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Measuring Political Leader's Geopolitical Risk Perceptions[1]

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Abstract

Does a political leader's perception of geopolitical risk influence the real economy? If so, to what extent and through what mechanisms? Using local-language sources, we explore these questions by constructing a geopolitical risk index based on textual data from statements made by Chinese President Xi Jinping and examining its relationship to firms' investment behavior in China. The index shows notable spikes in April 2016, June 2018, and April 2022, corresponding to terrorist attacks in neighboring countries, U.S.-China tensions, and the Russia-Ukraine war. We find that an increase in the geopolitical risk index is associated with a decline in firms' investment rates. Specifically, a 100% increase in the index leads to a 14.1% reduction in investment. Notably, politically connected firms are less affected, indicating their ability to mitigate the negative effects of geopolitical risk. Our findings advance the geopolitical risk literature by highlighting the role of political leaders' perceptions, utilizing local sources to measure this factor, and examining the moderating effect of political connections under geopolitical risks.

Keywords: geopolitical risk, political leader, firm behavior, political connection, text analysis, China

JEL classification: P23, G32, D80

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1. Introduction

Interest in geopolitical risk has grown significantly in recent years, leading to an extensive body of research on its measurement and effects. Various approaches have been developed to quantify geopolitical risk, with textual analysis emerging as a prominent method. Caldara and Iacoviello (2022) use a dictionary-based approach, identifying keywords from textual sources to construct a geopolitical risk index (hereafter GPR). Their findings indicate the GPR negatively impacts macroeconomic indicators and investment behaviors at both the industry and firm levels. Furthermore, they develop a series of GPRs covering an extended time span and various countries, facilitating further research on the economic implications of geopolitical risk around the world.[2]

While acknowledging the merits of the existing approaches to measuring GPR and its effects, this study departs from those approaches in several important ways. First, we focus on political leaders' geopolitical perceptions, a dimension that is understudied in the current literature. Second, we emphasize the value of utilizing media sources in the local language, moving beyond the typical reliance on international or English-language outlets and capturing more nuanced and context-specific insights. Third, we examine how political connections shape the economic consequences of GPR, providing a microlevel perspective on how firms respond to uncertainty.

We analyze the risk perceptions of political leaders in measuring GPR and assessing its economic impacts, specifically focusing on China. Building on the pioneering work of Jones and Olken (2005), a growing body of research has examined the relationship between the quality of political leadership and economic outcomes, such as economic growth rates, emphasizing the significant influence political leaders can exert—an effect that is particularly pronounced in authoritarian regimes (Besley, Montalvo, and Reynal-Querol, 2011; Berry and Fowler, 2021).

Since assuming his leadership role in the Chinese Communist party (hereafter CCP) in November 2012, Xi Jinping has increasingly consolidated power, surpassing the customary two-term limit of 10 years as he is now in his third term. Xi plays a central role in various policymaking bodies and is widely regarded as the most dominant figure in shaping China's economic, political, and military strategies. For example, his leadership as head of the Central Leading Small Group for Deepening Reform highlights his influence in decision-making across diverse policy domains, leading some observers to refer to him as "Chairman of everything" (Shirk 2017; Economy 2018). Despite this unprecedented concentration of authority, it remains unclear whether and how Xi's perceptions of geopolitical risk have influenced economic outcomes.

To investigate whether Xi Jinping's perception of geopolitical risks influences firms'

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[2] Website of the geopolitical risk index: https://www.matteoiacoviello.com/gpr.htm

behavior in China, we conduct a two-step analysis. First, we measure Xi's GPR perceptions using Chinese-language sources documenting his speeches. The dataset spans from March 2013 to December 2024, covering Xi's first two terms and approximately two years of his third term (after October 2022). Employing the standard dictionary-based approach developed by Caldara and Iacoviello (2022), we construct the Xi Jinping-specific geopolitical risk index (XiGPR) by extracting and aggregating relevant keywords. We then assess the impact of XiGPR on firms' investment behavior using financial data from publicly listed Chinese companies. This allows us to empirically examine how political connections may moderate firms' responses to perceived geopolitical risks at the micro level.

Our analysis reveals that increases in XiGPR are associated with declines in firm investment, a relationship that remains robust even after controlling for macroeconomic variables and global GPR. Our baseline results show a 100% increase in XiGPR leads to a 14.1% reduction in investment, which is consistent with the existing literature on GPR and studies on Economic Policy Uncertainty (EPU). Notably, using Chinese-language sources a version of GPR constructed from *People's Daily*, a leading newspaper, has a relatively weaker effect, whereas XiGPR—which more closely reflects President Xi Jinping's perceptions—exhibits a stronger impact. Furthermore, firms with political connections appear to offset the negative impact of a higher XiGPR on investment, suggesting that such connections may help mitigate uncertainty in volatile economic environments.

This study contributes to the literature on GPR and on the political economy of China. It advances the GPR literature by measuring and investigating the significance of political leaders' risk perceptions—a critical yet understudied dimension of GPR, particularly in authoritarian regimes where such perceptions can play a decisive role in shaping economic outcomes. In doing so, we introduce a novel approach that leverages political leader-specific textual data from local-language sources, offering a more targeted and context-sensitive measure of GPR. Our study enriches the literature on China's political economy by quantitatively examining how shifts in the top political leader's perceptions of GPR affect the real economy and how political connections mediate firms' responses to such risks. By integrating these dimensions, our results shed new light on the economic implications of Xi's growing influence within China's political-economic system, contributing to a deeper understanding of the intersection between political leadership and economic uncertainty. Overall, our study contributes to a more comprehensive and multidimensional understanding of GPR.

This remainder of this study is organized as follows. Section 2 reviews the measurement of GPR and its impact on firm behavior. Section 3 describes the data and methodology. Section 4 defines the measurement of XiGPR and analyzes the impact of the index on firm behavior. Sections 5 and 6 provide additional analysis and discussion, and Section 7 concludes.

2. Related Literature

2.1. Measurement and impacts of the GPR

Similar to other studies that construct text-based indices, such as the EPU developed by Baker, Bloom, and Davis (2016), Caldara and Iacoviello (2022) construct the GPR by counting the number of newspaper articles related to adverse geopolitical events on a monthly basis. They define GPR as "the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political factors that affect the peaceful course of international relations" (Caldara and Iacoviello 2022, 1195).

To understand the effects of GPRs on economic activity, insights from the broader literature on economic uncertainty are particularly valuable. Theoretically, rising uncertainty should deter firms from undertaking new investment. When planning investments, firms must weigh the cost of delay against the potential value of waiting to acquire additional information over time. As Bernanke (1983) suggests, increased uncertainty raises the value of waiting, incentivizing firms to postpone investment decisions. An alternative explanation highlights how uncertainty can shift decision thresholds for both employment (e.g., new hires, retention, and firings) and capital expenditures (e.g., new investment, maintaining the status quo, and reduced investment). According to Bloom (2009), such shifts tend to suppress both investment and employment in the short term, although both tend to rebound once uncertainty is resolved.

Since the release of the working paper version of Caldara and Iacoviello (2022) in 2018, a growing body of empirical research has explored the economic effects of GPR, particularly using U.S. firm-level data. Caldara and Iacoviello (2022) examine the impact of GPR on investment and employment using a vector auto regression (VAR) framework. Additionally, leveraging U.S. industry- and firm-level data, they find that elevated GPR is associated with lower investment. Several studies have since developed firm-level measures of GPR. Hassan et al. (2019) construct a measure of political risk based on a textual analysis of U.S. firms' quarterly earnings call transcripts and find that firms exposed to higher levels of political risk tend to reduce hiring and investment while increasing lobbying activities and political contributions. Similarly, Handley and Li (2020) develop a firm-level measure of uncertainty by analyzing the text of annual reports filed with the U.S. Securities and Exchange Commission. They show that periods of heightened uncertainty lead to a 0.5% decline in investment and a 1.4% reduction in employment growth.

Using Caldara and Iacoviello's (2022) index, recent research also examines the effects of

GPR on Chinese companies across a range of sectors (as shown in Table 1). Lee and Wang (2021) find that Chinese companies, particularly those that are financially constrained or operate in manufacturing-related sectors, tend to hoard more cash as a precautionary measure against GPR. Meanwhile, Jiang et al (2020) reveal that GPR has a prolonged negative influence on stock returns for companies in the Chinese tourism industry, particularly during off-seasons. In a cross-country comparative study, Raheem and Roux (2023) show that GPR significantly affects travel and leisure stocks in China. Shen et al (2021) find that GPR promotes mergers and acquisitions in China's energy and electric power industries, potentially due to the increased value of real options and perceived synergy effects. Taken together, these findings are generally consistent with the existing literature and highlight the extent to which Chinese corporate leaders, investors, and consumers actively assess and respond to GPR.

Table 1. Studies on GPR's impacts on Chinese firms

Paper	Studied period	Risk/Uncertainty variables	Dependent variable	Estimation method	Key findings
Jiang et al. (2020)	2000 to 2019	GPR, EPU, and categorical EPU (Huang and Luk 2020)	Stock return	quantile-on-quantile method, causality-in-quantile method	GPR exerts a lasting negative effect on tourism stock return and the negative effect of GPR at low quantile is more significant than at high quantile
Shen et al. (2021)	2007 to 2018	GRP	Scale of M&A and quantity of M&A	firm-level panel estimation	GPR promotes M&A. Debt ratio and property ownership reduce the positive impact of GPR on M&A.
Lee and Wang (2021)	1988 to 2018	GPR	Cash-to-assets ratio	firm-level panel estimation	Firms tend to hoard more cash as a precautionary measure when faced with geopolitical risk. Firms that are financially constrained and firms in manufacturing-related industries tend to save more cash.
Lee, Lee, and Xiao (2021)	2013 to 2017	GPR, EPU, and political risk index	Actual financing flows	firm-level panel estimation	GPR and EPU are negatively associated with companies' financing activities.
Jia, Yang, and Zhou (2022)	2007 to 2019	GPR	R&D intensity and number of patent applications	firm-level panel estimation	GPR positively affects corporate innovation activities. The effects are more pronounced for SOEs and firms with more government subsidies.
Raheem and Roux (2023)	2000 to 2019	GRP	Stock return	causality-in-quantile method	GPR is weakly related to the Travel and Leisure stock for both Indonesia and South Korea. Significant relationships ensue for India, China, Malaysia, and Israel.
Zhang et al. (2024)	2010 to 2022	Original GPR index using analyst reports	Stock market excess return	firm-level stock price estimation	Compiled GPR index negatively predicts excess returns on stocks, especially for SOEs.

2.2. Our focus: leadership perceptions, local-language sources, and political connections

Although previous studies examine various dimensions of GPR, several important areas remain underexplored.

An important area of inquiry concerns the role of political leaders and their perceptions of GPR. Various studies explore the mechanisms through which political leaders influence economic outcomes, identifying public communication as a particularly powerful instrument. For example, a substantial body of research addresses the effects of leadership statements about the economy—both formal and informal—with much of the focus centered on U.S. presidents. Wood (2007) demonstrates that presidential rhetoric about the economy affects uncertainty and alters attitudes for economic actors, which, in turn, affect economic performance. Similarly, Dybowski and Adammer (2018) find that optimistic tax policy statements by U.S. presidents stimulate consumption, investment, and economic output. Conversely, Burggraf et al. (2020) and Bianchi et al (2019) analyze President Trump's tweets with a critical tone about the economy, showing they have a negative impact on stock and futures indices.

