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Political relations and tourism: evidence from China

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ABSTRACT
This paper provides empirical evidence on how political relations affect the tourism market. We use monthly data to identify the pattern of short-lived effects of political shocks in the tourism market. A political relation shock has an immediate effect on Chinese outbound tourism, and then the effect is amplified in the next month before it vanishes in the following months. Particularly, the negative political shocks, namely political disputes, are responsible for most of the effects on outbound tourism. Moreover, we investigate the specific mechanism in China through which political relation shocks affect outbound tourism. We find that government interference by issuing travel warnings plays a crucial role in the mechanism. Further analysis on tourists' demand shows that deterioration in political relations itself has no direct effects on tourists' demand. However, when accompanied by the issuance of travel warnings, the negative political shocks significantly reduce tourists' willingness to travel to the opposing countries.

KEYWORDS
Political relation; tourism; travel warning; search engine index; gravity model; VAR

I. Introduction

Political relations between nations intertwine with international economic activities. There are extensive studies on the impact of political relations on trade and foreign investment (Pollins (1989a), Pollins (1989b), Long (2008), Desbordes and Vicard (2009), Davis and Meunier (2011), Fuchs and Klann (2013); Heilmann (2016), Lin, Cui, and Fuchs (2019)). Since travel and tourism play significant roles in international economic exchanges, we have every reason to anticipate that politics is a crucial determinant of international tourism. Particularly, when political relations deteriorate, bilateral tourism can be severely affected in various contexts (Alvarez and Campo (2014), Shaheer, Insch, and Carr (2017), Yu et al. (2020)).

Political disruptions between countries create uncertainty and hostility. Uncertainty reduces economic activities, such as trade and tourism, and hostility increases transaction costs or the chance of unfair treatments (Quintal, Lee, and Soutar (2010)). The political tensions pose threats to travellers' safety, making it an obstacle to developing tourism (Morakabati (2012)). Moreover, political tensions among countries may arouse nationalist sentiment among citizens (Bertoli (2017)). Consequently, consumers reshape the images and change their preferences for tourism destinations (Arana and León (2008), Alvarez and Campo (2014)). The government may also intervene in the tourism market when political tensions escalate (Lim, Ferguson, and Bishop (2020)).

For instance, China and South Korea disputed the deployment of the THAAD anti-missile system on the Korean Peninsula in 2017. During the height of the dispute, more than 3,000 Chinese passengers voluntarily refused to land when the Costa Serena cruise ship arrived at the resort island of Jeju, which used to be one of Chinese tourists' favourite destinations in South Korea. They expressed 'solidarity with their government' s vociferous opposition to South Korea' s decision to deploy a controversial missile defence system.'[1] This anecdote is a microcosm of the impact of the CChina–KoreaTHAAD dispute on the tourism market. Moreover, the Chinese authorities had taken actions to discourage trips to South Korea. China's tourism administration had issued travel warnings towards South Korea. It is also reported

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[1]'Chinese cruise passengers put patriotism above tourism by skipping South Korean port visit,' *Reuters*, 14 March 2017, https://www.reuters.com/article/us-southkorea-china-cruise/chinese-cruise-passengers-put-patriotism-above-tourism-by-skipping-south-korean-port-visit-idUSKBN16L0XD.

that Beijing and the national tourism administration instructed travel agencies to cancel South Korean tour packages.[2] According to the data released by the Korea Tourism Organization, the number of Chinese tourists arriving in South Korea fell 40% year-on-year in March 2017."[3]

There is a handful of literature that studies the relationship between tourism and political shocks. Mostly it focuses on prominent political conflicts such as public violence, terrorism, and warfare. This class of literature was pioneered by Mathews (1975), Matthews and Richter (1991), Richter (1980), Richter (1983), 1999), Richter and Waugh (1986). The work of Krakover (2005) proposes an index of the level of terrorist activities in a specific period and shows that tourism demand is negatively associated with both the severity and the frequency of the terror events. Arana and León (2008) studies the short-term effects of the 9/11 attacks in New York on tourist preferences for destinations. They show that the attacks induced a shock to tourists' utility, and tourists' image profiles of destinations were also changed. In the study of Saha and Yap (2014), they investigate how the interaction between political instability and terrorism affects tourism development. They find that the effect of political instability has a more substantial effect on tourism development than one-off terrorist attacks.

The existing literature mostly focus on the extreme political events or confrontations. But in most of time, political relations vary in a less extreme range that far falls short of war, e.g. political disputes over territory (Davis and Meunier (2011)). These disputes or conflicts may also raise the uncertainty and alter the preference of potential visitors, resulting in a reduction in tourist flows. Hence, our paper seeks to investigate how these moderate fluctuations of political relations affect bilateral tourism.

For political tensions ranging from mild to moderate, they are typically short-lived in nature and last for at most several months (Du et al. (2017)). For example, the US has been constantly criticizing China on political issues such as human rights (Zhou (2005), Drury and Li (2006)). China often expresses dissatisfaction with such criticism, and Sino-US political relations deteriorate temporarily. However, political dialogue and economic cooperation quickly play down these disputes. Consequently, most effects of political shocks on economic activities are short-lived (Davis and Meunier (2011), Du et al. (2017)). In that case, if we use a low-frequency data on international tourist flows, as in most existing literature, these short-lived effects from political shocks will hardly be captured. Therefore, high-frequency data is best suited for identifying political shocks' effects in an ever-changing international political environment. This paper documents the effect of political relation shocks on international tourist flows using monthly tourists data between China and its partner countries.

There are several reasons why we focus on China. As one of the world's leading economies, China has maintained a prolonged period of high economic growth. The tourism industry also experiences a dramatic expansion. The number of outbound tourists grows at 16% annually, on average, from 2000 to 2018. China has become the largest source country for outbound tourism since 2012 (UNWTO (2019)). During the same period, the number of inbound tourists to China also tripled. At the same time, however, China has constantly experienced political disputes with some of the major powers. Take China's relations with Japan as an example. In the past few decades, China and Japan dispute many issues, such as recognition of war crimes, Diaoyu (Senkaku) island, Japanese-American Security Cooperation, etc. Variations in political relations caused by these frequent disputes allow us to identify political shocks' effects on tourism. Moreover, Yan and Qi (2009), as well as Yan, Zhuo, and Haixia (2010), proposed China's political relation index (PRI) with several major countries at monthly frequency. The data set makes our quantitative analysis practical.

Our empirical analysis is twofold. We first want to establish the effects of political relation shocks on bilateral tourism. Both a gravity model and vector autoregression (VAR) analysis are utilized

[2]'China bans tour groups to South Korea as defence spat worsens,' *Financial Times*, 3 March 2017, https://www.ft.com/content/9fc4b1b4-ffb1-11e6-96f8-3700c5664d30.

[3]'Chinese Tourists to South Korea Drop 40% in March Amid THAAD Row', http://keia.org/chinese-tourists-south-korea-drop-40-percent-march-amid-thaad-row.

to investigate its dynamic pattern. Then we extend the analysis by exploring the potential mechanisms that may explain how the fluctuations of political relations affect tourism.

We first estimate dynamic gravity models for outbound and inbound tourism between China and its partner countries at a monthly frequency. (We refer the term 'outbound tourists' as tourists from China to partner countries and the term 'inbound tourists' as tourist from partner countries to China.) The results imply significant but short-lived impacts of political shocks on both outbound and inbound tourism. Notably, the effect on outbound tourism lasts longer than that on inbound tourism. The strongest effect on outbound tourism arises 1 month after the political shock, while the effect on inbound tourism only shows up contemporaneously (at the current month) with much smaller magnitude. For comparison, we also estimate gravity models at an annual frequency. However, there is only weak evidence of political shocks' effects on outbound and inbound tourism. The regression results at different frequencies echo our conjectures that the impacts of political relation shocks are transitory and can hardly be captured quantitatively without using high-frequency data.

To further investigate each country's dynamic pattern, we employ VAR models to describe monthly tourists flows between China and each partner country. Although different countries display slight differences in magnitudes, most of the countries share a similar dynamic pattern. The political relation shocks have an immediate but mild effect on outbound tourism in the current month. The effect is heightened in the next month, and varnishes soon. For inbound tourism, the impacts of political shocks are much milder and more transitory, concentrated in the current month.

The result that outbound tourists give a stronger reaction to conflicts than inbound ones makes us wonder the underlying mechanism about how political relation shocks affect outbound tourism in China. On one hand, when political relation deteriorates, tourists may postpone or cancel their trips out of safety concerns. On the other hand, as tourism is inextricably intertwined with politics, governments may impose their political agenda on citizens' travel decisions and utilize various methods to dissuade domestic tourists from travelling to unfriendly countries. Both these two factors contribute to a reduction in outbound tourists' number.

Thus, we complement our empirical analysis by investigating whether the decline in outbound tourists during political tensions is driven by a lack of demand or by government actions. While a government has various methods, e.g. reducing the issuance of visas, border control, etc., to restrict inbound tourism, it is difficult to impose restrictions on outbound tourism since citizens are free to travel abroad. One usual way is to issue travel advice or travel warnings. Although most of the advice are routinely issued to inform the citizens of potential threats abroad, considerable evidence suggests the abuse of travel advice by tourism-generating countries to realize their political motivation(Sharpley, Sharpley, and Adams (1996), Bianchi (2006), Oded (2007), Deep and Johnston (2017)). We use the issuance of travel warnings by Chinese authority as our indicator for government actions and estimate their effects on outbound tourists during political tensions.

The regression results reveal that the issuance of travel warnings significantly contributes to the reduction of outbound tourism during periods of political relation deterioration. It suggests that government actions do play a role in the mechanism. On the other hand, using search indices as proxies of demand, we examine the impacts of political relation shocks on tourists' demand. The results demonstrate that the deterioration in political relations itself has no direct effects on tourists' demand. However, when accompanied by the issuance of travel warnings, the negative political shocks significantly reduce tourists' willingness to travel to the opposing countries. All these analyses manifest government interference by issuing travel warnings as a dominating channel through which political shocks affect China's outbound tourism.

