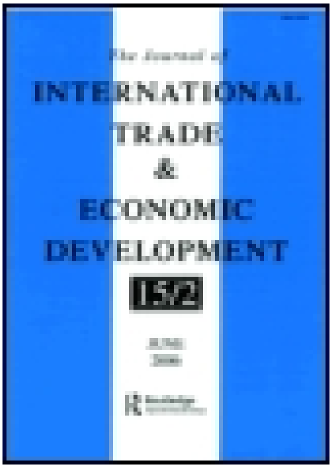
Impact of political dispute on international trade based on an international trade Inoperability Input–Output Model: A case stu....

Article *in* Journal of International Trade and Economic Development · April 2015

DOI: 10.1080/09638199.2015.1019552

Xianhua Wu
Nanjing University of Science and Technology

Guo Wei
University of North Carolina at Pembroke



The Journal of International Trade & Economic Development: An International and Comparative Review
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rjte20

Impact of political dispute on international trade based on an international trade Inoperability Input-Output Model: A case study of the 2012 Diaoyu Islands Dispute

Xianhua Wu[a], Yingying Wang[a], Lingjuan Yang[a], Shunfeng Song[bc], Guo Wei[d] & Ji Guo[a]
[a] Climate and Weather Disasters Collaborative Innovation Center, School of Economics and Management, Nanjing University of Information Science & Technology, Nanjing, China
[b] Department of Economics, College of Business, University of Nevada, Reno, NV, USA
[c] School of Economics and Management, Tianjin Chengjian University, Tianjin, China
[d] Department of Mathematics & Computer Science, University of North Carolina at Pembroke, Pembroke, NC, USA
Published online: 07 Apr 2015.

To link to this article: http://dx.doi.org/10.1080/09638199.2015.1019552

The Journal of International Trade & Economic Development, 2015
http://dx.doi.org/10.1080/09638199.2015.1019552

Routledge
Taylor & Francis Group

Impact of political dispute on international trade based on an international trade Inoperability Input-Output Model: A case study of the 2012 Diaoyu Islands Dispute

Xianhua Wu[a*], Yingying Wang[a], Lingjuan Yang[a], Shunfeng Song[b,c], Guo Wei[d] and Ji Guo[a]

[a]*Climate and Weather Disasters Collaborative Innovation Center, School of Economics and Management, Nanjing University of Information Science & Technology, Nanjing, China;* [b]*Department of Economics, College of Business, University of Nevada, Reno, NV, USA;* [c]*School of Economics and Management, Tianjin Chengjian University, Tianjin, China;* [d]*Department of Mathematics & Computer Science, University of North Carolina at Pembroke, Pembroke, NC, USA*

(*Received 2 October 2014; accepted 27 January 2015*)

While political disputes occur frequently and widely among many countries, their impact on the international trade is unclear and less systematically investigated. Considering the 2012 Diaoyu Islands Dispute, under several premised assumptions, this paper applies the international trade Inoperability Input-Output Model to determine the indirect economic loss and to screen out Chinese industries that are sensitive to the dispute. Results based on Leontief's technical coefficients matrix show that the total indirect economic loss of China's gross trade is between RMB 540.4226 billion and RMB 1023.3068 billion. Industries that are sensitive to the dispute include electrical equipment and machinery, general special equipment manufacturing, metal smelting and rolling processing, manufacture and processing of metals and metal products, and chemical. The empirical findings suggest that China establish an early-warning mechanism and trade assistance system, so that key industries that were damaged could be properly compensated.

Keywords: political dispute; Diaoyu Islands Dispute; international trade; Inoperability Input-Output Model; indirect economic loss evaluation

JEL Classifications: C67, F14

1. Introduction

The breadth and depth of Chinese economic development, especially with the country's access to the World Trade Organization, expanded steadily since the beginning of reform and opening in 1978. Official data indicate that the gross

*Corresponding author. Email: wxh77nuist@126.com

value of Chinese imports and exports exceeded that of the United States in 2012, which made China the largest trading nation in the world.[1] The country's volume of foreign trade is at a record high and drives the up-rush of domestic economic growth. Foreign trade dependency is rising simultaneously. However, higher foreign trade dependence results with the world economy having a stronger effect on the domestic economy (Zhang 2011). China's foreign trade will affect domestic production and consumption once a larger foreign trade fluctuation event occurs.

The Diaoyu Islands Dispute of 2012 is one of the political disputes which resulted in foreign trade fluctuations in China. Although never dormant the conflict which began in the 1970s, Sino–Japan Diaoyu Islands Dispute reached a climax in 2012. Anti-Japanese sentiments of the Chinese continued to run high after the dispute. Consequently, the Sino–Japanese bilateral trade relationship deteriorated, and domestic enterprise production and business operation risk increased. According to the China news IT channel, the monthly sales of Japanese TV sets in some enterprises fell sharply in Beijing, Shanghai, and Guangzhou in August 2012. The sales of Toshiba, Sanyo, Panasonic, and Sharp TV sets fell by 40.31%, 44.32%, 23.41%, and 40.31%, respectively.[2] According to China Automobile Industry Association, Japanese automobile sales have registered a 9.44% decrease since 2012. The market share of Japanese cars has also fallen by 2.99% since 2012.[3] The Diaoyu Islands Dispute affected China's economy and this study examines the degree of the correlation effect and the estimated impact.

