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# Does political conflict affect bilateral trade or vice versa? Evidence from Sino-U.S. relations

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## ABSTRACT

This paper investigates the dynamic causal relationship between Sino-U.S. political conflict and bilateral trade using a time-varying (bootstrap) Granger full-sample causality test and sub-sample rolling window estimation. The result indicates that Sino-U.S. political conflict and bilateral trade may interact in various ways. Bilateral trade has both positive and negative effects on political conflict in several sub-phases, and in turn, political conflict has the same impacts on bilateral trade. In general, the relationship between Sino-U.S. political conflict and bilateral trade is not always consistent with the model of Polachek, which states bilateral trade has significantly reduced political conflict. In the face of a severe economic situation, China and the U.S. government should strengthen trade cooperation and seek common ground of economic interests in order to expand the improvement of political relations.

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## 1. Introduction

Different from the instability in political relations, Sino-U.S. bilateral trade has grown continuously since the establishment of diplomatic relations. The trade volume between the two countries has been rapidly expanding with the economic development. As of 2017, the trade volume between China and the U.S. has increased by 237 times. According to China Business Yearbook and China Foreign Economic Statistics Yearbook, in most years, the annual growth rate of Sino-U.S. trade has exceeded 15%, and nearly half of the annual growth rate has exceeded 20%. In 2015, China surpassed Canada for the first time and became the largest trading partner of the U.S. At the same time, the ever-expanding bilateral trade deficit has been the focus of Sino-U.S. economic relations. After 1993, China's trade surplus with the U.S. accounted for a growing proportion of Sino-U.S. trade, especially after China's accession to the World Trade Organization (WTO) in 2001, the proportion exceeded 40%, and in 2005–2007 it exceeded 50%.

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There are very few political conflicts in these two countries with close trade relations because the opportunity cost of conflicts is too high. This is the main assertion of liberal theorists (Fearon, 1995; Gartzke, Li, & Boehmer, 2001; Maoz, 2009; Polachek, Robst, & Chang, 1999). However, this assertion seems to be proven untrue frequently in reality, and Sino-U.S. relations are typical evidence of this. Therefore, under the background of the Sino-U.S. trade war and unstable international political and economic situation, it is absolutely essential to explore how bilateral trade affects political conflicts or vice versa, based on Sino-U.S. relations.

The main purpose of this paper is to shed light on the causality between political conflict and bilateral trade based on Sino-U.S. relations. Political conflict and bilateral trade are influenced by the size and geographical location of the country (Bearce & Fisher, 2002; Werner, 1999; Xiang, Xu, & Keteku, 2007). The major power countries are more probably to be involved in political conflicts because they have an extensive range of interests that may cause them to clash with many nations (Glick & Taylor, 2010). The U.S. and China are the largest developed and developing countries, their political relations have been more unstable than in the past after the Cold War. The goal of the U.S. is to preserve dominant status in the world, while China is restoring its world leadership. This structural contradiction makes the political conflict between China and the U.S. unavoidable (Yan, 2010).

We apply the bootstrap rolling window technology (Balcilar, Ozdemir, & Arslanturk, 2010) to test the interaction, thus providing superior identification to study the causal relationship between Sino-U.S. political conflicts and bilateral trade. The bootstrap rolling window approach is distinct from most conventional mathematical methods, such as pulse impulse response methods (correlation analysis, Granger causality, etc.), which cannot identify full-sample and sub-sample relationships between time series and cannot reveal how such relationships change over time. At the same time, this approach can also assess whether bilateral trade has a significant effect on political conflicts and whether that effect is temporary or permanent.

This study proceeds as follows: in [Section 2](#), we briefly present the literature review, followed by [Section 3](#) which outlines the theoretical mechanism of political conflict and bilateral trade. [Section 4](#) explains the methodology of our study, continuing with [Section 5](#) in order to describe the corresponding data and [Section 6](#) intended for highlighting our empirical results. The last section mentions conclusion.

## 2. Literature review

The impact of political conflict on bilateral trade is an argumentative issue among political economy. Conventional view suggests that political conflict can greatly undermine economic activity, particularly the bilateral trade between countries (Du, Ju, Ramirez, & Yao, 2017; Fisman, Hamao, & Wang, 2014; Massoud & Magee, 2012; Reuveny & Kang, 2003). Political conflicts are frequently associated with trade sanctions and conflicts may also decrease bilateral trade by increasing the cost of traders involved in multinational business (Glick & Taylor, 2010). The other studies argue that the outbreak of political conflict will have an adverse impact on bilateral trade, but this situation would not have a consequence if the economic agent has the perfect

message about the political relations between countries (Morrow, Siverson, & Tabares, 1998). They would cut back their trade flows in anticipation of political conflict. The actual outbreak of political conflict will not bring about a decrease in trade over the same period, as the reduction in related business activities has already taken place (Armstrong, 2012; Schneider & Troeger, 2006). In other words, economic actors will adjust trade activities before the conflict in order to cope with the deterioration of political relations, so political conflicts have little impact on bilateral trade (Li & Sacko, 2002; Morrow, 1999).

In addition to this, there is now extensive evidence that interdependent bilateral trade reduce interstate political conflict (Gleditsch, 2008; Jervis, 2002; Xing & Zhou, 2018). For example, liberal theorists identify that increased bilateral trade strengthens cooperation by increasing the opportunity cost of political conflicts (Maoz, 2009; Polachek et al., 1999). It is generally believed that political leaders are considered to be prevented from participating in political conflicts, when conflicts are expected to adversely affect trading conditions (Fearon, 1995; Gartzke et al., 2001). Specifically, supposing political conflicts lead to the decrease of bilateral trade, then the hidden cost is the loss of social welfare profits. Bilateral trade benefits increase the hidden costs of political conflict and generate strong incentives to improve bilateral political relations. In short, bilateral trade has generated common economic benefits, and therefore enhances cooperation and deters political conflict (Polachek, 1992). By contrast, realism argue that asymmetric bilateral trade actually exacerbates political conflict between trading partners (Barbieri & Peters, 2003; Buzan, 1984). The concern about relative interests will lead to the cessation of trade in order to prevent opponents from using bilateral trade gains to enhance relative military force (Ripsman & Blanchard, 1996). In general, the causal relationships between bilateral trade and political conflict are generally bidirectional (Reuveny & Kang, 2003). Most analyses also conclude that the essential characteristics of the relationship between these two variables may be interactive (Freeman, 1983; Gasiorowski & Polachek, 1982; Polachek, 1980).