While previous studies examine economic responses to political leaders' rhetoric, this study focuses specifically on these leaders' perceptions of GPRs. Despite the clear implications of geopolitical events for economic behavior, few empirical studies evaluate political leaders' language concerning external uncertainty and its economic consequences. There are compelling reasons to assume that economic actors have strong incentives to closely monitor such messaging during periods of adverse geopolitical events. First, a significant informational asymmetry typically exists between political leaders and economic actors regarding international affairs. Moreover, political leaders speak with authority in interactions with other nations, shaping public expectations for future developments. For example, Wood (2009) shows that "presidential saber rattling"—the use of language to imply threats toward foreign entities—intensifies the sense of crisis, producing risk-averse consumer behavior.

In China, political leaders' statements have historically been a critical source of information about the broader economic outlook and geopolitical trends (Lampton, 2014; Shambaugh, 2021). There is also reason to believe that China's economic actors have become more responsive to presidential rhetoric since Xi Jinping assumed power in 2012. As noted earlier, Xi has significantly expanded the role of the General Secretary in economic policymaking. Additionally, as the nation's chief foreign policy leader, President Xi is widely regarded as having been considerably more explicit and forthcoming than his predecessors in articulating his interpretation of global trends and their associated risks to both domestic and international audiences (Wang 2022; Economy 2021; Zhao 2022).

However, relatively few studies systematically examine whether and how Xi's leadership has reshaped the collective behavior of key stakeholders within China's economy (Jaros and Tan 2020; Pei 2019). This gap in the literature is especially concerning given that Xi Jinping appears to be further consolidated his personal control over the entire regime in his third term. As a notable exception, Ito, Lim, and Zhang (2023) construct an EPU index based on Xi's textual data and find that higher index values correlate with lower firm investment. While this approach provides valuable insights into economic uncertainty, it does not fully capture how the Chinese leadership specifically perceives and communicates on geopolitical risks. Given the continued fluctuation of geopolitical tensions both regionally and globally throughout the 2010s, there is a growing need for a more targeted and robust measure that captures leadership's perceptions of geopolitical risks and for a systematic empirical assessment of its impact on the real economy.

Another important area of inquiry in the GPR literature concerns the use of local-language data sources. While much of the existing research relies on English-language media, growing evidence suggests that GPR indices constructed from local sources can yield distinct and contextually richer insights. For example, Bondarenko et al. (2024) develop a GPR index for Russia based on state-controlled and independent domestic media as well as foreign sources. Their findings reveal that the Russian GPR index evolves in a markedly different manner compared to indices derived from English-, German-, or Ukrainian-language news sources, underscoring the value of incorporating local linguistic contexts into GPR measurement.

In the case of China, however, most GPR studies continue to rely on the index developed by Caldara and Iacoviello (2022), which is based on English-language news articles. The use of Chinese-language data for GPR construction remains limited. A notable exception is Zhang et al. (2024), who employ Chinese-language sources, including investment analyst reports, to develop a more local, "on the ground" measure of GPR. This study aims to provide an additional benchmark by demonstrating the value of using local-language sources in capturing a more context-sensitive measure of GPR and empirically examining its economic effects.

Finally, the relationship between GPR and economic behavior warrants a closer empirical examination. Existing research suggests the effects of GPR are heterogeneous across firms, with ownership structure and industry emerging as potential sources of variation in firm-level responses, particularly in China. The literature on the Chinese political economy shows the unique role and behaviors of State-Owned Enterprises (SOEs), which maintain institutional and political ties to government authorities. These political connections have been shown to influence a range of economic outcomes. For example, connected firms are more likely to secure access to financial resources such as bank loans and government subsidies (Cheng, 2018), receive more favorable court rulings (Ang and Jia, 2014), and achieve stronger overall performance (Li et al., 2008).

More importantly for the present study, political connections have been found to function as a buffer against economic uncertainty, as demonstrated in the literature on EPU. For example, Liu, Xin, and Li (2021) show that political connections mitigate the adverse effects of EPU on firm behavior. Building on these insights, this study empirically examines whether and how political connections similarly shape firms' responses to geopolitical risks, particularly those perceived and articulated by political leaders. Our investigation provides a more nuanced understanding of the institutional and strategic factors that influence how a firm navigates external uncertainty.

3. Data and the method

3.1. Data

We use text data from President Xi Jinping's statements obtained from the Database of Xi Jinping's Important Speech Series (*Xi Jinping Xilie Zhongyao Jianghua Shujuku,* or *Xi-database*), a web-based source of Xi Jinping-related speeches and reports. The content begins on November 15, 2012, the day Xi Jinping took office as the General Secretary of the CCP. This material is obtained mainly from Chinese state media, including the *People's Daily* (domestic and international editions), Xinhua News Agency, local newspapers, and several state or CCP publications such as *Qiushi*. The content include speeches, activity reports, field visits, press conferences, meetings, telegrams (e.g., ceremonial), and others. After data cleansing, we have 9,745 articles. Appendix Figure 1 shows the number of articles and characteristics of the dataset.

To assess the specific influence of Xi Jinping's statements, we also construct a GPR (referred to as PDGPR) using data from the *People's Daily* which covers a wide-range of topics not limited to activities of the highest Chinese official. The dataset from the *People's Daily* consists of 313,247 articles published from January 2013 to June 2022. To compare the Xi-database and the *People's Daily* content, Ito, Lim, and Zhang (2024) provide useful insights. They find the *Xi-database* is primarily compiled from state-run newspapers, focusing specifically on reports related to Xi Jinping himself, while only 1.9% of the articles published in the *People's Daily* are included in this database. Ito, Lim, and Zhang (2024) also show trends for keywords such as "Belt and Road Initiative" and "National Security," suggesting that policy priorities may emerge earlier in the *Xi-database* than in the overall corpus of *People's Daily* articles. Therefore, XiGPR is considered to more strongly reflect the geopolitical perceptions of the top leader compared to PDGPR and is assumed to have a greater impact on firm behavior.

We use content from the *Xi-database* for the period from March 2013 to December 2024, covering the first and second terms of the Xi Jinping administration, and approximately two years of his third term as leader of the CCP (beginning October 2022). Several developments during this period that may affect the XiGPR are worth noting. First, diplomatic relations between China and Japan have been deteriorating since 2012. The conflict over the Senkaku Islands, in particular, led to massive demonstrations in China in 2012. From a geopolitical perspective, the possibility of an accidental military conflict between China and Japan has increased, especially after a Chinese People's Liberation Army Navy ship irradiated a Japanese Maritime Self-Defense Force ship with fire control radar on January 30, 2013. Second, frequent missile launch tests by North Korea (the Democratic People's Republic of Korea), which China views as a friendly country with which it shares a socialist ideology. However, these missile launch tests could have certain implications for China as well, as they are perceived as threats by South Korea, Japan, and the U.S. Third, strategic competition with the U.S. has intensified since 2018. After increased tariffs against China were implemented by the first Trump administration, the relationship between the two countries have been strained. There have been some extremely negative comments about the U.S. in the Chinese domestic media, especially when Nancy Pelosi, the Speaker of the U.S. House of Representatives, visited Taiwan in August 2022. Also, in February 2022, Russia began its invasion of Ukraine, further straining the U.S.-China relationship. Our data cover the period during which these events occurred.

One concern when using text data are media bias, meaning the tone across articles and topics covered differs across media sources. Prior research indicates Chinese state-owned media is biased in terms of content (Roberts, Stewart, and Airoldi, 2016; Yuan, 2016; Piotroski, Wong, and Zhang, 2017; Qin et al., 2018), as it tends to report positive stories whereas negative news is rarely covered. Prior studies show content from sources that are more strongly controlled by the CCP and the Chinese government tends to be aligned with political ideological objectives, while local newspapers, where control is relatively looser, tend to cover more commercial topics. Davis, Liu and Sheng (2019) develop a Chinese EPU index using mainland newspapers (*People's Daily* and *Guangming Daily*) and find the index did not spike during the Great Leap Forward (1958) or the Cultural Revolution (1966), as these newspapers did not directly discuss those sensitive issues.

The question here is how media biases affect our index measurement. Importantly, in the case of the EPU measurement, Huang and Luk (2020) assess the bias using 114 local newspapers and report that the strength of CCP control had no qualitative impact on the EPU measurement. Furthermore, using EPUs generated from Chinese-language state-owned media confirms that Chinese firms are affected by changes in the index (Davis, Liu, and Sheng, 2019; Huang and Luk 2020; Ito, Lim and Zhang 2023). Although Chinese state-owned media shows biases, this has a minor impact on the index, which focuses on increases or decreases within a given period, and the index created from state-owned media does have an impact on firm behavior. Interestingly, Bondarenko et al. (2024), who constructs a GPR index using Russian-language text data, finds that GPR derived from state media has a stronger impact on the real economy compared to an index based on independent media. They attribute this stronger effect to the fact that state media more directly reflects the government's narrative, and therefore has more of an influence on economic outcomes.

Given this, measuring the GPR using the aforementioned local media sources is particularly significant in this analysis. General observations suggest that Chinese firms closely monitor information from state-owned media, as alternative sources of information are often limited and uncertain. By leveraging this data, we can effectively capture the publicly-reported perceptions of China's most influential high-ranking politicians, providing a more accurate representation of the geopolitical risk landscape.

3.2. Method

In measuring GPR using the dictionary method we follow Caldara and Iacoviello (2022) as closely as possible. They search for articles that contain keywords based on the eight categories shown in Appendix Table 1. For example, in the first category, WAR THREAT, if a sentence contains a keyword on the WAR keyword list, and a keyword on the THREAT keyword list is found within the two words before or after the WAR keyword, the article is counted as a WAR THREAT article (keywords for each category are shown in Appendix Table 2). In the text analysis literature, this method is called the N-gram approach. Caldara and Iacoviello (2022) use the N-gram approach for six of their eight categories and the bag-of-words approach for the remaining two categories, which searches for keywords in the article regardless of the proximity of other keywords (Caldara and Iacoviello 2022, 1199-1200). In addition, articles containing any of the 22 words included in the Excluded Words shown in Appendix Table 3 were excluded from their baseline analysis.

In this study, the keywords used in Caldara and Iacoviello (2022) were translated into Chinese, as shown in Appendix Table 2. However, several problems arise when applying the method in Caldara and Iacoviello (2022) directly to the Chinese texts, which we address as follows. First, certain keywords are dropped because of their context-specific meaning in Chinese: the WAR keyword "uprising" (*Qiyi*) captures the Wuchang Uprising in 1911, and "Revolution" (*Gemin*) in many contexts refers to the Communist revolution in China. Second, the 22 Excluded Words adopted in Caldara and Iacoviello (2022) include common words such as "book" and "history." These words appear frequently in the Chinese articles in our datasets and excluding articles on this basis would lead us to remove content that is meaningful to our analysis. For this reason, we do not remove articles based on Excluded Words.

After applying our keyword search, of the 9,745 articles in our dataset, 471 (4.83%) were classified as GPR papers, referring to one of the eight categories of GPR classification. In creating our index using the dictionary method, we first count the relevant articles that meet the keyword criteria, then divide them by the total number of articles in that month. This tells us the relative number of articles referring to geopolitical risk each month, The values are then standardized to obtain the final index.