The findings that tourists respond quite differently to political shock when the authority issues travel warnings suggest that travel warnings effectively arouse consumers' attention to political shocks in China's context. For political shocks affecting consumers' preferences for travel destinations, consumers are aware of these shocks and perceive the political tensions as a risk (Sönmez and Graefe (1998), Lepp and Gibson (2003)). However, potential tourists may not pay attention to news on international relations unless political shocks gain sufficient media visibility (Semetko et al. (1992)). The Chinese government exerts a strong control on mass media (Tong (2010), Stockmann and Gallagher (2011)). Thus, the issuance of travel warnings can effectively arouse consumers' attention (Bianchi (2006)). As a result, consumers perceive the potential risk of travelling and alter their preferences for destinations.

The rest of the paper is organized as follows. Section 2 describes data sources and summarizes data on political relations, tourism, and other economic indicators. Section 3 quantitatively assesses political relation shocks' effect on tourism and examine the potential mechanisms. Section 4 concludes.

II. Data

Political relation index

In this study, we use a particular measure of China's political relations with other countries, political relation index (PRI), constructed by Yan and Qi (2009) and Yan, Zhuo, and Haixia (2010). This index quantifies the overall level of bilateral relations between China and 12 major partner countries: Australia, France, Germany, India, Indonesia, Japan, Pakistan, Russia, South Korea, UK, US, and Vietnam, one index for each country from January 1950 to December 2018. This index synthesizes reports and information related to bilateral political events from *Renmin Ribao* (People's Daily) and the Ministry of Foreign Affairs of the People's Republic of China. These events include all political events of varying magnitudes, such as military conflicts, diplomatic events, territory disputes, etc. Each of these events are assigned to a score according to its severity and influence on bilateral relation. Official visits and meetings are assigned positive scores. For example, it assigns 1.5 points to a country whose national leaders visit China. Bilateral meetings between China and government heads of a country are assigned 0.8 points. Depending on the context, statements and other diplomatic events can be either positive or negative. It assigns 0.1 points for opening a new consulate, while closing a consulate is assigned −0.1 points. All the scores are amassed each month and converted into the political relation index within a uniform scale.

The political relations index between China and a foreign country are then summarized by this uniform scale ranging from 9 (most friendly) to −9 (most confrontational). Although this index takes on a continuous value between −9 and 9, it can be divided into six categories according to its value: confrontational (−9 to −6), tense (−6 to −3), bad (−3 to 0), normal (0 to 3), good (3 to 6), and friendly (6 to 9). Each category consists of three levels: low, medium, high. These levels correspond to the magnitude of the absolute value of PRI within each category (see Figure 1).

To verify the stationarity of the PRI series, we apply the standard and augmented Dicky–Fuller tests. Both tests show that the PRI are non-stationary series, but its first differences are stationary. We further use the methodology of Box and Jenkins (1976) to identify the pattern of PRI series. The PRI series for all the sample countries follows an ARIMA(0,1,0) process, indicating that, for each country, its PRI series follow a random walk and political relations are unpredictable at monthly frequency.

Tourism and economic data

To investigate the impacts on bilateral tourism, we retrieve monthly data on the number of outbound

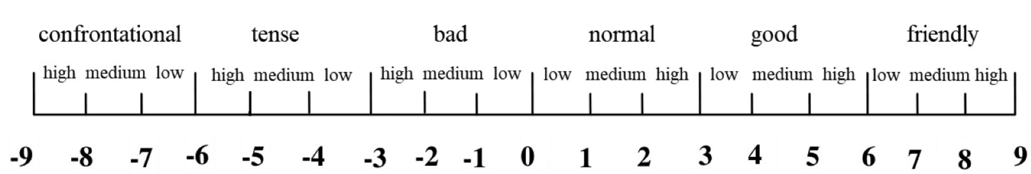

Figure 1. The spectrum of political relation index.

Chinese tourists to partner countries and that of inbound tourists from partner counties. Consistent with the PRI data, the sample countries include Australia, France, Germany, India, Japan, Russia, South Korea, UK, US, and Vietnam. The other two countries, Indonesia and Pakistan, are excluded due to the availability and quality of tourism-related data. The tourism data spans from January 1994 to December 2017.

We also include economic data, such as industrial production and real effective exchange rate, as control variables. Note that we use industrial production instead of GDP since GDP data is not available at monthly frequency. Variable description and data sources are listed in Table 1.

Summary statistics

We present the summary statistics in Table 2. Each row displays key statistics for each variable. 'Outbound tourists (from China to countries)' in row 1 refers to the number of outbound tourists from China to each partner country, while 'Inbound tourists (from countries to China)' in row 2 stands for the number of inbound tourists from each partner country to China. It should be noted that the monthly data on outbound tourist flows is available only for five countries – Australia, Japan, South Korea, the US, and Vietnam, while data on inbound tourist flows are available for all countries but Vietnam. From the first two rows in Table 2, we can see that Japan, South Korea, Russia, the US, and Vietnam are the major bilateral tourism partner countries of China. Among them, South Korea is the largest source country for inbound tourists to China. From 1994 to 2017, the monthly average inbound tourist number reaches 232 thousand for South Korea, followed by Japan with an average of 223 thousand. At the same time, South Korea is also the destination country that most Chinese tourists visit. Up to 155 thousand Chinese tourists visit South Korea on average in a month. Since China's overseas tourism has experienced more drastic growth and fluctuations than inbound tourism, the outbound tourists in row 1 for each country has a higher standard deviation than inbound tourists in row 2.

Row 3 displays statistics of the PRI for each country. For most of the countries, the long-term monthly average of PRI ranges from 4 to 5. However, because of complicated historical entanglement in the Sino-Japan and Sino-US relations, both Japan and the US witnessed a much lower PRI average, around 0.77. However, the Sino-Japan relationship has experienced more turns and twists than China's relationship with other countries. Therefore, the PRI for Japan has a much higher standard deviation (over 3) than other countries, whose standard deviations of PRI lie between 1 and 2.

Row 4 represents the industrial production of each country. The data of Australia, India, and Vietnam is retrieved from the World Bank GEM Database and is measured in constant 2005 USD of one billion. The other countries' data come from OECD iLibrary and is measured in an index based on a reference period of the year 2015. Therefore, it is not suitable to compare these data in level cross-sectionally. However, the first difference of logarithm of the data, or growth rates of IP, can be compared among countries. We hence use the growth rate of IP in the following quantitative analysis. The 'Exchange Rate Ratio' in Row 5 is defined as the ratio of each country's real effective exchange rate to China's real effective exchange rate.

Table 1. Data Sources.

Variable	Description	Source
PRI	Political relations index	Yan and Qi (2009),Yan, Zhuo, and Haixia (2010)
TR	The number of partner country's tourists to China (inbound) or the number of Chinese tourists to partner country (outbound)	CEIC database; U.S. National Travel and Tourism Office; World Tourism Organization (UNWTO)
ER	Real effective exchange Rate between partner country and China	Bruegel.org; IMF International Financial Statistics (IFS)
IP	Industrial Production	OECD iLibrary; World Bank GEM Database

An illustration: the PRI during China–Korea THAAD dispute

To illustrate how the PRI responds to political events and how tourism comoves with the PRI, we take the THAAD Dispute between South Korea and China in 2017 as an example. The blue solid line in Figure 2 plots South Korea's PRI from 2000 to 2018. The political relation index has grown steadily since 2000, accompanied

Table 2. Summary Statistics.

Variable	Stats.	Australia	France	Germany	Great Britain	India	Japan	Russia	South Korea	United States	Vietnam
Outbound tourists (from China to countries)	obs.	288					288		288	144	108
	mean	33.474					119.549		154.781	124.795	153.884
	std	31.160					161.934		188.552	84.391	86.815
	max	123.557					735.891		725.872	281.380	436.200
	min	1.981					12.135		8.132	22.787	11.368
Inbound tourists (from countries to China)	obs.	288	288	288	288	288	288	288	288	288	
	mean	37.110	27.711	35.105	36.281	31.156	223.320	140.605	232.209	119.760	
	std	19.357	13.665	16.323	13.999	21.930	73.456	68.232	129.017	53.797	
	max	67.810	51.660	67.470	60.690	77.890	350.840	321.170	429.780	208.530	
	min	4.460	0.890	2.270	8.050	2.420	53.200	8.480	17.820	16.610	
PRI	obs.	288	288	288	288	288	288	288	288	288	288
	mean	4.873	5.174	5.324	4.093	3.535	0.778	7.391	4.343	0.770	4.445
	std	1.241	1.541	1.191	1.473	1.757	3.206	1.088	1.922	1.057	1.665
	max	6.7	6.8	7	5.7	5.9	5	8.2	6.5	3.3	6.2
	min	2.5	1.2	3.1	1	0.4	−5	3.7	−0.7	−2.2	0.1
Industrial Production	obs.	264	288	288	288	288	288	288	288	288	120
	mean	28.119	103.159	86.372	103.931	32.757	103.062	80.171	68.708	90.449	3.099
	std	18.573	6.527	11.430	3.872	13.669	6.334	16.647	26.234	9.235	0.826
	max	100.528	115.581	108.591	110.654	58.580	119.473	106.669	106.691	102.451	5.653
	min	1.068	87.561	67.094	96.190	13.307	79.649	49.958	26.957	66.049	1.953
Exchange Rate Ratio	obs.	288	288	288	288	288	288	288	288	288	276
	mean	0.885	0.924	0.934	0.914	0.918	1.198	0.781	0.859	1.040	1.021
	std	0.125	0.174	0.190	0.176	0.084	0.356	0.161	0.187	0.160	0.044
	max	1.152	1.402	1.468	1.292	1.242	2.267	1.010	1.413	1.445	1.138
	min	0.660	0.614	0.616	0.602	0.748	0.609	0.434	0.528	0.777	0.935

Note: The numbers of outbound and inbound tourists are obtained from the Ministry of Culture and Tourism of China, National Travel and Tourism Office of U.S. and CEIC dataset, and are measured in thousand persons. The PRI index comes from Yan and Qi (2009) and is explained in detail in Section 3.1.1. Industrial production data of Australia, India and Vietnam is retrieved from the World Bank GEM Database and is measured in constant 2005 USD of one billion. The other countries' industrial production index data comes from OECD iLibrary and is measured in an index based on a reference period of year 2015. Exchange Rate Ratio is the ratio of each country's real effective exchange rate to China's real effective exchange rate and is obtained from IMF International Financial Statistics and Bruegel.org. The tourists and industrial production data are seasonally adjusted. The blanks indicates the data is not available for the country.