Considering Sino-U.S. relations, the conclusions are also inconsistent. Reuveny and Kang (1998) find that Sino-U.S. dyads bilateral trade in certain goods enhances as political relations improve. Zhang (2000) also finds that the Sino-U.S. accord from the WTO is supposed to increase U.S. exports to China and thus improve the bilateral trade balance in favor of the U.S. However, the premise is that the two countries must resolve the following long-standing disputes: merchandise trade imbalance; U.S. sanctions against China; technology export control; the alleged currency manipulation; and the human right issues. Anderton and Carter (2001) highlight that trade falls with the onset of conflict, and trade is still close to zero after the conflict. Reuveny and Kang (2003) conclude that the influence of trade on conflict seems to change with the different countries. Among the members of the European Community, trade appears to be associated with good political relations. Between U.S.-Japan and Sino-U.S., bilateral trade seems to be related to political conflicts. Liew (2010) explains why the U.S. treats its trade deficits with China as a security issue that have become a source of friction in Sino-U.S. relations. He argues that this problem is driven by complex motives that concern domestic economic and political

demands. Wu, Fu, and Pan (2016) suggest that the Sino-U.S. competition is expected to intensify as China aggressively deepens its economic ties worldwide. Yu and Zhang (2019) evaluate the Sino-U.S. trade imbalance from the perspective of the Trump administration, then clarify Sino-U.S. trade relations and the causes of the conflict. Despite the previous research has made important contributions, they do not clarify the interaction mechanism between bilateral trade and political conflict. On the other hand, the time-varying properties between these two variables are not fully considered. With these unsolved questions, in this paper, we attempt to interpret through what interactive mechanism does Sino-U.S. political conflict affects bilateral trade or vice versa.

### 3. Theoretical model of political conflict and bilateral trade

First of all, we assume that political conflicts indicate stopping or reducing bilateral trade through quotas, embargoes, and even the blockades. Subsequently, the hidden cost of political conflicts are the loss of trade gains related to the reduction of bilateral trade. Based on Polachek' (1992) assumptions, the relationship between these two variables can be expressed by the following:

$$W \equiv w(C, Z) \equiv w\left(\left[q_i + \sum_j m_{ij} + \sum_j x_{ij}\right], [z_j]\right) \quad (1)$$

where  $Z \equiv (z_1, z_2, \dots, z_j)$  represents political conflict toward any of  $j$  target countries, bilateral trade volume equals imports ( $m_i$ ) plus exports ( $x_i$ ),  $W$  represents welfare function,  $C$  is each possible consumption basket and  $q_i$  is the production possibility frontier.

For the purpose of drawing the link of the impact of bilateral trade on political conflict, we have determined the optimal level of conflict/cooperation between present consumption and bilateral trade patterns. If we don't consider the balance of payments, then

$$\sum_i^m \sum_j^k x_{ij} P_{xij} - \sum_i^m \sum_j^k m_{ij} P_{mij} = 0 \quad (2)$$

where  $P_{xij} \equiv$  unit export price charged to country  $j$  for commodity  $i$ .  $P_{mij} \equiv$  unit import charged by country  $j$  for commodity  $i$ .

The international market determines the final price, but as mentioned earlier, it contains at least one component that is assumed to depend on a dual political conflict.  $P_{xij} = f(z_j)$  and  $P_{mij} = g(z_j)$ . This hostility increases the value of imported goods and at the same time lowers the selling value of exported goods

$$\partial P_{mij} / \partial z_j = P'_{mij} = g' > 0 \quad (3)$$

$$\partial P_{xij} / \partial z_j = P'_{xij} = f' < 0 \quad (4)$$

If the boycott or embargo cause bilateral trade to stop completely,  $f' = -\infty$  and  $g' = +\infty$ . Considering this structure and the predetermined bilateral trade, the

rational decision of policy maker means choosing the optimal level of  $Z$  to maximize welfare levels. This suggests maximizing the following lagrangian equation

$$\text{Max}(L) = W \left[ (q_i + \tilde{m}_{ij} + \tilde{j}x_{ij}), z_j \right] + \lambda \left[ \tilde{i}\tilde{j}x_{ij}P_{xij}(z_j)P_{xij}(z_j) - \tilde{i}\tilde{j}m_{ij}P_{mij}(z_j) \right] \quad (5)$$

First order optimality conditions for optimal conflict requires:

$$\partial w / \partial z_j + \lambda [\tilde{i}\tilde{j}x_{ij}(fP_{xij}(z_j)/fz_j - \tilde{i}\tilde{j}m_{ij}(fP_{mij}(z_j)/fz_j))] = 0 \quad (6)$$

$$\partial w / \partial \lambda = \tilde{i}\tilde{j}x_{ij}P_{xij}(z_j) - \tilde{i}\tilde{j}m_{ij}P_{mij}(z_j) = 0 \quad (7)$$

Polachek (1992) repotes that as the scale of consumption and political conflict increases, the government's utility to bilateral trading partners is maximized. Equation (7) is only a constraint on the balance of payments. Equation (6) depicts a mechanism for a country to determine the extent of conflict.

In equilibrium, the marginal cost (MC) of hostility must be able to balance the welfare gain of additional hostility so that the intersection of the MC curve depicts equilibrium conflict/cooperation. Even if conflict/cooperation means no welfare benefit, the level of equilibrium conflict still exists. The optimal conflict is based only on the intersection of MC curve and the horizontal axis. Thus, we can conclude that if the import and export increase, the MC curve will rise, which means that the degree of political conflict is reduced.