3.3. Firm-level investment function

Our dataset includes comprehensive information about Chinese A-share firms listed on the Shanghai and Shenzhen stock exchanges. We obtain quarterly accounting data from the China Stock Market and Accounting Research Database from 2013 to 2019 (the China Securities Regulatory Commission has required all publicly listed firms to publish quarterly reports since 2003). We start our analysis with Q1 2013 because our baseline XiGPR begins that quarter. Our data includes listed firms in the manufacturing and nonmanufacturing sectors; we exclude the financial and real estate sectors because their investment behaviors differ significantly from those of other sectors.

We use our calculated GPRs to estimate the impact on firm investment behaviors. As a baseline, we adopt the model in Gulen and Ion (2016) as follows:

$$\frac{Inv_{i,t}}{TA_{i,t-1}} = \alpha_i + \beta_1 \log\left(XiGPR_{t-1}\right) + \beta_2 TQ_{i,t-1} + \beta_3 \frac{CF_{i,t}}{TA_{i,t-1}} + \beta_4 SG_{i,t} + \delta GR_t + QRT_t + \varepsilon_{it}, \quad (1)$$

where *i* indexes firms and *t* indexes calendar quarters. The dependent variable $\frac{Inv_{i,t}}{TA_{i,t-1}}$ is the firm-level capital investment rate, where $Inv_{i,t}$ is firm *i*'s capital investment in period *t*, normalized by total assets (*TA*) from the previous period *t*-1 (henceforth *I/K*). Capital investment is a firm's cash payments made to acquire or construct fixed, intangible, and other long-term assets. We exclude interest on debt raised to acquire or construct fixed assets and lease payments for fixed assets under a finance lease. We control for several firm-level financial and macroeconomic factors, such as Tobin's Q (*TQ*), operating cash flow (*CF*), sales growth (*SG*), and GDP growth rate (*GR*). Specifically, *TQ* is measured as [(market value of equity + book value of assets–book value of equity + deferred taxes)/book value of assets]. *CF* is operating cash flow scaled by *TA*, while *SG* is the year-on-year growth in quarterly sales, controlling for investment opportunities. GR is the year-on-year real GDP growth rate. Additionally, α_i are firm fixed effects, and *QRT* contains a set of quarterly dummy variables to control for capital investment seasonality.[3] We cannot control for time-fixed effects as they are collinear with our key variable, the XiGPR index. Standard errors are clustered at the firm level. Our key variable, $XiGPR_t$, is the arithmetic average of the XiGPR index over the three months prior to time *t*.

[3] The first quarter dummy will be dropped automatically in the regressions.

As we adopt firm-level panel estimations, missing values and outliers may cause measurement issues. Thus, we exclude listed firms with abnormal financial conditions, designated as “Special Treatment” shares according to the stock exchange listing rules. To be included in our estimation, a firm must not have any missing observations for the variables in Eq. (1) for at least two years (eight quarters). To reduce the impact of outliers, we exclude the top and bottom 1% values of the continuous variables in Eq. (1), excluding the GPR index and GDP GR. After these cleaning procedures, we obtained 3,261 unique firms with 68,910 firm-quarter observations over the sample period Q1 2013–Q4 2019.

Table 2 shows descriptive statistics for the firm-level data used in the baseline estimation equation (see Table A11 in the Appendix for correlations between main variables). Panel A shows the average capital investment ratio is 2.92%, with a standard deviation of 3.22%. SOE firms comprise 35% of the observations, 2% are in the defense industry, and 39% are in the second term of the Xi administration. We create two variables to measure a firm’s political connections. First, GOV is a dummy variable set equal to one if any of the firm’s board members have experience working as government officials. The second measure, CCP, is equal to one if any of the firm’s board members are CCP members. The share of politically connected firms (observations) through GOV is roughly 13%, whereas that of CCP is 40%.

Panel B tests for the significance of differences in the investment ratio between high- and low-XiGPR periods. Using the median value of the XiGPR index, we divide the high-XiGPR period from the low-XiGPR period. We then conduct a *t*-test for the mean and a Wilcoxon *z*-test for the median, finding significant differences in firms’ investment behavior in the high- and low-XiGPR periods. The positive signs for these measures indicate the capital investment ratio is comparatively lower during the high-XiGPR period.

Table 2. Descriptive statistics of the firm investment analysis

Panel A: Descriptive statistics

Variable	Defination	Obs	Mean	Std. Dev.	Min	Max
I/K	Capital investment/ lagged total assets (%)	68,282	2.92	3.22	0.00	18.67
GPR	GPR index, Caldara and Iacoviello (2022)	68,910	97.89	14.45	73.70	135.59
PDGPR	GPR index, People's Daily	68,910	100.72	21.40	69.94	164.34
XiGPR	GPR index, Xi Jinping	68,910	114.40	43.72	43.44	219.38
EPU	EPU index, Baker et al. (2016)	68,910	197.44	107.79	75.91	444.53
Tobin	Tobin's Q	68,910	2.67	1.82	0.86	12.53
Cash flow	Cash flow/ lagged total assets (%)	68,910	1.65	5.63	-16.62	20.16
Sales growth	Year-on-year growth in quarterly sales (%)	54,854	10.60	32.19	-115.25	143.42
GDP growth	Year-on-year quarterly growth in real GDP (%)	68,910	6.89	0.54	5.80	7.90
Defence	Defence industry dummy	68,910	0.02	0.15	0	1
SOE	State-owned enterprise dummy	68,568	0.35	0.48	0	1
GOV	GOV dummy equal to one if any of the board members of the firm has working experience as a government official	68,910	0.13	0.33	0	1
CCP	CCP dummy equal to one if any of the board members of the firm is Chinese Communist Party member	68,910	0.40	0.49	0	1
Term2	Xi Jinping's second term dummy	68,910	0.39	0.49	0	1

Panel B: I/K in low XiGPR period vs. high XiGPR period

Difference (low - high)	t-test (p value)	z-score (p value)
	34.237 (0.000)	36.659 (0.000)

Source: Authors' calculations.

3.4. Testable hypotheses

The first testable hypothesis is that an increase in the XiGPR causes firms to decrease their investment. This is because, as mentioned in the previous section, firms have an incentive to postpone investment in the face of increasing GPRs.

Hypothesis 1: Increased awareness of geopolitical risks by high-level politicians leads to a decline in firm investment. Thus, we expect a negative coefficient for β_1 on XiGPR.

Next, we construct PDGPR from articles in the *People's Daily*, noting that XiGPR more strongly reflects Xi Jinping's geopolitical perceptions. Assuming the top leader's authority is exceptionally high in an authoritarian regime, XiGPR is likely to have a greater impact on firm behavior than PDGPR.

Hypothesis 2: XiGPR more strongly reflects the geopolitical perceptions of the top leader than PDGPR. Thus, we expect the coefficient β_1 to be larger for XiGPR than for PDGPR.

In addition, XiGPR may have different effects depending on the attributes of the firms and the timing of the analysis. Thus, we propose three additional related hypotheses as shown below.

Hypothesis 3a: Firms with political connections (e.g., SOEs) can obtain information on geopolitical risks from political leaders in advance. Therefore, the effect of XiGPR on lowering investment is weakened for firms with political connections. We expect the intersection term between political connections and the XiGPR index to be positive.

Hypothesis 3b: For firms in the defense industry, increased geopolitical risk can create business opportunities. Therefore, when the XiGPR index increases, the investment rate for defense industry firms increases. We expect the intersection term between the defense industry dummy and the XiGPR index to be positive.

Hypothesis 3c: Compared to the first term of the Xi administration (2012–2017), Xi Jinping's power was strengthened in his second term, and thus the impact of his statements is stronger in the second term. We expect the intersection term between the second period dummy and the XiGPR index to be negative.

4. Results

4.1. Validation

Figure 1 shows the XiGPR index computed at both monthly- and quarterly-frequencies. The XiGPR exhibits peaks in the second and third quarters of 2016, the second and third quarters of 2018, and the second quarter of 2022. The highest monthly values are seen in April 2016, April 2022, and June 2018. These periods appear to correspond to specific geopolitical events. In 2016, North Korea conducted a high number of ballistic missile launches (Murooka and Akutsu, 2017). Notable news reports from this period include speeches delivered by President Xi Jinping at the Fourth Nuclear Security Summit in Washington D.C.[4] Around the same time, on August 30, 2016, a suicide bombing using a vehicle occurred at the Chinese embassy in Kyrgyzstan, marking a period of heightened vigilance against terrorist activities in neighboring countries.[5] Additionally, terrorist incidents occurred in Afghanistan, along with hostage incidents in Bangladesh, resulting in increased mentions of terrorism (see Figure 2). As for the peak in 2018, although establishing a direct cause is challenging, the emergence of U.S.-China tensions could be a contributing factor. During this period, President Xi Jinping's inspections of the Chinese People's Liberation Army

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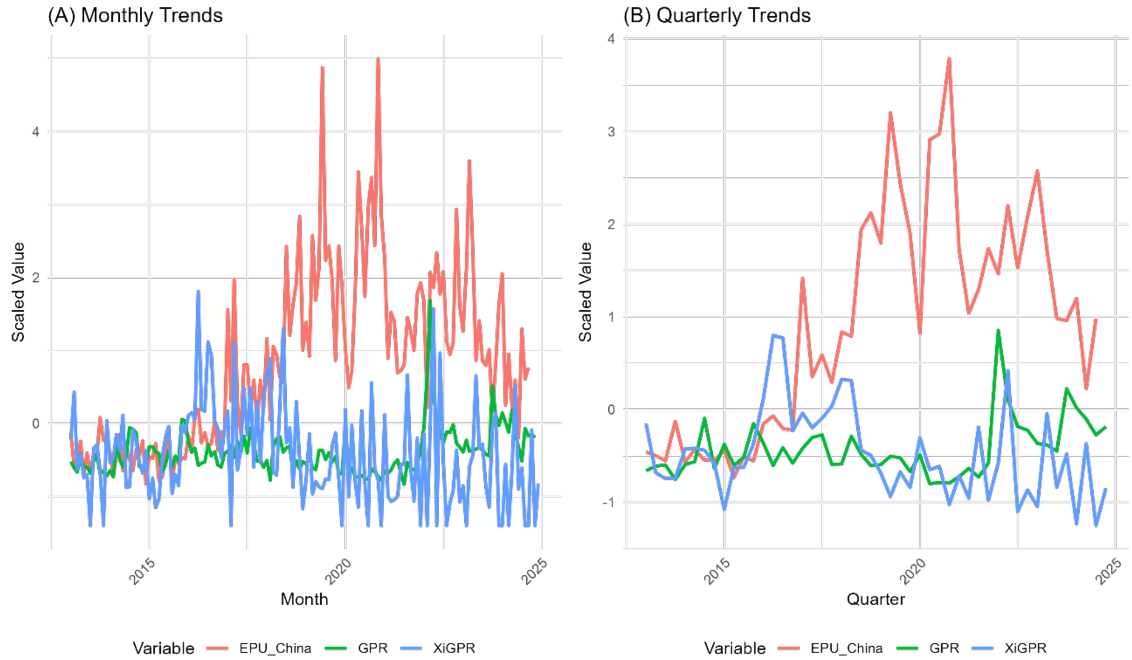
[4] "Nuclear terrorism fears loom over Obama's final atomic summit," March 31st, 2016, Reuters. https://www.reuters.com/article/world/nuclear-terrorism-fears-loom-over-obama-s-final-atomic-summit-idUSKCN0WW2NL/

[5] "Chinese embassy in Kyrgyzstan hit by suspected suicide car bomb," August 31st, 2016. Reuter. https://www.reuters.com/article/world/chinese-embassy-in-kyrgyzstan-hit-by-suspected-suicide-car-bomb-idUSKCN1150AO/.

bases were particularly notable, implying heightened friction with the U.S.[6] Third, the increase in XiGPR in 2022 appears to have been influenced by Russia's invasion of Ukraine. According to Figure 2, the rise in XiGPR in 2022 was driven by factors related to military armament and disruptions to peace. Notably, while Russia's invasion began in February, the XiGPR peaked in April, indicating a certain time lag. As will be discussed later, the XiGPR is partly influenced by global geopolitical risks reflected in the GPR, and this episode suggests a relationship between the GPR and the XiGPR[7].