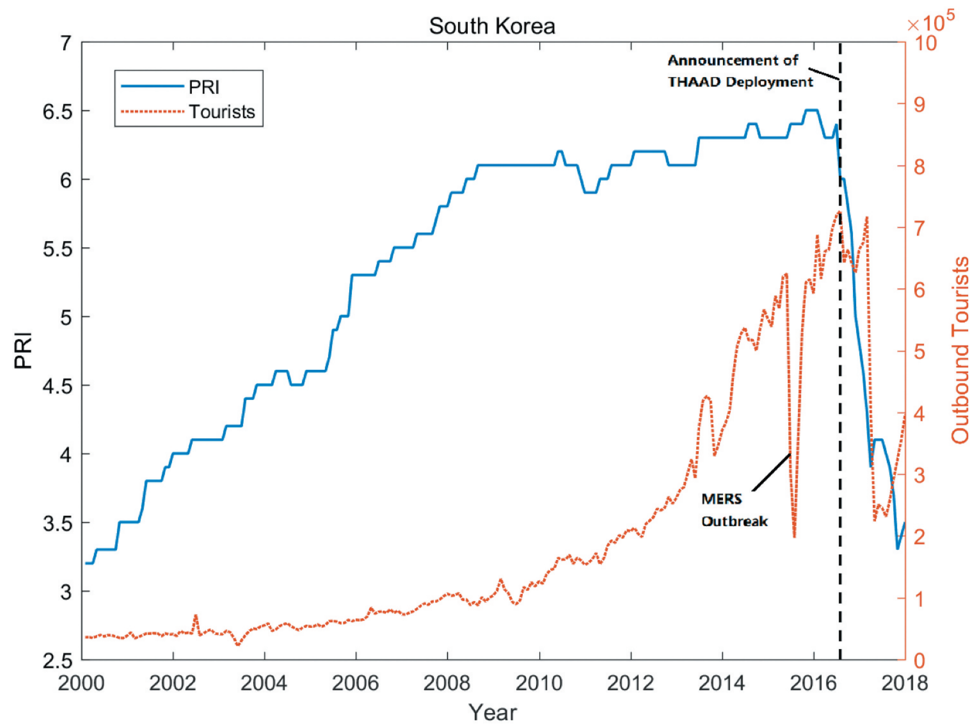

Figure 2. PRI and Outbound Tourists between South Korea and China. *Note*: This blue solid line depicts political relation index between South Korea and China. The red dotted line represents the tourist number arriving in South Korea from China. Vertical line marks the announcement date of THAAD deployment. The tourists number is seasonally adjusted.

by a continuous increase in the number of tourists from China. During the first half of 2016, the PRI for South Korea fluctuated between 6.3 and 6.5, which indicates that the bilateral relation between China and South Korea is largely friendly. However, on 8 July 2016, South Korean Defence Ministry and the commander of US Forces Korea had announced the deployment of THAAD to prepare for rising threats from North Korea, who conducted its fourth nuclear detonation and more than 20 ballistic missile tests in 2016. It raises red flags for its relationship with China.

In the following months, China had repeatedly expressed its opposition to THAAD deployment in South Korea and made several criticisms, and South Korea's PRI experienced a steady decline. Beijing claims that THAAD is not technically competent in defending missiles from North Korea. However, THAAD radars are so powerful that their long-range reconnaissance capabilities are far beyond deterring missiles from North Korea. Thus, it implies that the real target of THAAD is China. When two THAAD launcher trucks arrived at Osan Air Base, a United States Air Force base located 64 km south of Seoul, on 6 March 2017, its PRI had dropped to 3.9, the lowest point in the past 15 years.

Later on, the Chinese government suspended diplomatic ties with South Korea immediately. At the top level, China cancelled the meeting between its prime minister, Li Keqiang, with South Korean President Park Geun-Hye. Because Lotte Corporation, a major Korean conglomerate, provided land to host THAAD, local officials in China initiated tax audits and safety inspections on Lotte factories and retail stores.[4] The Chinese authorities also discouraged Korean cultural products and cancelled many Korean dramas and concerts. South Korea's PRI kept low and further declined to 3.3 in October 2017. It was not until the newly elected South Korean president promised not to expand THAAD deployment that the relationship between China and South Korea tended to reconcile. In November 2017, South Korea's

[4]'With China dream shattered over missile land deal, Lotte faces costly overhaul,' *Reuters*, 25 October 2017, https://uk.reuters.com/article/us-lotte-china-analysis/with-china-dream-shattered-over-missile-land-deal-lotte-faces-costly-overhaul-idUKKBN1CT35Y.

PRI started to rebound from the lowest point in the previous month.

At the same time, the tourism market in South Korea experienced a significant hit from China during the THAAD dispute. From October 2016, Chinese authorities began to advise travel agencies to restrict sales of tour packages to South Korea. When THAAD launcher trucks arrived at the military base near Seoul in March 2017, Chinese travel agencies suspend all the tour packages to South Korea. Airlines cancelled many flights from Chinese cities to South Korea. China National Tourism Administration (CNTA) also issued a travel warning for travelling to South Korea, which said that many Chinese travellers were blocked from entry. March 2017 witnessed an unprecedented 40% year-on-year drop of Chinese tourists arriving in South Korea. The number of Chinese visitors dropped from 601,671 in March 2016 to only 360,782 one year later amid the THAAD dispute.

III. Quantitative analysis

The quantitative analysis consists of two parts. In the first part, we try to establish the effects of political relation shocks on bilateral tourism. Both a gravity model (in Section 3.1) and vector autoregression (VAR) analysis (in Section 3.2) are utilized to investigate its dynamic pattern. In the second part, we extend the analysis by investigating the potential mechanisms that may explain how the fluctuations of political relations affect tourism (in Section 3.3).

The gravity model

Since international tourism is basically a form of international trade, the gravity model is adopted to study the tourist flows. Early authors (e.g. Isard (1954), Tinbergen (1962), Linnemann (1966), etc.) proposed that bilateral trade flows increase in the economic size and decrease in distance between two regions. The model turns out a great empirical success in predicting international trade flows. Eichengreen and Irwin (1998) called it the 'workhorse for empirical studies of international trade.' Besides, many other authors extend the applications of the gravity model to study other bilateral flows, such as migration, remittance, direct foreign investment, etc. It also gets popularity in tourism research (Khadaroo and Seetanah (2008), Santeramo and Morelli (2016), Fourie, Rosselló-Nadal, and Santana-Gallego. (2020), Liou, Hsu, and Pei-Ing (2020)). Morley, Rosselló, and Santana-Gallego. (2014).

Our quantitative analysis starts with a gravity model to examine how the tourism markets respond to political relation shocks. In the context of tourism, there are 'persistence or reputation effcts' when tourists decide their destinations, implying the possibility of an endogeneity problem in tourism that cannot be catered for in a static panel data framework (Naudé and Saayman (2005), Khadaroo and Seetanah (2008)). Here we adopt a dynamic version of the gravity model to capture the dynamic effects of this relationship. Specifically, the following equation describes our dynamic panel model:

$$\Delta TR_{i,t} = \alpha_0 + \beta_i + \gamma_t + \sum_{m}^{k=1} \delta_k \Delta TR_{i,t-k} + \sum_{n}^{h=0} \lambda_h \Delta PRI_{i,t-h} + \alpha_1 \Delta IP_{i,t} + \alpha_2 \Delta ER_{i,t} + \in_{i,t}. \quad (1)$$

In equation (1), the dependent variable $\Delta TR_{i,t}$ is the growth rate, i.e. the first differences of logarithm, of tourists flows between country i and China in period t. We run regressions for both *outbound* tourists, i.e. from China to partner countries, and *inbound* tourists, i.e. from partner countries to China. This model includes lags of the dependent variable to capture the dynamic feedback of tourist flows. The variable $\Delta PRI_{i,t}$ is the percentage change of PRI, and we are particularly interested in its coefficients λ_h's.[5] The variables $\Delta IP_{i,t}$ is the growth rate of industrial production in country i at period t.[6] $\Delta ER_{i,t}$ is the change in the ratio of partner country i's real effective exchange rate to China's real effective exchange rate at period t. Note that

[5]Percentage changes are calculated as the first difference of the logarithm transformations. Since the political relation index can take on negative values, we add a sufficiently positive constant before the log transformation. We use percentage changes, instead of first differences, of PRI so that the variations in the PRI variables are comparable across countries.

[6]we use industrial production instead of GDP since GDP data is not available at a monthly frequency. All the growth rates are computed as the first difference of the logarithm transformations.

some variables normally considered in a standard gravity model, such as China's industrial production, distance between China and partner countries, and language of each country, etc., are not present in the gravity model. The reason is that we have already included the time-fixed effects γ_t and country-fixed effects β_i to control the potential time- or country-invariant factors. Therefore, China's industrial production and variables indicating characteristics of each country like distance and language are entirely absorbed in these fixed-effect terms. The lags of $\Delta PRI_{i,t}$ are also included to capture the dynamic pattern of its impact on tourism.

Since a lagged term of dependent variable $\Delta TR_{i,t}$ is included at the righthand side of the regression model, it is not appropriate to estimate this model using OLS. Hence, the system GMM (Blundell and Bond (1998)) estimator is employed. Another dynamic panel estimator typically used in the literature is the one-step GMM estimator, or Arellano-Bond estimator(Arellano and Bond (1991)). However, if the endogenous variable is highly persistent, the Arellano-Bond estimator may perform very poorly in finite samples. The system GMM, on the other hand, assumes that first differences of the instruments are uncorrelated with the fixed effects. It expands the set of instruments and thus improve efficiency to a great extent. The system GMM method builds a system of two equations, the original equation and the transformed one. Here we adopt the system GMM estimator for a more reliable inference.