## 4. Methodology

### 4.1. Bootstrap full-sample causality test

We investigated the causal relationship between Sino-U.S. political conflict and bilateral trade by applying a full-sample Granger causality test under the framework of the bivariate vector autoregressive (VAR) presented by Balcilar et al. (2010). The Granger-causality test (Granger, 1969) is based on the hypothesis of time series stationarity and they may not have standard asymptotic distributions when the stationarity assumption does not hold, which causes difficulties in the levels estimation of VAR models (Sims, Stock, & Watson, 1990; Toda & Phillips, 1993, 1994). In such a scenario, Toda and Yamamoto (1995) propose a modified Wald test, which acquires standard asymptotic distribution for the Wald test by estimating an augmented VAR model with I(1) variables. Shukur and Mantalos (2000) use a modified Wald test by using Monte Carlo simulations and found that it could be only used with large samples. However, they prove that the residual-based bootstrap (RB) method can be used with small and medium-sized samples to improve critical values in power and size significantly. Furthermore, another certain advantage of the RB method is that it has sufficient effectiveness, even if the time series are not cointegrated (Balcilar et al., 2010; Hacker & Hatemi-J, 2006; Mantalos, 2000; Mantalos & Shukur, 1998; Shukur & Mantalos, 2000). In particular, Shukur and Mantalos (2000) indicate that in the absence of cointegration, all standard tests that do not use the RB method perform

inadequately, particularly in small samples. Thus, to analyze the causality between the political conflict and bilateral trade, a two-variable Granger non-causality test under the VAR is employed here.

Based on the RB modified-LR method, the VAR ( $p$ ) process for two variables may be expressed as follows:

$$T_t = \varphi_0 + \varphi_1 Y_{t-1} + \dots + \varphi_p Y_{t-p} + \varepsilon_t, \quad t = 1, 2, \dots, T \quad (8)$$

where  $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$  follows a zero mean, independent and white noise process with nonsingular covariance matrix, and the optimal lag length  $p$  can be obtained from the Schwarz Information Criteria (SIC). By splitting  $y_t$  into two sub-vectors,  $y_t = (y_{1t}, y_{2t})'$ , thus the above equation can be rewritten as follows:

$$\begin{bmatrix} PC_{1t} \\ BT_{2t} \end{bmatrix} = \begin{bmatrix} \varphi_{10} \\ \varphi_{20} \end{bmatrix} + \begin{bmatrix} \varphi_{11}(L)\varphi_{12}(L) \\ \varphi_{21}(L)\varphi_{22}(L) \end{bmatrix} \begin{bmatrix} PC_{1t} \\ BT_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (9)$$

where PC and BT denote the political conflict and bilateral trade, respectively.  $\varphi_{ij}(L) = \sum_{k=1}^{p+1} \varphi_{ij,k} L^k$ ,  $i, j = 1, 2$  and  $L$  is the lag operator defined as  $L^k x_t = x_{t-k}$ .

Based on the above analysis, the causal relationship between political conflict and bilateral trade can be tested. We test the hypothesis that political conflict does not Granger cause bilateral trade,  $\varphi_{12,k} = 0$  for  $k = 1, 2, \dots, s$ . Similarly, the hypothesis that bilateral trade does not Granger cause political conflict was tested by imposing the restriction  $\varphi_{21,k} = 0$  for  $k = 1, 2, \dots, s$ . The hypothesis will be rejected if political conflict has impact on bilateral trade and vice versa.

#### 4.2. Parameter stability test

One of the assumptions for the Granger full-sample causality tests is that the parameters of the VAR model are constant. This assumption may be wrong if structural changes are shown in the underlying full-sample time series; that is, the results become null and the causal links become unstable (Balcilar & Ozdemir, 2013). Thus, this study tested the stability of short-term and long-term parameters. We examined the stability of the short-term parameters by using the *Sup-F*, *Mean-F* and *Exp-F* tests (Andrews, 1993; Andrews & Ploberger, 1994). However, when the underlying variables were cointegrated, the VAR model in first differences is misspecified unless error-correction is allowed. Consequently, we tested the long-term relationship for cointegration and parameter stability. We applied the Fully Modified Ordinary Least Squares (FM-OLS) estimator proposed by Phillips and Hansen (1990) to estimate the parameters of cointegration regressions. Then, we used the  $L_c$  test from Nyblom (1989) and Hansen (2002) to check the stability of the long-term parameters. The  $L_c$  test serves as a test of cointegration when the underlying series are I (1) (Balcilar et al., 2010).

These tests were calculated from the sequence of LR statistics, which examine the stability of parameters against the alternative of a single structural break at an

unknown point. Critical values and  $p$ -values were reported by means of the parametric bootstrap procedure (Andrews, 1993; Andrews & Ploberger, 1994) because of a nonstandard asymptotic distribution. Statistics (*Sup-F*, *Mean-F* and *Exp-F*) require 15% trimming from both ends of the sample (Andrews, 1993) to investigate the stability of the short-term parameters. As a result, the fraction of the sample in (0.15, 0.85) was needed.

### 4.3. Sub-sample rolling-window causality test

To overcome the parameter non-constancy and avoid pretest bias, we apply the rolling-window bootstrap estimation (Balcilar et al., 2010). There are two important reasons for using the rolling estimation. First, the causal relationship between variables can change over time in the rolling window method. Second, rolling estimation can observe instability across different sub-samples due to structural change, and the rolling-window estimation captures this process.