Mutual dependence between countries has gradually deepened due to the acceleration of the economic globalization process and the development of trade liberalization. Emergencies in a globalized world can be the reason for trade fluctuations in many countries. Studies and exploratory trials have been carried out for analyzing the impacts of different emergencies. These emergencies can be classified into three categories: natural disasters, economic crises, and social and national security incidents. For the first category, natural disasters impact international trade through damage of physical capital and equipment, injuries of human resources, and emergence of aid and reconstruction. Yang (2008) found that hurricanes lead to large increases in foreign aid to developing countries, but for other types of international financial flows, the impact of hurricanes varies according to the income level. Gassebner, Keck, and Teh (2010) conservatively estimated an additional disaster reduced imports on average by 0.2% and exports by 0.1%. Felbermayr and Groschl (2013) measured the interaction of foreign natural disasters with geography in a modified gravity framework, and found a robust positive effect of trade on income, when controlling for constant determinants of income by means of fixed effects.

Within the second category, economic crises, the literature focuses on the transmission channels of economic crises' impact on international trade. Chor and Manova (2012) was one of the first to establish and quantify the effect that credit conditions had on international trade during the 2008–2009 global financial crisis. Haidar (2012) innovatively considered the international trade perspective to model currency crisis transmission or a spillover effect generation between countries. Le and Chang (2013) examined whether a large part of the variability of trade balances and their oil and non-oil components was associated with oil price fluctuations.

For the third category, conflicts such as wars and national security incidents usually induce interruptions of trade connections and reduce the trade volume. This view is supported by most of the studies (Alston, Kearl, and Vaughan 1992; Mansfield and Bronson 1997; Anderton and Carter 2001; Keshk, Pollins, and Reuveny 2004; Long 2008; Glick and Taylor 2010; Qureshi 2013; Bashir 2013; Fuchs and Klann 2013). For example, Bashir et al. (2013) analyzed the impact of foreign political instability abroad (political safety, revolutionary wars, and adverse regime change) on Chinese exports, and concluded that an adverse regime change has a negative and statistically significant impact on Chinese exports. Fuchs and Klann (2013) investigated the extent to which bilateral tensions affected trade with autocratic China to examine the 'Dalai Lama Effect', reduction in exports to China for those countries officially receiving the Dalai Lama at the highest political level. In contrast, some scholars deemed that there was no statistically significant evidence of any negative effect of conflict on international trade (Morrow, Siverson, and Taberes 1998, 1999; Barbieri and Levy 1999; Mansfield and Pevehouse 2000).

The reasons for inconsistent conclusions of these studies may lie in the differences in methods, variables, and samples used. The majority of the studies adopted the econometric models such as interrupted times-series models and gravity models. Furthermore, the results of these models are highly dependent on the selection of control variables and samples used. Moreover, these samples with a complicated background are difficult to be compared historically (Glick and Taylor 2010). Therefore, the specific case studies may be novel solutions to handle the controversial issues. For example, Adams et al. (1996) and Adams et al. (2000) studied the medium-term and long-term effects of the elimination of tariff barriers among the Asia-Pacific Economic Cooperation members on Australia's and China's economies using CGE (Computable General Equilibrium) models. Bao et al. (2013), Naude and Rossouwc (2008), and Lai and Li (2007) applied CGE models to analyze the influence of tariff changes on China's macro economy and industry. Jung, Santos, and Haimes (2009) constructed and applied the international trade Inoperability Input-Output Model, estimating the comprehensive loss of the 10 day shutdown of the Los Angeles port in 2002 to be USD19.4 billion. Tang, Song, and Zhou (2012) improved the IMPLAN system to analyze the economic effect of an assumed emergency shock on Chinese industries, and concluded that the impacts of different industries affected by an emergency shock were not identical.

Compared with other methods, the Inoperability Input-Output Model (IIM) based on Wassily Leontief's (1951) input-output model has clear advantages. First, IIM has a relatively simple structure but is capable of describing the effects of disruptions to interdependent systems (Santos 2006). Second, detailed inter-industry linkages are helpful in analyzing the loss of each industry and selecting highly sensitive industries, which is very important for policy–makers in international relations (Okuyama 2003). Third, analytical techniques such as an 'inoperability' metric can be used to quantify the magnitude and extent of impact of conflict on international trade (Santos 2006). In addition, the data for the case study are usually easy to obtain. Based on the considerations outlined above, this study adopts IIM to calculate China's indirect economic losses caused by the Diaoyu Islands Dispute.