Figure 1. EPU and constructed XiGPR compared with GPR (2013Q1-2024Q4)



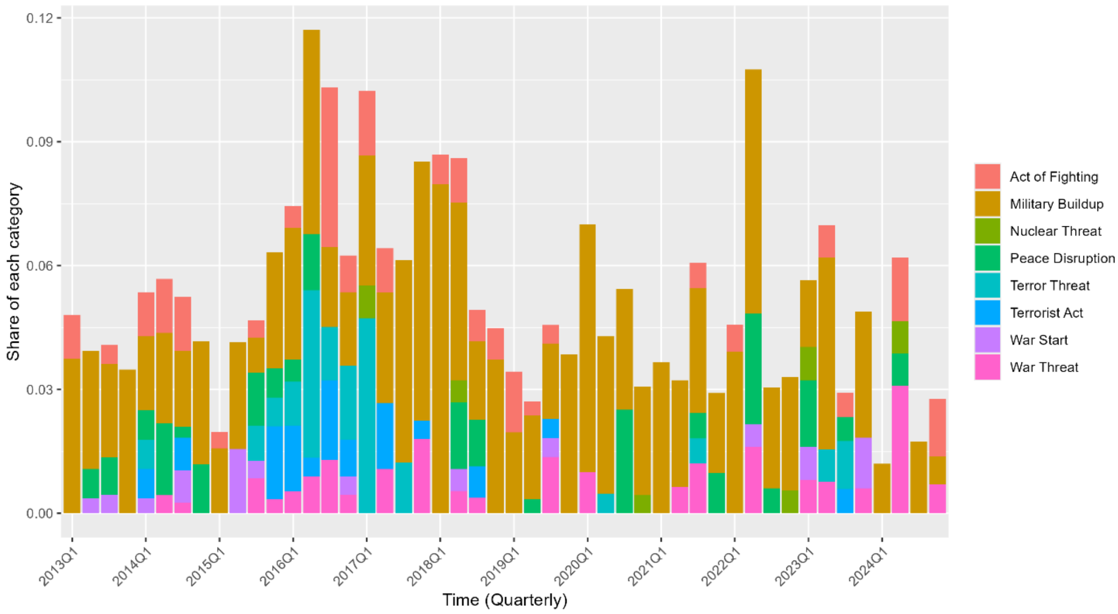
Note: Indices are standardized to have a mean of 0 and variance of 1.

Source: Authors' calculation.

Figure 2. Categorical share of GPR articles (2013Q1-2024Q4)

[6] "Xi stresses building elite maritime force during navy inspection," June 16th, 2018, Xinhua News Agency. http://www.xinhuanet.com/english/2018-06/15/c_137256952.htm

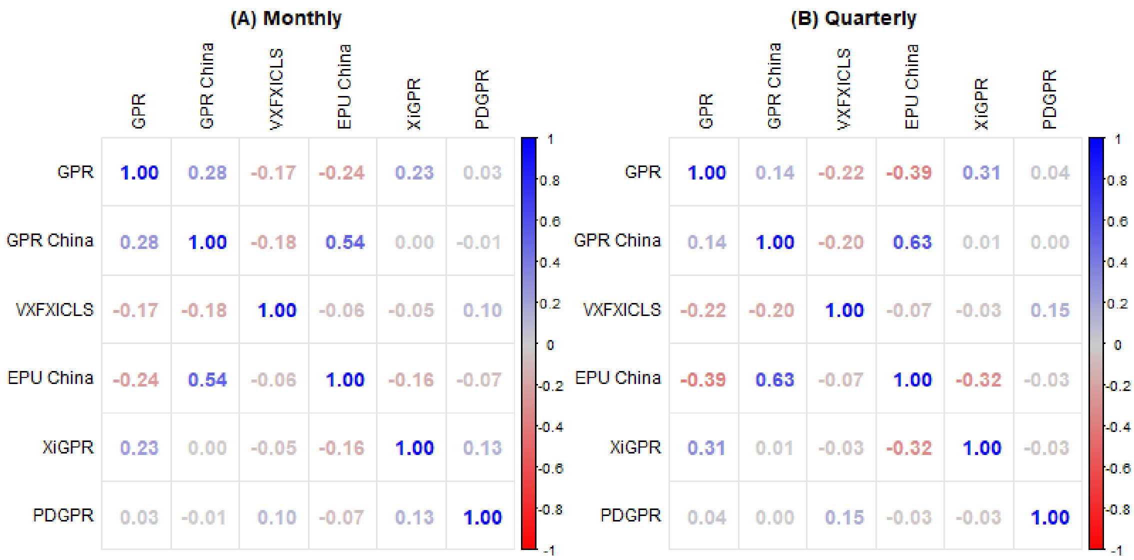
[7] See Appendix Figure 2 for GPR, XiGPR, and PDGPR.



Source: Authors' calculation.

Figure 3 shows the correlation between the measured XiGPR and the GPR and GPRC China (GPR index for China) constructed by Caldara and Iacoviello (2022), the Chinese version of the stock market "fear index," VXFXICLS (CBOE China ETF Volatility Index), and the Chinese version of EPU. The monthly XiGPR and the GPR of Caldara and Iacoviello (2022) show a fairly low correlation of 0.23. In addition, the XiGPR has a low correlation with VXFXICLS and the Chinese version of the EPU. These results confirm that XiGPR is significantly different from the existing related indices. The key question is whether shifts in Xi's geopolitical perceptions affect the real economy.

Figure 3. Correlation matrix



Note: GPR, GPRC_CHN, VXFXICLS (CBOE China ETF Volatility Index), EPU_China (China Policy Uncertainty Indices Based on Mainland Papers).

Source: GPR and GPR China, VXFXICLS, and EPU China are obtained from the Website of geopolitical risk (GPR) index (https://www.matteoiacoviello.com/gpr.htm), Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/series/VXFXIC), and the Economic Policy Uncertainty Index (https://www.policyuncertainty.com/index.html), respectively.

Following Caldara and Iacoviello (2022), we examine the impact of monthly macroeconomic variables, financial indices, and uncertainty indices on XiGPR. Appendix Table 4 shows the results of the VAR analysis. As the table indicates, none of the lagged variables has a statistically significant impact on XiGPR. Overall, as suggested by the Adjusted R-squared and F-statistics, the explanatory power of the independent variables is generally weak. However, GPR has a relatively positive and strong influence on XiGPR. For example, the coefficient of GPR with a one-period lag is 1.15 (t value = 1.5), and the coefficient of GPR with a three-period lag is 1.42 (t value = 1.76). Additionally, when testing whether Log(GPR) Granger-causes Log(XiGPR), we find a statistically significant Granger causality relationship (F-value = 3.33, p-value = 0.02). Based on these findings, while XiGPR does not seem to be influenced by macroeconomic variables or financial indices, it does appear to be affected by broader GPRs. This suggests President Xi is aware of global geopolitical risks. Further analyses demonstrate that even after controlling for the effect of GPR, XiGPR continues to influence firm behavior. Therefore, the results of the VAR regression analysis and the Granger causality test do not undermine the value of XiGPR. In fact, these results support its relevance as a meaningful factor in understanding

Chinese firms' decision-making in the context of global geopolitical developments.

4.2. Geopolitical risk and firm-level investment

Table 3 presents our baseline estimation results, where Columns (1)–(3) show estimations with only the GPRs as explanatory variables, and Columns (4)–(6) include additional control variables. All estimation equations control for firm and quarter fixed effects. Columns (4)–(6) show the control variables, such as Tobin's Q, CF, SG rate, and GDP GR, have their expected signs and are statistically significant. These results are consistent with those in previous studies (Caldara and Iacoviello, 2022; Gulen and Ion, 2016).

The XiGPR coefficient of interest is negative and statistically significant at the 1% level, supporting Hypothesis 1. Taking column (6) as an example and controlling for other factors, the coefficient of −0.412 suggests that doubling the level of XiGPR is associated with a decrease of approximately 14.1% (= −0.412/2.92) in firm investment. This result is in line with the standard theoretical predictions of investment-under-uncertainty models (Bernanke, 1983; Bloom et al., 2007) and the literature on the relationships between GPR and investment and policy uncertainty and investment (Baker, Bloom, Davis, 2016; Caldara and Iacoviello, 2022; Gulen and Ion, 2016). Notably, the estimated coefficients for GPR in Caldara and Iacoviello (2022) have negative effects in Columns (1) and (4). Our estimate of XiGPR is quantitatively similar to that of GPR after controlling for various factors. The estimation results in Table 3 also support Hypothesis 2. As shown in Models (5) and (6), which present the baseline estimation results after controlling for other explanatory variables, the coefficient of XiGPR is larger than that of PDGPR.

Table 3. Baseline estimation

I/K	(1)	(2)	(3)	(4)	(5)	(6)
L.logGPR	-0.823***			-0.529***		
	(0.0778)			(0.0835)		
L.logPDGPR		-0.332***			0.172**	
		(0.0605)			(0.0765)	
L.logXiGPR			-0.236***			-0.412***
			(0.0343)			(0.0403)
L.tobin				0.0455***	0.0276*	0.0422**
				(0.0174)	(0.0167)	(0.0167)
cashflow				0.0278***	0.0282***	0.0271***
				(0.00412)	(0.00412)	(0.00411)
sales_growth				0.000489	0.000416	0.000849**
				(0.000428)	(0.000429)	(0.000423)
gdp_growth				0.856***	0.896***	0.910***
				(0.0448)	(0.0478)	(0.0463)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	62078	62078	62078	49897	49897	49897
R-sq	0.545	0.544	0.545	0.565	0.565	0.567

Note: This table shows the results of regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table 4 shows the results of testing the hypotheses related to heterogeneous effects (H3a–H3c), which include the interaction terms between the heterogeneity dummies (SOE, defense firm, and the second term of Xi's administration) and XiGPR and their triple interaction terms. Column (1) shows the estimated coefficient of the interaction term between SOE and XiGPR is negative but small and not statistically significant. Column (2), which reports the estimated coefficient of the interaction term between the defense firm and XiGPR, shows similar results. However, when the triple interaction term is included in column (3), although defense firms are more affected by high-XiGPR, the triple interaction term shows that relative to non-SOEs, state-owned defense firms are less affected by high-XiGPR. This finding shows the heterogeneous effects of XiGPR on Chinese firms' investments, depending on ownership and political connections.

