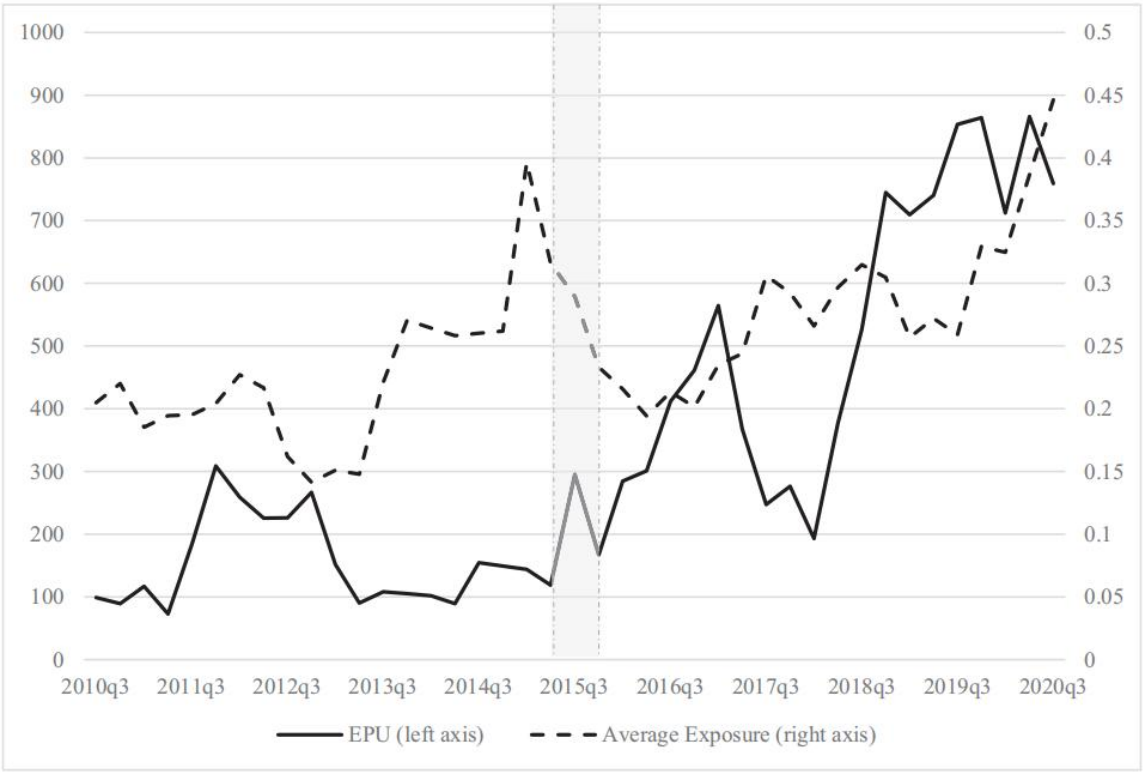

Fig. 3. Average Exchange Rate Exposure and Economic Policy Uncertainty Index.
Note: This figure shows the time trend of economic policy uncertainty (left axis) and the average exchange rate exposure (right axis), where economic policy uncertainty is the original value without logarithmic transformation. The shaded area in the figure indicates the period of the 811 exchange rate reform in the third quarter of 2015.

4. Empirical results

4.1. Main results

Next, we explore the relationship between policy uncertainty and exchange rate exposure using firm-quarterly panel regressions. We model a firm's exposure in a given calendar quarter as a function of the level of economic uncertainty in the prior quarter, con trolling for lagged firm-level and macroeconomic variables. Our primary regression specification is as follows:

$$|\gamma_{i,t}| = \alpha_0 + \alpha_1 EPU_{t-1} + \alpha_2 controls_{i,t-1} + \theta_i + \epsilon_{i,t}\# \quad (3)$$

where $\gamma_{i,t}$ is the estimated exchange rate exposure of firm i in quarter t. EPU_{t-1} is the natural logarithm of the average of the BBD index in quarter t-1. $controls_{i,t-1}$ are the firm-level controls and macroeconomic variables described above. Firm-level variables are measured in the fiscal year ending in the previous year, while macroeconomic variables are measured in the prior quarter. θ_i captures the firm fixed effects and $\epsilon_{i,t}$ donates the error term. All t-statistics are clustered at the firm level.

Table 3 presents the results on the relationship between EPU and firms' exchange rate exposure. EPU's coefficients are positive and statistically significant at the 1 % confidence level, confirming our expectation that EPU is associated with higher exposure.

This result remains unchanged when we include an array of firm-level determinants of exposure and macroeconomic variables, as well as quarterly time and firm fixed effects. The marginal effects associated with EPU coefficients in the full specification (Column 4) suggest that one standard deviation increase in the EPU index is associated with a 0.022 (0.028 × 0.785) increase in exposure. Given that the average of exposure is 0.262, a 0.022 increase in exposure is economically large, corresponding to 8.4 % of the sample average.

Regarding the control variables, we find negative and significant (at the 1 % level) sign on the coefficients of quick ratio (quick). Consistent with previous findings (Hutson & Laing, 2014; Nance et al., 1993), firms with adequate short-term liquidity are less exposed to currency movements, as liquidity can substitute for hedging, reducing the sensitivity to the cash-flow volatility caused by exchange rate shocks. The book-to-market ratio (BM) is significantly positive (at the 1 % level); consistent with hedging theory (G´eczy, Minton, & Schrand, 1997; Guay & Kothari, 2003; Huang, Huang, & Zhang, 2019), firms with greater growth opportunities have strong incentives to hedge cash-flow risk caused by exchange rate fluctuations, hence exhibiting a lower exposure. Oversea sales (overseas) and foreign loan (floan) are found to be insignificant in all specifications; this is consistent with Choi and Jiang (2009) and He et al. (2021a). Most macroeconomic variables exert significant effects on firms' exposure. For instance, the coefficients of interest spread (IntSpread) (0.007, with a t-statistic of 3.39) and REER (REER) (0.388, with a t-statistic of 7.93) show a strong positive relationship between foreign exchange market conditions and firms' exchange rate exposure—consistent with the hypothesis positing that the volatility of foreign exchange markets leads to higher exposure to currency movements. We also find that economic conditions—e.g., inflation rate (CPI) and fixed investment (FGDP)—have a significant effect on exposure.

Overall, the results in columns (2)–(4) confirm that neither firm characteristics nor macroeconomic conditions explain the relationship between policy uncertainty and exchange rate exposure. However, it is still possible that we do not fully control the economic conditions or foreign exchange market volatility, or that this result is driven by certain policies generating uncertainty. We address these issues in the following sections.

4.2. The effects of hedging

Hedging is a strategy for firms to cope with foreign exchange risk. Bartram and Bodnar (2007a, 2007b) argue that foreign exchange rate exposure is largely minimized if firms can manage exchange rate risk rationally via operational or financial hedging. The former involves multinational operations to diversify currency revenue, match revenue and cost in the same currency, and increase operational flexibility to shift their operations across countries (Bodnar et al., 2002; Hutson & Laing, 2014). The latter involves a range of foreign currency derivative usage (Aggarwal & Harper, 2010; Allayannis, Lel, & Miller, 2012). Numerous empirical studies have examined the relationship between foreign exchange exposure and the usage of operational and financial hedging tools. For instance, Pantzalis, Simkins, and Laux (2001) find that the geographical dispersion of a firm's international actives is negatively related with exchange rate exposure. Allayannis and Weston (2001) show that foreign currency derivatives comprise an effective instrument to hedge against exchange rate fluctuations.

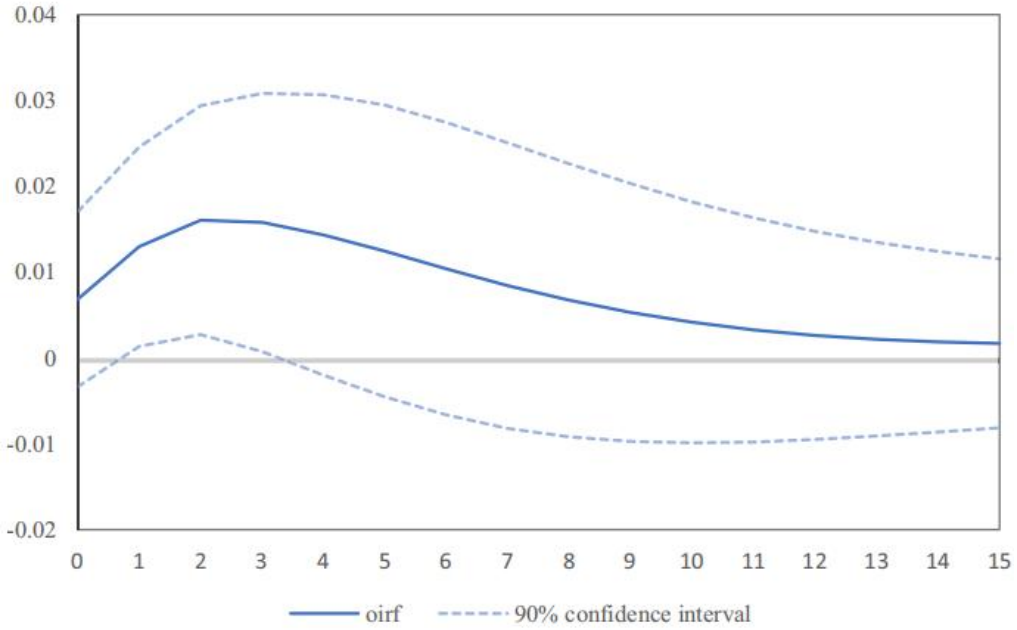

Fig. 4. Response of Exposure to an Economic Policy Uncertainty Shock.
Note: The average exposure impulse response function is estimated from the VAR (1) model in the following order: the natural logarithm of economic policy uncertainty index from Baker et al. (2016), growth rate of RMB real effective exchange rate index (REER), interest spread between China and United States (IntSpread), onshore and offshore USDCNY exchange rate spread (ExchSpread), foreign currency bank loan growth rate (Exloan), fixed asset investment growth rate (FixInv), international trade deficit (Deficit), growth rate of producer price index (PPI) and average level of exchange rate exposure. The solid line represents the orthogonalized impulse response of exposure to an economic policy uncertainty shock, whereas the dashed lines represent the upper and lower boundaries of the 90 % confidence interval, respectively. The eigenvalues of the VAR (1) model are all located inside the unit circle, implying that the model passed the stationarity condition test. The Granger causality test shows that economic policy uncertainty is statistically significant at the 10 % level (P = 0.0925) in the equation of the average exposure, implying that economic policy uncertainty is the Granger cause of exchange rate risk exposure.

Hedging decisions arise from balancing costs and benefits. If EPU has a significant impact on firms' exchange rate exposure, its effects should be lower when the risk is preemptively hedged. We should observe that such policy uncertainty shocks enhance the benefits of hedging, mitigating the impact on exchange rate exposure. To measure financial hedging, we use an indicator variable, *drvtv*, which equals 1 if a firm reports the usage of currency derivative in a year, and 0 otherwise (Allayannis & Weston, 2001; Hutson & Laing, 2014). As for the measure of operational hedging, we use "brdth," which equals 1 if the number of continents where a firm has subsidiaries is >3, and 0 otherwise, as Pantzalis et al. (2001) find that breadth can capture the geographical dispersion of a

firm's international involvement.[13] Empirically, the dummy indicator for hedging, drvtv or brdth, and its interaction with EPU are incor porated into our benchmark regression.