The Diaoyu Islands Dispute in 2012 is a national conflict event. However, few studies quantitatively estimated the indirect industry loss in an economy due to the trade fluctuations. As a disturbance event in international trade, the Diaoyu Islands Dispute inevitably causes loss to China and Japan. Quantitative assessment of the indirect economic loss can contribute to a more comprehensive understanding of the effects of the dispute and provide empirical support for China's policy–making in international relations and international trade. The results can also provide a reference for perfecting the industry's early warning, monitoring, and rescue system as well as for helping the Chinese react rationally toward the Diaoyu Islands Dispute. Therefore, this paper attempts to do some useful exploration in this aspect.

2. Model and hypothesis

2.1. *Inoperability Input-Output Model*

Haimes et al. (2005a) utilized the traditional Leontief matrix to introduce IIM for analyzing the extent of the economic system function failure caused by disaster events, such as natural disasters and man-made destruction.

The demand-based IIM is defined as

$$Q = A * Q + C*, \tag{1}$$

where Q is the demand-based inoperability vector, which is defined as the percentage of economic loss on expected output when the industrial economic system is affected by disaster events. In detail,

$$Q = [\mathrm{diag}(\bar{x})]^{-1}[\bar{x} - \tilde{x}] \Leftrightarrow \left\{ q_i = \frac{\bar{x}_i - \tilde{x}_i}{\bar{x}_i} = \frac{\delta x_i}{\bar{x}_i} \right\}, \tag{2}$$

where $\bar{x}_i$ is defined as the counterfactual industry total production of department$i$. The real industry total production of department$i$is represented by $\tilde{x}_i$. That is, 0 in $q_i \in [0, 1]$ means that the industrial economic system functions are exerted normally, whereas 1 means that the function of the industrial economic system is totally disabled.

A^* is the demand-based interdependency matrix, defined as the proportion of department i loss due to the real demand of department j in the Leontief input–output table. That is,

$$A^* = [\mathrm{diag}(\bar{x})]^{-1}[A][\mathrm{diag}(\bar{x})] \Leftrightarrow \left\{a_{ij}^* = a_{ij}\frac{\bar{x}_j}{\bar{x}_i}\right\}, \tag{3}$$

where a_{ij} is the element of the Leontief technology coefficient matrix.

C^* is the demand-based perturbation vector, defined as the proportion of the real final demand caused by disaster events in the industrial economic system. That is,

$$C^* = [\mathrm{diag}(\bar{x})]^{-1}[\bar{c} - \tilde{c}] \Leftrightarrow \left\{c_i^* = \frac{\bar{c}_i - \tilde{c}_i}{\bar{x}_i} = \frac{\delta c_i}{\bar{x}_i}\right\}, \tag{4}$$

where $\bar{c}_i$ is defined as the counterfactual industry total demand of department i. The real industry total demand of department i is represented by $\tilde{x}_i$. That is, 0 in $c_i^* \in [0, \frac{\bar{c}_i}{\bar{x}_i}]$ means that the industrial economic system demand remains unchanged, and $\frac{\bar{c}_i}{\bar{x}_i}$ means that the demand of the industrial economic system has reached a minimum.

Indirect economic loss refers to the unrealized production capacity affected by the industrial economic system function failure because of disaster events. It is expressed as follows:

$$S = \sum_{i=1}^{n} \bar{x}_i q_i. \tag{5}$$

2.2. International trade Inoperability Input-Output Model (ITIM)

This study estimates China's indirect economic loss due to the trade disturbance caused by the Diaoyu Islands Dispute, using the international trade Inoperability Input-Output Model (ITIM) proposed by Jung, Santos, and Haimes (2009). This model includes three important concepts on which we will elaborate, namely, indirect economic loss, gross trade economy (GTE), and the inoperability ratio.

(1) *Indirect economic loss*. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China and Standardization Administration of the People's Republic of China published the book *Assessment Methods of Earthquake-Caused Indirect Economic Loss* (GB/T 27932-2011) in 2011. This book defines the indirect economic loss of earthquake disasters as 'the economic loss due to the disturbance of normal social economic activities, which are indirectly

affected by earthquake disaster, including enterprise production stop and reduction loss, industry association loss, land loss, and so on'. This study argues that the Diaoyu Islands Dispute caused a significant negative effect on the Sino–Japanese trade and could be regarded as a disaster event in international trade. Due to limited data, the indirect economic loss proposed in this research mainly refers to the industry association loss.

(2) *Gross trade economy* (GTE). This concept combines the gross domestic product (GDP) and the gross value of total final goods and services produced by a country or region, namely, imported products and services. GTE is defined as

$$\mathrm{GTE} = \mathrm{GDP} + M, \tag{6}$$

where GDP is defined as

$$\mathrm{GDP} = C + I + G + X - M, \tag{7}$$

where C is consumption, I is investment, G is government expenditure, X is exports, and M is imports.