Similarly, Columns (4)–(5) in Table 4 present the results of the heterogeneous effect by period. The estimates are negative and significant for the interaction between President Xi's second term and XiGPR, as assumed. A more substantial negative effect is reported in Xi's second term, which supports Hypothesis 3c. Interestingly, SOEs are less likely to reduce their investment in Xi's second term, suggesting government control over SOEs strengthened in this period.

Table 4. Heterogeneous effects by ownership, sector, and period

I/K	(1)	(2)	(3)	(4)	(5)
L.logXiGPR	-0.400***	-0.404***	-0.392***	-0.254***	-0.236***
	(0.0511)	(0.0410)	(0.0512)	(0.0471)	(0.0579)
L.logXiGPR*SOE	-0.0306		-0.0321		-0.0848
	(0.0785)		(0.0795)		(0.0779)
L.logXiGPR*defense		-0.299	-0.625***		
		(0.184)	(0.227)		
L.logXiGPR*defense*SOE			0.506***		
			(0.116)		
L.logXiGPR*term2				-0.531***	-0.527***
				(0.102)	(0.102)
L.logXiGPR*term2*SOE					0.0737***
					(0.0180)
L.tobin3	0.0376**	0.0422**	0.0375**	0.0705***	0.0555***
	(0.0166)	(0.0167)	(0.0166)	(0.0181)	(0.0181)
cashflow	0.0269***	0.0271***	0.0269***	0.0267***	0.0265***
	(0.00411)	(0.00411)	(0.00411)	(0.00411)	(0.00412)
sales_growth	0.000798*	0.000835**	0.000787*	0.000824*	0.000681
	(0.000424)	(0.000424)	(0.000425)	(0.000423)	(0.000422)
gdp_growth	0.914***	0.910***	0.914***	1.175***	1.164***
	(0.0465)	(0.0463)	(0.0465)	(0.0706)	(0.0706)
Firm FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
N	49646	49897	49646	49897	49646
R-sq	0.567	0.567	0.567	0.567	0.568

Note: This table shows the results from the regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

5. Robustness checks

5.1. Two-period lag effect of XiGPR

The effects of GPRs are not necessarily lagged by one period (Caldara and Iacoviello, 2022). Table A5 in the Appendix reports results containing two-period lag effects. Column (6) shows a negative effect over two periods for XiGPR, while Columns (4)–(5) show mixed results for the other GPRs. The results for both GPR and XiGPR reveal negative effects for the two-period lag, whereas PDGPR does not, indicating firms gradually reduced their investment over the two quarters after a geopolitical shock. Furthermore, compared with the PDGPR, XiGPR has a negative and longer-lasting effect on investment rates. As our sample period is relatively short (36 quarters), we do not consider additional lags here.

5.2. Contemporaneous effect of XiGPR

Table A6 considers the dynamics in firm-level investment rate responses to XiGPR. Following Caldara and Iacoviello (2022), we add the changes in XiGPR (ΔlogXiGPR) in Eq. (1) and re-run the regressions to investigate the contemporaneous relationship between GPR and firm-level investment. ΔlogXiGPR has a significant negative coefficient of −0.288 (Column 6), which is quantitatively similar to ΔlogGPR (−0.570). Importantly, the results of our main variable lagged XiGPR remain robust. These results suggest that investment at the firm level is negatively associated with both high levels of XiGPR and an increase in XiGPR.

5.3. Placebo test

As a placebo test, Table A7 considers the impact of XiGPR on firm sales. We regress quarterly firm-level sales on XiGPR in Columns (1)–(3) and regress year-on-year SG on the changes in XiGPR. The real options literature highlights how uncertainty suppresses demand for input factors (capital investment) with adjustment costs; however, the short-run impact on output should be more negligible (Baker, Bloom, and Davis, 2016). Consistent with this prediction, we do not observe any negative effect of XiGPR on sales. In fact, the estimated coefficient of XiGPR is positive and statistically significant and the control variables remain positive and significant. These results suggest an increase in XiGPR is associated with a significant decline in firm investment; however, the association with sales is positive. This result is also broadly consistent for the existing GPR index.

5.4. Conventional GPR vs. XiGPR

The relationship between the extant GPR and the newly created XiGPR is vital to our analysis. Overall, XiGPR has as strong an explanatory power as existing China-related GPRs. Table A8 in the Appendix compares these measures using the same estimation equation, showing that XiGPR negatively impacts firms' investment rates even after controlling for the extant GPRs (i.e., Caldara and Iacoviello (2022) GPR and PDGPR). Specifically, column (6) shows the estimated coefficient of the lagged XiGPR is 0.390 and that of the GPR is 0.294, while the coefficient on PDGPR is not significant. Figure 1 shows the XiGPR has several peaks that differ from the China-related GPRs. The results in Table A8 suggest that both the existing GPR and

XiGPR have substantial effects; the existing GPR index reflects general geopolitical risk in China, while the XiGPR also contains meaningful signals for Chinese firms.

5.5. Additional controls

To address potential concerns regarding omitted variables, we include several additional control variables, as shown in Table A9 in the Appendix. First, our XiGPR index may be related to local political risk and uncertainty in China. In the related literature, Li et al. (2021) show that such political uncertainty, such as replacing the Municipal party Committee secretary without changing a mayor, is negatively associated with investment efficiency for listed firms in China. As XiGPR may reflect local political risk and uncertainty instead of GPR, we conduct additional estimations by adding control variables related to local political uncertainty. In column (1) of Table A9, we include a local policy uncertainty dummy variable set equal to one if there is a change of party secretary in the city where a listed firm is headquartered, and otherwise zero.[8] The result shows our main results remain robust after controlling for local political uncertainty, as XiGPR is still negatively associated with investment and has a larger estimated coefficient than the local political uncertainty dummy variable.

Second, the XiGPR index may capture effects related to general economic uncertainty and volatility, not just the political leader's perceptions and signals. To address this concern, we include additional controls for economic uncertainty and volatility in column (2). Importantly, we control for EPU for China, as developed in Baker, Bloom, and Davis (2016). In addition, following Bloom (2009) and Gulen and Ion (2016), we control for (i) uncertainty regarding future profitability using the within-quarter cross-sectional standard deviation of firm-level profit growth (the quarter-on-quarter change in net profit divided by average sales) calculated from our firm-level data. We also control for (ii) uncertainty perceived by the equity market using the within-quarter cross-sectional standard deviation of firm-level stock returns,[9] and (iii) a volatility index for the Chinese stock market (VXFXICLS).[10] The results in column (2) show the negative relationship between investments and XiGPR remains statistically significant after including these additional variables. Notably, none of the proxies for aggregate economic uncertainty and volatility absorb the explanatory power of our XiGPR index.

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[8] We manually collected the data on the changes of the municipal party secretary at the city level from *Zechengwang* (https://www.hotelaah.com/, accessed on January 15th, 2023).
[9] We obtain firm-level stock return data from the Refinitiv Datastream (https://www.refinitiv.com/en, accessed on January 12th 2023).
[10] We obtain the CBOE China ETF Volatility Index (VXFXICLS) from the Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/series/ VXFXICLS, accessed on January 11th, 2023).

Third, concerns regarding the effects of XiGPR on investment may have been due to an overall negative outlook for the future and other determinants of the macroeconomic environment. In column (3), we control for a purchasing managers' index for manufacturing sectors, a consumer confidence index, and average property prices (RMB/sq. meter).[11] The results show the negative relationship between investment and XiGPR remains statistically significant, and while the estimated coefficients are smaller they are not negligible.

Finally, we include all of the additional control variables and re-run the regression in column (4). We further control for year fixed effects in Columns (5)–(6) and cluster the standard errors at the year-quarter (time) level in column (6). The baseline results remain robust. Compared to column (1), the coefficient of the lagged XiGPR in our full model shown in column (5) declines from 0.409 to 0.166, indicating the importance of various economic conditions. According to the results in column (5), doubling the level of XiGPR is associated with an average decline in quarterly investment rates of approximately 5.7% (= −0.166/2.92). As this model controls for various other factors the result should be the most conservative among our estimations; however, the effect is still sizable. Columns (4)–(6) show that the results of these tests strengthen the robustness of the XiGPR effect on investments. The findings also indicate the XiGPR index contains information about geopolitical risk not captured by economic and political uncertainty, an overall negative outlook for the future, and other determinants of the macroeconomic environment.

6. Political connections

The results of the heterogeneity analysis in column (3) of Table 4 indicate that in the defense industry, SOEs tend to be less affected by XiGPR than private firms. In addition, as shown in column (5), while the effects of XiGPR were stronger in the latter part of President Xi's term, SOEs again tended to be less affected than non-SOEs. These results suggest that politically connected firms under government control tend to offset the negative effects of GPRs and may even increase investment in the face of such risks. In other words, political connections may mitigate the adverse effects of GPRs on Chinese firms. Although the Chinese economy has become more market-oriented since the 1980s, the party retains strong authority over economic matters; thus, we assume listed firms view policymakers' statements as essential inputs when making strategic decisions. Using detailed information on listed firms' board members, we

[11] We do not include the PMI for nonmanufacturing sectors as its correlation with GDP growth is 0.96 (the correlation between the manufacturing sector's PMI and GDP growth is 0.81). We obtained these indicators from the CEIC database (https://www.ceicdata.com/en, accessed on January 12th, 2023).

examine the effect of political connections on the geopolitical risk-investment relationship.

Table 5 presents the regression results that include the effects of lags and changes in XiGPR on firm investment. Columns (1)–(9) report the estimated coefficients of the interaction terms between our political connections dummies (SOE, government work experience, and membership in the CCP) and XiGPR. Most of the interaction terms are positive and statistically significant. These results show that although XiGPR is generally associated with a decline in firm investment, firms with political connections are less affected by XiGPR, which supports Hypothesis 3a. Notably, the results are robust using lagged and/or changes in XiGPR.

Our results suggest GPR has a lesser impact on politically connected firms, in line with the findings in Liu, Xin, and Li (2021). One possible explanation is that political connections—particularly board members who have government work experience or CCP membership—may help Chinese firms gain access to reliable political and policy information, thereby mitigating the impact of geopolitical risk. Several pieces of evidence support this interpretation. An additional analysis reveals that investment rates for firms with political connections (measured as SOEs, GOV firms, and CCP firms) exhibit a smaller standard deviation than non-connected firms, regardless of whether XiGPR is low or high (see Figure A3). This suggests politically connected firms are generally less affected by the external environment in China[12]. Notably, we observe that firms with political connections reduce their investments during the low-XiGPR period (see Appendix Table A10). This implies that these firms may obtain beneficial information earlier than publicly available sources and use it to inform their decision-making.

Table 5. Political connections (PC) under geopolitical risks

[12] Furthermore, our additional analysis shows that relative to non-SOEs, SOEs rely more on government procurement in terms of contractual value and the number of projects based on the matched data between listed firms and the Chinese Government Procurement Database maintained by China's Ministry of Finance (https://www.ccgp.gov.cn/). Therefore, short-term risks or uncertainties may have relatively minor effects on SOEs compared to private firms.