Table 3
Baseline Results: EPU and Exposure.

Dependent Variable: Exposure				
	(1)	(2)	(3)	(4)
EPU	0.023***	0.024***	0.024***	0.028***
	(14.60)	(10.37)	(10.17)	(11.25)
size		0.002	0.002	0.004
		(0.45)	(0.46)	(0.65)
leverage		0.009	0.009	0.013
		(0.56)	(0.55)	(0.77)
quick		−0.006***	−0.006***	−0.006***
		(−7.93)	(−7.93)	(−7.71)
BM		0.012***	0.012***	0.008**
		(3.52)	(3.51)	(2.07)
floan		0.010	0.010	0.012
		(0.81)	(0.83)	(0.97)
overseas		0.013	0.013	0.013
		(0.72)	(0.70)	(0.70)
CPI				−0.005***
				(−5.35)
IntSpread				0.007***
				(3.39)
FGDP				−0.087***
				(−2.78)
Exloan				−0.061*
				(−1.72)
REER				0.388***
				(7.93)
Constant	0.127***	0.104***	0.105***	0.121***
	(13.93)	(7.33)	(7.37)	(6.43)
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	No	No	Yes	Yes
No. firms	3616	3431	3431	3431
Observations	100,836	94,507	94,507	94,507
Adj-R^2	0.102	0.089	0.089	0.090

Note: A detailed description of the variables is given in Appendix A. The sample period is from the third quarter of 2010 to the fourth quarter of 2020. t-statistics are clustered at the firm level and appear between parentheses below the coefficient estimates. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A of Table 4 presents the results. The first two columns report that the interaction of EPU and *drvtv* is insignificant, suggesting that financial hedging activities have no significant impact on the nexus of EPU and exchange rate risk exposure. Consistent with the findings of He et al. (2021a), Chinese firms have a limited ability to financially hedge against unfavorable currency movements, mostly due to underdeveloped currency derivative markets in China.[14] Column (3) and (4) report that the interaction between EPU and brdth is significantly negative, suggesting that operational hedging can moderate EPU's impact on exposure. This supports the findings of Pantzalis et al. (2001), who find that operational hedges provide better protection against adverse currency movements, compared with financial hedging.

[13] Using a sample of US multinational firms, Pantzalis et al. (2001) show that breadth is significantly negatively related with firms' exchange rate exposure.

[14] Most Chinese companies are difficult in utilizing offshore foreign exchange derivatives to hedge exchange rate exposure. This limits the overall effectiveness of financial hedging strategies in mitigating such risks in China. We appreciate the reviewer for pointing this out.

A potential concern is that firms may adjust their hedging behavior in response to prior exposure shocks, which could limit its immediate effectiveness. Such delayed effects of financial hedging may help explain the relatively weak moderating effect observed in the short term. To address this concern, we incorporate the first-order and second-order lagged terms of financial hedging and EPU.[15] We find that the interaction terms between financial hedging and EPU, both contemporaneous and lagged, are statistically insignificant. Moreover, the absolute magnitude of the negative coefficient for the lagged interaction term is smaller than that of the contemporaneous term. These results suggest that the use of derivatives appears to play only a modest role in mitigating firms' ex change rate exposure, indicating a relatively weak hedging effect in the context of elevated EPU.

4.3. Heightened exchange rate volatility

Obviously, unusual exchange rate fluctuations will increase firms' exposure to currency movements. To examine whether EPU's positive effect on exposure survives during times of heightened exchange rate volatility, we focus on the 811 reform. The 811 reform represents one of China's key steps in the transition toward RMB exchange rate flexibility; however, the RMB experienced a short period of high volatility during this time. We calculate the standard deviation of the exchange rate index of SDR currency for the period 2015Q3–2016Q2 (811 reform); we find that the index increases from a mean of 0.471 in other periods to 0.601 in the aforementioned periods.

Columns (1) and (4) show that the positive relationship remains significant at the 1 % level or better. The coefficients are several times larger than those in benchmark regressions (Table 3), indicating that EPU has a pronounced impact on exchange rate exposure during high exchange rate volatility periods.

Note that the benefits of hedging might weaken in times of heightened exchange rate volatility, as firms conduct selective hedging—they hedge currency risk only when they believe the exchange rate will change to their detriment. Selective hedging is found to be inadequate because exchange rate movements are largely unexpected in short periods with heightened exchange rate volatility (Bodnar et al., 2011). Using a sample of US firms around the crisis (2007–2008), Hutson and Laing (2014) find that financial hedging lost its effectiveness during the study period, whereas operational hedging remained robust as a risk management tool. To test the role of hedging in times of heightened exchange rate volatility, we include proxies of hedging, *drvtv*, *brdth* and their interaction terms with EPU in the regression. Consistent with the results in Panel A of Table 4, both *drvtv* and its interaction term, EPU × *drvtv*, are still not significant in both sub periods (Columns (2) and (5)). This is unsurprising, as derivative markets are underdeveloped and firms suffer a high hedging cost in China. Financial derivatives fail to hedge against exchange rate risks, while firms experience direct ERE following an increase in EPU

[15] These results are not reported, but available upon requested. In Section 6.3, we further employ the methodology proposed by Allayannis and Weston (2001) to conduct reverse causality tests. We find that the decision to initiate or discontinue hedging does not appear to be opportunistically timed in response to changes in exposure levels.

Table 4
Hedging Effects.

Panel A: Hedging Effects				
Dependent Variable: Exposure	Financial hedging		Operational Hedging	
	(1)	(2)	(3)	(4)
EPU	0.024***	0.028***	0.024***	0.029***
	(10.21)	(11.30)	(9.95)	(11.04)
EPU × drvtv	−0.009	−0.011		
	(−0.46)	(−0.54)		
drvtv	0.047	0.055		
	(0.40)	(0.47)		
EPU× brdth			−0.019*	−0.019*
			(−1.79)	(−1.74)
brdth			0.090	0.085
			(1.50)	(1.43)
Firm Control	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Macro Control	No	Yes	No	Yes
No. firms	3431	3431	3431	3431
Observations	94,507	94,507	94,507	94,507
Adj-R^2	0.089	0.090	0.089	0.090

Panel B: Heightened Exchange Rate Volatility						
Dependent Variable: Exposure	The year after the "811 Reform" 2015Q3–2016Q2			The year after the outbreak of the COVID-19 pandemic 2019Q4–2020Q4		
	Baseline	Conditioning on Hedging Activities		Baseline	Conditioning on Hedging Activities	
	(1)	(2)	(3)	(4)	(5)	(6)
EPU	0.204***	0.204***	0.205***	0.294***	0.294***	0.300***
	(5.66)	(5.64)	(5.58)	(6.99)	(6.98)	(7.07)
EPU × drvtv		0.051			0.006	
		(0.96)			(0.06)	
drvtv		−0.204			−0.142	
		(−0.74)			(−0.21)	
EPU × brdth			−0.025			−0.103*
			(−0.79)			(−1.69)
brdth			0.175			0.647
			(0.87)			(1.63)
Firm Control	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	No	No	No	No	No	No
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes
No. firms	2196	2196	2196	3427	3427	3427
Observations	7892	7892	7892	13,520	13,520	13,520
Adj-R^2	0.151	0.151	0.151	0.363	0.363	0.363

Note: Table 4 reports the effects of hedging on the nexus of EPU and exchange rate risk exposure in the whole period. Columns (1) and (2) report the interaction between EPU and *drvtv*. Columns (3) and (4) report the interaction between EPU and *brdth*, where the *brdth* dummy equals 1 if the number of continents where a firm has subsidiaries is >3, and 0 otherwise. Panel B reports the regression results in a scenario of the 811 reform with high exchange rate volatility. Columns (5)−(7) report the regression results in the year after "811 reform"—i.e., from the third quarter of 2015 to the second quarter of 2016. More specifically, Column (5) reports the benchmark regression results. To test the role of hedging, Column (6) reports the interaction between EPU and *drvtv*. Column (7) reports the interaction between EPU and *brdth*.

The interaction term EPU × *brdth* becomes no longer significant during the year after the "811 Reform" (Column (3)). While it remains significant at the 10 % level during the year after the outbreak of the COVID-19 pandemic, albeit offering only modest mitigation of EPU-related exchange rate exposure (Column (6)). This partial attenuation

of international operations' effectiveness may indicate that international operations are generally insufficient to fully hedge firms' exchange rate risks when exchange rates are largely unpredictable in the short term. A possible explanation is that international operation is a longer-term hedging technique and primarily plays a role on longer-term exposures (Muller & Verschoor, 2006).

5. Robustness

5.1. Alternative specifications

To verify the robustness of our main results (Table 5), we first consider alternative measures of exchange rate exposure. Starting in 2015, the China Foreign Exchange Trade System (CFETS) has published an RMB currency index, which is an aggregate proxy for the Chinese RMB exchange rates against a basket of currencies from 13 countries, including both emerging and developed economies. The index is the average of the daily CNY Central Parity Rate, weighted by the international trade denominated with each foreign currency. In 2017, the CFETS increased the number of currencies in the basket from 13 to 27. Thus, we construct a trade weighted index for currencies of developed, emerging, and whole countries according to 27 currencies in the CFETS basket. Specifically, using Eq.(1) and a different weighted RMB index, we estimate the firms' exposure to the exchange rate of all currencies (Exposure_a), developed economies' currencies (Exposure_d), and emerging economies' currencies (Exposure_e). Subsequently, we estimate EPU's effect on these three alternative measures (Table 5).

Columns (1) – (3) in Table 5 show that EPU is significantly associated with higher exposure in the three alternative measures. Interestingly, the EPU coefficients in developed currencies (Column 2) are almost three times larger than those of the exposure to emerging-market currencies (Column 3). This suggests that Chinese firms are more susceptible to the movement of developed countries' currencies.

We also examine the sensitivity of our main results vis-a-vis ` alternative specifications. In Column (4), we further move the EPU ahead two quarters and examine whether the EPU in quarter t-2 influences exposure in quarter t. To address the possible estimation error, we re-estimate Eq.(2) by weighting each sample as the inverse of its standard error, and report the results in Column (5).[16] It could be argued that absolute exposure produces truncation bias. Thus, following Dominguez and Tesar (2006), we take the square root of $|\gamma_{i,t}|$ as the independent variable and re-estimate our baseline equation (Column 6). To address the concern that the relationship between policy uncertainty and exchange rate exposure is simultaneous (Bartram & Bodnar, 2012; He, Liu, Wang, & Yu, 2020), we also conduct generalized methods of moments to re-estimate the results in a dynamic panel setting (Column 7). As potential cross-sectional and serial correlation may bias our error term (Petersen, 2009), we re-estimate our baseline equation by clustering the standard errors at both the firm and calendar-quarter level (Column 8). Columns (9) and (10) demonstrate that EPU exerts a statistically significant positive influence on exchange rate exposure both prior to and following the RMB Exchange Rate Formation Mechanism Reform implemented on August 11, 2015. This persistent effect, however, manifests

[16] The weighted least squares approach reduces the extent of estimation errors biasing our results (He et al., 2021b; Hutson and Liang, 2014).

within distinct structural regimes, as confirmed by the Chow test which identifies significant structural breaks between the pre-reform and post-reform periods.