Then,

$$\begin{aligned}\mathrm{GTE} &= \mathrm{GDP} + M \\ &= C + I + G + X - M + M \\ &= C - M + I + G + X + M \\ &= DD + X + M, \end{aligned} \tag{8}$$

where DD is the combination of domestic consumption, investment, and government expenditure. GTE reflects the effect of international trade on the national or regional industrial economic system. The definition of GTE indicates that the economic system differs from the conception of the traditional domestic economic system, which is composed of two parts. The first part is composed of domestic consumption, investment, and government purchase, and the second part is international trade.

(3) *Inoperability ratio*. This study defines the inoperability ratio based on Haimes et al. (2005a, 2005b). The inoperability ratio is the percentage of the impaired part of the original system, after the system is affected by disasters.

Based on the above equations (these definitions), we can calculate the indirect economic loss and the inoperability ratio of the industrial economic system of China caused by the Diaoyu Islands Dispute. Statistics that indicate whether imports are used as intermediate inputs or for final consumption are not available. Therefore, two cases are defined in the ITIM model. In Case 1, all imports are used only by domestic industries as intermediate inputs. The inoperability ratio of the industrial economy system reaches the maximum at the moment. In Case 2, all imports are only used by domestic consumers for final consumption. The inoperability ratio of the industrial economy system is at the minimum at present.

Case 1: All imports are used only as intermediate inputs. The inoperability ratio of the industrial economy system is defined as

$$q^{T.1} = A^T * q^{T.1} + C^{T.1}, \tag{9}$$

where $q^{T.1}$ is the inoperability ratio of the industrial economy system in Case 1. It is defined as the percentage of the real industry total production at the counterfactual system function level after a system has been affected by disasters. That is,

$$q^{T.1} = [\mathrm{diag}(\bar{x}^T)]^{-1}[\bar{x}^T - \tilde{x}^T] \Leftrightarrow \left\{ q_i = \frac{\bar{x}_i^T - \tilde{x}_i^T}{\bar{x}_i^T} = \frac{\delta x_i{}^T}{\bar{x}_i^T} \right\}, \tag{10}$$

$$\bar{x}^T = \bar{x} + \bar{m}, \bar{x} = A\bar{x} + \bar{f}, \tag{11}$$

$$\tilde{x}^T = \tilde{x} + \tilde{m}, \tilde{x} = A\tilde{x} + \tilde{f}, \tag{12}$$

where $\bar{x}^T$ is defined as the counterfactual industry total production when the industrial economic system function is performing normally. This variable is generated by the counterfactual GTE. The real industry total production is represented by $\tilde{x}^T$ when the industrial economic system function is inoperable. The counterfactual industry total import vector is represented by $\bar{m}$, and $\tilde{m}$ is the real industry total import vector.

A^T is the international trade demand-based interdependency matrix, which is defined as the proportion of department less i due to the real demand of department j in the domestic industrial economic system. That is,

$$A^T = [\mathrm{diag}(\bar{x}^T)]^{-1}[A][\mathrm{diag}(\bar{x}^T)] \Leftrightarrow \left\{ a_{ij}^T = a_{ij}\frac{\bar{x}_j^T}{\bar{x}_i^T} \right\}, \tag{13}$$

where a_{ij} is the element of the Leontief technology coefficient matrix.

$C^{T.1}$ is the international trade perturbation vector, which is defined as the proportion of the real international trade final demand caused by disaster events. That is,

$$C^{T.1} = [\mathrm{diag}(\bar{x}^T)]^{-1}[\bar{r} - \tilde{r}] \Leftrightarrow \left\{ c^{T.1} = \frac{\bar{r}_i - \tilde{r}_i}{\bar{x}_i^T} = \frac{\delta r_i}{\bar{x}_i^T} \right\}, \tag{14}$$

$$\bar{r} = \bar{e} + \bar{m}, \tag{15}$$

$$\tilde{r} = \tilde{e} + \tilde{m}, \tag{16}$$

where $\bar{e}$ is the counterfactual industry total export vector and $\tilde{e}$ is the real industry total export vector. The counterfactual industry total import and export vector is represented by$\bar{r}$, and $\tilde{r}$ is the real industry total import and export vector.

Indirect economic loss is defined in the following equation based on the counterfactual industry total production $\bar{x}^T$ and the inoperability ratio $q^{T.1}$:

$$S^{T.1} = \sum_{i=1}^{n} \bar{x}_i^T q_i^{T.1} (n = 1, 2, \ldots, 42). \tag{17}$$

Case 2: All imports are used only for final consumption and have no effect on domestic industry production activities. In this case, indirect economic loss caused by imports and exports fluctuation is composed of two parts. The first part is the effect of exports on domestic industry production and final consumption, and the second part is the effect of imports on domestic consumption. The inoperability ratio of the industrial economy system is defined as

$$q^{T.2} = q^E + q^{M.2}, \tag{18}$$

where $q^{T.2}$ is defined as the inoperability ratio in Case 2, q^E is the inoperability ratio caused by exports, and $q^{M.2}$ is the inoperability ratio caused by imports. That is,

$$q_i^{M.2} = \frac{\bar{m}_i - \tilde{m}_i}{\bar{x}_i^T} = \frac{\delta m_i}{\bar{x}_i^T}, \tag{19}$$

$$q_i^E = \frac{\bar{x}_i^E - \tilde{x}_i^E}{\bar{x}_i^T} = \frac{\delta x_i^E}{\bar{x}_i^T}, \tag{20}$$

$$\bar{x}^E = A\bar{x}^E + \bar{e}, \tag{21}$$

$$\tilde{x}^E = A\tilde{x}^E + \tilde{e}, \tag{22}$$

where $\bar{x}^E$ is the counterfactual industry total exports generated by the domestic industrial economy system and $\tilde{x}^E$ is the real industry total exports generated by the domestic industrial economy system.