Table 3 reports the estimation results of gravity models for outbound tourist flows at monthly and annual frequencies, respectively. The dependent variable $\Delta TR_{i.t}$ is the growth rates of outbound tourists, i.e. tourists from China to country i, in period t. Regression (1)–(3) are estimated at monthly frequency, while regression (4)–(6) are at annual frequency. The specifications of regression models in different columns vary from each other. Regression (1) and (4) include no lags of any variables, while others include autoregressive components of dependent variables $\Delta TR_{i,t-k}$ and a distributive lag of the political relation variables $\Delta PRI_{i,t-h}$.

We start with the monthly regression results. Regression (1) is actually static gravity model and play benchmark roles against which other regression results can be compared. Their results support a significant effect of political relation shocks on outbound tourism. We include autoregressive process of dependent variables in Regression (2) and (3). These terms capture the dynamic responses of outbound tourism following a political relation

Table 3. Regression Results of Gravity Models for outbound tourist growth.

	(1)	(2)	(3)	(4)	(5)	(6)
		Monthly			Annual	
$\Delta TR_{i.t-1}$		-0.300^{***}	-0.308^{***}			0.007
		(0.052)	(0.056)			(0.038)
$\Delta TR_{i.t-2}$			-0.130^{***}			
			(0.012)			
$\Delta PRI_{i.t}$	0.580^{**}	0.329^{**}	0.249^{**}	0.572^{*}	0.505	0.526
	(0.180)	(0.130)	(0.100)	(0.304)	(0.471)	(0.474)
$\Delta PRI_{i.t-1}$		1.113^{***}	1.000^{***}		−0.173	−0.183
		(0.223)	(0.198)		(0.727)	(0.738)
$\Delta PRI_{i.t-2}$			0.489			
			(0.314)			
$\Delta IP_{i.t}$	0.006	0.018	0.019	1.863^{*}	1.195^{*}	1.181^{*}
	(0.009)	(0.013)	(0.013)	(0.928)	(0.675)	(0.677)
$\Delta ER_{i.t}$	− 0.304	− 0.273	− 0.266	−0.368	-0.361^{*}	-0.363^{*}
	(0.309)	(0.211)	(0.223)	(0.218)	(0.208)	(0.211)
Constant	−0.023	− 0.002	0.094	0.133	−0.059	0.074
	(0.072)	(0.034)	(0.093)	(0.151)	(0.079)	(0.072)
observations	1087	1082	1077	258	247	246
State FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Note: This table reports the regression results of various specifications of gravity models. Regressions with lagged dependent variables are estimated using system GMM for dynamic panels. The dependent variable $\Delta TR_{i,t}$ is the growth rate of monthly (annual) tourists from China to country i. Up to three lags of the dependent variables, denoted as $\Delta TR_{i,t-1}$, $\Delta TR_{i,t-2}$ and $\Delta TR_{i,t-3}$, are included as independent variables in regression (2)-(4). $\Delta PRI_{i,t-k}$ is the percentage change in the political relation index between country i and China at time $t-k, k=0,\ldots,3$. $\Delta IP_{i,t}$ is defined as the change in the logarithm of country i's industrial production at time t. $\Delta ER_{i,t}$ is the change in the real exchange rate between country i and China at time t. The sample countries include U.S., Japan, South Korea, Australia and Vietnam. The other five countries are excluded due to data availability and quality. Standard errors are reported in parentheses.$^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

shock. The negative estimated coefficients of the autoregressive terms, $\Delta TR_{i,t-1}$ and $\Delta TR_{i,t-2}$, shown in Table 3 indicate outbound tourist growth has a fast-moving, mean-reverting component.

The lags of political relation variables $\Delta PRI_{i,t-h}$ in Regression (2) and (3) depicts the dynamics of the political impacts. The estimated coefficients of $\Delta PRI_{i,t-1}$ demonstrate a stronger and more significant effect on outbound tourism one month after the shock compared to the contemporaneous effect represented by the coefficient of $\Delta PRI_{i,t}$. Moreover, the coefficient of $\Delta PRI_{i,t-2}$ is insignificant. It indicates that a shock in political relations has a transitory effect on outbound tourist growth. On average, the impact of a political shock does not last for more than two months.

Regression (3) contains most informative results among all these monthly regressions. It indicates that a 1% decline in PRI change rate induces an instantaneous decline in outbound tourism growth by 0.249%. In the subsequent month after the PRI shock, the autoregressive component of the outbound tourism contributes a revision of 0.077% $(= 0.308 \times 0.249\%)$ in outbound tourism growth, and the PRI shock still takes a delayed effect, causing a further decline of tourism growth by 1.000%. So the cumulative effect on outbound tourism growth is a decline of 1.172% $(= 0.249\% - 0.077\% + 1.000\%)$ one month after the shock. The PRI shock has no direct impacts two months after it occurs. But the autoregressive components further dampen its effect in month two and onwards. The results suggests that the dynamics of the PRI impact on outbound tourism is hump-shaped, with the peak occuring one month after the shock.

In contrast with the monthly regressions, the annual regressions do not provide strong evidence of the impact of a political shock on outbound tourism. The coefficient of the political relation variables $\Delta PRI_{i,t}$ is marginally significant in Regression (4). Moreover, the political relation shocks display an insignificant impact on tourism in Regression (5) and (6). We postulate that temporal aggregation reduces the power of the estimation because political relations are unpredictable and fast-moving. Most political shocks vary from mild to moderate, and it is very occasionally that these shocks end up with severe conflicts and wars. These political shocks appear to be fairly short-lived, usually lasting at most several months. Therefore, if the empirical relationship is conducted using annual data, the natural duration of political shocks is shorter than the frequency at which data is measured. The effect of political shocks on the tourism market will be 'diluted' in the sense that standard errors increase. That's why we find a larger standard error of the regression coefficient in Regression (4)–(6). It is noteworthy that temporal aggregation bias may also arise from the 'harvesting effect', which is often discussed in the health literature (Schwartz (2001)). That is, tourists postpone their overseas trips until political conflicts cool down. As a results, the outbound tourists number is to witness a short-term backward shift. If it were the case, the coefficients of the PRI in the regressions (4)–(6) would be driven down and largely different from those in the monthly regressions. From the empirical results, however, it doesn't seem to be the case in our context.

We also apply the same gravity models to inbound tourist flows using monthly and annual data. The estimation results are reported in Table 4. The dependent variable $\Delta TR_{i,t}$ is the growth rates of inbound tourists, i.e. tourists from country i to China in period t. Consistent with Table 3, Regression (1)–(3) are estimated at a monthly frequency, while regression (4)–(6) are at an annual frequency. The coefficients of the political relation variables are significant contemporaneously. But the impacts receded one month and onwards. This evidence supports that the impact of a political shock is bidirectional. The fluctuations in political relations affect both the tourists flows coming out from China and those arriving in China. However, the impact on outbound tourism is more pronounced and long-lasting than on inbound tourism. Regression (3) in Table 4 indicates that 1% decline in PRI change rate leads to a decline in inbound tourism growth by 0.307% contemporaneously. And there is no significant effect in the subsequent months. Compare to the results in Table 3, we can see that inbound tourists give a weak reaction to political shocks. In addition, Regression (4)–(6) at annual frequency also only display instantaneous effect of the PRI shock.

Table 4. Regression Results of Gravity Models for inbound tourist growth.

	(1)	(2)	(3)	(4)	(5)	(6)
		Monthly			Annual	
$\Delta TR_{i,t-1}$		− 0.306***	− 0.385***			−0.074
		(0.036)	(0.036)			(0.122)
$\Delta TR_{i,t-2}$			− 0.274***			
			(0.048)			
$\Delta TR_{i,t-3}$						
$\Delta PRI_{i,t}$	0.258	0.314***	0.307***	0.233**	0.243**	0.243**
	(0.157)	(0.121)	(0.098)	(0.091)	(0.072)	(0.077)
$\Delta PRI_{i,t-1}$		− 0.017	0.063		− 0.063*	−0.041
		(0.135)	(0.089)		(0.029)	(0.054)
$\Delta PRI_{i,t-2}$			− 0.027			
			(0.145)			
$\Delta IP_{i,t}$	0.010*	0.011**	0.012***	1.425***	1.332***	1.376***
	(0.005)	(0.005)	(0.004)	(0.406)	(0.175)	(0.196)
$\Delta ER_{i,t}$	0.587*	0.603**	0.586**	0.263**	0.271**	0.268**
	(0.297)	(0.275)	(0.271)	(0.082)	(0.086)	(0.083)
Constant	−0.025	0.179	0.519***	0.140***	−0.064	−0.069
	(0.044)	(0.127)	(0.085)	(0.021)	(0.053)	(0.060)
observations	2559	2550	2541	207	198	198
State FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES

Note: This table reports the regression results of various gravity models. Regressions with lagged dependent variables are estimated using system GMM for dynamic panels. The dependent variable $\Delta TR_{i,t}$ is the growth rate of tourists from country i to China. Up to three lags of the dependent variables, denoted as $\Delta TR_{i,t-1}$, $\Delta TR_{i,t-2}$ and $\Delta TR_{i,t-3}$, are included as independent variables in regression (2)-(4). $\Delta PRI_{i,t-k}$ is the percentage change in the political relation index between country i and China at time $t-k, k=0,\ldots,3$. $\Delta IP_{i,t}$ is defined as the change in the logarithm of country i's industrial production at time t. $\Delta ER_{i,t}$ is the change in the real exchange rate between country i and China at time t. The sample countries includes U.S., Japan, Russia, U.K., France, India, Germany, South Korea and Australia. Vietnam is excluded due to data availability and quality. Standard errors are reported in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

To summarize, our findings of the gravity models are as follows: First, the fluctuations in political relations have a significant impact on bilateral tourism. However, the effects are transitory, lasting no more than several months.[7] Second, the impacts of political shocks on outbound tourism are of greater magnitude and longer duration than those on inbound tourism. Furthermore, tourism-related data measured at lower frequency is not able to capture the temporary pattern of the political relations' impacts.

VAR analysis

In the previous section, we utilize panel regressions to estimate the impacts of political relation shocks on bilateral tourism. We find delayed effects of political relations on outbound tourism. In this section, we investigate in more details the dynamic pattern of these effects.