Following Robinson (1988) and Chevalier and Ellison (1997), we run a semi-parametric regression of exchange rate exposure on EPU, allowing for an unconstrained functional form. Column (11) reveals that exposure is more sensitive to EPU increases in the tail of the distribution, with a sharper rise in exposure beyond a certain EPU threshold. To further refine this analysis, we introduce an indicator for EPU in the top 25 % decile. As shown in Column (12), during high EPU periods, the marginal impact on exchange rate exposure strengthens significantly, underscoring the heightened risk enterprises face in such conditions. To address concerns of omitted variable bias, Column (13) adds four market sentiment control variables (*PE ratio*, *NewAcct, TrnOvr*, and *VIX*),[17] while Column (14) controls for exchange rate volatility using the quarterly standard deviation of the CFETS RMB Exchange Rate Index (CNY *Vol*). To eliminate the influence of time trends on the key variable, Column (15) applies first-differencing to EPU. Additionally, Column (16) regresses EPU on the logarithmic transformation of quarterly trend variables and their polynomial terms, using the residual series (*EPU_detrend*) as the adjusted core explanatory variable. All results remain qualitatively unchanged and confirm that EPU has a significantly positive impact on firms' exchange rate exposure.

5.2. Alternative variable measures

While our main specification controls for several macroeconomic variables, it is possible that the measure of EPU is still related with other macroeconomic factors. To further isolate EPU's impact, we consider several commonly used proxies for macroeconomic uncertainty (Aastveit, Natvik, & Sola, 2017; Rossi & Sekhposyan, 2015) and include them in our baseline regression (Column 1 of Panel B).[18] Our test relies on BBD's measure of EPU as our primary EPU index. One concern is that this index may not fully capture the EPU in China, as BBD only uses the SCMP to extract news content. Additionally, BBD is not able to construct category-specific EPU indices. In this section, we introduce two additional EPU indices to confirm the positive relationship between EPU and firms' exposure, comparing EPU's effects across different policy categories.

Following BBD's compilation strategy, Davis et al. (2019) construct the EPU index *(EPU_ML*) based on two Chinese mainland newspapers: the Renmin Daily and the Guangming Daily. Huang and Luk (2020) select 10 Chinese mainland newspapers[19] and construct an overall EPU index (*EPU_H&L*) and uncertainty indices for four policy

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[17] The variable PEratio denotes the quarterly average price-earnings ratio of A share stocks. NewAcct signifies new A share account openings, measured in units of one hundred thousand accounts. TrnOvr represents the turnover rate of the CSI 300 Index. VIX refers to the Chicago Board Options Exchange Volatility Index, measuring the volatility of the US S&P500 Index.

[18] We include additional macro control variables (GDP, IndValue, Imprt, Exprt, FrgRsv, FscRvn, and FscExp) and three principal component factors with eigenvalues >1, extracted from the gap between the predicted and actual value of a series of general macroeconomic variables, including GDP, IndValue, Imprt, Exprt, M2, RetSale, FixInv, Intrst, PPI, and USDCNY. Their detailed descriptions are reported in the Appendix.

[19] Huang and Luk (2020) obtain news contents from the digital archive Wisers Information Portal, which includes 114 newspapers in China. They select 10 out of 114 newspapers because they have a complete series of data and are distributed in China's major cities.

categories—fiscal (*EPU_fsc*), monetary (*EPU_mn*), trade (*EPU_trd*), and exchange rate and capital account policy (*EPU_ec*).

Table 5
Robustness

Panel A: Alternative Specifications

Dependent Variable: Exposure	CFETS Currency	Advanced Economy Currency	Emerging Economy Currency	Two Quarter Forward	WLS	Square Root	System GMM	Double Cluster
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EPU	0.032***	0.057***	0.015***	0.022***	0.016***	0.014***	0.028***	0.028**
	(11.28)	(19.03)	(6.76)	(11.16)	(10.39)	(11.25)	(11.15)	(2.08)
L. exposure							0.379***	
							(4.72)	
Firm Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94,507	94,507	94,507	86,788	94,507	94,507	91,308	94,507
Adj-R^2	0.113	0.097	0.101	0.130	0.116	0.090		0.090
	Before 2015Q3	After 2015Q3	Nonparametric series regression	EPU 75th percentile Indicator	Controlling Market Sentiment	Controlling Exchange Rate Volatility	EPU First-order Difference	Detrended EPU
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
EPU	0.089***	0.045***	0.075***	0.004*	0.048***	0.026***		
	(14.18)	(5.13)	(25.04)	(1.66)	(14.10)	(10.46)		
ΔEPU							0.020***	
							(7.04)	
EPU_detrend								0.029***
								(11.97)
EPU 75p Indicator × EPU				0.009***				
				(19.22)				
Firm Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Observations	41,825	59,857	94,507	94,507	94,507	94,507	94,507	94,507
Adj-R^2	0.237	0.132		0.094	0.103	0.091	0.087	0.089
Chow test: LR chi2 (13): (9) = (10)	13,424.38***							
Unit Root-Test Z (t):							−4.885***	−1.455*

Panel B: Alternative Variable Measures

Dependent Variable:	Exposure							Expo
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EPU	0.021***							0.072***
	(7.10)							(12.21)
EPU_ML		0.042***						
		(10.09)						
EPU_H&L			0.049***					
			(4.43)					
EPU_fsc				0.006*				
				(1.69)				
EPU_mn					0.012***			
					(2.57)			
EPU_ec						−0.004		
						(−1.36)		
EPU_trd							0.017***	
							(7.85)	
More Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94,507	94,507	94,507	94,507	94,507	94,507	94,507	99,535
Adj-R^2	0.116	0.117	0.116	0.116	0.116	0.116	0.116	0.290

Note: Panel A reports the regression results of alternative specifications. In Column (1), the currency basket refers to the CFETS' RMB exchange rate index with yearly changing

weights. In Columns (2) and (3), the currency basket is classified into advanced economy currency and emerging economy currency, respectively. In column (4), we move the rolling window for computing exposure two quarters forward. Column (5) shows the results of the weighted least squares regression by weighting each sample as the inverse of its standard error in the coefficient estimation process through Eq.(2). In Column (6), the independent variable is the square root of exposure. Column (7) uses the system generalized methods of moments (GMM) of Blundell and Bond (1998) to estimate our results in a dynamic panel, where the quarter and industry fixed effects are controlled. In Column (8), t-statistics are clustered at the firm and year-quarter level. In order to analyzes the impact of the RMB Exchange Rate Formation Mechanism Reform on corporate exchange rate exposure, column (9) and (10) show that EPU significantly affects both pre- and post-reform periods, with structural changes identified through a Chow test. Following Robinson (1988) and Chevalier and Ellison (1997), Column (11) shows the results of the semi-parametric regression. Similarly, Column (12) shows the results with an indicator variable for the top 25 % EPU decile added. Column (13) adds four market sentiment control variables to the regression: PE ratio, NewAcct, TrnOvr, and VIX, representing quarterly average price-earnings ratio, new A share account openings, CSI 300 turnover rate, and US S&P 500 volatility, respectively. Column (14) controls for exchange rate volatility by using the quarterly standard deviation of the CFETS RMB Exchange Rate Index (CNY Vol) as a measure. To eliminates the influence of time trends on the key variable, column (15) applies first-differencing to EPU, while column (16) regresses EPU on the logarithmic transformation of quarterly trend variables and their polynomial terms, using the residual series (EPU_detrend) as the adjusted core explanatory variable. Panel B reports the regression results of alternative variable measures, with more macroeconomic variables controlled in the model. Specifically, Column (8) uses alternative exposure with operating metrics.

The results reported in Table 5's Panel B uniformly confirm that overall high EPU is associated with high exposure (Columns (1)–(3)); the result is economically large. The coefficient of *EPU_ML* is 0.042, suggesting that a one standard deviation increase in *EPU_ML* is associated with a 0.022 (0.517 × 0.042) increase in exchange rate exposure, corresponding to 8.225 % of the sample average. To access which policy category index is likely to drive our results, we run our regression separately using the EPU indices for each policy category, constructed by Huang and Luk (2020). Columns (4) and (7) show that the fiscal (*EPU_fsc*) and trade policy uncertainty (*EPU_trd*) have strong positive impacts on firms' exposure. This is not surprising, since trade policy plays a key role in firms' international operations, while fiscal policy (both tax and government purchase) is directly relevant to firms' operational cash flows. Monetary policy uncertainty is also positively related with firms' exposure (Column 5), while we find no evidence that exchange rate and capital account EPU is related with corporate exchange rate exposure (Column 6). A possible explanation is that monetary policy plays a key role in driving uncertainty (Bonaime et al., 2018), while exchange rate and capital account policy changes infrequently, and are relatively less important sources of EPU.

In column (8), we construct alternative measure by utilizing the financial statement data disclosed by publicly listed companies. Under the assumption of constant tax rates and discount factors, the exchange rate exposure of a firm is reflected in the impact of

exchange rate fluctuations on the expected future cash flows. Bodnar et al. (2002) argue that the current pre-tax profit can serve as a proxy for expected future cash flows. Therefore, the exchange rate exposure of a firm can be expressed as:

$$\gamma_i = R_i + (R_i - C_i)\left(\frac{1}{r} - 1\right)\# \tag{4}$$

where R_i and C_i represent the proportion of foreign currency revenue and foreign currency cost, respectively, and r denotes the pre-tax sales profit margin. The proportion of foreign currency revenue and the pre-tax sales profit margin can be obtained from the financial statements of publicly listed companies. However, due to the limitations of China's financial statement disclosure system, data on the proportion of foreign currency cost at the firm level are unavailable. We thus resort to an industry-fitting method, with industry data derived from the non-competitive input-output table published by the National Bureau of Statistics.

This method of inferring expected future cash flows from the annual reports disclosed by firms primarily captures the exchange rate risk associated with the firm's import and export transactions. It has certain limitations in that it fails to account for the impact of economic exposure, such as market competition, factor allocation, strategic transformation, and macroeconomic shocks, on the firm's exchange rate risk. Moreover, it does not incorporate the various exchange rate risk management practices that firms may adopt in response to exchange rate risks. Column (8) reports the results, and EPU remain a highly positive impact on cash-flow based exposure.

5.3. Endogeneity

A major empirical challenge is to identify policy uncertainty's causal effect on firms' exchange rate exposure. We can safely dismiss the possibility of reverse causality because firms' exposure is clearly too small to influence a country's EPU. Hence, the main challenge is identifying whether EPU is correlated with other factors that simultaneously affect firms' exposure. We conduct two additional tests to alleviate these endogeneity concerns.