I/K	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PC = SOE			PC = Government working experience			PC = CCP member		
L.logXiGPR	-0.400***		-0.512***	-0.429***		-0.539***	-0.485***		-0.625***
	(0.0511)		(0.0584)	(0.0434)		(0.0493)	(0.0533)		(0.0605)
L.logXiGPR*PC	-0.0306		0.0219	0.133		0.233**	0.190**		0.294***
	(0.0785)		(0.0879)	(0.104)		(0.116)	(0.0769)		(0.0859)
△logXiGPR		-0.0746**	-0.330***		-0.0756***	-0.329***		-0.120***	-0.420***
		(0.0298)	(0.0383)		(0.0249)	(0.0319)		(0.0319)	(0.0401)
△logXiGPR*PC		0.0786*	0.135**		0.185**	0.299***		0.169***	0.318***
		(0.0474)	(0.0588)		(0.0752)	(0.0895)		(0.0471)	(0.0576)
L.tobin	0.0376**	0.0281*	0.0556***	0.0422**	0.0322*	0.0601***	0.0420**	0.0320*	0.0607***
	(0.0166)	(0.0170)	(0.0170)	(0.0167)	(0.0170)	(0.0170)	(0.0167)	(0.0171)	(0.0171)
cashflow	0.0269***	0.0282***	0.0264***	0.0271***	0.0284***	0.0266***	0.0271***	0.0285***	0.0265***
	(0.00411)	(0.00412)	(0.00411)	(0.00411)	(0.00412)	(0.00410)	(0.00411)	(0.00411)	(0.00410)
sales_growth	0.000798*	0.000376	0.000893**	0.000854**	0.000419	0.000941**	0.000834**	0.000415	0.000918**
	(0.000424)	(0.000430)	(0.000424)	(0.000424)	(0.000429)	(0.000424)	(0.000423)	(0.000429)	(0.000423)
gdp_growth	0.914***	0.884***	0.919***	0.912***	0.880***	0.917***	0.907***	0.873***	0.914***
	(0.0465)	(0.0453)	(0.0467)	(0.0462)	(0.0452)	(0.0464)	(0.0464)	(0.0452)	(0.0466)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	49646	49646	49646	49897	49897	49897	49897	49897	49897
R-sq	0.567	0.565	0.568	0.567	0.565	0.567	0.567	0.565	0.568

Note: This table shows the results from the regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

7. Conclusion

In this study, we measure Chinese President Xi Jinping's perception of geopolitical risk based on his public statements and examine its impact on Chinese firms' investment behavior. Our findings indicate that a doubling of XiGPR leads to a 14.1% decline in firm investment in the subsequent quarter. This effect remains significant even after controlling for existing GPR measures and macroeconomic variables. Notably, political connections mitigate the negative impact of XiGPR, as firms with strong political ties—measured through state ownership, prior government employment, and CCP membership—exhibit less sensitivity to perceived GPR. Furthermore, while PDGPR, derived from *People's Daily* articles, had a relatively minor effect, XiGPR, which reflects the geopolitical perception of China's top political leader, showed a more substantial influence.

Our study advances the GPR literature by highlighting the role of political leaders' perceptions, utilizing local sources, and examining the moderating effect of PC. Moreover, our results align with previous empirical research on political leadership, which highlights the pivotal role leaders play in shaping macroeconomic outcomes, particularly in authoritarian regimes. China's Communist party leader has historically exercised considerable authority over economic governance, a trend that appears to have intensified under Xi Jinping. Our analysis suggests that Xi's perception of geopolitical risks, as conveyed through his public statements, affects firms' investment behavior, with varying effects depending on the nature of the firm's political ties. Furthermore, our results indicate that Xi's rhetorical influence became more pronounced during his second term, which is consistent with observations that Xi has increased his personal power over time. Additionally, our findings suggests that PC may play a role in mitigating the impact of perceived GPR in China. By quantitatively demonstrating the impact of the top leader's perceptions in an authoritarian regime, this study makes a significant contribution to the literature.

However, several limitations of our study suggest areas for further research. First, this study focuses exclusively on the Xi Jinping era, without considering the effects of prior China's leaders. Expanding the temporal scope to include previous administrations could provide a more comprehensive understanding of leadership-driven economic outcomes in China. Second, due to constraints in quarterly financial data, our analysis primarily examines firm investment rates. Future research could explore a wider range of macroeconomic indicators, such as employment, productivity, and capital allocation. Third, while this study adopts established methods for measuring geopolitical risks, alternative approaches, including deep learning techniques, could further refine the measurement of political leaders' shifting perceptions.

Declaration of interest

None.

Author contributions

Asei Ito: Conceptualization, methodology, software, validation, investigation, resources, data curation, writing (original draft preparation), writing (review and editing), visualization, project administration, funding acquisition. **Jaehwan Lim**: Conceptualization, methodology, software, investigation, data curation, writing (original draft preparation), writing (review and editing). **Hongyong Zhang**: Conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing (original draft preparation), writing (review and editing), funding acquisition.

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Data statement

The data that support the findings of this study are available from the corresponding author upon request.

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Appendix

Figure A1. Number of articles and characters

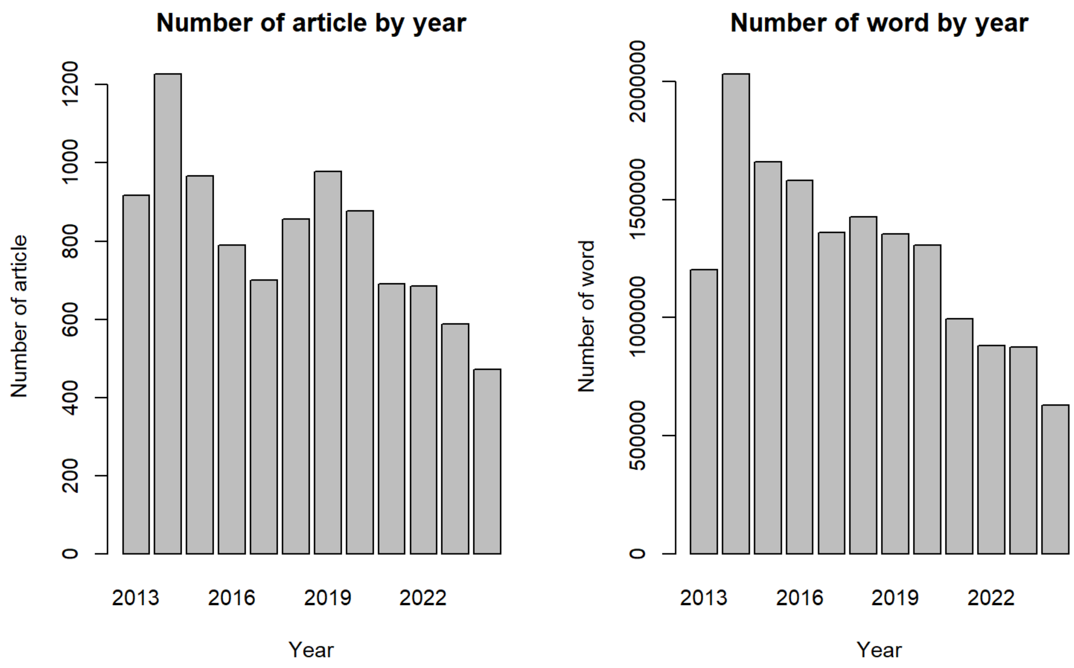
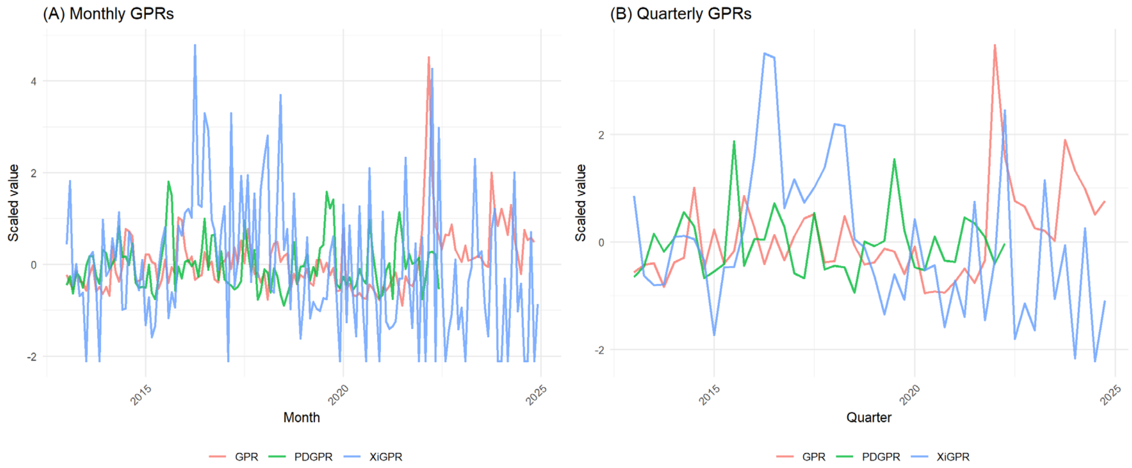