Here we employ a vector autoregression (VAR) model for each country. Our purpose is to quantify the magnitude of the impacts over time for each country and to make inferences about their dynamics. The VAR model treats all covariates in the system as endogenous variables, alleviating the potential endogenous problem to some extent. Specifically, the VAR model of order q takes the following form: for country i,

$$Y_{i,t} = C + \sum_{k=1}^{q} A_{i,k} Y_{i,t-k} + B_i X_{i,t} + u_{i,t}, \;\; u_{i,t} \sim N(0, \Sigma_i)$$

$$Y_{i,t} = (\Delta TR_{i,t}, \Delta PRI_{i,t}, \Delta IP_{c,t}, \Delta IP_{i,t}, \Delta CPI_{c,t}, \Delta ER_{i,t})'$$

$$X_{i,t} = (SARS, MERS)'$$

where subscript i represents a partner country in our sample and subscript t represents the month, covering the period from January 1994 to December 2017.

Analogous to the gravity model, the vector of endogenous variables, $Y_{i,t}$, in VAR model includes the following variables: growth rates of tourist flows between China and country i ($\Delta TR_{i,t}$, both inbound and outbound), the percentage change of PRI for country i ($\Delta PRI_{i,t}$), the growth rate of country i's industrial production at period t ($\Delta IP_{i,t}$), the growth rate of China's industrial production at period t ($\Delta IP_{c,t}$), the percentage change

[7]The direct impacts from PRI shock is insignificant after two months (see the coefficient of $\Delta PRI_{i,t-2}$,). But the autoregressive components will grdually dampen its effect in month two and onwards. Therefore we expect the transitory effects of political relation shocks last slightly longer than two months.

of China's consumer price index at period t ($\Delta CPI_{c,t}$), and the change in the ratio of partner country i's real effective exchange rate to China's real effective exchange rate at period t ($\Delta ER_{i,t}$). All these variables are included in their growth rate form to be stationary.

Also, we control the effects of epidemic shocks by including exogenous dummy variables on the SARS and MERS epidemic periods, where $SARS = 1$ for periods from January 2013 to December 2013 and 0 for other periods, $MERS = 1$ only for South Korea from June 2015 to Augest 2015 and 0 for other periods. C is constant vector and $u_{i,t}$ is the error term that follows a multivariate normal distribution with mean 0 and variance matrix Σ_i. The 6×6 matrix $A_{i,k}$'s and 6×2 matrix B_i are coefficients of this VAR model. The lag order q is selected by the standard information criteria, i.e. the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). It should be noted that the VAR model is applied to each country separately. For each country i, $\Delta TR_{i,t}$ can be the growth rate of both outbound and inbound tourists flows.

Impulse response functions The effect of a political shock on tourism is illustrated by impulse response functions. Generally speaking, impulse response functions exhibit how one variable changes over time as another variable is shocked in the model. Our purpose in this section is to figure out the tourist flows' dynamic responses to shocks of political relations. The Cholesky decomposition is employed to retrieve the orthogonal shocks. The variables in $Y_{i,t}$ are ordered as follows: $\Delta PRI_{i,t}, \Delta IP_{i,t}, \Delta IP_{c,t}, \Delta CPI_{c,t}, \Delta TR_{i,t}, \Delta ER_{i,t}$.[8] These variables are ordered in terms of their exogeneity, from most exogenous variable to the least exogenous one. The identification is accomplished by assuming that variables do not respond to shocks to variables ordered after it contemporaneously, the standard Cholesky identification assumption. In our model, the political relation is placed as the most exogenous variable, considering the political relation shocks are mostly exogenously-driven events.

We estimate the impulse response functions of both outbound and inbound tourist growth for each country. To ease the comparison across countries, we combine the impulse response functions for outbound tourist growth of different countries into a single figure, Figure 3. For conciseness and clarity, it only shows the impulse responses over significance level of 90%. Besides, bands of standard errors are excluded as well. Similarly, all countries' impulse response functions for inbound tourist growth are combined into Figure 4.

Figure 3 illustrates the impulse responses of outbound tourists flows to a one-standard-deviation positive shock of PRI for five countries. Although there are slight differences in the responses of different countries, a common dynamic pattern is observed across counties: the outbound tourist growth gives a significantly positive and hump-shaped response to an improvement in political relations in short term. In other words, a deterioration in political relation will induce a significant but transitory decline in the outbound tourist growth.

Chronologically, in the month when an adverse political-relation shock occurs, three out of the five sample countries, Japan, South Korean, and Vietnam, display an immediate response to the shock. The contemporaneous effects for these three countries ranges from 0.7% to 2.6%. In the first month after the political shock occurs, the effects on outbound tourism enlarge and reach the peak level for all countries except for the US. To be specific, a one-standard-deviation adverse political shock induce an average (over all countries except the US) of 2.3% decline in outbound tourist growth, with a maximum drop of 3.6% for Vietnam. The political shock does not take effect for the US until two months after it occurs, and the response of U.S. reaches about 1.2%. However, these effects are short-lived. The responses of all these countries soon vanish three months after the shock. The resulting hump-shaped dynamics of a political shock's effect on outbound tourist growth is consistent with the results observed in gravity model.

Figure 4 displays the impulse responses of inbound tourists flows to a one-standard-deviation positive PRI shock. This figure depicts the results for nine countries. Consistent with our

[8]We tried different orders of variables in $Y_{i,t}$. The impulse response patterns are similar.

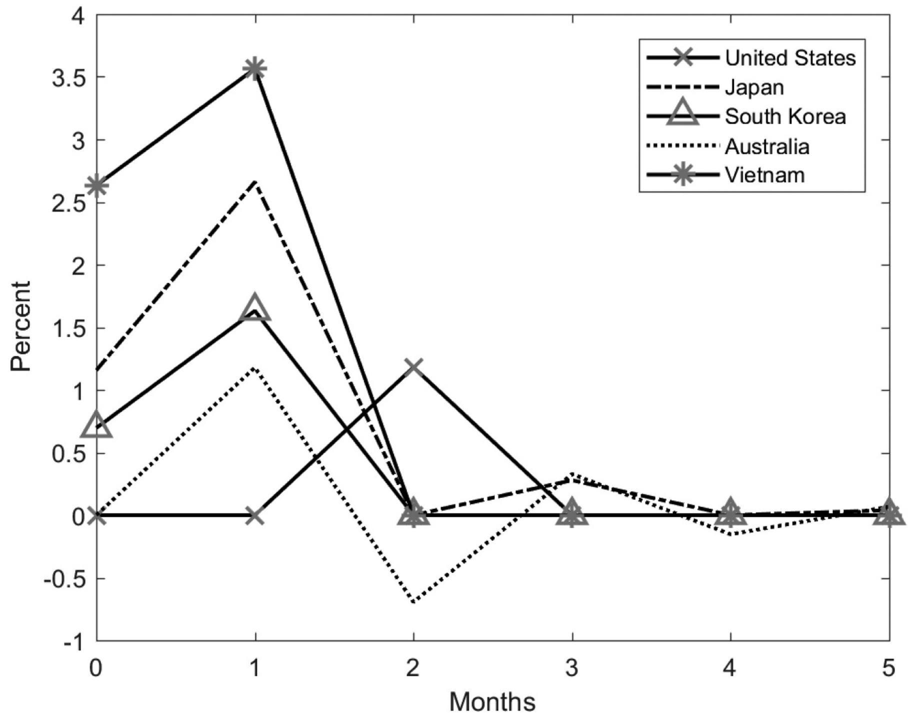

Figure 3. Impulse response of a PRI shock on outbound tourist growth. *Note*: This figure depicts the dynamic effect of a one-standard-deviation positive shock to the PRI series on a country's outbound tourist growth to China as implied by the VAR model. It displays the effects that are statistically significant at the 90% level.

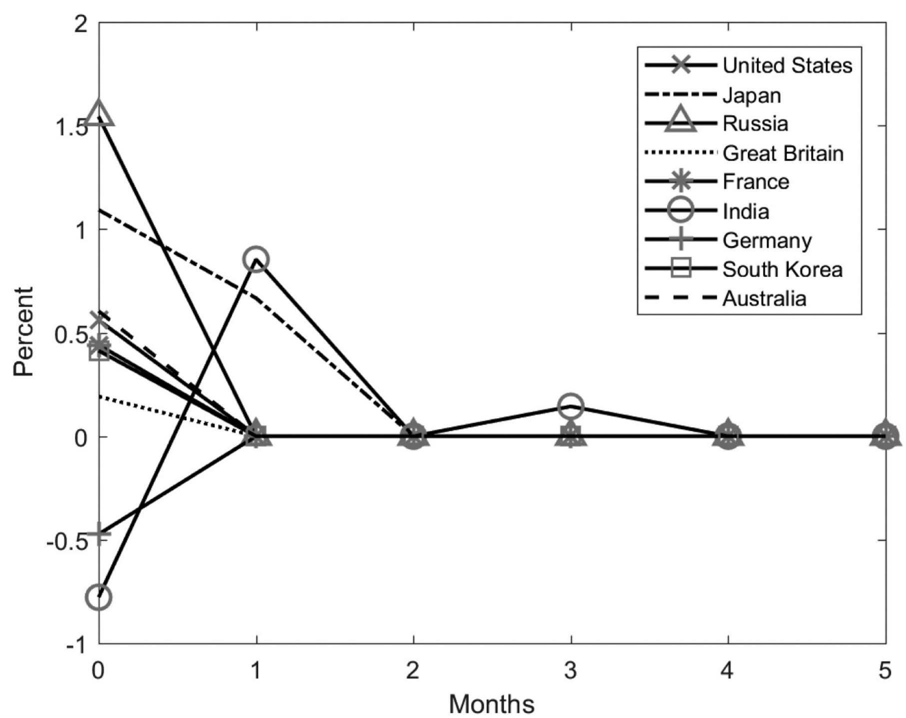

Figure 4. Impulse response of a PRI shock on inbound tourists growth. *Note*: This figure depicts the dynamic effect of a one-standard-deviation positive shock to the PRI series on a country's inbound tourist growth to China as implied by the VAR model. It displays the effects that are statistically significant at the 90% level.

finding in the gravity models, the responses of most of the countries concentrated in current period when the shock occurs. A adverse PRI shock induces a decline in the inbound tourist growth for all the sample countries except for Germany and India. On average (over all countries except Germany and India), the effect from a one-standard-deviation shock accounts for about 0.78% decline in inbound tourist growth, with a maximum drop of 1.5% for Russia. For India, the adverse effect of a negative PRI shock manifests itself after two months, while in the case of Germany, an adverse political relation shock appears to boost inbound tourism. The dynamics of impact exhibit different patterns across countries because much heterogeneity is not modelled. Regardless of these differences, their effects are all short-lived. There are basically no discernible effects after two months.