First, BBD's EPU index may be contaminated by economic uncertainty, which has a large impact on firms' exchange rate exposure but is unrelated to EPU. Although we control for a large number of economic condition and foreign market condition variables, concerns remain regarding the EPU index (Gulen & Ion, 2016; Kaviani et al., 2020). Thus, we introduce additional tests, using the residual EPU as an alternative independent variable (Kaviani et al., 2020). Specifically, the residual EPU is estimated as follows:

$$EPU_t = \delta_0 + \delta_1 EPU\_foreign_t + \sum \delta_n Macro\ Factors_t + EPU\_R_t\# \tag{5}$$

EPU_foreign is foreign countries' uncertainty index, measured as a principal component factor with the largest eigenvalue extracted from the logarithm of the seven EPU indices of foreign countries—the United States, the United Kingdom, Japan, the European Union, India, South Korea, and Russia. Note that China maintains close trade relationships with said countries. Economic shocks that affect these economies could

impact the Chinese economy. *Macro Factors*$_t$ include the same macroeconomic variables in our baseline regression.

EPU_R provides a cleaner measure of EPU by taking out the part of EPU only reflecting economic uncertainty. Columns (1) and (2) of Table 6 report the estimation results. In both specifications, the coefficients are positive and statistically significant at the 1 % level. The coefficients are higher than those reported in Table 3. This suggests that measure errors influence the relationship between policy uncertainty and exchange rate exposure but EPU still has a significantly positive impact on exposure.

Second, to further alleviate endogeneity concerns, we propose a novel instrument variable—the number of geological dis- asters—for EPU. Various studies have found that natural disasters have a significant impact on countries' political stability and legitimacy (Abney & Hill, 1966; Cavallo, Galiani, Noy, & Pantano, 2013; Gasper & Reeves, 2011; Quarantelli & Dynes, 1977). The politicization of natural disasters is common, as disaster-related issues — e.g., victims' and society's grievances and government relief efforts — give a rise to intensified political contestation and social conflicts. China has a party-centric political system emphasizing the need to keep society stable and economic performance high (Yang, 2022; Zhao, Seibert, Thomas, & Lumpkin., 2010); thus, to deal with natural disasters, the Chinese government enacts policies focusing on disaster relief and social stability.[20] Thus, while China incurs great expenses when natural disasters occur, the government is likely to remain consistent in economic policy.[21]

Compared to other natural disasters, geological disasters are unpredictable and have major adverse effects (Geller, Jackson, Kagan, & Mulargia, 1997). During our sample period, the number of geological disasters ranged from around 3000 in 2018 to more than 100,000 in 2006. We use the natural logarithm of the number of geological disasters in a year (*Disaster*) as the instrumental variable for EPU and report our two-stage least-squares results in Table 6.

Columns (3) and (4) show that EPU has a positive and statistically significant effect on firms' exposure (second stage). The EPU coefficients (0.094 and 0.098) are larger than those in specifications without instrumental variables. First-stage regressions show that *Disaster* is negatively and significantly associated with EPU in both specifications. The *F*-statistics for the first-stage regressions are >10 and t-statistics for the instrumental variables are >3.6, which is enough to conclude that a weak instrumentation problem is unlikely.

Column (5) reports the results of using *EPU_R* as an alternative EPU measure. With *Disaster* as the instrument, the coefficient of *EPU_R* is positive (0.116) and significant at the 1 % level (t-statistic = 3.42), in line with the EPU results. These results support that policy uncertainty has causal positive effects on firms' exchange rate exposure.

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[20] In response to the Wenchuan Earthquake, national ministries and commissions emphasized the continuity and stability of financial support policies and minimized the adverse influence of policy uncertainty—e.g., suspending the decision of raising the reserve requirement ratio for financial institutions in the afflicted area.

[21] Additionally, Nordhaus (2012) argues that there is no optimal policy in case of events such as earthquakes, indicating that the best action for policymakers is no action when facing catastrophic disasters.

Table 6
Endogeneity.

Second Stage					
Dependent Variable: Exposure					
	(1)	(2)	(3)	(4)	(5)
EPU			0.094***	0.098***	
			(3.89)	(3.21)	
EPU_R	0.071***	0.082***			0.116***
	(27.20)	(27.17)			(3.42)
Firm Control	No	Yes	Yes	Yes	Yes
Macro Control	No	No	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Double Cluster	No	No	Yes	Yes	Yes
No. firms	3616	3431	3431	3431	3431
Observations	100,836	94,507	94,507	94,507	94,507
First Stage					
Dependent Variable:			EPU	EPU	EPU_R
Disaster			−0.579***	−0.762***	−0.467***
			(−4.97)	(−5.87)	(−8.02)
F value			24.73***	34.49***	64.36***
Adj-R^2			0.485	0.709	0.492

Note: Columns (1) and (2) report the results of fixed-effect regressions of Exposure on the residuals of EPU on EPU_foreign and a series of macro variables that are consistent with baseline regression. Columns (3)–(5) report the results of a two-stage least squares test, with the number of geological disasters (unit: 10,000) as the instrumental variable. Taking Column (4) as an example, the Cragg-Donald Wald F statistic is 43,063.03 and the Kleibergen-Paap Wald rk F statistic is 34.21. The two statistics are both larger than the Stock-Yogo weak ID test 10 % critical values 16.38. t-statistics appear in parentheses below coefficient estimates. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

6. Why does policy uncertainty affect exchange rate exposure?

In this section, we investigate the channels through which policy uncertainty affects exchange rate exposure. We examine whether EPU's positive effect on exposure differs across firms. We focus on three reasons. First, firms differ in the extent of their international involvement. If international involvement is not equally costly across firms, we should observe cross-section variations in exchange rate exposure as a response to increased EPU. Second, EPU could encourage managers to believe they can engage in self-serving dealings without immediate consequences, thus increase exposure risk in poorly-governed firms (He et al., 2021a). Third, EPU influences firms' willingness and cost to hedge. Higher uncertainty could incentivize managers to engage in risk management (e.g., Nguyen et al., 2018). Nevertheless, EPU is associated with higher hedging costs, thereby preventing firms from actively managing currency risks.

6.1. International operations

The direct exposure is a crucial factor in determining currency risk (He et al., 2021b; Wei & Starks, 2013). For enterprises with international operations, the impact of EPU is particularly pronounced. These multinational corporations must navigate more complex strategic landscapes, such as adjusting pricing models or supply chain relationships, when faced with elevated EPU. This complexity leads to a greater susceptibility to exchange rate volatility compared to purely domestic counterparts. Thus, the positive relation between policy uncertainty and exchange rate exposure is more pronounced for firms

heavily involved in international business. To test this hypothesis, we construct proxy for firms' involvement in international operations and its impact on the relationship between policy uncertainty and exchange rate exposure. Specifically, we use firms' foreign sales ratio as our first measure of international operations (overseas) to quantify firms' revenue received from international markets. We report the estimates in Columns (1) and (2) in Table 7. We focus on the coefficient of the interaction term, EPU × overseas, which captures how foreign revenue affects the EPU's effect on exposure. EPU × overseas coefficient is positive and statistically significant at the 1 % level. These results confirm that firms with high foreign revenue are more sensitive to EPU changes.

International industry competition is another important source of exchange rate exposure. Williamson (2001) posits that industries structures and competition environments differ. Industry competition plays a vital role in firms' exchange rate exposure, as firms facing high foreign competition have high demand elasticity; thus, their revenue is more sensitive to currency movements. To measure international industry competition, we use the procedure of Griffin and Stulz (2001) and He et al. (2021b), while the excess return of the Chinese industry is regressed on that of its US counterpart. A negative coefficient indicates that China industry's performance is worse when the US industry does better relative to its market. We define a dummy variable, *cmpt*, that equals 1 if the coefficient is significantly negative and 0 otherwise. Columns (3) and (4) in Table 7 report the results. The coefficients of the interaction term, EPU × *cmpt*, are positive and highly significant. The effect is also large: the response of exposure to EPU in highly competitive industries is 34.6 % (0.009/0.026) larger than that in low-competitiveness industries. This supports the hypothesis that industry competition amplifies EPU's effect on exchange rate exposure.

Finally, we use the ratio of foreign loan over total loans (Floan) as our third measure of international operations. Many emergingmarket economies raise debts invoicing in foreign currency and inevitably must make timely repayments on principal and interest. Their cash flows are sensitive to large adjustments in exchange rate movements (Salomao & Varela, 2022). On the other hand, foreign debt works as a hedging tool to smooth cash flow volatility caused by foreign operations. The coefficients of the interaction term, EPU × floan, are both insignificantly negative (Columns (5) and (6)). This suggests that firms' foreign currency loan reduce the policy uncertainty and exchange rate exposure relationship, but the effect is not significant.

Overall, these findings are consistent with our hypothesis that a firm's international involvements strengthen the relationship between policy uncertainty and exchange rate exposure.

Table 7
International Operation.

Dependent Variable: Exposure	Foreign Sales Ratio		Market Competition		Foreign Currency Loan	
	(1)	(2)	(3)	(4)	(5)	(6)
EPU	0.018***	0.023***	0.021***	0.026***	0.024***	0.029***
	(7.51)	(8.78)	(8.48)	(9.61)	(10.19)	(11.27)
EPU × overseas	0.048***	0.047***				
	(5.15)	(5.12)				
EPU × cmpt			0.009**	0.009**		
			(2.42)	(2.36)		
EPU × floan					−0.019	−0.017
					(−1.24)	(−1.12)
overseas	−0.254***	−0.253***				
	(−4.89)	(−4.82)				
floan					0.118	0.108
					(1.37)	(1.26)
Firm Control	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	No	Yes	No	Yes	No	Yes
No. firms	3431	3431	3431	3431	3431	3431
Observations	94,507	94,507	94,507	94,507	94,507	94,507
Adj-R^2	0.090	0.091	0.089	0.090	0.089	0.090

Note: Columns (1) and (2) report the interaction between EPU and overseas operations. Columns (3) and (4) report the interaction between EPU and market competition. Columns (5) and (6) report the interaction between EPU and foreign currency loans.

6.2. Rent-seeking

In emerging markets characterized by weak market discipline, such as China, rent-seeking activities by corporate insiders are widespread. EPU may lower the barriers to self-serving behavior by managers, thereby increasing cash flow volatility. First, elevated EPU can foster an opaque and low-quality information environment, which amplifies insiders' informational advantages and creates opportunities for rent-seeking (Aboody, Hughes, & Liu, 2005; Maffett, 2012; Nagar, Schoenfeld, & Wellman, 2019). For instance, Chen, Chen, Wang, and Zheng (2018) show that firms respond to policy uncertainty by reducing both the quantity and quality of disclosures. Similarly, Hossain et al. (2020) find that managers can exploit the increased opacity and market turbulence induced by EPU to mislead stakeholders.

Second, since managerial performance is often evaluated relative to peers rather than solely on absolute outcomes (Scharfstein & Stein, 1990), EPU introduces an exogenous and systematic noise that complicates performance attribution. This allows managers to blame unfavorable outcomes on external policy shocks rather than on their own decisions, facilitating a "blame-sharing" effect among peers (Garofalo & Rott, 2018). Consequently, EPU creates a more lenient environment for decision-making failures and raises the propensity for rent-seeking during high-uncertainty periods.[22]Duchin and Schmidt (2013), using a sample of 9854 mergers from 1980 to 2009, show that poorly governed firms are more likely to engage in empire-building and value-destroying mergers during high-uncertainty periods.