The rolling window techniques rely on fixed-size sub-samples rolling sequentially from the beginning to the end of the full sample (Balcilar et al., 2010). In this premise, setting a fixed-size rolling window including  $l$  observations, the full-sample is converted to a sequence of  $T-l$  sub-samples, that is,  $\tau - l + 1, \tau - l, \dots, T$  for  $\tau = l, l + 1, \dots, T$ . Then, it can apply the RB-based modified-LR causality test to each sub-sample, instead of estimating a single causality test for a full sample. Possible changes in the causal links between political conflict and bilateral trade are intuitively identified by calculating the bootstrap  $p$ -values of observed LR-statistics rolling through  $T-l$  sub-samples. The impact of political conflict on bilateral trade is defined as the average of the entire bootstrap estimates derived from the formula , with  $N_b$  representing the number of bootstrap repetitions; similarly, the impact of bilateral trade on political conflict is obtained from the formula. Both  $\hat{\phi}_{21,k}^*$  and  $\hat{\phi}_{12,k}^*$  are bootstrap estimates from the VAR models in Equation (9). The 90-percent confidence intervals are also computed, for which the lower and upper limits equal the 5th and 95th quantiles of each of the  $\hat{\phi}_{21,k}^*$  and  $\hat{\phi}_{12,k}^*$ , respectively (Balcilar et al., 2010).

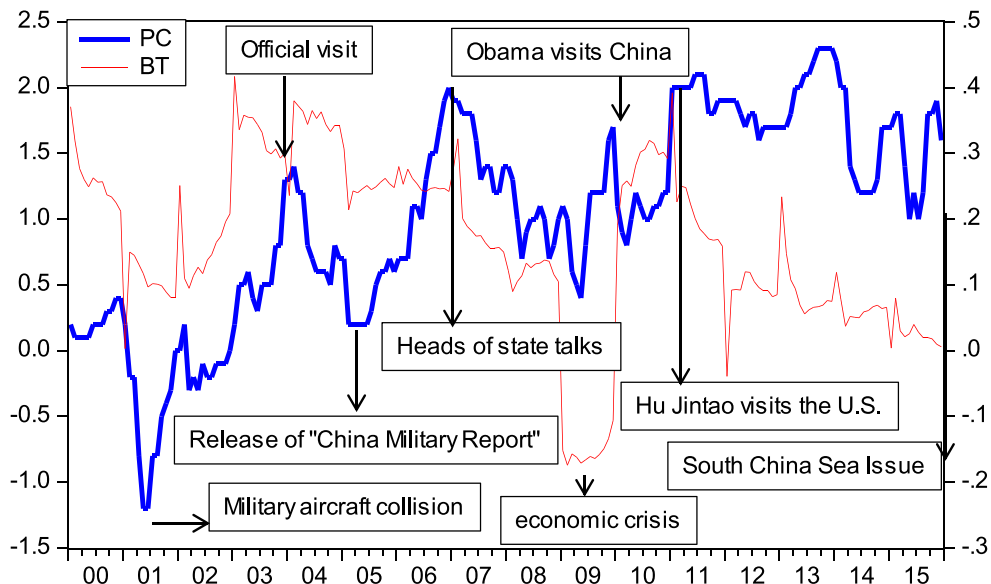
There are two conflicting objectives in the rolling-window estimation accuracy of the parameter estimates and the representativeness of the model over the sub-sample period. The window size is the precision of estimations, and it controls the number of observations. A large window size may improve the accuracy of estimates but may reduce the representativeness in the presence of heterogeneity and vice versa. Consequently, we must select a suitable window size to balance the accuracy and representativeness. Pesaran and Timmermann (2005) demonstrate that optimal window size depends on persistence and size of the break, which is according to square root mean square error. More importantly, based on Monte Carlo simulations, they propose that the minimum limit of window size is 20 when there are frequent breaks. A large window size is needed to ensure the precision of parameter estimates, but if it is too large may increase the risk of including some of these multiple shifts in the window sample claims for a smaller. As for the issue of inaccurate estimates as a result of the selected small window size, it can be addressed by the bootstrap technique employed in the rolling estimation for better precision.



## 5. Data

In this study, we consider monthly data from 2000:01 to 2015:12 to examine the interaction of Sino-U.S. political conflict and bilateral trade. The total volume of imports and exports depends more on factors such as tariff levels and macroeconomic aggregates. Therefore, this paper uses Sino-U.S. trade (import plus export) growth rate as an indicator to measure bilateral trade (Blomberg & Hess, 2006; Hegre, Oneal, & Russett, 2010). The data are gathered from the General Administration of Customs of People's Republic of China. The issue on how to measure the degree of political conflict has always been the focus of debate. The defense spending is assumed to be potential conflict (Seiglie, 1988). A significant problem with the defense spending indicator is the lack of directionality in determining the target country. For example, defense spending refers to the overall level of hostilities in a country, but did not reflect political conflict with a particular country (Polachek, 1992). Moreover, the level and pattern of political conflict will be masked. In this paper we use database from the Institute of International Relations of Tsinghua University that provides a quantitative assessment of Sino-U.S. relations<sup>1</sup> (Zhang, 2011). This database benefit from quantitative measures to divide bilateral political relations into six levels (Rivalry, Tension, Discord, Ordinary, Good, and Friendly). The higher quantified score means friendly bilateral political relations and lower political conflict, and vice versa.

Figure 1 indicates the trend of political conflict and bilateral trade. Along with the military aircraft collision in South China Sea in 2001, Sino-U.S. relations fell to the bottom again, corresponding to a sharp drop in bilateral trade. In December 2003, Chinese Premier Wen Jiabao paid an official visit to the U.S. During the visit, Premier Wen Jiabao proposed five principles to ensure the sustained and healthy



**Figure 1.** Trend of political conflict and bilateral trade. Note: PC and BT represent political conflict and bilateral trade respectively.

Source: Authors' calculation.

**Table 1.** Descriptive statistics for political conflict and bilateral trade.

	Political conflict	Bilateral trade
Mean	1.014	0.164
Median	1.100	0.165
Maximum	2.300	0.417
Minimum	-1.200	-0.174
Standard deviation	0.773	0.131
Skewness	-0.433	-0.562
Kurtosis	2.580	3.142
Jarque–Bera	7.422**	10.258***

Note: \*\*\* and \*\* denote significance at the 1% and 5% levels, respectively.