Extended analysis

The results in Section 3.1 and 3.2 indicate that outbound tourism reacts stronger to political conflicts than inbound tourism. It leaves open an interesting question about why they are different. One possible reason is that the mechanisms at play are quite different in China from those in other countries. Then what exactly is the mechanism in China? In other words, through which channels do the variations in political relations affect outbound tourism in China? During political tensions, visitors may postpone or cancel their trips for safety concerns, resulting in a lack of demand. Meanwhile, the government is also likely to intervene in the travel market to impose their political agenda on citizens' travel decisions. The government may take actions to dissuade domestic tourists from travelling to the opposing countries. Here comes the question: is the effect of political relation shocks on outbound tourists driven by a lack of tourists' demand or by government actions. With this point in mind, we try to work out the specific mechanism in China, especially focusing on two potential channels at play: one is the government's actions, the other is tourists' demand.

Specifically, we proceed with the following questions in this section.

- Do positive and negative political relation shocks have the same effects on outbound tourism?
- How do the political relation shocks affect the outbound tourism? Is it driven by a lack of demand, or by government interference?

Negative shocks or positive shocks?

Before investigating potential mechanisms, we first need more in-depth understandings of the effects of political relation on outbound tourism. We want to figure out what kind of political shock will affect outbound tourism. The gravity model in equation (1) assumes that political relation shocks, whatever positive or negative, give rise to variations of identical magnitudes in tourist number. It is intuitive, however, that tourists typically react more remarkably to political conflicts or disputes than to improvement in political relations. Therefore it is natural to ask whether the positive and negative shocks take effect in a similar way. To this end, we augment the gravity model by introducing a dummy variable to differentiate the positive and negative political shocks. The regression model is as follows.

$$\begin{aligned} \Delta TR_{i,t} = \; & \alpha_0 + \beta_i + \gamma_t + \sum_{m}^{k=1} \delta_k \Delta TR_{i,t-k} + \sum_{n}^{h=0} \lambda_h \Delta PRI_{i,t-h} + \sum_{p}^{l=0} \theta_l I^{neg}_{i,t-l} \\ & + \sum_{q}^{s=0} \xi_s \Delta PRI_{i,t-s} * I^{neg}_{i,t-s} + \alpha_1 \Delta IP_{i,t} + \alpha_2 \Delta ER_{i,t} + \in_{i,t}. \end{aligned} \tag{2}$$

In equation (2), the dependent variable $\Delta TR_{i,t}$ is the growth rate of outbound tourists from China to country i in period t. Variable $I^{neg}_{i,t}$ is a dummy variable indicating a negative political relation shock of country i at period t. To be specific, $I^{neg}_{i,t} = 1$ when $\Delta PRI_{i,t} < 0$, and $I^{neg}_{i,t} = 0$ otherwise. The interaction term $\Delta PRI_{i,t-s} * I^{neg}_{i,t-s}$ isolates the extra effects from political conflicts. We especially focus on its coefficient ξ_s, which represents the extent to which the impact of negative political relation shocks differs from that of positive shocks. We expect ξ_s to be positive, implying a stronger response of tourism when political relation deteriorates. Other variables and parameters remain the same with equation (1). Time-fixed effects γ_t and country-fixed effects β_i are included to control the potential time- or country-invariant factors. Also the lags of $\Delta TR_{i,t}$, $\Delta PRI_{i,t}$ and $I^{neg}_{i,t}$ are to capture the dynamic pattern of its impact on tourism and hence system GMM estimation is adopted as in Section 3.1.

Table 5 presents the estimation results of equation (2). Regression (1) is a static regression which include only the contemporary variables. The coefficient of $\Delta PRI_{i,t} * I_{i,t}^{neg}$ demonstrates that the effect of a negative political relation shock is significantly different from that of a positive one. We include the lagged terms of all the variables in Regression (2) to capture a dynamic pattern of the effects. The coefficients of the interaction terms $\Delta PRI_{i,t} * I_{i,t}^{neg}$ and $\Delta PRI_{i,t-1} * I_{i,t-1}^{neg}$ show a profound and remarkable effect from negative political shocks. On average, outbound tourists drop by an extra 0.738% when confronting 1% decline of political relations contemporaneously, followed by a larger plummet of 1.422% one month later. Moreover, it is noticed that neither of the coefficients of $\Delta PRI_{i,t}$ and $\Delta PRI_{i,t-1}$ in Regression (1) and (2) are significant, indicating a barely perceptible effect of positive political relation shocks on outbound tourism. Therefore, the overall effects of political relations on tourism mainly come from the impacts of negative shocks, namely political disputes and frictions. Improvement of bilateral relation is not a big concern for tourists in making travel decisions.

As a robust check, we change the threshold of $I_{i,t}^{neg}$ to negative shocks of magnitude larger than 2% in order to capture only serious political conflicts. Specifically, $I_{i,t}^{neg} = 1$ when $\Delta PRI_{i,t} < -2\%$. The results are shown in Regression (3) and (4) in Table 5. The results show a similar pattern as Regression (1) and (2): negative political relation shocks contribute to the fluctuations of outbound tourism, and this effects enhance prominently one month later.

To sum up, the effects of political relation fluctuations on tourism are mainly driven by the negative shocks. Tourists respond strongly to deterioration in political relations, while less responsive to improvement in bilateral relationship. With this in mind, we pay more attention to periods when political relation deteriorates. In next two sections 3.3.2 and 3.3.3, we will further investigate the specific channels through which the political frictions affect outbound tourism. We focus on two possible channels. First, we want to examine whether government actions, particularly the issuance of travel warnings, play a role. Second, we use the search indices as proxies of consumer demand and test whether they respond to political relation shocks.

Table 5. Regression Results of Gravity Model in Equation (2).

	(1)	(2)	(3)	(4)
	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$
$\Delta TR_{i,t-1}$		−0.306 ***		−0.304 ***
		(0.0511)		(0.0497)
$\Delta PRI_{i,t}$	−0.258	−0.205	0.208	−0.0358
	(0.440)	(0.264)	(0.405)	(0.212)
$\Delta PRI_{i,t-1}$		−0.00196		0.287
		(0.183)		(0.217)
$\Delta PRI_{i,t} * I_{i,t}^{neg}$	0.986 *	0.738 ***	0.460	0.621 **
	(0.355)	(0.197)	(0.554)	(0.297)
$\Delta PRI_{i,t-1} * I_{i,t-1}^{neg}$		1.422 ***		1.314 ***
		(0.223)		(0.319)
$I_{i,t}^{neg}$	−0.0128	0.00797	−0.00891	0.0131
	(0.00917)	(0.00701)	(0.0340)	(0.0223)
$I_{i,t-1}^{neg}$		−0.00905		0.00462
		(0.0128)		(0.0185)
$\Delta IP_{i,t}$	0.00493	0.0177	0.00595	0.0179
	(0.00909)	(0.0115)	(0.00882)	(0.0121)
$\Delta ER_{i,t}$	−0.319	−0.286	−0.309	−0.267
	(0.310)	(0.216)	(0.314)	(0.220)
Constant	−0.0217	−0.143	−0.0226	−0.0127
	(0.0727)	(0.110)	(0.0727)	(0.0294)
N	1087	1082	1087	1082
State FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES

Note:This table reports the regression results of gravity models in equation (2). In Regression (1)-(2), dummy variable $I_{i,t}^{neg}$ is defined to be 1 when $\Delta PRI_{i,t} < 0$, while in Regression (3)-(4) $I_{i,t}^{neg} = 1$ when $\Delta PRI_{i,t} < -2\%$. The sample countries include U.S., Japan, South Korea, Australia and Vietnam. Regressions with lagged dependent variables are estimated using system GMM for dynamic panels. Standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

The channel of government interference

Tourism is an integral part of the world's political economy and a means of achieving economic and political objectives (Sharpley, Sharpley, and Adams (1996)). Although individual's freedom of travel is guaranteed by many established global regulations,[9] various methods can be utilized by governments to impose their political agenda on citizens' travel decisions. For a tourism-generating country, one usual way is to issue travel advice. Governments have the right to issue travel warnings to protect their citizens from potential security threats when travelling abroad, especially in the

[9]For example, the General Agreement on Trade in Service, which members of the World Trade Organization sign

case of natural disasters or political unrest. The United Nations World Tourism Organization resolution A/RES/578 (XVIII) acknowledges the right, and at the same time, requires that the advice should not be issued in an unjustified or exaggerated manner.

While travel advice is routinely issued without prejudice, considerable evidence suggests the abuse of travel advice by tourism-generating countries to exert economic and political pressure on destination countries (Sharpley, Sharpley, and Adams (1996), Bianchi (2006), Oded (2007), Deep and Johnston (2017)). Based on a case study of The Gambia, Sharpley, Sharpley, and Adams (1996) points out that broader political objectives may influence the detail and accuracy of travel advice issued by government agencies and that the provision of official travel advice gives rise to the opportunity for tourism to be used as a political bargaining tool. Deep and Johnston (2017) considers travel advice as an attempt to politically or economically destabilize the developing-nation destination through disruption of tourism. Bianchi (2006) showed that the US government heavily restricted travel by US citizens to Cuba due to prolonged ideological hostility towards Castro's communist government and paradoxically underestimated genuine risk in places of less geopolitical concerns such as Colombia and Mexico.