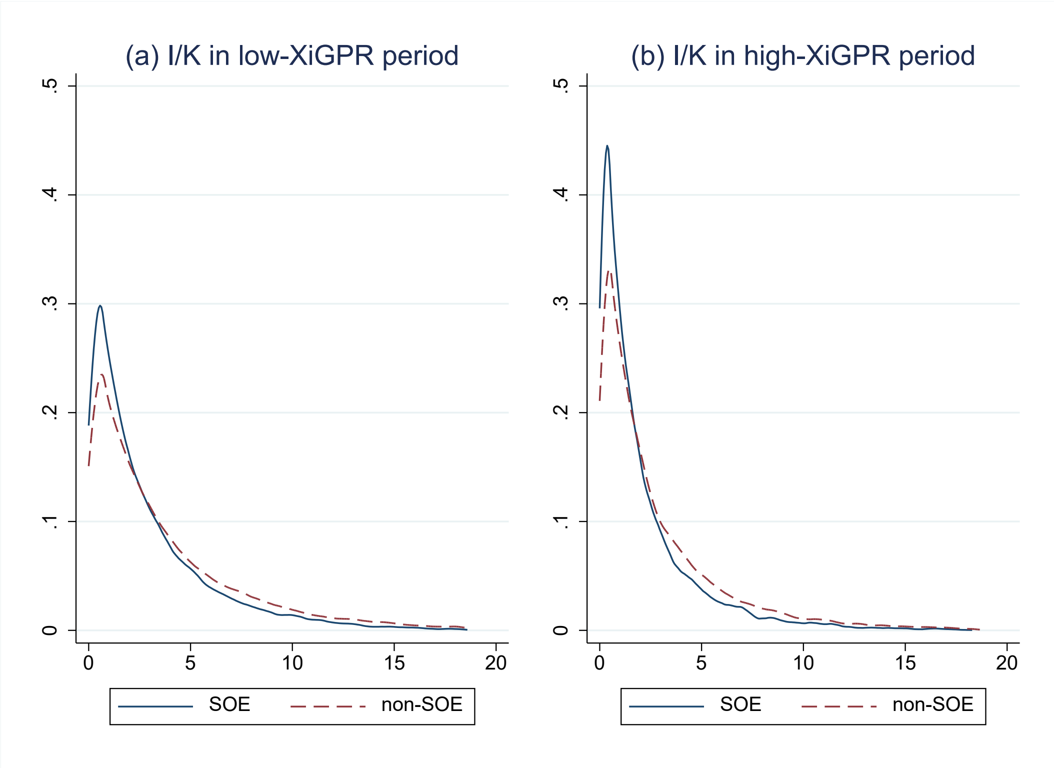
Figure A2. GPR, XiGPR, and PDGPR



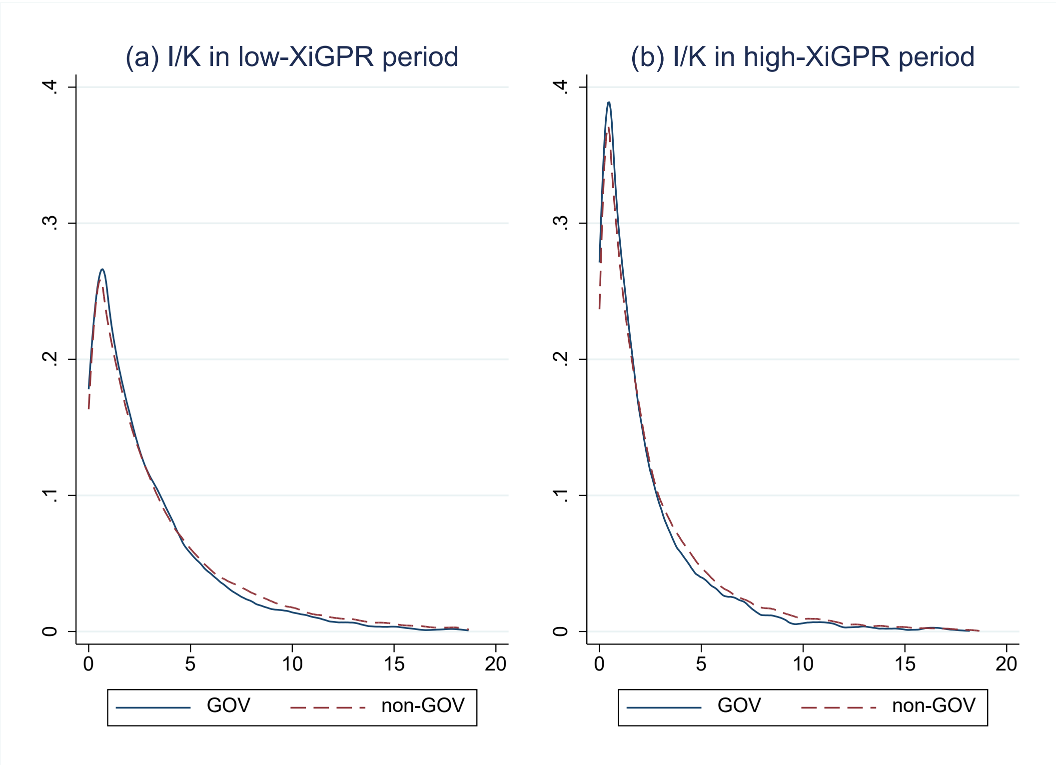
Note: XiGPR covers the period from January 2013 to December 2024. Due to data availability, GPR and PDGPR end earlier.

Figure A3. Distribution of investment rate

Panel A: SOE and non-SOE



Panel B: GOV connected firm and non-GOV connected firm



Panel C: CCP connected firm and non-CCP connected firm

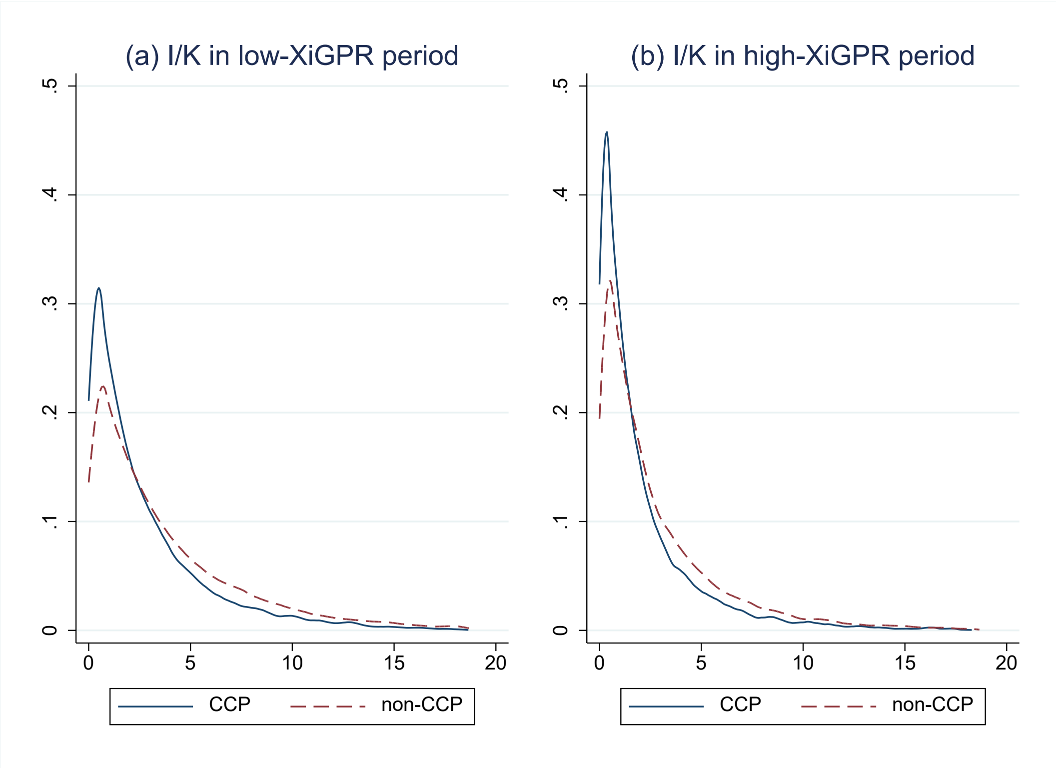


Table A1. Caldara and Iacoviello (2022)'s keyword categories

Category	Procedure
War Threats (Category 1)	War_words N/2 Threat_words
Peace Threats (Category 2)	Peace_words N/2 Peace_disruption_words
Military Buildups (Category 3)	Military_words AND buildup_words
Nuclear Threats (Category 4)	Nuclear_bigrams AND Threat_words
Terror Threats (Category 5)	Terrorism_words N/2 Threat_words
Beginning of War (Category 6)	War_words N/2 War_begin_words
Escalation of War (Category 7	Actors_words N/2 Actors_fight_words
Terror Acts (Category 8)	Terrorism_words N/2 Terrorism_act_words

Note: Categories marked with N/2 are proximity searches (ngram search) that keywords appear within two words of each other. For keywords of each category, see appendix table 2.

Table A2. Caldara and Iacoviello (2022)'s threat/act keywords and translation

Topic Sets	English words	Chinese translation
War_words	war OR conflict OR hostilities OR revolution* OR insurrection OR uprising OR revolt OR coup OR geopolitical	战争，冲突，敌对，革命，叛乱，起义，反叛，政变，地缘政治
Peace_words	peace OR truce OR armistice OR treaty OR parley	和平，休战，停战，条约，会谈
Military_words	military OR troops OR missile* OR "arms" OR weapon* OR bomb* OR warhead*	军事，部队，导弹，武器，兵器，炸弹，弹头
Nuclear_bigrams	"nuclear war*" OR "atomic war*" OR "nuclear missile*" OR "nuclear bomb*" OR "atomic bomb*" OR "h-bomb*" OR "hydrogen bomb*" OR "nuclear test" OR "nuclear weapon*"	核战争，原子战争，核导弹，核弹，原子弹，氢弹，核试验，核武器
Terrorism_words	terror* OR guerrilla* OR hostage*	恐怖，游击队，人质
Actor_words	allie* OR enem* OR insurgen* OR foe* OR army OR navy OR aerial OR troops OR rebels	盟友，敌人，叛乱分子，敌人，陆军，海军，航空，部队，叛乱分子
Threat_words	threat* OR warn* OR fear* OR risk* OR concern* OR danger* OR doubt*	威胁，警告，恐惧，风

	OR crisis OR troubl* OR disput* OR tension* OR imminen* OR inevitable OR footing OR menace* OR brink OR scare OR peril*	险，忧虑，危险，怀疑，危机，麻烦，争议，紧张，不确定，不可避免，立足点，威胁，边缘，惊吓，险情
Peace_disruption_words	threat* OR menace* OR reject* OR peril* OR boycott* OR disrupt*	恐吓，威胁，拒绝，险情，抵制，破坏
Buildup_words	buildup* OR build-up* OR sanction* OR blockad* OR embargo OR quarantine OR ultimatum OR mobiliz*	集结，制裁，封锁，禁运，检疫，最后通牒，动员
War_begin_words	begin* OR start* OR declar* OR begun OR began OR outbreak OR "broke out" OR breakout OR proclamation OR launch*	开始，启动，宣布，爆发，宣布，发射
Actor_fight_words	advance* OR attack* OR strike* OR drive* OR shell* OR offensive OR invasion OR invad* OR clash* OR raid* OR launch*	推进，攻击，打击，驱动，炮击，进攻，入侵，冲突，突袭，发射
Terrorism_act_words	attack OR act OR bomb* OR kill* OR strike* OR hijack*	攻击，行动，炸弹，杀，袭击，劫持

Source: Caldara and Iacoviello (2022) and Authors' translation.

Table A3. Exclusion keywords and its translation

Exclusion Keywords	Words	Chinese translation
Caldara and Iacoviello (2022)	movie* OR film* OR museum* OR anniversar* OR obituar* OR memorial* OR arts OR book OR books OR memoir* OR "price war" OR game OR story OR history OR veteran* OR tribute* OR sport OR music OR racing OR cancer OR "real estate" OR mafia OR trial OR tax	电影，博物馆，纪念日，讣告，纪念馆，艺术，书籍，回忆录，价格战，游戏，故事， 历史，退伍军人，致敬，体育，音乐，赛车，癌症，房地产，黑帮，审判，税务
Additional exclusion keywords		周年

Source: Caldara and Iacoviello (2022) and Authors' translation.

Table A4. VAR regression result

	Dependent variable: log(XiGPR)			
	Coefficient	Standard Error	t value	Pr(>|t|)
LXiGPR.l1	-0.16	0.11	-1.55	0.13
Industrial output growth.l1	-0.03	0.04	-0.83	0.41
Equity price growth.l1	-0.04	2.29	-0.02	0.99
LGPR.l1	1.15	0.75	1.53	0.13
VXFXICLS.l1	-0.03	0.04	-0.71	0.48
LXiGPR.l2	-0.06	0.12	-0.53	0.60
Industrial output growth.l2	0.02	0.06	0.38	0.70
Equity price growth.l2	-0.80	2.25	-0.36	0.72
LGPR.l2	0.23	0.83	0.28	0.78
VXFXICLS.l2	0.03	0.05	0.62	0.53
LXiGPR.l3	-0.04	0.12	-0.33	0.74
Industrial output growth.l3	0.01	0.04	0.36	0.72
Equity price growth.l3	-0.50	2.13	-0.24	0.81
LGPR.l3	1.43	0.81	1.77	0.08
VXFXICLS.l3	0.01	0.04	0.41	0.68
Constant	-7.81	4.44	-1.76	0.08

R-Squared	0.13
Adjusted R-squared	-0.02
F-statistic	0.88
p-value	0.58

Note: LXiGPR refers log(XiGPR). l1 refers to the lag of one term, indicating the impact of the previous period's data; l2 refers to the lag of two terms, and l3 refers to the lag of three terms.