Source: Authors computation using E-views.

development of Sino-U.S. trade relations. This visit has improved Sino-U.S. political relations and promoted the subsequent development of bilateral trade. In 2004, the U.S. imposed sanctions on Chinese textiles and issued ‘China Military Report’. Sino-U.S. political relations declined overall during the year. In 2006, the leaders of the two countries met several times during the year, and the exchange of visits by cabinet-level officials was very frequent. Sino-U.S. relations are at their best in history. Overall, in 2001–2007, bilateral trade has been maintained at a relatively high level due to China joins the WTO. In 2008, the world economy was shrinking due to the global financial crisis, and Sino-U.S. trade fell rapidly to the lowest point. The relationship between the two countries fluctuated frequently during this period. From 2010 to 2015, Sino-U.S. political relations are relatively stable. President Barack Hussein Obama paid a visit to China in November 2009. In January 2011, President Hu Jintao visited the U.S. However, bilateral trade during this period has declined. In 2010, the U.S. launched a 301 survey into Chinese companies, which undermined bilateral trade. In 2015, the U.S. continued to promote the ‘Asia-Pacific rebalancing’ strategy, and China and the U.S. have been continually rubbing on the South China Sea issue. Overall, the relationship between political conflict and bilateral trade is complicated.

Table 1 illustrates the descriptive statistics. The means of political conflict and bilateral trade suggest that their series are concentrated at the 1.014 and 0.164 levels, respectively. The skewness is negative both in terms of political conflict and bilateral trade. The kurtosis is the opposite, which demonstrate the feature of leptokurtosis and a fat-tailand. In addition, the Jarque–Bera test proves that both variables are non-normally distributed, indicating that the traditional method is not appropriate for the Granger causality analysis. It is known that the full-sample test lose power in the process of estimating parameters when the variable is not normally distributed (Chunchachinda, Dandapani, Hamid, & Prakash, 1997). Therefore, we apply the bootstrap sub-sample rolling window test, liable to capture time-varying causality of political conflict and bilateral trade.

## 6. Empirical results

For the purpose of testing for the stationarity of the data, we perform Augmented Dickey–Fuller (ADF, Dickey & Fuller, 1979) test, Phillips–Perron (PP, Phillips & Perron, 1988) test and Kwiatkowski Phillips Schmidt Shin (KPSS, Kwiatkowski,

**Table 2.** Unit root test results.

Series	Levels			First differences		
	ADF	PP	KPSS	ADF	PP	KPSS
Political conflict	-1.847(0)	-1.967[1]	1.372[10]**	-11.869(0)***	-11.806[5]***	0.031[3]
Bilateral trade	-1.574(1)	-1.245[8]	0.606[10]**	-16.610(0)***	-16.597[4]***	0.038[4]

Note: The number in parenthesis indicates the lag order selected based on the recursive t-statistic, as suggested by Perron (1989). The number in the brackets indicates the truncation for the Bartlett Kernel as suggested by the Newey–West test (1987). \*\*\* and \*\* denote significance at the 1% and 5% levels, respectively.

Source: Authors computation using E-views.

**Table 3.** Full-sample Granger causality tests.

Tests	H <sub>0</sub> : bilateral trade does not Granger cause political conflict		H <sub>1</sub> : political conflict does not Granger cause bilateral trade	
	Statistics	p-values	Statistics	p-values
Bootstrap LR test	0.147	0.931	0.906	0.440

Source: Authors computation using E-views.

Phillips, Schmidt, & Shin, 1992) test. Table 2 reports the results of the unit root test. The ADF and PP statistics accept the null hypothesis of non-stationarity for political conflict and bilateral trade, in levels. Moreover, the KPSS statistics reject the null hypothesis of stationarity. However, political conflict and bilateral trade are stationary after the first order difference, which suggests that both of them are I (1) process. Therefore, we can apply the bivariate VAR model in order to estimate the full-sample causal nexus based on Equation (9). The optimal lag length selected based on Schwarz Information Criteria (SIC) was 3. Table 3 reveals the results of full-sample causality test. In the light of the bootstrap p-values, we note that the relation between the probability of political conflict and bilateral trade is not obvious. Political conflict does not Granger cause bilateral trade and vice versa. The result is not in accordance with Polachek (1992), who argue that political conflict and bilateral trade are related to some extent.

The parameters in the full-sample estimate will change over time, because of the structural changes. The causal link between the Sino-U.S. political conflict and bilateral trade may be unstable. To this end, the parameter stability is tested to determine whether there is a structural change. As mentioned before, *Mean-F*, *Exp-F*, *Sup-F*, and *L<sub>c</sub>* tests are performed to examine the short-term stability of above-mentioned VAR model parameters constituted by Sino-U.S. political conflict and bilateral trade. The relevant results are reported in Table 4. The *Mean-F* and *Exp-F* tests suggest that equations from the political conflict, bilateral trade and VAR system may gradually evolve over time. The *Sup-F* tests show that there is a sudden shift in the Sino-U.S. political conflict at the 5% level and exists in the bilateral trade and the VAR system at the 1% level. The *L<sub>c</sub>* statistics test against the alternative that the parameters follow a random walk process proposed by Gardner (1969), indicative of parameter non-constancy in the overall VAR models estimated. In summary, the parameter stability test shows that the parameters are significantly unstable between political conflict and bilateral trade. The result from bootstrap full-sample causality test is unreliable due to structural changes.