Anecdotal evidence also suggests the issuance of politically-motivated travel warnings by the Chinese authority. Besides the regular travel warnings of extreme weather, domestic political upheaval, and so on, the Chinese Ministry of Culture and Tourism sometimes issues warnings for no explicit event but usually at the timing of deteriorating bilateral relations with the destination country. For example, China issued a warning, saying that 'Public security in the United States is not good. Cases of shootings, robberies, and theft are frequent,' as trade tensions escalate between the US and China. Other examples include the dispute over the uninhabited islands in the East China Sea with Japan in 2012, South Korea's deployment of the THAAD system in 2017, etc.

To investigate the role Chinese government plays in how the political relation affects outbound tourism, we augment the gravity model in equation (1) with variable *warning*. It measures the number of travel warnings the Chinese Ministry of Culture and Tourism issued each month to a specific country to capture the effects of government intervention. Specifically, the regression model is

$$\begin{aligned}\Delta TR_{i,t} = \quad & \alpha_0 + \beta_i + \gamma_t + \sum_{k=1}^{m} \delta_k \Delta TR_{i,t-k} \\ & + \sum_{h=0}^{n} \lambda_h \Delta PRI_{i,t-h} + \sum_{l=1}^{p} \phi_l warning_{i,t-l} \\ & + \sum_{s=0}^{q} \xi_s \Delta PRI_{i,t-s} * warning_{i,t-s-1} \\ & + \alpha_1 \Delta IP_{i,t} + \alpha_2 \Delta ER_{i,t} + \in_{i,t}. \end{aligned} \tag{3}$$

In equation (3), the dependent variable $\Delta TR_{i,t}$ is the growth rate of outbound tourists from China to country i in period t. We manually collect the information about travel warnings from 2006 to 2018 on the official website of Chinese Ministry of Culture and Tourism.[10] The variable $warning_{i,t}$ is defined to be the number of travel warnings issued towards destination country i in period t. $warning_{i,t} = 0$ if China issued no warning to country i in month t. $warning_{i,t}$ are lagged by one period to account for its delayed effect on tourist number. Other variables and parameters remain the same. We are particularly interested in the coefficients of the interaction term $\Delta PRI_{i,t} * warning_{i,t-1}$ as well as its lags. We expect a significantly positive coefficient.

Table 6 represents the estimation results of equation (3). Regression (1)–(2) replicates the estimation results of equation (1) in Table 3 for comparison. Regression (3) add the travel warning variable $warning_{i,t-1}$ and its interaction with political relation term on the basis of Regression (1), with no lags of any variables included. The significantly positive coefficient of the interaction term $\Delta PRI_{i,t} * warning_{i,t-1}$ assures its effect. Compared with Regression (1), the coefficient of $\Delta PRI_{i,t}$ in Regression (3) is of similar magnitude and significance. The interaction term, however, has a much more profound effect than $\Delta PRI_{i,t}$ term, suggesting a crucial role the travel warnings play. To be

[10]The url for the official website of Chinese Ministry of Culture and Tourism is https://www.mct.gov.cn/. At the point of writing this paper, the earliest travel warning on the website was issued on March 2017. For travel warnings before March 2017, we retrieve information from the snapshots on Web Archive, https://web.archive.org/.

Table 6. Regression Results of Travel Warnings.

	(1)	(2)	(3)	(4)	(5)
	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$	$\Delta TR_{i,t}$
$\Delta TR_{i,t-1}$		−0.300 ***		−0.303 ***	−0.293 ***
		(0.0519)		(0.0719)	(0.0652)
$\Delta PRI_{i,t}$	0.580 **	0.329 **	0.561 **	0.465 ***	−0.265
	(0.180)	(0.130)	(0.164)	(0.116)	(0.244)
$\Delta PRI_{i,t-1}$		1.113 ***		0.624 ***	
		(0.223)		(0.177)	
$warning_{i,t-1}$			−0.0642 *	−0.0704 **	−0.0224
			(0.0296)	(0.0278)	(0.0334)
$warning_{i,t-2}$				0.0264	
				(0.0213)	
$\Delta PRI_{i,t} * warning_{i,t-1}$			2.544 ***	1.475 *	−1.888 **
			(0.531)	(0.771)	(0.771)
$\Delta PRI_{i,t-1} * warning_{i,t-2}$				3.521 ***	
				(1.194)	
$\Delta PRI_{i,t} * I^{neg}_{i,t} * warning_{i,t-1}$					5.961 ***
					(1.441)
$\Delta PRI_{i,t} * I^{neg}_{i,t}$					1.054 ***
					(0.172)
$I^{neg}_{i,t} * warning_{i,t-1}$					−0.0494
					(0.0358)
$I^{neg}_{i,t}$					−0.00906
					(0.00845)
$\Delta IP_{i,t}$	0.00604	0.0176	0.0305 *	0.0536 ***	0.0523 ***
	(0.00891)	(0.0125)	(0.0120)	(0.0173)	(0.0190)
$\Delta ER_{i,t}$	−0.304	−0.273	−0.740	−0.650	−0.601
	(0.309)	(0.211)	(0.570)	(0.413)	(0.401)
Constant	−0.0230	−0.00229	0.0215	−0.137	−0.261 **
	(0.0725)	(0.0340)	(0.0115)	(0.150)	(0.120)
N	1087	1082	635	630	634
State FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Note:This table reports the regression results of travel warnings in equation (3) and (4). In Regression (5), dummy variable $I^{neg}_{i,t}$ is defined to be 1 when $\Delta PRI_{i,t} < 0$, while in Regression (6), $I^{neg}_{i,t} = 1$ when $\Delta PRI_{i,t} < -0.02$. The sample countries include U.S., Japan, South Korea, Australia and Vietnam. Regressions with lagged dependent variables are estimated using system GMM for dynamic panels. Standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

specific, a 1% drop in $\Delta PRI_{i,t}$ alone generates a 0.56% decline in outbound tourists. When compounded with a travel warning, outbound tourists plummets by another 2.54%. Regression (4) includes autoregressive components of dependent variables $\sum_{k=1}^{m} \delta_k \Delta TR_{i,t-k}$ and a distributive lag of the explanatory variables based on Regression (2). Their results present similar patterns with Regression (3). The variable $\Delta PRI_{i,t-h}$ alone shows a significant but mild impact. The variable $warning_{i,t-l}$ represents that the average effect of travel warning is negative. The positive coefficients of interaction terms $\sum_{h=0}^{n} \xi_s \Delta PRI_{i,t-s} * warning_{i,t-s}$ demonstrate the dynamic pattern: as PRI declines, the travel warnings can exacerbate the effect of political relation shocks and further reduce outbound tourists. This effect heightens one months after a political relation shock.

Government's issuance of travel warnings contributes to the decline of outbound tourists. At the same time, results in Section 3.3.1 tell us the negative shocks, i.e. political conflicts, are the driving force to the decline of tourists. However, a political-motivated travel warning is typically issued during political conflicts. Thus, without controlling the effect of a negative political relation shock, the estimates are likely to be biased. Thus, we include in equation (3) the dummy variable for a negative political relation shock, $I^{neg}_{i,t}$, and its interaction with PRI changes, $\Delta PRI_{i,t} * I^{neg}_{i,t}$. Furthermore, we also interact $\Delta PRI_{i,t} * I^{neg}_{i,t}$ with $warning_{i,t-1}$ to differentiate the warning effects from the impacts of negative political shocks. The regression model is

$$\begin{aligned} \Delta TR_{i,t} = f \quad (& \Delta PRI_{i,t},\ warning_{i,t-1},\ I^{neg}_{i,t}, \\ & \Delta PRI_{i,t} * I^{neg}_{i,t},\ \Delta PRI_{i,t} * warning_{i,t-1},\ I^{neg}_{i,t} \\ & * warning_{i,t-1}.\Delta PRI_{i,t} * I^{neg}_{i,t} * warning_{i,t-1}, \\ & \Delta IP_{i,t},\ \Delta ER_{i,t},\ \beta_i,\ \gamma_t,\ \alpha). \end{aligned} \tag{4}$$

where the dummy variable $I^{neg}_{i,t}$ is defined to be 1 when $\Delta PRI_{i,t} < 0$. We are interested in the coefficient of the triple interaction term

$\Delta PRI_{i,t} * I_{i,t}^{neg} * warning_{i,t-1}$, which describes the extra effects of travel warning ($warning_{i,t-1}$) in case of a negative political relation shock ($PRI_{i,t} * I_{i,t}^{neg}$). Regression (5) in Table 6 displays the estimation results. The significantly positive coefficient of the triple interaction $\Delta PRI_{i,t} * I_{i,t}^{neg} * warning_{i,t-1}$ supports the prominent role of travel warnings in reducing the number of outbound tourists, even when we control the effects of negative shocks. It demonstrates that in situation of political conflicts, the issuance of travel warnings does further contribute to the decline of tourists.

The channel of tourists' demand

We proceed to examine the other potential channel, tourists' demand channel. This channel is related to the willingness of tourists to travel abroad. What is in our mind is that when political relation deteriorates, security concerns prompt potential tourists to cancel or postpone their trips, resulting in a lack of demand and then a decline in tourist number. To identify this channel, we will examine the direct impact of political relation shocks on tourists' demand. Note that the number of actual tourist flows cannot simply represents consumer demand. To make a trip, it depends on not only a tourist's willingness but also other factors related to supply side, such as tour packages provided by travel agencies, etc. Hence, we need to a proxy to measure consumer demand.

The rapid application of information technology provide researchers with massive internet big data to capture tourists' demand. Yang et al. (2015) contended that internet big data can reveal tourists' preferences and their changes in real time. The prevailing form of internet big data used in tourism demand measurement is search engine data, such as Google and Baidu. Before travelling, most of the tourists will use search engine to find out information about the destination and to make travel decisions. Several studies have demonstrated that incorporating search engine data can improve tourism demand forecasting performance (Pan, Wu, and Song (2012), Bangwayo-Skeete and Skeete (2015), Xin et al. (2017), Sun et al. (2019)). Since Baidu is the biggest search engine in China, research has also found Baidu data to be more useful in depicting Chinese tourists' demand (Yang et al. (2015)).