Third, heightened EPU makes it more difficult for shareholders and investors to accurately assess whether performance fluctuations arise from managerial actions or

[22] For instance, Maike Group, Shaanxi's largest private enterprise, faced a liquidity crisis in 2023. The company strategically uses the pandemic-induced global health crisis as a smokescreen to obscure its failures in corporate governance and capital allocation strategies.

exogenous policy effects (Baum, Caglayan, Ozkan, & Talavera, 2006). As rent-seeking activities often do not directly affect accounting-based performance metrics, insiders may be incentivized to pursue such actions under the assumption that their evaluated performance will not be penalized (Jensen & Meckling, 2019). Managers may resort to opportunistic strategies, such as earnings management or strategic litigation, to obfuscate firm-specific information and conceal rent-seeking activities (Ali & Hirshleifer, 2017).

If this hypothesis holds, we should observe more rent-seeking activities during periods of high EPU. This would in turn translate into greater firm exposure, as cash flow volatility increases when firms are subjected to adverse exchange rate shocks. In Panel A of Table 8, we compare the averages (median) of proxies for insiders' rent-seeking activities for both high- and low-EPU periods (based on the mean EPU). Following the literature (Cheung, Raghavendra Rau, & Stouraitis, 2006; He & Rui, 2016; Jiang, Lee, & Yue, 2010; Roulstone, 2003; Shleifer & Vishny, 1997), we consider three corporate activities that are most likely associated with self-dealing transactions or risky business activities—related-party transactions (RPTs), other accounts receivables, and executive compensation[23]—scaled by the prior year's total sales. Note that corporate insiders can use RPTs to either prop up or tunnel a corporation. Thus, we only focus on tunneling-motivated RPTs that harm the interests of minority shareholders (Cheung et al., 2006; Jian & Wong, 2010). More specifically, we perform an event study using all RPT events and estimate announcement cumulative abnormal returns over the event window of [−1,1]. We classify RPTs as harmful if the cumulative abnormal return [− 1, 1] is negative.

Our results show that the averages of harmful RPTs, other accounts receivables and executive compensations are 0.310, 0.031, and 0.235, respectively, in low-EPU periods, and 0.257, 0.030, and 0.226, respectively, in high-EPU periods. The last two columns of Panel A reveal that the differences between low- and high-EPU periods are statistically significant at the 1 % confidence level. Hence, our findings are consistent with the hypothesis that insiders engage more in rent-seeking during high-EPU periods.

If rent-seeking is an important channel through which policy uncertainty affects exchange rate exposure, this effect will be moderated by better corporate governance. As well-governed firms largely mitigate insiders' rent-seeking (He & Rui, 2016; Shleifer & Vishny, 1997), the relationship should be significant weaker (less positive) for such firms. To test this prediction, we include the following corporate governance proxies and their interactions with EPU (one-by-one) into our benchmark regressions: CEO serving as the board chairman (*dual*), the percentage of institutional investors' shareholding (*instown*), and the number of analysts following the firm (*analyst*). The first indictor is proxy for corporate internal governance. Dual are positively related with insiders' entrenchment and allow them to seek extra private benefits of controls (Claessens, Djankov, Fan, & Lang, 2002; He, Cheng, & Wen, 2019). We expect that its interaction with EPU is positive, as the positive effect of EPU is more pronounced in poorly-governed firms. The remaining two indicators represent the strength of external governance. If the external governance mechanism works well—e.g., transparency mitigates information asymmetry,

[23] For example, Jiang et al. (2010) note the widespread use of other accounts receivables. Cheung et al. (2006) show that minority shareholders experience significant value losses when companies undertake related party transactions. Roulstone (2003) finds that firms with insider trading restrictions are required to pay a premium in total executive compensation.

institutional investors play an active role on corporate monitoring—insiders' rent-seeking activities are presumably constrained.[24] Thus, their impact on EPU should be negative, as improved external governance reduces the link through rent-seeking.

Table 8
Rent-seeking.

Panel A: Tunneling in High vs Low EPU Period

Variable		High EPU	Low EPU			Diff (High-Low)	Diff (t-stat/z-stat)
		Obs	Value	Obs	Value		
Harmful RPT	Mean	26,515	0.310	15,364	0.257	0.053	11.772***
	Median		0.064		0.042	0.022	11.542***
Other Receivables	Mean	59,672	0.031	43,463	0.030	0.001	5.395***
	Median		0.014		0.014	0.000	1.999**
Executive Compensation	Mean	46,778	0.235	35,067	0.226	0.009	5.475***
	Median		0.149		0.141	0.008	6.536***

Panel B: Conditioning on Corporate Governance Proxies

Dependent Variable: Exposure	Duality of General Manager and Board Chairman	Shareholding of Institutional Investor	Analyst Coverage
	(1)	(2)	(3)
EPU	0.026***	0.043***	0.033***
	(10.19)	(9.92)	(12.71)
EPU × dual	0.008**		
	(2.06)		
EPU × instown		−0.033***	
		(−4.86)	
EPU × analyst			−0.001***
			(−5.33)
dual	−0.052**		
	(−2.28)		
instown		0.170***	
		(3.97)	
analyst			0.004***
			(4.69)
Firm Control	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes
No. firms	3431	3431	3431
Observations	94,507	94,402	94,507
Adj-R^2	0.090	0.090	0.091

Note: Panel A reports the descriptive statistics for Harmful RPT, Other Receivables, and Executive Compensation separately for periods of high- and low-EPU based on the time-series median. Student's t-test and the Wilcoxon-Mann-Whitney Utest are used to examine the significance of the differences in the means and medians of these indicators between the two groups defined by EPU. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively. All the variables are winsorized at the 5 % and 95 % levels. Panel B shows the impact of corporate governance on the nexus between EPU and ERE. Column (1) reports the interaction between EPU and *dual*, a dummy that equals 1 if the general manager is also a chairperson, and equals 0 otherwise. Column (2) reports the interaction between EPU and *instown*, which indicates the proportion of institutional investors' shareholding. Column (3) reports the interaction between EPU and *analyst*,

[24] The introduction of institutional investors plays a positive governance role by virtue of their own professional and independence advantages. Institutional investors provide an effective way to balance major shareholders and alleviate the "insider control" problem by means of on-site investigation and participation in proposals. The governance effect of institutional investors also increases the cost of tunneling and self-serving deals under high-EPU conditions.

which indicates the number of analyst teams following the firm in the current year, with missing values replaced by 0.

Column (1) of Panel B reports that the coefficient of EPU × dual is significantly positive, thus confirming that EPU has a stronger impact on exposure for firms with poor internal governance. The last two columns of Panel B show that the interactions between our two external governance proxies and EPU are all negative and statistically significant at the conventional confidence level. These findings suggest that the relationship between policy uncertainty and exchange rate exposure is meaningfully related to firms' external governance. Overall, our results show that insiders' rent-seeking is a channel through which EPU impacts firms' exchange rate exposure.

6.3. Risk management

Table 4 shows that firms' hedging activities—particularly operational hedging—can mitigate adverse currency movements' impact on firm value. Note that proactive hedging can significantly mitigate EPU's impact. If firms hedge heavily because of an increased EPU, we should observe their cash flows are less sensitive to currency movements. However, we find a significant positive relationship between EPU and exchange rate exposure. It may suggest that Chinese firms are unlikely to adopt preemptively hedging strategies to cope with the increased exposure arising from EPU. [25] Nevertheless, we take a further step to examine firm's hedging strategy during high-EPU periods.

If policy uncertainty prompts Chinese firms to engage in exchange rate risk management, we expect high-EPU periods will be associated with a more intensive use of hedging tools. To test this prediction, we conduct a multivariate analysis to examine whether EPU increases the likelihood of financial and operational hedging. Specifically, in line with Nguyen et al. (2018), we use the following logit model specification:

$$Hedge_{it} = \beta_0 + \beta_1 EPU\_Y_{t-1} + \beta_2 controls_{i,t-1} + \pi_i + \epsilon_{i,t} \# \quad (6)$$

where $Hedge_{it}$ refers to $drvtv_{it}$ or $brdth_{it}.drvtv_{it}$ is a dummy variable that equals 1 if a firm report the usage of currency derivatives in year t, and 0 otherwise. $brdth_{it}$ is a dummy variable that equals 1 if the number of continents where a firm has subsidiaries is >3 at year t, and 0 otherwise. EPU_Y_{t-1} is the average of EPU in year t-1. We control for the firm-specific variables used in the benchmark specification. Additionally, we include *crslist*, PERGDP, and VIX. Their detailed descriptions are reported in appendix. π_i captures the industry fixed-effect.

Columns (1)–(3) in Table 9 shows the results of financial hedging. The estimated coefficients of EPU_Y_{t-1} are positive and statistically significant at the 1 % confidence level. Specifically, one standard deviation increase in EPU is associated with a 62.870 %

[25] It's unclear whether EPU is associated with firms' oversea activities. For example, Nguyen et al. (2018) find that heightened domestic economic policy uncertainty prompts firms to increase exports and overseas investments, while Carballo, Handley, and Lim˜ ao (2018) find the opposite results. However, these actions are typically not viewed as strategies for hedging exchange rate risks (Pantzalis et al., 2001; Bartram and Bodnar, 2007).

(0.758 × (e0.604 − 1)) increase in the likelihood of using financial derivatives, indicating that listed companies in China are more likely to purchase foreign exchange derivatives in response to high EPU. This result is consistent with Azad, Fang, and Hung (2012), Bartram, Brown, and Fehle (2009), Kim, Mathur, and Nam (2006), and Nguyen et al. (2018). Considering the vital role of stable and predictable cash flows in alleviating underinvestment problems and reducing the possibility of financial distress, as well as the accumulation of payment to corporate tax (Nance et al., 1993; Smith & Stulz, 1985), the incentives for smoothing the volatile cash flows caused by high-EPU shocks are increased, despite of the fact that only a minority of firms can engage in financial hedging activities due to the underdeveloped foreign exchange derivatives market in China.

Interestingly, unlike financial hedging, operational hedging has the opposite results. Columns (4)–(6) show that the EPU has a negative and statistically significant effect on operational hedging. Specifically, one standard deviation increase in EPU is associated with an 8.308 % (0.758 × ($e^{0.104}$ − 1)) decrease in the likelihood of adopting operational hedging. Operational hedging involves risk sharing and the transfer of international operations across regions. Our results suggest that heightened economic policy uncertainty prompts firms to adopt a more conservative strategy, focusing on some important markets. Consistent with previous findings, operational hedging is a long-term project and difficult to initiate due to short-term influencing factors such as EPU (Aretz & Bartram, 2010; Hoberg & Katie Moon, 2017; Kim et al., 2006). In comparison, financial hedging is more simple, flexible, and suitable for hedging short-term exposure (Chowdhry & Howe, 1999). Beber, Brandt, and Kavajecz (2009) observe that firms manage to increase the derivatives trading volume in time to cope with high uncertainty and unwind these derivatives positions shortly after. Furthermore, with revenue expectations being disrupted by EPU, corporate overseas investments are deferred and even depressed temporarily during high-EPU periods, thus minimizing the moderating effect of operational hedging.