Indirect economic loss in Case 2 is defined based on the counterfactual industry total production $\bar{x}^T$ and the inoperability ratio $q^{T.2}$ as follows:

$$S^{T.2} = \sum_{i=1}^{n} \bar{x}_i^T q_i^{T.2} (n = 1, 2, \ldots, 42). \tag{23}$$

Equations (17) and (23) provide the final interval for indirect economic loss: $[\sum_{i=1}^{n} \bar{x}_i^T q_i^{T.2}, \sum_{i=1}^{n} \bar{x}_i^T q_i^{T.1}]$.

2.3. Hypothesis

It is well known that many factors affected the Sino–Japanese trade. Because the relevant data are unavailable, to simplify the calculation of the ITIM model, three assumptions are presented.

H1: We do not consider influences of macroeconomic conditions and the domestic factors within China and Japan. For instance, we neglect the decline in global demand, domestic industrial structure adjustments within China and Japan, and the latest Japanese earthquake all of which may have created fluctuations in the Sino–Japanese trade.

H2: The 2012 Diaoyu Islands Dispute is the only factor that may result in a significant fluctuation in the Sino–Japanese trade. That is to say, recent historical data can be used to linearly predict the 2012 Sino–Japanese trade volume.

H3: In order to simplify the calculations, the import goods are used only for two scenarios, namely, intermediate inputs and final consumption. The scenario that part of import goods be used as intermediate inputs and part for final consumption is not considered.

3. The data

The input–output table is derived from the 2007 input–output table of China's 42 departments, as provided by the National Economy Accounting Department of the National Bureau of Statistics of the People's Republic of China (2009a,2009b). The Sino–Japanese import and export data from 1997 to 2012 are taken from the official websites of the Ministry of Commerce of the People's Republic of China (2013), the General Administration of Customs of the People's Republic of China (2013), and China Customs Statistics (2013).

Trade statistics use the dollar value of goods as statistical units, and the input–output table of China uses the renminbi (RMB). Therefore, currency conversion is required. The dollar and RMB exchange rate data from 1997 to 2012 are taken from the official website of the Financial Survey and Statistics Department of the People's Republic of China (Statistics and Analysis Department of the People's Republic of China 2013). In order to eliminate the influence of price factors, this study adopts the deflator statistics according to China Import and Export

Commodity price indexes and GDP deflators using 1997 as the base year. China Import and Export Commodity price indexes from 1997 to 2012 are derived from *China's Foreign Trade Index 1993–2004* and *2005–2012 Monthly China's Foreign Trade Index*, and GDP deflators are derived from *China Statistical Yearbook 2013* (The National Bureau of Statistics of the People's Republic of China 2013).

The Sino–Japanese trade statistics are classified into 22 chapters and 98 major categories. This classification is based on the 2012 Customs Tariff of the People's Republic of China, which was drafted by the General Administration of Customs Import and Export Tariff Commission of China (2012). Based on the 2007 Chinese input–output table, import and export commodities were merged and then sorted into 42 industry departments to facilitate calculation.

4. Empirical analysis

4.1. Outline of the impact of the 2012 Diaoyu Islands Dispute

Sino–Japanese trade has developed rapidly since 2001. The total trade volume increased from USD87.73 billion in 2001 to USD329.46 billion in 2011, which is equivalent to an increase of about 3.8 times. The world economy gradually recovered after the global financial crisis in 2009. The total trade volume of Sino–Japanese trade registered a year-on-year growth of 30.2% and 15.1% in 2010 and 2011, respectively. However, Japan faced a series of economic problems, such as the appreciation of the yen, the European debt crisis, and the post-earthquake reconstruction. The Diaoyu Islands Dispute was another blow to Japan's weak domestic economy. In consequence, the Sino–Japanese gross bilateral trade fell by USD13.4371 billion and the volume of imports fell by USD16.7817 billion.