Table A5. Additional estimates with two-quarterly lag effects

I/K	(1)	(2)	(3)	(4)	(5)	(6)
L.logGPR	-0.450***			-0.437***		
	(0.0694)			(0.0822)		
L2.logGPR	-1.022***			-0.590***		
	(0.0834)			(0.0766)		
L.logPDGPR		-0.273***			0.186***	
		(0.0608)			(0.0673)	
L2.logPDGPR		0.101**			-0.00247	
		(0.0410)			(0.0493)	
L.logXiGPR			-0.269***			-0.385***
			(0.0329)			(0.0353)
L2.logXiGPR			0.0236			-0.0631*
			(0.0308)			(0.0361)
L.tobin				0.0628***	0.0355***	0.0511***
				(0.0131)	(0.0130)	(0.0123)
cashflow				0.0280***	0.0288***	0.0274***
				(0.00318)	(0.00318)	(0.00317)
sales_growth				0.000488	0.000374	0.000863**
				(0.000364)	(0.000364)	(0.000363)
gdp_growth				0.788***	0.858***	0.872***
				(0.0295)	(0.0319)	(0.0309)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	56390	56390	56390	46067	46067	46067
R-sq	0.563	0.561	0.561	0.578	0.577	0.579

Note: This table shows the results of regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A6. Additional estimates with the changes of XiGPR

I/K	(1)	(2)	(3)	(4)	(5)	(6)
L.logGPR	-1.288***			-1.022***		
△	(0.123)			(0.132)		
logGPR	-0.548***			-0.570***		
	(0.0754)			(0.0828)		
L.logPDGPR		-0.648***			0.249**	
△		(0.0873)			(0.112)	
logPDGPR		-0.387***			0.0881	
		(0.0476)			(0.0569)	
L.logXiGPR			-0.282***			-0.507***
△			(0.0389)			(0.0458)
logXiGPR			-0.147***			-0.288***
			(0.0270)			(0.0300)
L.tobin				0.0537***	0.0262	0.0591***
				(0.0174)	(0.0168)	(0.0170)
cashflow				0.0273***	0.0281***	0.0266***
				(0.00412)	(0.00412)	(0.00411)
sales_growth				0.000545	0.000436	0.000929**
				(0.000427)	(0.000429)	(0.000423)
gdp_growth				0.849***	0.903***	0.915***
				(0.0447)	(0.0493)	(0.0464)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	62078	62078	62078	49897	49897	49897
R-sq	0.546	0.545	0.545	0.565	0.565	0.567

Note: This table shows the results of regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A7. Placebo test

	(1)	(2)	(3)	(4)	(5)	(6)
	log(sales)			Sales growth rate		
L.logGPR	0.288					
	(0.186)					
L.logPDGPR		-0.211*				
		(0.107)				
L.logXiGPR			0.186***			
			(0.0547)			
logGPR				4.505		
				(6.128)		
logPDGPR					4.573	
					(3.718)	
logXIGPR						7.092**
						(2.825)
L.tobin3	-0.0695***	-0.0585***	-0.0671***	0.736	0.673	0.352
	(0.00640)	(0.00679)	(0.00764)	(0.540)	(0.538)	(0.565)
cashflow	0.00531***	0.00524***	0.00551***	1.217***	1.219***	1.224***
	(0.00149)	(0.00153)	(0.00146)	(0.241)	(0.241)	(0.241)
gdp_growth	-0.309***	-0.340***	-0.337***	2.588***	2.728***	2.769***
	(0.0340)	(0.0359)	(0.0305)	(0.931)	(0.894)	(0.900)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	54311	54311	54311	46539	46539	46539
R-sq	0.852	0.852	0.854	0.283	0.283	0.283

Note: This table shows the results of regressions of firm-level sales and sales growth on geopolitical risk. Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A8. Conventional GPR vs. XiGPR

I/K	(1)	(2)	(3)	(4)	(5)	(6)
L.logGPR	-0.917***	-0.717***	-0.810***	-0.505***	-0.318***	-0.294***
	(0.0781)	(0.0702)	(0.0715)	(0.0830)	(0.0767)	(0.0782)
L.logPDGPR	-0.444***		-0.461***	0.0859		0.0871
	(0.0608)		(0.0603)	(0.0767)		(0.0768)
L.logXiGPR		-0.187***	-0.195***		-0.390***	-0.390***
		(0.0325)	(0.0322)		(0.0389)	(0.0389)
L.tobin				0.0437**	0.0510***	0.0492***
				(0.0174)	(0.0173)	(0.0173)
cashflow				0.0277***	0.0268***	0.0267***
				(0.00412)	(0.00411)	(0.00411)
sales_growth				0.000483	0.000867**	0.000861**
				(0.000428)	(0.000423)	(0.000423)
gdp_growth				0.865***	0.894***	0.903***
				(0.0477)	(0.0461)	(0.0492)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	62078	62078	62078	49897	49897	49897
R-sq	0.546	0.546	0.546	0.565	0.567	0.567

Note: This table shows the results of regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%). Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A9. Additional controls

I/K	(1)	(2)	(3)	(4)	(5)	(6)
L.logXiGPR	-0.409***	-0.409***	-0.314***	-0.382***	-0.166***	-0.166***
	(0.0404)	(0.0452)	(0.0416)	(0.0465)	(0.0424)	(0.0335)
L.tobin	0.0426**	0.0414**	0.0398**	0.0635***	0.106***	0.106***
	(0.0167)	(0.0181)	(0.0176)	(0.0190)	(0.0203)	(0.0147)
cashflow	0.0270***	0.0271***	0.0267***	0.0260***	0.0252***	0.0252***
	(0.00411)	(0.00411)	(0.00411)	(0.00412)	(0.00413)	(0.00463)
sales_growth	0.000872**	0.000818*	0.00104**	0.000996**	0.00112***	0.00112**
	(0.000424)	(0.000425)	(0.000425)	(0.000425)	(0.000425)	(0.000429)
gdp_growth	0.913***	0.894***	1.012***	1.367***	-0.0603	-0.0603
	(0.0464)	(0.0546)	(0.0820)	(0.106)	(0.0830)	(0.0699)
local political uncertainty	-0.0839**			-0.0765**	-0.0836**	-0.0836**
	(0.0368)			(0.0370)	(0.0369)	(0.0368)
L.logEPU		-0.00967		-0.350***	-0.00642	-0.00642
		(0.0635)		(0.0583)	(0.0494)	(0.0513)
profit_growth_SD		-0.634		-2.683***	-1.048**	-1.048**
		(0.485)		(0.537)	(0.491)	(0.437)
stock_return_SD		0.00278		-0.00163	-0.000282	-0.000282
		(0.00237)		(0.00265)	(0.00235)	(0.00281)
VXFXICLS		-0.00348		-0.0334***	-0.00741*	-0.00741*
		(0.00240)		(0.00453)	(0.00400)	(0.00364)
PMI			-0.114***	-0.333***	-0.0555**	-0.0555
			(0.0220)	(0.0364)	(0.0280)	(0.0338)
CCI			0.00174	-0.000320	-0.0207***	-0.0207***
			(0.00349)	(0.00375)	(0.00491)	(0.00337)
property_price			0.0391	2.188***	-8.105***	-8.105***
			(0.384)	(0.505)	(1.083)	(0.626)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes
N	49703	49897	49897	49703	49703	49703
R-sq	0.567	0.567	0.567	0.568	0.571	0.571

Note: This table shows the results from regressions of firm-level investment on geopolitical risk. The dependent variable I/K is the firm-level quarterly investment rate (%) in all regressions. A full set of firm and quarter fixed effects are included in columns (1)-(4) and a full set of firm, quarter, and year fixed effects are included in columns (5)-(6), respectively. Standard errors are clustered at the firm level in columns (1)-(5) and at the year-quarter level in column (6), respectively. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A10. Low-XiGPR period and firm investment behaviors

I/K	(1)	(2)	(3)	(4)	(5)	(6)
XiGPR_low	0.498***	0.484***	0.575***			
	(0.0423)	(0.0362)	(0.0436)			
XiGPR_low*SOE	-0.149**			-0.144**		
	(0.0595)			(0.0599)		
XiGPR_low*GOV		-0.268***			-0.270***	
		(0.0802)			(0.0801)	
XiGPR_low*CCP			-0.312***			-0.312***
			(0.0575)			(0.0576)
L.tobin3	0.0731***	0.0764***	0.0773***	0.103***	0.106***	0.108***
	(0.0170)	(0.0170)	(0.0170)	(0.0210)	(0.0208)	(0.0209)
cashflow	0.0266***	0.0269***	0.0268***	0.0251***	0.0254***	0.0254***
	(0.00411)	(0.00411)	(0.00410)	(0.00413)	(0.00413)	(0.00412)
sales_growth	0.00100**	0.00102**	0.00101**	0.00110***	0.00112***	0.00110***
	(0.000424)	(0.000423)	(0.000423)	(0.000426)	(0.000425)	(0.000424)
gdp_growth	0.949***	0.945***	0.941***			
	(0.0476)	(0.0475)	(0.0475)			
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	No	No	No
Time FE	No	No	No	Yes	Yes	Yes
N	49646	49897	49897	49646	49897	49897
R-sq	0.565	0.565	0.565	0.571	0.571	0.571

Notes: XiGPR_low refers to periods when XiGPR is below the median value (see also Table 2). A full set of firm and quarter fixed effects are included in columns (1)-(3) and a full set of firm and time fixed effects are included in columns (4)-(6), respectively. Standard errors are clustered at the firm level. *, **, and *** indicate significance at 0.10, 0.05, and 0.01, respectively.

Table A11. Correlation matrix of main variables

	I/K	GPR	PDGPR	XiGPR	EPU	Tobin	Cash flow	Sales growth	GDP growth	Defense	SOE	GOV	CCP	Term2
I/K	1													
GPR	-0.064	1												
PDGPR	0.070	0	1											
XiGPR	-0.102	0.2149	-0.0799	1										
EPU	-0.020	-0.1086	0.0771	-0.2245	1									
Tobin	0.033	0.1368	0.0099	0.093	-0.176	1								
Cash flow	0.274	-0.07	0.0715	-0.0819	0.0425	0.0091	1							
Sales growth	0.070	0.0254	-0.0407	0.0804	-0.0144	0.0799	-0.0099	1						
GDP growth	-0.006	-0.038	-0.2886	0.1293	-0.8149	0.0442	-0.114	0.0296	1					
Defense	-0.028	0.0017	-0.0017	-0.0037	-0.0116	0.0509	-0.0753	0.003	0.0121	1				
SOE	-0.112	0.0044	-0.0267	0.0101	-0.0973	-0.2045	-0.0158	-0.0941	0.0987	0.107	1			
GOV	-0.043	-0.0013	-0.0071	-0.001	-0.053	-0.1075	0.0028	-0.0385	0.0533	0.0094	0.2703	1		
CCP	-0.134	0.0062	-0.0159	0.006	-0.0811	-0.1381	-0.0151	-0.0904	0.0786	0.0203	0.41	0.2806	1	
Term2	0.013	-0.2079	-0.027	-0.1183	0.8142	-0.1984	0.0646	-0.0199	-0.7176	-0.0111	-0.0946	-0.0511	-0.0801	1

Source: Authors' calculations.