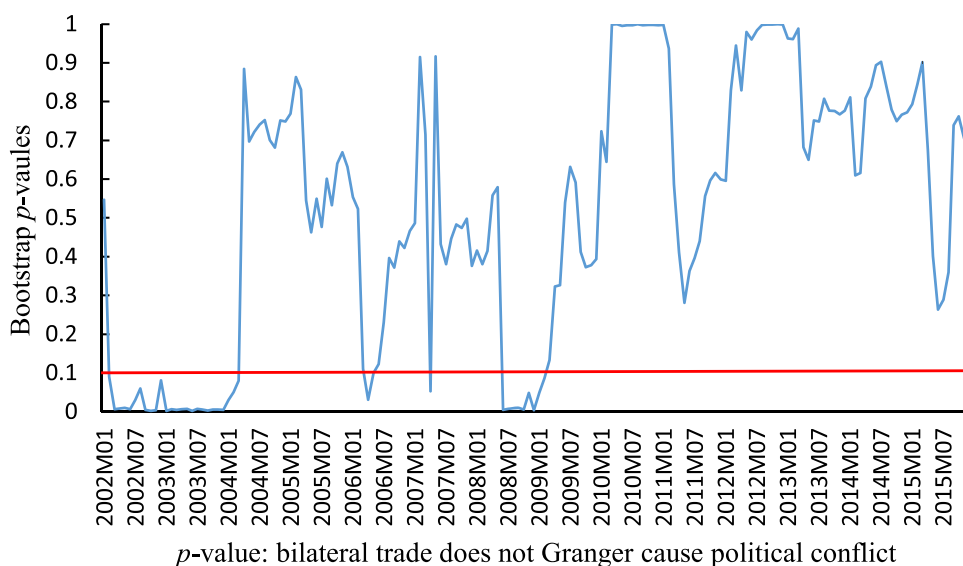
**Table 4.** Parameter stability tests.

Tests	Political conflict equation		Bilateral trade equation		VAR system	
	Statistics	<i>p</i> -value	Statistics	<i>p</i> -value	Statistics	<i>p</i> -value
<i>Sup-F</i>	78.648**	0.025	86.468***	0.000	98.636***	0.000
<i>Mean-F</i>	57.345**	0.017	47.743***	0.003	68.648***	0.001
<i>Exp-F</i>	26.676***	0.002	41.765***	0.000	58.766***	0.001
$L_c^b$					5.879***	0.003

Notes:

1. We calculate *p*-values using 10,000 bootstrap repetitions.
2. \*\* and \*\*\* denote significance at the 5% and 1% level, respectively.
3. Hansen–Nyblom parameter stability test for all parameters in the VAR jointly.

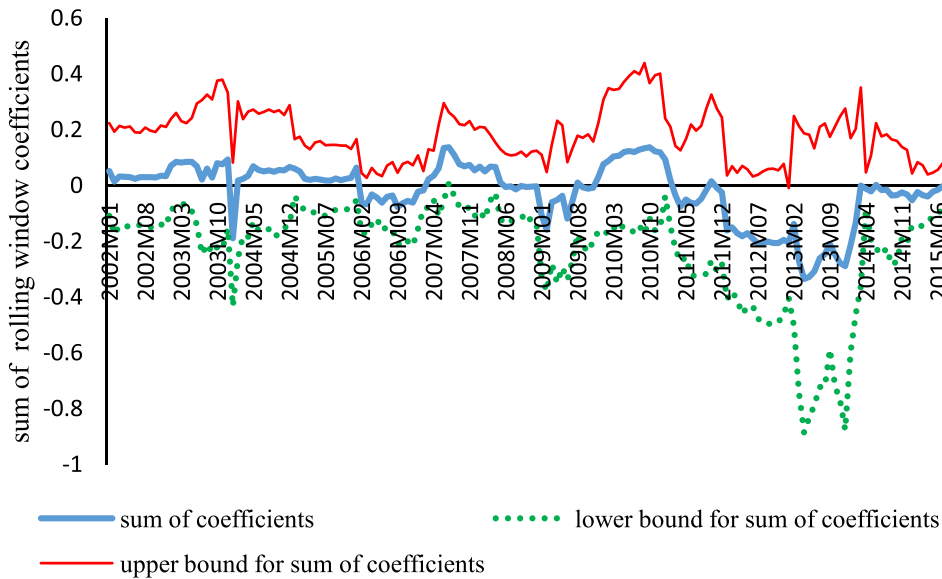
Source: Authors computation using R.



**Figure 2.** Bootstrap *p*-value of rolling test statistic testing the null that bilateral trade does not Granger cause political conflict. Source: Authors computation using E-views.

We turn to revisit the relationship between political conflict and bilateral trade by using the bootstrap sub-sample rolling window causality test. The time-varying causality and structural changes can be tested when the fixed window is allowed to scroll.<sup>2</sup> Causality between political conflict and bilateral trade in distinct sub-samples reflects the changes of the specific relationship, under certain economic backgrounds, which is different from the estimations in the existing literature. Through this method, we can assess whether political conflict has an important influence on bilateral trade or vice versa, and whether that effect is temporary or permanent. These rolling estimates move from 2002:01 to 2015:12 after trimming 24-month observations. Furthermore, we also calculated the corresponding coefficients of the VAR model to investigate whether the influence of political conflict on bilateral trade (or the effect of bilateral trade on political conflict) is positive or negative.

Figure 2 presents the null hypothesis that bilateral trade does not Granger cause political conflict can be accepted mostly except 2002:02–2004:03 and 2008:06–2009:02 at the significance level of 10%. Figure 3 demonstrates the sum of coefficients for the



**Figure 3.** Bootstrap estimates of the sum of the rolling window coefficients for the impact of bilateral trade on political conflict. *Source:* Authors computation using E-views.

effects from bilateral trade. In 2002:02–2004:03, bilateral trade has negative influence on political conflict, while in 2008:06–2009:02, bilateral trade has positive impact on political conflict.<sup>3</sup>

In the process of globalization, when China joined the WTO on 21 November, 2001, free trade conditions are conducive to the export of products and the import of advanced technologies. The Sino-U.S. trade links are increasingly close and have common interests after joining the WTO. On the one hand, in 2002:02–2004:03, economic interdependence raises the opportunity cost of political conflicts, thereby encouraging national leaders to adopt a more cooperative foreign policy. On the other hand, China and the U.S. are important trading partners in this period, the high levels of common interest determine both governments and businesses to afraid to allow politics intervene in the economy. The expectation of peace relations between nations increases as the volume of trade increases. Expected commercial pressures will motivate governments to establish peaceful political relationships with trading partners. In the context of the continued expansion of Sino-U.S. bilateral trade, President George Walker Bush visited China in February 2002. In October of the same year, President Jiang Zemin visited the U.S. and the relationship between the two countries improved significantly.