Therefore we adopt the Baidu search data to measure Chinese outbound tourists' demand. Following the previous gravity models, the regression model is specified as follows:

$$\Delta BSI_{i,t} = \alpha_0 + \beta_i + \gamma_t + \sum_{k=1}^{m} \delta_k \Delta BSI_{i,t-k} + \sum_{h=0}^{n} \lambda_h \Delta PRI_{i,t-h} + \alpha_1 \Delta IP_{i,t} + \alpha_2 \Delta ER_{i,t} + \in_{i,t}, \tag{5}$$

where $BSI_{i,t}$ is the Baidu Search Index. We retrieve Baidu search index (representing search volume) for key words 'country i + tourism' at period t and use it as our proxies for consumer demand for country i. Baidu Index database provides the monthly volume data of these search queries since January 2006. We transformed the search index data into its growth rate form $\Delta BSI_{i,t}$ for stationarity. Other variables and parameters remain the same as before. The coefficient of the political relation variable $\Delta PRI_{i,t-h}$ manifests itself as the direct impact of political relation on tourists' demand.

Regression results are shown in Table 7. From the coefficients of $\Delta PRI_{i,t}$ and its lags in Regression (1)–(2), we can see that the overall effect of political relation shocks on tourists' demand is not statistically significant. We then again divide the political relation shock into two parts, the positive shocks and negative shocks, and examine their own effects on tourists' demand. We augment the regression equation (5) by including the dummy variable $I_{i,t}^{neg}$ and its interaction with $\Delta PRI_{i,t}$. Here the dummy variable $I_{i,t}^{neg}$ is defined as an indicator for $\Delta PRI_{i,t} < 0$ as before. The regression results reported in the Regression (3) display a distinctive effects of different political shocks. The significantly positive coefficient of interaction term $\Delta PRI_{i,t-1} * I_{i,t-1}^{neg}$ shows that tourists' demand is sensitive to deterioration in political relations last month. The insignificant coefficients of $PRI_{i,t-1}$, however, suggests tourists' indifference to the improvement of political relations. Therefore, the political relation do affect the outbound tourism by way of changing the tourists' demand. But consumer demand is responsive only when political relations worsen.

Table 7. Regression Results of Tourists' Demand.

	(1)	(2)	(3)	(4)
	$\Delta BSI_{i,t}$	$\Delta BSI_{i,t}$	$\Delta BSI_{i,t}$	$\Delta BSI_{i,t}$
$\Delta BSI_{i,t-1}$		0.00206	0.00551	0.00910
		(0.0447)	(0.0269)	(0.0394)
$\Delta PRI_{i,t}$	0.0423	0.0389		
	(0.249)	(0.300)		
$\Delta PRI_{i,t-1}$	0.0832	0.0965	−0.636	−0.431
	(0.564)	(0.663)	(0.428)	(0.435)
$\Delta PRI_{i,t-1} * I^{neg}_{i,t-1}$			1.040 ***	−1.172
			(0.153)	(0.742)
$\Delta PRI_{i,t-1} * I^{neg}_{i,t-1} * warning_{i,t-1}$				2.278 **
				(1.112)
$\Delta PRI_{i,t-1} * warning_{i,t-1}$				−1.220
				(1.055)
$I^{neg}_{i,t-1} * warning_{i,t-1}$				−0.0557
				(0.0362)
$warning_{i,t-1}$				0.0238
				(0.0247)
$I^{neg}_{i,t-1}$			0.00425	−0.0299 *
			(0.00542)	(0.0161)
$\Delta IP_{i,t}$	−0.00800	−0.00910	−0.00828	−0.00691
	(0.00669)	(0.00788)	(0.00527)	(0.0168)
$\Delta IP_{i,t}$	0.461 **	0.434 *	0.433 ***	0.463 ***
	(0.139)	(0.179)	(0.115)	(0.167)
Constant	−0.192 ***	0.0692	0.0827 **	0.0799
	(0.0183)	(0.0540)	(0.0392)	(0.0492)
N	634	630	630	630
State FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES

Note:This table reports the regression results of tourists' demand in equation (5) and (6). Dummy variable $I^{neg}_{i,t}$ is defined to be 1 when $\Delta PRI_{i,t} < 0$. The sample countries include U.S., Japan, South Korea, Australia and Vietnam. Regressions with lagged dependent variables are estimated using system GMM for dynamic panels. Standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Before the channel of tourists' demand can be identified as a separate channel, we still need to check whether the issuance of travel warnings take effects in the decline of tourists' demand when political relation deteriorates. To do so, we further augment the regression equation (5) by introducing the travel warning variable $warning_{i,t}$. Since we have found that tourists' demand responds to the negative political relations shocks in the last month, we particularly include travel warnings of last month to examine whether it takes effect. The regression model is as follows:

$$\Delta BSI_{i,t} = f\begin{pmatrix}\Delta PRI_{i,t-1},\ warning_{i,t-1},\ I^{neg}_{i,t-1},\ \Delta PRI_{i,t-1} \\ *I^{neg}_{i,t-1},\ \Delta PRI_{i,t-1} * warning_{i,t-1}, \\ I^{neg}_{i,t-1} * warning_{i,t-1},\ \Delta PRI_{i,t-1} \\ *I^{neg}_{i,t-1} * warning_{i,t-1},\ \Delta IP_{i,t},\ \Delta ER_{i,t},\ \beta_i,\ \gamma_t,\ \alpha\end{pmatrix}, \quad (6)$$

where the definition of variable $warning_{i,t}$ stays the same with that in equation (3). Considering different political shocks have different effects on tourists' demand, we separate the $\Delta PRI_{i,t}$ into positive and negative parts using the indicator $I^{neg}_{i,t}$. We pay particular attention to the coefficient of the two terms, $\Delta PRI_{i,t-1} * I^{neg}_{i,t-1}$ and $\Delta PRI_{i,t-1} * I^{neg}_{i,t-1} * warning_{i,t-1}$. The political shocks themselves do affect consumer demand during political relation deteriorations only if the coefficient of $\Delta PRI_{i,t-1} * I^{neg}_{i,t-1}$ is significant. Whether the travel warnings have additional impact on consumer demand depends on the significance of the coefficient of the triple interaction term $\Delta PRI_{i,t-1} * I^{neg}_{i,t-1} * warning_{i,t-1}$.

Regression (4) in Table 7 shows the results. The significantly positive coefficient of $\Delta PRI_{i,t-1} * I^{neg}_{i,t-1} * warning_{i,t-1}$ demonstrates that the travel warnings play a noteworthy role in the tourists' demand. However, the negative political shock itself has no statistically significant effects on demand any more, as we can see from the coefficient of variable $\Delta PRI_{i,t} * I^{neg}_{i,t-1}$. These results tell us that during periods of political relation deterioration, a substantial portion of the reduction in tourists' demand comes from the impact of the issuance of travel warnings, while a deterioration in political relation per se may have no direct impact on visitors' travel decisions.

To summarize the findings in this section, we examine whether the effects of political relation on outbound tourism is driven by a lack of demand. We use Baidu search index as a proxy of tourists' demand and then test the impact of political shocks on tourists' demand. We find that the tourists' demand declines when political relation deteriorates but gives no significant response to improvement in political relation. Moreover, further investigations find that when political relationship gets worse, most of the reduction in tourists' demand can be attribute to the issuance of travel warnings. Tourists' demand barely reacts to political relation deterioration without travel warnings.

This evidence suggests something about travellers' information choice may be at play. The issuance of travel warnings effectively draws consumers' attention and enhances consumers' perception of potential risk in travelling to the opposing countries. Since most political tensions are mild and temporary, potential tourists tend to neglect the negative information on bilateral relations and continue with their travel decisions. When the government issues a travel warning, however, it leads to a large amount of media exposure. It is especially the case in China which exert a strong control on mass media, that the issuance of travel warnings strongly signals that the bilateral relation disruptions may escalate and last for a long time. It further changes potential tourists' destination preferences since they perceive much risk in travelling to conflicting countries. Tourists raise concerns about travelling costs, reduction in amenity, and safety. Thus, their willingness to travel to the opposing countries also decline.

IV. Conclusion

Many economic theories expect that international politics affect the tourism market. For example, political shocks may excite nationalistic sentiment that affects tourists' preferences over destinations. Sometimes, a country's policy or government intervention in the tourism market can be affected by political relations with another country. Moreover, political disruptions create uncertainty and hostility. Uncertainty reduces economic activities such as trade and tourism, and hostility makes economic activities more costly.

In this paper, we document empirical evidence that political relations have substantial effects on the tourism market. In the gravity models, we find that the tourism market significantly responds to political relation shocks using data on political relations and tourist flows between China and partner countries. Furthermore, using high-frequency data, we detect that the effects of political relation shocks are transitory and typically last for at most several months. Annually aggregated data, in contrast, is not capable to capture the short-lived effects. We also find strong evidence that the impacts of political shocks on outbound tourism are of greater magnitude and longer duration than those on inbound tourism.

The VAR analysis illustrates the dynamics of how political shocks affect the tourism market over time for each country. Political shocks exercise an immediate but mild effect on outbound tourism. The effect is heightened in the following month, and then it varnishes. However, political shocks only have a contemporaneous effect on inbound tourist growth.

We complement our analysis by exploring potential mechanisms through which political relation shocks affect outbound tourism in China. We focus on two channels. One is tourists' demand, the other is government interference. Using the issuance of travel warnings as an indicator of government actions, we find that travel warnings account for substantial effects on outbound tourist flows during political relation deteriorations. Moreover, evidence also supports a pronounced effect of travel warnings on consumer demand, while the direct effect of political relation shocks on consumer demand is hardly detectable. It suggests that the issuance of travel warnings effectively draws consumers' attention and changes their perception of travel risk and preferences for destinations.

Our study provides evidence to support the theories that predict the effect of political relation shocks on the tourism market. As best summarized by the French economist, Jean-Maurice Thurot (1975), 'tourism is an extension of politics by other means.' The conflict, competition, and cooperation in international tourism relations are often a barometer of countries' overall relations. The foresight of the change in political relations helps the tourism industry prepare for possible fluctuations in tourist flows. However, in turn, we also have reasons to expect that tourism can shape international relationships. International tourism builds a bridge of communication between countries. It has practical significance for clearing up misunderstandings and estrangements between countries, promoting international relations.

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