One might be concerned that EPU not only directly affects firms ' exchange rate exposure, but also indirectly influences their financial hedging decisions through its impact on such exposure. This suggests a potential reverse causality issue: elevated EPU increases exchange rate exposure, which in turn leads firms to intensify financial hedging as a reactive measure to mitigate these effects, rather than employing it proactively as part of a strategic risk management approach. The insignificant coefficients of the interaction term, EPU × *drvtv*, in Table 4 could arise as financial hedging acts as an endogenous response to increased exposure.

To test the for the possibility of reverse causality, we implement methodology of Allayannis and Weston (2001), and classify firms each year into one of four mutually exclusive categories based on their hedging behavior:

1. **Non-hedgers:** Firms that do not hedge in either the current or the next period (N_tN_{t+1}).
2. **Hedge quitters:** Firms that hedge in the current period but discontinue hedging in the next period (H_tN_{t+1}).
3. **Hedge starters:** Firms that do not hedge in the current period but initiate hedging in the next period (N_tH_{t+1}).
4. **Persistent hedgers:** Firms that hedge in both the current and the next period (H_tH_{t+1}).

Table 9
Risk Management.

Panel A: The impact of EPU on hedging

Dependent Variable:	Financial Hedging			Operational Hedging		
	(1)	(2)	(3)	(4)	(5)	(6)
EPU_Y	0.785***	0.715***	0.604***	−0.323***	−0.337***	−0.104**
	(5.91)	(5.04)	(3.08)	(−7.70)	(−7.85)	(−2.24)
size		0.221**	0.224**		0.111*	0.117*
		(2.52)	(2.55)		(1.83)	(1.90)
leverage		0.161	0.141		1.125***	0.880***
		(0.18)	(0.16)		(3.69)	(2.77)
quick		−0.073	−0.073		0.106***	0.093***
		(−1.25)	(−1.25)		(7.05)	(5.96)
BM		−0.203*	−0.206*		−0.031	0.018
		(−1.72)	(−1.73)		(−0.51)	(0.30)
floan		0.553	0.553		1.509***	1.702***
		(0.96)	(0.96)		(6.43)	(7.13)
overseas		2.645***	2.646***		0.875***	0.854***
		(8.45)	(8.47)		(4.33)	(4.15)
crslist		0.295	0.291		−0.039	−0.099
		(0.64)	(0.62)		(−0.18)	(−0.44)
PERGDP			−1.478			8.966***
			(−0.46)			(13.15)
VIX			0.007			0.052***
			(0.41)			(13.37)
Industry FE	No	Yes	Yes	Yes	Yes	Yes
No. firms	3502	3075	3075	3500	3430	3430
Observations	25,917	21,894	21,894	25,900	25,395	25,395
Pseudo R^2	0.023	0.100	0.100	0.012	0.039	0.059

Panel B: Reserve Causality Tests for Financing Hedging

Dependent Variable: $Exposure_t$				
	(1)	(2)	(3)	(4)
EPU_{t-1}	0.013***	0.011***	0.013***	0.011***
	(4.42)	(2.72)	(4.41)	(2.71)
$EPU_{t-1} \times H_tH_{t+1}$	−0.003	−0.005		
	(−1.07)	(−1.62)		
$EPU_{t-1} \times H_tN_{t+1}$	−0.001	−0.001		
	(−0.20)	(−0.18)		
$EPU_{t-1} \times N_tH_{t+1}$	0.004	0.002		
	(1.41)	(0.73)		
H_tH_{t+1}			−0.014	−0.024
			(−0.77)	(−1.30)
H_tN_{t+1}			−0.003	−0.003
			(−0.21)	(−0.17)
N_tH_{t+1}			0.023	0.011
			(1.43)	(0.67)
Firm Control	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Macro Control	No	Yes	No	Yes
No. firms	3147	3147	3147	3147
Observations	22,876	22,876	22,876	22,876
Adj-R^2	0.105	0.137	0.105	0.137
Wald test (p-value)				
H1:$EPU_{t-1} \times H_tH_{t+1}=0$	0.283	0.105		
H2:$EPU_{t-1} \times N_tH_{t+1}=0$	0.157	0.466		
H3:$EPU_{t-1} \times H_tN_{t+1}=EPU_{t-1} \times H_tH_{t+1}$	0.408	0.180		
H1: $H_tH_{t+1}=0$			0.440	0.194
H2: $N_tH_{t+1}=0$			0.154	0.504
H3: $H_tN_{t+1}=H_tH_{t+1}$			0.559	0.257
H2 and H3 Jointly	0.274	0.325	0.316	0.437

Note: Panel A reports EPU's impact on derivatives usage and operational hedging. Columns (1)–(3) represent the results of the logit model where the dependent variable is *drvtv*. Columns (4)–(6) represent the results of the logit model where the dependent variable is *brdth*. In order to make the data frequency uniform, EPU is adjusted as annual average. To maintain consistency with the frequency of hedging data, Panel B presents the tests for potential reverse causality in financial hedging decisions using annual data. Both the dependent Exposuret and independent variables EPU_{t-1} are constructed as annual averages of their quarterly counterparts. H_tH_{t+1} denotes the category of hedging

firms, those that engage in hedging activity both in the current period (t) and the subsequent period (t + 1). H_tH_{t+1} denotes the category of hedge quitters, those that hedge in the current period but discontinue hedging in the next period. H_tH_{t+1} denotes the category of hedge starters—those that do not hedge in the current period but initiate hedging in the next period. Wald tests are employed to formally test the hypotheses concerning the causal relationship between EPU, exposure, and hedging transitions, with the P-values reported.

Dummy variables representing these four hedging transition categories are constructed. Specifically, to avoid multicollinearity, we generate interaction terms between the last three category dummy and EPU_{t-1}, which are thereafter incorporated into our regression of Exposure_t. Specifically, we estimate the following cross-sectional regression:

$$Exposure_t = \psi_0 + \psi_1 EPU_{t-1} + \psi_2 EPU_{t-1} \times H_tH_{t+1} + \psi_3 EPU_{t-1} \times H_tN_{t+1} + \psi_4 EPU_{t-1} \times N_tH_{t+1} + \psi_5 controls_{i,t-1} + \theta_i + \epsilon_{i,t} \quad (7)$$

Our empirical strategy is predicated on specific testable implications derived from the hypothesized reverse causality. If firms' exchange rate exposure is significantly amplified by EPU, then firms initiating hedging in the subsequent period (N_tH_{t+1}) should exhibit a stronger impact of EPU on their exposure in current period compared to firms remaining unhedged (N_tN_{t+1}). We expect the coefficient of the interaction term $EPU_{t-1} \times N_tH_{t+1}$, denoted ψ_4, to be positive.

Conversely, if firms choose to forgo hedging because their exposure is less susceptible to EPU fluctuations, then firms discontinuing hedging in the next period (H_tN_{t+1}) should exhibit a weaker impact of EPU in current period relative to firms maintaining their hedge (H_tH_{t+1}). Formally, this implies the coefficient of $EPU_{t-1} \times H_tN_{t+1}$, denoted ψ_3, should be smaller than that of $EPU_{t-1} \times H_tH_{t+1}$, denoted ψ_2. We also control for the same set of control variables as in the previous specifications, denoted as $\text{controls}_{i,t-1}$, as well as firm fixed effects θ_i.

Based on the foregoing analysis, we implement Wald tests to evaluate the following three hypotheses:

H1: The coefficient of $EPU_{t-1} \times H_tH_{t+1}$, denoted ψ_2, equals 0, indicating that hedging does not significantly mitigate the amplifying effect of EPU on exposure.

H2: The coefficient of $EPU_{t-1} \times$ NtHt+1, denoted ψ_4, equals 0, indicating that the decision to initiate hedging is unaffected by the impact of EPU on exposure.

H3: The coefficient of $EPU_{t-1} \times$ HtNt+1, denoted ψ_3, equals the coefficient of $EPU_{t-1} \times H_tH_{t+1}$, denoted ψ_2, indicating that the decision to discontinue hedging is unaffected by the impact of EPU on exposure.

Panel B of Table 9 presents the results of our fixed-effects regression analyses and the corresponding Wald test p-values for each hypothesis. Column (1) includes firm-level control variables, while Column (2) incorporates both firm-level and macroeconomic controls. Consistent with our prior findings, the results indicate that financial hedging fails to significantly mitigate the amplifying effect of EPU on firms' exchange rate exposure. Consequently, we cannot reject Hypothesis 1 (p-values = 0.283 and 0.105).

Furthermore, Wald tests reject the linear restrictions under H2 and H3: we reject H2 (that the decision to initiate hedging is unaffected by the impact of EPU on current exposure.) at the 1 % level (p = 0.157 and 0.466), and also reject H3 (that the decision to discontinue hedging is unaffected by the impact of EPU on current exposure) at the 1 % level (p = 0.408 and 0.180). Jointly, we cannot reject the null hypothesis of no reverse causality (p = 0.274 and 0.325) at the 1 % level. The results reveal that hedge quitters do not show significantly weaker sensitivity than persistent hedgers and hedge starters do not exhibit significantly greater sensitivity than persistent non-hedgers, suggesting that the decision to initiate or cease hedging is not likely driven by opportunistic timing based on exposure levels. Robustness checks regressing Exposuret on hedging dummies (Columns (3) and (4)) confirm these patterns. Collectively, our analysis demonstrates that financial hedging fails to mitigate EPU-driven exposure amplification among Chinese firms, consistent with our findings in Section 4.2.

Taken together, the hedging strategies currently employed by Chinese firms remain relatively underdeveloped. Specifically, as a relatively flexible hedging instrument, financial hedging has gained recognition vis-à-vis EPU shocks but it has limited impact on the nexus between EPU and exposure; thus, financial hedging is inadequate in the Chinese context. Although the moderating effect of operational hedging on the nexus between policy uncertainty and exchange rate exposure is statistically significant, as a long-term project, operational hedging is depressed by EPU in the short term, which could minimize its moderating function.

7. Further evidence

7.1. Heterogeneity tests

The relationship between EPU and exchange rate exposure may exhibit sectoral differences. For example, exporters benefit from RMB depreciation, while importers face cost pressures. Compared with private firms, state-owned enterprises (SOEs) may benefit from implicit government support and are therefore less likely to be influenced by EPU. We thus conduct additional heterogeneity tests to examine whether the EPU-exposure relationship varies across industry, firm size and ownership. Column (1) and (2) of Table 10 reveal that exchange rate exposure in manufacturing firms is more significantly impacted by EPU compared to service firms. Column (3) and (4) shows that large firms are more sensitive to EPU than smaller firms. This is consistent with the notion that manufacturing and largesize firms, involved in more international trade and directly exposed to currency conversion risks, are more responsive to exchange rate fluctuations and a wider range of economic policy uncertainties. Whereas, service firms and small-size firms, primarily dealing in non-tradable goods or business conducted in a single currency, exhibit lower sensitivity. Column (5) and (6) reveal that the coefficients for state-owned and private firms show little variation, indicating minimal differences in their exposure to EPU.

The exchange rate of the RMB against the US dollar has traditionally been a critical concern for Chinese firms. For a long period in the past, the RMB was effectively pegged or crawling to the US dollar. However, with the multiple market-oriented reforms of the RMB, the currency has gained more independence (Ilzetzki, Reinhart, & Rogoff, 2019). Given the majority of international trade is invoiced in dollars, we also delve deeper into the impact of EPU on the exchange rate exposure to USD and other currencies.