According to Zheng Yuesheng, chief of the General Administration of Customs Statistics Division of China:

> Chinese exports to Japan rose by only 2.3% in 2012, whereas imports from Japan fell 8.6%, Japan has been reduced to be the fifth largest trade partner of China. It can't be said that it has nothing to do with the Diaoyu Islands Dispute.[4]

In a speech in the United States, Tokyo's Governor Shintaro Ishihara made a government proposal to 'purchase' the Diaoyu Islands for the first time on 16 April 2012. The Diaoyu Islands Dispute intensified since then, and the Chinese anti-Japanese sentiments ran high. On 10 September 2012, the Japanese government officially decided to buy three islands in Diaoyu at the price of 2.05 billion yen and nationalized them. The Diaoyu Islands Dispute comprehensively deepened. An outbreak of large-scale anti-Japanese demonstrations in multiple areas of China erupted, such as Beijing, Shanghai, Xi'an, Zhengzhou, and Chengdu. People claimed that they were defending the sovereignty of the Diaoyu Islands. An overall boycott of Japanese goods also occurred.

The growth of the Sino–Japanese exports and imports trade volume declined as the Diaoyu Islands Dispute intensified. A majority of imports from Japan demonstrated a downward trend, with the exception of a few goods. For example, the mechanical and electrical equipment and parts volume fell by 12.91% on a yearly basis; the base metals and products volume fell by 8.94% each year; the vehicle, aircraft shipping, and transportation equipment goods volume fell by 8.58% each year. Table 1 presents the details.

4.2. Quantitative analysis of the impact of the 2012 Diaoyu Islands Dispute

This study quantitatively analyzes the indirect economic loss caused by the Diaoyu Islands Dispute by applying the ITIM. One challenge is to separate the effect of the Diaoyu Islands Dispute from those caused by other factors (such as the European debt crisis and the post-earthquake reconstruction), largely due to data limitations. To focus on the Diaoyu Islands Dispute, this article assumes that Japan's economy follows the historical trend in 2012 and the Sino–Japanese trade disturbance was mainly caused by the Diaoyu Islands Dispute.

Specifically, the calculation is carried out as follows. First, a regression analysis is conducted on the Sino–Japanese trade data from 1997 to 2011 to predict the counterfactual volumes of imports and exports between China and Japan in 2012, assuming that the Diaoyu Islands Dispute did not occur. Second, the ITIM is applied based on the difference between the real trade value and the counterfactual value of imports and exports between China and Japan in 2012 to determine the indirect economic loss and inoperability ratio of China's industrial economic system. Finally, the empirical results are used to screen out industries that are more sensitive to the Diaoyu Islands Dispute and to provide an appropriate policy analysis. With the Sino–Japanese trade data from 1997 to 2011, a linear regression model $y = \alpha x + \beta$ was developed to predict the counterfactual volumes of imports and exports for 2012. Here, x is the independent variable representing the year and y is the dependent variable representing the industrial output value. Due to space limitations, only electrical equipment and machinery regression models and related parameters are listed in Table 2 as examples.

Table 3 presents the real and counterfactual volumes of Sino–Japan imports and exports in 2012.

4.2.1. *Inoperability ratios*

In Case 1, all imports are used by domestic industries as intermediate inputs only. Based on equation (9), the inoperability ratio of the industrial economy system reaches the maximum of 3.15%. Accordingly, the total indirect economic loss amounts to RMB 1023.3068 billion. The top 10 industrial sectors seriously affected by the Diaoyu Islands Dispute, in terms of the inoperability ratio, include metal mining and dressing (9.42%), electrical equipment and machinery (8.81%), instruments, meters, and cultural and office machinery (7.70%), general special equipment manufacturing (7.49%), scrap waste (6.62%), manufacture and processing of metals and metal products (6.04%), petroleum and natural gas

Table 1. Comparison of Japanese imports in China in 2011 and 2012 (unit: %).

Category	2011 Imports (billion USD)	2011 Proportion of imports	2012 Imports (billion USD)	2012 Proportion of imports	Growth rate year-on-year
1. Live animals and live animal products	0.1627	0.0084	0.1753	0.0099	0.7719
2. Plant products	0.0558	0.0029	0.0668	0.0038	1.9719
3. Animal or vegetable fats, waxes, and prepared edible fats	0.0072	0.0004	0.0084	0.0005	1.5884
4. Food, beverages, spirits and vinegar, and tobacco and related products	0.1000	0.0051	0.1383	0.0078	3.8278
5. Minerals	2.7900	0.1434	2.4614	0.1384	–1.1777
6. Chemical industry and related Products	16.8618	0.8665	16.6348	0.9355	–0.1346
7. Plastics and related products and rubber and related products	13.4786	0.6927	12.7993	0.7198	–0.5040
8. Leather, fur and products, bags, and gut products	0.0808	0.0042	0.0738	0.0042	–0.8590
9. Wood and products, charcoal, cork, and knitting products	0.0304	0.0016	0.0264	0.0015	–1.3353
10. Cellulose pulp, waste paper, paper, and cardboard and related products	2.2191	0.1140	1.9261	0.1083	–1.3204
11. Textile materials and products	4.1261	0.2120	3.8796	0.2182	–0.5976
12. Shoes, hats, umbrellas, feather products, artificial flowers, and human hair products	0.0589	0.0030	0.0505	0.0028	–1.4219
13. Mineral materials products, ceramics, and glass and metal products	2.1753	0.1118	2.5906	0.1457	1.9088
14. Jewelry, precious metals and products, imitation jewelry, and coins	1.5816	0.0813	1.1038	0.0621	–3.0211
15. Base metals and related products	20.8446	1.0712	18.9814	1.0675	–0.8938
16. Mechanical, electrical, audio-visual equipment, and parts and accessories	93.8464	4.8228	81.7335	4.5967	–1.2907

(*continued*)

Table 1. (*Continued*).