In 2008:06–2009:02, the increase in Sino-U.S. bilateral trade has intensified political conflict. The reason is that the U.S. government adopted trade protectionism to implement sanctions against China to safeguard the interests of domestic enterprises during the 2008 financial crisis, and therefore worsened Sino-U.S. political relations. Specifically, although the Sino-U.S. bilateral trade volume continues to expand, the trade imbalance is also growing. Based on data from the U.S. Department of Commerce, China is the largest source of trade deficit in the U.S., which is believed to have led to higher U.S. unemployment. With the outbreak of the financial crisis,

the U.S. has more clearly promoted trade protectionism, and has successively promulgated the 'purchase of U.S. goods' clause and the 'fair trade' policy. These practices aim to curb the trade share of Chinese products and change the trend of the Sino-U.S. trade deficit expansion. Since 2008, the U.S. government has filed more and more trade lawsuit against China, and the industries involved have become more extensive. In trade liberalization and fair trade, the U.S. has set various trade barriers for China. In 2009, President Barack Hussein Obama also avowed that a stronger position should be adopted on the issue of trade and RMB exchange rate, to enhance the competitiveness of the U.S. commodities. Trade sanctions have worsened political relations between nations, which can escalate into conflict. In general, the essence of trade protectionism is that the country which is less dependent on bilateral trade impose their political goals on another country. In addition to this, bilateral trade can trigger political conflicts because it can cause friction between traders, who compete for limited markets or scarce resources.

Except for 2002:02–2004:03 and 2008:06–2009:02, bilateral trade has no significant impact on political conflict between China and the U.S. This denotes that the Sino-U.S. political relations are not excessively dependent on bilateral trade. First, national leaders do not fully rational consider the dependence of bilateral trade, when dealing with diplomatic relations, especially in the period the presidential election. During this period, the economy serves politics and government decision-making is less dependent on the economy. Second, if government is facing a political crisis, even if the opportunity cost of conflict is high, political conflict will still occur in order to transfer domestic contradictions. Third, in some core interests, such as territorial sovereignty, bilateral trade has little impact on political conflict.

We also examined the causality from political conflict to bilateral trade, which is highlighted in [Figures 4](#) and [5](#). It reveals that political conflict has a significant impact on bilateral trade in sub-sample 2002:01–2002:03; 2003:08–2003:12; 2008:05–2009:04 and 2013:04–2014:07. It can be noticed, in [Figure 5](#), that both positive effects (2002:01–2002:03; 2003:08–2003:12) and negative effects (2008:05–2009:04; 2013:04–2014:07) occur from political conflict to bilateral trade.

In 2008:05–2009:04, the negative effects imply that Sino-U.S. bilateral trade will suspend, or rapidly reduce once countries are engaged in severe political conflict. As we mentioned above, during the 2008 financial crisis, the U.S. implemented trade protectionism, which led to political tensions between China and the U.S. In turn, the growing political conflict will further worsen bilateral trade. With increasing hostility, traders will face political pressures, which may completely block trade exchange, in extreme cases. In addition, the relative gains concerns lead to the drastic halt or reduction of bilateral trade between enemy parties, after the political conflict break out. When political relations deteriorate, importers and exporters may suffer additional expenses such as insurance premiums, traffic and market expenses. However, in 2013:04–2014:07, although the coefficients are also negative, compared to the first two sub-samples, it means that the reduction of political conflict has improved bilateral trade. The Sino-U.S. relations have remained stable at this stage. In June 2013, President Xi Jinping was invited to meet President Barack Hussein Obama and at this meeting they reach an important consensus on building a 'new model of major



The results of 2002:01–2002:03 and 2003:08–2003:12 present that Sino-U.S. political conflict favors the expansion of bilateral trade. During the same period of deterioration in political relations, the economic relationship between China and the U.S. became increasingly interdependent. This is in stark contrast to the conclusion that the conflict described above jeopardizes trade. In April 2001, Sino-U.S. military aircraft collided in the South China Sea, and the relationship between the two countries was suddenly tense. In 2002:01–2002:03, political conflict can lead to a decline in trade, but this effect is offset due to China joined the WTO. It can even be considered that the benefits of joining the WTO are far greater than the negative influences of political conflict on bilateral trade. Although the Chinese government rhetorically protested after the collision of military aircraft, it imposes no substantial sanctions on the U.S. The different positions in the Iraq war, and allowing the Taiwan leader to transit, have caused the deterioration of political relations in 2003, but the Sino-U.S. bilateral trade does not fall in 2003:08–2003:12. The reason for this result may be due to the U.S. allies strongly opposed any intervention, without United Nations support, during the Iraq war, which caused the U.S. to be strongly dissatisfied with its allies. As the U.S. boycotted allies' goods, its import and export turned to China, and the Sino-U.S. bilateral trade volume increased.