Specifically, we focus on USD, and our currency index excluding USD — against the RMB. We re-estimate the respective exchange rate exposures using Eq.(1) and employ these new exposure measures as the dependent variables in the regression analysis outlined in Eq.(3). Columns (7) and (8) present the effects of EPU on the exposure to exchange rate fluctuations against USD and other currencies. It shows that Chinese firms' exposure to USD exchange rate fluctuations is more sensitive to EPU than their exposure to other currencies.

Table 10
Heterogeneity Analysis.

Dependent Variable: Exposure	Sector		Size		Ownership		Currency	
	Manufacturing Industry	Service Industry	Large-size Firms	Small-size Firms	State-owned Firms	Private Firms	Exposure to USD	Exposure to Other Currencies
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EPU	0.026***	0.019***	0.026***	0.017***	0.028***	0.026***	0.042***	0.028***
	(8.28)	(3.15)	(5.91)	(5.38)	(7.99)	(7.33)	(13.91)	(11.32)
Firm Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. firms	2221	383	1964	2411	1003	2428	3431	3431
Observations	58,902	9251	49,676	44,823	35,684	58,823	94,507	94,507
Adj-R^2	0.092	0.120	0.083	0.142	0.067	0.089	0.144	0.091
Coefficient	0.007*		0.009**		0.002			
Difference Test (P value)	(0.080)		(0.020)		(0.340)			

Note: Table 10 presents heterogeneity tests based on sector, size, ownership and currency. Columns (1) and (2) present regressions grouped by whether the sample firms are in the manufacturing or services sector. Columns (3) and (4) group the regressions based on firm size, using asset size as the criterion. Columns (5) and (6) group the regressions by ownership type, distinguishing between state-owned and private enterprises. Columns (7) and (8) reflect the impact of EPU on exchange rate exposure to USD and other currencies. The last row displays the results of the coefficient difference tests, with the corresponding P - values in parentheses.

7.2. Sample period extension: 2010–2023

We begin our analysis using data from the period from 2010 to 2020. We focus on this period as we wish to avoid any potential effects of the COVID-19 pandemic crisis of 2020–2023. In this section, we expand the temporal scope to include the entire 2010–2023 period for a more comprehensive analysis, with particular emphasis on the impact of the COVID-19 pandemic. The robustness check presented in Table 11 reveals persistent statistical significance of EPU in amplifying exchange rate exposure. To further explore the impact of the COVID-19 pandemic, this paper constructs the variable *CovidCase* to measure the fluctuating severity of the current epidemic situation. *CovidCase* is defined as the daily new confirmed cases of COVID-19 in China (including Hong Kong, Macao, and Taiwan), measured in thousands. The results from column (4) to column (6) show that the interaction terms between *CovidCase* and EPU are positive and significant, indicating that during the pandemic, the sensitivity of corporate exchange rate exposure to EPU is greater. This finding underscores that economic policy uncertainty during the pandemic has a more significant impact on enterprises.

Table 11
Sample Period Extension and the Effect of Confirmed COVID-19 Cases

Dependent Variable: Exposure								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EPU	0.009***	0.020***	0.034***	0.023***	0.029***	0.036***	0.034***	0.035***
	(7.26)	(12.83)	(20.13)	(16.78)	(18.46)	(20.61)	(20.13)	(20.14)
EPU × CovidCase				0.013***	0.009***	0.015***		
				(19.38)	(19.97)	(25.28)		
CovidCase				−0.088***	−0.065***	−0.100***		
				(−20.11)	(−20.76)	(−25.61)		
EPU × drvtv							−0.002	
							(−0.22)	
drvtv							0.003	
							(0.04)	
EPU × brdth								−0.014*
								(−1.81)
brdth								0.084*
								(1.74)
size		−0.018***	−0.004*		−0.013***	−0.005**	−0.004*	−0.004*
		(−8.90)	(−1.94)		(−6.65)	(−2.30)	(−1.89)	(−1.89)
leverage		0.026***	0.028***		0.035***	0.033***	0.028***	0.028***
		(2.66)	(2.93)		(3.65)	(3.54)	(2.93)	(2.93)
quick		−0.002***	−0.003***		−0.002***	−0.003***	−0.003***	−0.003***
		(−3.64)	(−4.91)		(−3.13)	(−4.19)	(−4.91)	(−4.89)
BM		0.085***	0.040***		0.063***	0.032***	0.040***	0.040***
		(14.20)	(6.69)		(10.63)	(5.36)	(6.69)	(6.71)
floan		0.012	0.006		0.008	0.006	0.006	0.006
		(1.10)	(0.57)		(0.77)	(0.54)	(0.60)	(0.60)
overseas		0.015	0.022**		0.014	0.019*	0.022**	0.023**
		(1.32)	(1.96)		(1.24)	(1.73)	(2.00)	(2.07)
Macro Controls	No	No	Yes	No	No	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. firms	5320	5054	5054	5320	5054	5054	5054	5054
Observations	171,304	160,229	160,229	171,304	160,229	160,229	160,229	160,229
Adj-R^2	0.064	0.076	0.098	0.077	0.091	0.105	0.098	0.098

Note: Table 11 extends the temporal scope to encompass the 2010 – 2023 period for comprehensive analysis. To further investigate the impact of the COVID-19 pandemic, Panel A of Table 11 introduces the variable *CovidCase* to measure the severity of the epidemic. In Columns (4) to (6), *CovidCase* is defined as the daily number of new confirmed COVID-19 cases in China, measured in thousands. Panel B reports the regression results of the hedging effects under two scenarios: across the entire period and during the peak of the pandemic. Columns (7)–(8) report the regression results across the entire period. Columns (9)–(11) report the regression results for the COVID-19 pandemic peak period, specifically from 2019Q4 to 2022Q3. More specifically, Column (9) reports the benchmark regression results. To test the role of hedging, Column (10) reports the interaction between EPU and *drvtv*. Column (11) reports the interaction between EPU and *brdth*

Columns (7) and (8) present the hedging effects based on updated data. The results show that operational hedging significantly mitigates the impact of EPU on exchange rate exposure, whereas financial hedging does not exhibit such a significant effect, which is consistent with the results in Table 4.

7.3. Alternative explanation

One may concern that EPU may increase investor risk aversion, for instance heightened discount rates for foreign cash flows, and hence lead to higher discount rate for firms with foreign operations. As a result, the positive relationship between EPU and exchange rate exposure be driven by investors risk aversion. There is no theoretical basis

for valuing firms with foreign cash flows at a discount relative to those without. The choice of asset pricing model in the context of foreign cash flows has not yet been formulated (Cravino & Levchenko, 2017; Jia & Li, 2020). To examine whether EPU is associated with higher discount rate for firms with foreign operations, we thus take a firm characteristic-based method relating firms' stock returns to EPU and firm's foreign cash flows, along the lines of Daniel and Titman (1997) and Bolton and Kacperczyk (2023).[26] Specifically, we estimate the following model:

$$Ret_{i,t+1} = \alpha_0 + \alpha_1 EPU_t + \alpha_2 EPU_t \times FrgnOpr_{i,t} + FrgnOpr_{i,t} + \alpha_3 Control_{i,t} + \theta_i + \epsilon_{i,t} \quad (7)$$

where the dependent variable $Ret_{i,t+1}$ is the return on stock i in quarter t + 1. To capture firms' foreign operations, we construct three proxy variables for $FrgnOpr_{i,t}$ based on foreign sales, foreign debt, and foreign ownership. $Overseas_{i,t}$ measures firm's foreign sales ratio, $Fcash_{it}$, a binary indicator equaling 1 if firm holds material foreign-currency revenues or debt obligations, and 0 otherwise. Noting that overseas investors may exhibit greater risk aversion in response to EPU, we introduce an additional variable, $QFIIprc_{i,t}$, to capture this effect. Specifically, $QFIIprc_{i,t}$ represents the ownership stake of qualified foreign institutional investors, measured as the percentage of total outstanding shares. We employ an interaction-term approach to examine whether investors demand a higher risk premium for firms with foreign operations, specifically testing if EPU increases these firms' discount rates. If this hypothesis holds, we should observe a statistically significant and positive coefficient for α_2.

Following the literature, firm-level controls $Control_{i,t}$ include $size_{i,t}$, $leverage_{i,t}$, $BM_{i,t}$, $E/P_{i,t}$, $Beta_{i,t}$, $Mom_{i,t}$ (Brogaard & Detzel, 2015; Carhart, 1997; Fama & French, 1992; Fang & Peress, 2009). $size_{i,t}$ is the logarithm of the firm's total assets in the end of previous year; $leverage_{i,t}$ is the debt-to-asset ratio in the end of previous year; $BM_{i,t}$ is ratio of total value of assets to market value;$E/P_{i,t}$ is the ratio of net earnings per share in the end of previous year; $Beta_{i,t}$ is the estimated coefficient derived from the CAPM using daily data from the preceding year;$Mom_{i,t}$ is the cumulative return over the 6 quarters from t-6 to t-1. Macro Controls are captured to control the general economic conditions, consistent with our previous regression model. We also control for both firm and time fixed effects.

[26] This approach is particularly well-suited to leverage the substantial cross-sectional variation in firm-level characteristics within our sample. In line with the empirical asset pricing literature (e.g., Fama & French, 1992; Carhart, 1997; Fang & Peress, 2009; Brogaard et al., 2015), we focus on a set of theoretically and empirically motivated characteristics that capture time-varying effects: firm size, leverage, book-to-market ratio, return on equity, market beta, and stock return momentum. By employing a characteristic-based framework, we effectively incorporate firm and time fixed effects, thereby enhancing the identification of causal influences. This strategy also facilitates the use of clustered standard errors to account for residual dependence and potential unobserved correlations. A further advantage of this approach is that it remains agnostic to the underlying asset pricing model, circumventing the need for restrictive theoretical assumptions.