Category	2011 Imports (billion USD)	2011 Proportion of imports	2012 Imports (billion USD)	2012 Proportion of imports	Growth rate year-on-year
17. Vehicles, aircraft, vessels, and transport equipment	18.0234	0.9262	16.4767	0.9267	–0.8582
18. Optical medical instruments, clocks and watches, and musical instruments	16.7889	0.8628	17.4320	0.9804	0.3830
19. Weapons, ammunition and parts, and accessories	0.0000	0.0000	0.0000	0.0000	130.0000
20. Miscellaneous products	1.0646	0.0547	1.0913	0.0614	0.2507
21. Art, collectibles, and antiques	0.0007	0.0000	0.0010	0.0001	3.4950
22. Special transactions and unclassified commodity	0.2935	0.0151	0.1580	0.0089	–4.6184

Note: The import amount of 19 class goods is USD1000 and USD14000, respectively, in 2011 and 2012, close to USD0 billion; the growth rate is 1300% year-on-year.
Source: http://www.chinacustomsstat.com

extraction (5.91%), metal smelting and rolling processing (5.82%), chemical (4.95%), and art products and other manufacturing (4.31%). In Case 2, all imports are used by domestic consumers for final consumption only. Based on equation (18), the inoperability ratio of the industrial economy system reaches a minimum of 1.66%. Accordingly, the total indirect economic loss amounts to RMB 540.4226 billion. The top 10 industrial sectors seriously affected by the Diaoyu Islands Dispute, in terms of the inoperability ratio, include electrical equipment and machinery (6.75%), general special equipment manufacturing (5.41%), instruments, meters, and cultural and office machinery (5.37%), manufacture and

Table 2. Regression models and related parameters of general special equipment manufacturing.

Department		Regression model	F	Significance F	R^2
Electrical equipment and machinery	Import	$y = 82.7993x + 653.5846$ (4.7270*) (5.4447*)	29.6447	0.0001	0.6952
	Export	$y = 91.3790x + 257.5363$ (13.7648*) (4.2667*)	189.4694	0.0000	0.9358

Notes: * represents the significance levels of 5%. The number in the brackets is the value of T-test.
Source: Author's calculations.

Table 3. Real and counterfactual Sino–Japan imports and exports in Japan in 2012 (in billion RMB).

Industrial sector	Imports: Real value	Imports: Counterfactual value	Exports: Real value	Exports: Counterfactual value
Agriculture, forestry and animal husbandry and fishery	0.7576	1.0493	25.4315	23.5443
Nonmetal minerals and other mining and dressing	1.0706	1.3509	3.1645	3.3404
Manufacture of foods, beverage, and tobacco	0.4183	0.4831	34.0797	36.6885
Textile	11.7372	11.5842	132.9982	151.6935
Garments, shoes, chapeau, leather, feather, and related products	0.3762	0.4715	27.9913	29.7590
Timber processing and furniture manufacturing	0.0798	0.1470	9.4658	11.1515
Papermaking, printing, stationery, education, and sports goods	6.8610	8.5859	23.8639	22.1336
Chemical	89.0497	109.9609	62.4344	72.2956
Manufacture of nonmetallic mineral products	14.2135	18.5291	23.6713	31.5697
Metal smelting and rolling processing	27.6110	39.0897	9.4054	14.5151
Manufacture and processing of metals and metal products	29.8152	41.2856	33.1501	40.3941
General special equipment manufacturing	108.6691	148.9429	129.5388	154.7085
Transportation equipment	49.8485	58.8878	20.3087	27.7581
Electrical equipment and machinery	138.6067	197.8373	165.5282	171.9600
Instruments, meters, and cultural and office machinery	52.3285	61.9061	30.5945	29.8948
Art products and other manufacturing	6.4981	9.0014	31.6000	34.8315

Note: The counterfactual and real values of the parts of industry sectors are zero and are not listed here, as the Sino–Japanese trade statistics are classified into 42 departments according to the input–output table.
Source: Author's calculations.

processing of metals and metal products (3.77%), textile (3.39%), art products and other manufacturing (3.25%), metal mining and dressing (2.79%), chemical (2.62%), metal smelting and rolling processing (2.18%), and petroleum and natural gas extraction (2.01%).