By the bootstrap rolling window causal test, we establish that the political conflict is not the Granger cause of bilateral trade more than half of the time. While conflicts frequently bring about temporary declines in bilateral trade, in most cases conflicts do not have permanent long-term impact on trade relations. This indicates that the causal relationships are complicated and depend on whether the trader has enough determination to sacrifice own interests to serve country's politics. First, traders lack the motivation to link politics and the economy. Davis and Meunier (2011) argue that the sunk costs of investment and trade reduce the likelihood that governments, companies and consumers will change their choice in political conflicts. Once companies have built exports to a specific market, it is difficult for them to change their trade patterns quickly (Helpman, Melitz, & Yeaple, 2004). In the context of globalization, the sunk costs can be seen as a buffer for absorbing political conflicts. The trade volume between China and the U.S. reached 558.39 billion in 2015. If bilateral trade is cut due to political conflicts, it will cause huge sunk costs, which will bring irreparable losses to traders. Second, traders pay close attention to political relations between countries and update their expectations regarding possible future conflicts. Once they believe that there is a high probability of a conflict, they will adjust their trade policies in a timely manner. Specifically, suppose the businessmen of the U.S. and China rationally predict that the political relations between the two countries will deteriorate, and they may decide to increase trade now or transfer trade to a third country (Li & Sacko, 2002; Morrow et al., 1998). If the conflict does occur, the relevant trade adjustments have been completed and will not affect the current trade volume (Schneider & Troeger, 2006). Third, the increase of multinational companies create mutual benefit and identities, which reduce the response to political conflict. Those companies that trade with foreign affiliates are unlikely to punish their own subsidiary (Davis & Meunier, 2011). For the consumers, if they give up a priority project is costly, they are unlikely to participate in the boycott. Rational consumers are not



willing to sacrifice extra benefits for boycotts (Klein, Smith, & John, 2004). At the same time, the conflict between China and the U.S. is overall controllable, so political conflict will not have much impact on bilateral trade. Both governments hope to minimize political conflicts and fear that Sino-U.S. nationalism will evolve into a large-scale destabilizing movement, which might disruption of bilateral economic relations. Finally, trade protectionist countries tend to use more trade barriers to deal with political conflicts. However, with the extensive development of economic liberalization, the relation between politics and economy is no longer close, this means that political conflict has little impact on bilateral trade (Kastner, 2007). The government rarely interfere in economic activities directly for political reasons. It is difficult to implement politicized trade policies arbitrarily nowadays, such as using boycotts or sanctions to deal with political conflicts.

In addition, we have also considered the important role of WTO. When a dispute arises with a member of the WTO, the trade dispute settlement mechanism of the organization is used to resolve possible trade disputes between members. Joining the WTO is conducive to reducing the political conflict risks faced by traders because they can prosecute the host country via international arbitration. In the context of the unstable Sino-U.S. political relations, WTO can minimize the adverse effects on the U.S. or Chinese traders. In summary, the impact of political conflict on bilateral trade should not just be thought out from the positive or negative connection between them, we must also consider special conflict events or economic backgrounds in order to accurately assess complex Sino-U.S. relations.

## 7. Conclusions

This study tests the causality between Sino-U.S. political conflict and bilateral trade in order to highlight whether political conflict can affect bilateral trade or vice versa. We find that the increase in bilateral trade leads to either conflict or cooperation, and in turn, a change in political conflict causes increase or decrease in bilateral trade value. It indicates that we cannot just regard the relationship between them as negative or positive, and ought to integrate it with the actual situation of Sino-U.S. relations. In most of the sub-samples, the findings are not in accordance with Polachek's (1992) models who argue that the influence of bilateral trade on political conflict is stable and negative. Both China and the U.S. need to view each other objectively and strengthen trade cooperation in order to maintain a stable political relationship.

There are several contributions of this study. To begin with, this paper probes the dynamic causal nexus between political conflict and bilateral trade empirically based on Sino-U.S. relations. As the world's largest economy, China and the U.S. share many common interests. The two countries have a special responsibility for defending world peace and safeguarding the global trading system. The deterioration of political relations may harm the welfare of both peoples and businesses. The expectation of peace relations between nations increases as the volume of trade increases. Expected commercial pressures will motivate governments to establish peaceful political relationships with trading partners. In the face of a severe world economic situation, we think that China and the U.S. governments should seek common ground of economic

interests in order to promote the sound development of political relations. Secondly, our results help to motivate policy makers and government to resolve trade disputes. This is mainly because the intensification of political conflicts will have an adverse influence on economic relations and traders, private actors wishing to benefit from continued bilateral trade will lobby to limit the state participation in conflicts. China and the U.S. should understand each other, strengthen dialogue between political system and political culture, and establish strategic trust relationship to safeguard common interests. Policymakers should also actively considering the role of political relations in promoting bilateral trade and resolve trade disputes through political means. Finally, the previous literature exclusively turn to account the full-sample causality estimation. The bootstrap rolling-window approach is distinctive from most conventional mathematical methods such as pulse impulse response methods (correlation analysis and Granger causality, etc.), which cannot identify full-sample and sub-sample relationships between time series and cannot reveal how such relationships change over time. The result may not be accurate because the structural changes in the time series are not taken into account. Structural changes can make the dynamic causality of time series unstable between different sub-samples (Balcilar et al., 2010). This can be addressed by allowing the causal relationship between the two series to be time-varying instead of using full-sample data that assume the single causality holds in every time period. The time-varying nature that may exist in the causal link between political conflict and bilateral trade has been taken fully into consideration in this paper. Instead of just testing for causality on the full-sample, which assumes a permanent causal relationship, we also test for causality on the rolling sub-sample with a fixed-size window, thus allowing us to capture structural changes in the model and the evolution of causality between sub-periods. The results indicates that there is a two-way causal nexus between Sino-U.S. political conflict and bilateral trade.

## Notes

1. The Institute of International Relations of Tsinghua University has quantified the Sino-U.S. bilateral relationship since January 1950. The database has been updated to May 2018.
2. To prove the result of this study is robust, we also use the window widths of 20-, 30- and 36-months to explore the causality, and the results are consistent with the 24 month window.
3. According to the Sino-U.S. Political Relations Index assessed by the Institute of International Relations of Tsinghua University, the larger the value indicates that the political conflict is smaller, so the positive or negative correlation shown by the coefficient of Figure 3 is opposite to the true result. In other words, a negative coefficient means positive correlation and vice versa.

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