Table 12
Alternative Explanation: Investor Risk Perceptions

Dependent Variable: $Ret_{i,t+1}$						
	(1)	(2)	(3)	(4)	(5)	(6)
EPU	0.219***	0.160**	0.218***	0.159**	0.219***	0.160**
	(2.70)	(2.14)	(2.70)	(2.14)	(2.70)	(2.13)
EPU × Fcash	0.001	0.000				
	(1.15)	(0.77)				
EPU × overseas			0.013	0.009		
			(1.20)	(0.86)		
EPU × QFIIprc					0.310	0.291
					(1.68)	(1.52)
overseas	0.020***	0.022***	−0.049	−0.027		
	(2.70)	(2.93)	(−0.82)	(−0.45)		
floan	−0.002	−0.002	−0.002	−0.002		
	(−0.34)	(−0.36)	(−0.30)	(−0.32)		
QFIIprc					−1.517	−1.437
					(−1.42)	(−1.30)
size	−0.036***	−0.036***	−0.036***	−0.036***	−0.036***	−0.036***
	(−4.95)	(−5.02)	(−4.95)	(−5.03)	(−4.95)	(−5.03)
leverage	0.017	0.013	0.016	0.013	0.017	0.022
	(1.00)	(0.77)	(0.99)	(0.76)	(1.00)	(1.40)
B/M	0.025***	0.027***	0.026***	0.027***	0.026***	0.027***
	(2.99)	(3.11)	(3.01)	(3.12)	(3.00)	(3.08)
E/P	−0.010**	−0.011**	−0.010**	−0.011**	−0.010**	−0.011**
	(−2.07)	(−2.37)	(3.01)	(−2.35)	(−2.09)	(−2.40)
Beta	−0.071	−0.051*	−0.071	−0.051*	−0.071	−0.051*
	(−1.46)	(−1.70)	(−1.47)	(−1.71)	(−1.46)	(−1.70)
Mom	0.001	0.008	0.001	0.008	0.001	0.008
	(0.05)	(0.50)	(0.05)	(0.50)	(0.05)	(0.50)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	No	Yes	No	Yes	No	Yes
No. firms	3242	3242	3242	3242	3242	3242
Observations	92,964	92,964	92,964	92,964	92,964	92,964
Adj-R^2	0.132	0.161	0.132	0.161	0.133	0.161

Note: Table 12 examines the competing channel of investor risk perceptions. $Overseas_{i,t}$ measures firm's foreign sales ratio. $Fcash_{it}$ is a binary indicator equaling 1 if firm holds material foreign-currency revenues or debt obligations, and 0 otherwise. $QFIIprc_{i,t}$ represents the ownership stake of qualified foreign institutional investors, measured as the percentage of total outstanding shares. The dependent variable $Ret_{i,t+1}$ is the return on stock i in quarter t + 1. $size_{i,t}$ is the logarithm of the firm's total assets in the end of previous year; $leverage_{i,t}$ is the debt-to-asset ratio in the end of previous year; $BM_{i,t}$ is ratio of total value of assets to market value; $E/P_{i,t}$ is the ratio of net earnings per share in the end of previous year; $Beta_{i,t}$ is the estimated coefficient derived from the CAPM using daily data from the preceding year; $Mom_{i,t}$ is the cumulative return over the 6 quarters from t-6 to t-1. Macro Controls are captured to control the general economic conditions, consistent with our previous regression model. The t-statistics in parentheses are reported using standard errors adjusted for within firm and time clustering.

Throughout all specifications, we find a positive and statistically significant effects of EPU on individual stock returns, consistent with the existing literature (Belo, Gala, & Li, 2013; Pastor ´ & Veronesi, 2013) that investors require higher return premium for elevated EPU. Notably, regardless of whether $Overseas_{i,t}$, $Fcash_{it}$, or $QFIIprc_{i,t}$ is used to proxy for firms' foreign operations, the coefficients of interaction term between these measures and EPU (α_2) are statitically insignificant. There is no significant premium associated with level of foreign operations during high EPU periods. Our results suggests that EPU doesn't increase investor risk aversion toward firms with foreign cash flows.

8. Conclusion

We propose a novel and significant influence factor, economic policy uncertainty, affecting firms' exposure to exchange rate fluctuations. By focusing on China, a typical emerging-market country, we find an economically positive and highly statistically significant relationship between EPU and exchange rate exposure. Moreover, this positive relationship is more pronounced in heightened exchange rate volatility periods. Operational hedging manages to mitigate EPU's impact on firms' exchange rate exposure, whereas financial hedging has a negligible impact, probably due to the high hedging cost and underdeveloped foreign exchange derivatives market in China.

Our main results remain robust after integrating alternative measures and different specifications, while addressing possible endogeneity concerns. We examine three potential channels of EPU's impact on exposure: international operations, rent-seeking, and risk management. Our results show that EPU has a more pronounced impact on the exposure of firms heavily reliant on foreign revenue or international borrowing. This suggests that higher EPU increases risks for firms' international operations, which translates into higher exposure.

We also find that EPU increases insiders' rent-seeking activities. Better governance can constrain insider's self-serving transactions, thereby moderating EPU's positive impact on exchange rate exposure. Lastly, we also find that Chinese listed firms tend to engage in financial hedging more intensively in response to high EPU, whereas operational hedging declines. Given the inadequate role of financial hedging in emerging markets, operational hedging is particularly important to mitigate EPU's impact on exchange rate exposure.

Our study highlights important insights for emerging market economies, which often rely on export-driven growth and are in the midst of economic changes. These markets tend to experience high and unpredictable corporate exposure to exchange rate fluctuations, a point emphasized by Chue and Cook (2008). They are also particularly sensitive to shocks from economic policy uncertainty. To address these challenges, strong corporate governance and advanced hedging techniques are essential for reducing exchange rate risks and handling policy uncertainty shocks.

Declaration of competing interest

This manuscript has not been published or presented elsewhere in part or in entirety and is not under consideration by another journal. We have read and understood your journal's policies, and we believe that neither the manuscript nor the study violates any of these. There are no conflicts of interest to declare.

Appendix A. Variable definition

Variable	Variable Description	Data Source
Economic Policy Uncertainty Index		
EPU	Logarithm of quarterly BBD index based on the South China Morning Post	BBD economic policy uncertainty index official website[a]
EPU_R	Residual EPU	
EPU_ML	Residual China mainland EPU index constructed by Davis et al. (2019), based on the Renmin Daily and the Guangming Daily	
ΔEPU	First-differencing EPU	
EPU_detrend	Residual series obtained from regressing EPU on the logarithmic transformation of quarterly trend variables and their polynomial terms	
EPU_H&L	Residual China EPU index constructed by Huang and Luk (2020), based on 10 Chinese mainland leading newspapers	Chinese economic policy uncertainty index official website[b]
EPU_fsc	Residual fiscal policy uncertainty index	
EPU_mn	Residual monetary policy uncertainty index	
EPU_ec	Residual exchange rate and capital account policy uncertainty index	
EPU_trd	Residual trade policy uncertainty index	
Firms' Exposure to Exchange Rate Risk		
exposure	The sensitivity of a firms' stock return to the change of SDR currency exchange rate, controlling for market return estimated by Eq.(1)	Bloomberg database (exchange rate data); CSMAR and Wind database (stock data)
Firm Control Variables		
Firm Control Variables for Exposure		
size	Firm's size, measured by the logarithm of the firm's total assets (units: 100 million yuan) in the end of previous year	CSMAR database
leverage	Firm's leverage, measured by the debt-to-asset ratio in the end of previous year	CSMAR database
quick	Ratio of current assets minus inventory to current liabilities	CSMAR database
BM	Ratio of total value of assets to market value	Wind database
floan	Ratio of foreign currency loans to total loans	Wind database
oversea	Ratio of overseas revenue over operating income	Wind database
E/P	Ratio of net earnings per share	CSMAR database
Beta	Estimated coefficient derived from the CAPM using daily data from the preceding year	CSMAR database
Mom	Cumulative return over the 6 quarters from t-6 to t-1	CSMAR database
Macro Control Variables		
CPI	Consumer Price Index quarterly average growth rate (%)	RESSET database
IntSpread	Interest spread between China and US measured by the difference between the yield to China Bond 5 Year CDB Bond and US Treasuries	Wind database
FGDP	The ratio of fixed asset investment to GDP	Wind database
Exloan	Foreign currency bank loan growth rate	Wind database
REER	Growth rate of RMB real effective exchange rate index	Wind database
Additional Macro Factors		
EPU_foreign	A principal component factor with the largest eigenvalue extracted from the logarithm of the seven EPU indices of the United States, United Kingdom, Japan, European Union, India, South Korea, and Russia	BBD economic policy uncertainty index official website[c]
GDP	GDP growth rate	CSMAR and Wind database
IndValue	Industrial added value growth rate	
Imprt	Import volume growth rate	
Exprt	Export volume growth rate	
FrgRsv	Logarithm of foreign exchange reserve	
FscRvn	Fiscal revenue growth rate	
FscExp	Fiscal expenditure growth rate	
M2	M2 growth rate	
RetSale	Total retail sales of social consumer goods growth rate	
FixInv	Fixed assets investment growth rate	
Intrst	One-year deposit interest rate	
PPI	Producer price index growth rate	
USDCNY	Exchange rate of USD to CNY	
Instrumental Variables		
Disaster	The number of geological disasters (unit: 10,000)	China Statistical Yearbook
Other Variables		
drvtv	Dummy variable; equals 1 if a firm reports the usage of currency derivatives, and 0 otherwise.	CSMAR database
brdth	Dummy variable; equals 1 if the number of continents where a firm has subsidiaries is >3, and 0 otherwise.	Wind database
cmpt	Dummy variable; equals 1 if foreign industry return has a significant (at the 10 % level) negative effect on China's industry return in the same industry, and otherwise 0.	CSMAR database
Harmful RPT	Ratio of the aggregate amounts of related-party transactions within the current year, which is harmful to the total sales in the previous year.	Wind database
Other Receivables	Net amounts of other receivables in the current year scaled by the total sales in the previous year.	Wind database
Executive Compensation	Percentage of total executive compensation to the total sales.	Wind database
dual	Dummy variable; equals 1 if the general manager is also a chairperson, and equals 0 otherwise.	CSMAR database
instown	The dummy variable instown is the proportion of institutional investors shareholding.	Wind database
analyst	Dummy variable; the number of analyst teams following the firm within the current year, with the missing value replaced by 0.	CSMAR database
crslist	Dummy variable; equals 1 if ABH share cross-listed code is not null, and equals 0 otherwise.	CSMAR database

(*continued on next page*)

(*continued*)

Variable	Variable Description	Data Source
PERGDP	Annual growth rate of per capita GDP	CSMAR database
VIX	Annual S&P 500 Volatility Index (the Fear Index).	CSMAR database
CovidCase	Severity of the epidemic; daily number of new confirmed COVID-19 cases in China, measured in thousands	Wind database
Fcash	Dummy variable; equals 1 if firm holds material foreign-currency revenues or debt obligations, and equals 0 otherwise.	CSMAR database
QFIIprc	Ownership stake of qualified foreign institutional investors, measured as the percentage of total outstanding shares	CSMAR database
NN	Dummy variable; equals 1 if firms that do not hedge in either the current or the next period, and equals 0 otherwise.	CSMAR database
HN	Dummy variable; equals 1 if firms that hedge in the current period but discontinue hedging in the next period, and equals 0 otherwise.	CSMAR database
NH	Dummy variable; equals 1 if firms that do not hedge in the current period but initiate hedging in the next period, and equals 0 otherwise.	CSMAR database
HH	Dummy variable; equals 1 if firms that hedge in both the current and the next period, and equals 0 otherwise.	CSMAR database

[a] http://www.policyuncertainty.com/china_epu.html
[b] https://economicpolicyuncertaintyinchina.weebly.com
[c] http://www.policyuncertainty.com/china_epu.html

Appendix B. Frequency on firms reporting the impact of exchange rate movements on cash flow

Year	No. of Listed Firms	No. of Reporting Firms	% of Reporting Firms
2010	1911	1152	60.28 %
2011	2182	1397	64.02 %
2012	2328	1549	66.54 %
2013	2330	1600	68.67 %
2014	2450	1731	70.65 %
2015	2668	1940	72.71 %
2016	2894	2190	75.67 %
2017	3331	2572	77.21 %
2018	3436	2720	79.16 %
2019	3639	2895	79.55 %
2020	4071	3283	80.64 %

Data availability

Data will be made available on request.

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