4.2.2. Indirect economic losses

Table 4 shows the indirect economic loss of the 42 industry sectors. In Case 1, the total indirect economic loss reaches the maximum RMB 1023.3068 billion when all imports are used as intermediate inputs only. The top 10 industrial sectors seriously affected by the Diaoyu Islands Dispute, in terms of their indirect economic loss, include metal smelting and rolling processing (RMB 140.4997 billion), general special equipment manufacturing (RMB 124.2577 billion), chemical (RMB 119.6790 billion), electrical equipment and machinery (RMB 113.1887 billion), electricity and hot power production and supply (RMB 45.5604 billion), manufacture and processing of metals and metal products (RMB 43.3719 billion), transportation equipment (RMB 40.0447 billion), textile (RMB 39.9194 billion), telecommunications equipment, computer, and others (RMB 32.6950 billion), and processing of petroleum, coking, and nuclear fuel (RMB 30.5098 billion).

In Case 2, the total indirect economic loss reaches the minimum of RMB 540.4226 billion when all imports are used only for final consumption. The top 10 industrial sectors seriously affected by the Diaoyu Islands Dispute, in terms of their indirect economic loss, include general special equipment manufacturing (RMB 89.6208 billion), electrical equipment and machinery (RMB 86.6607 billion), chemical (RMB 63.2756 billion), metal smelting and rolling processing (RMB 52.7533 billion), textile (RMB 34.1795 billion), manufacture and processing of metals and metal products (RMB 27.0619 billion), transportation equipment (RMB 25.8447 billion), manufacture of nonmetallic mineral products (RMB 17.2459 billion), electricity and hot power production and supply (RMB 15.8222 billion), and instruments, meters, and cultural and office machinery (RMB 13.8809 billion).

4.2.3. Highly sensitive industries

To better understand the sensitivity, the industry sectors are sorted according to their inoperability ratios and indirect economic losses in a two–dimensional span. More sensitive industries are defined as those industries with a higher inoperability ratio and a larger indirect economic loss. Figure 1 shows the industries that are most sensitive to the Diaoyu Islands Dispute in two cases.

In Case 1, where all imports are used only by domestic industries as intermediate inputs, there are 10 industries that always rank in the highest damaged 15 industries, whether the measure of inoperability ratio is employed or the measure of indirect economic loss is utilized. The total indirect economic loss to these 10 industries is RMB 729.7264 billion, accounting for 71.31% of the overall indirect economic loss to the domestic industry economic system. These industries are electrical equipment and machinery, general special equipment manufacturing, metal smelting and rolling processing, manufacture and processing of metals and metal products, chemical, metals mining and dressing, electricity and hot power production and supply, textile, petroleum and natural gas extraction, and processing of petroleum, coking, and nuclear fuel.

Table 4. Indirect economic loss due to the Diaoyu Islands Dispute (in billion RMB).

Industrial sector	Case 1	Case 2	Industrial sector	Case 1	Case 2
Agriculture, forestry, animal husbandry, and fishery	20.5313	10.6104	Scrap waste	11.5757	3.4814
Coal mining and dressing	16.7575	5.9013	Electricity and hot power production and supply	45.5604	15.8222
Petroleum and natural gas extraction	21.9598	7.4569	Gas production and supply	1.1751	0.3969
Metal mining and dressing	23.1103	6.8558	Water production and supply	0.9223	0.3217
Nonmetal minerals and other mining and dressing	5.2735	2.3658	Construction	0.6271	0.2162
Food making and tobacco processing	15.7654	8.1371	Transport and storage	23.9986	8.3204
Textile	39.9194	34.1795	Post	0.5169	0.1819
Garments, shoes, chapeau, leather, feather and related products	7.0330	4.3151	Information transmission, computer services, and software	4.6116	1.5076
Timber processing and furniture manufacturing	7.3017	4.0810	Wholesale and retail trades	17.3595	5.8417
Papermaking, printing, stationery, and education and sports goods	12.4139	3.8001	Hotels and catering services	7.0282	2.3788
Processing of petroleum, coking, and nuclear fuel	30.5098	10.3537	Financial intermediation	15.0559	5.2574
Chemical	119.6790	63.2756	Real estate	3.0064	1.0517
Manufacture of nonmetallic mineral products	26.0343	17.2459	Leasing and business services	8.6750	2.7811
Metal smelting and rolling processing	140.4997	52.7533	Research and experimental development industry	1.8986	0.5840

(*continued*)

Table 4. (*Continued*).

Industrial sector	Case 1	Case 2	Industrial sector	Case 1	Case 2
Manufacture and processing of metals and metal products	43.3719	27.0619	Polytechnic services	3.6612	1.2344
General special equipment manufacturing	124.2577	89.6208	Water conservancy, environment and public facilities administration industry	0.6172	0.2366
Transportation equipment	40.0447	25.8447	Resident services and other services	3.4813	1.2122
Electrical equipment and machinery	113.1887	86.6607	Education	0.6573	0.2298
Telecommunications equipment, computer, and others	32.6950	6.7055	Sanitation, social insurance, and social welfare industry	1.5175	0.5024
Instruments, meters, and cultural and office machinery	19.9018	13.8809	Culture, physical education, and entertainment industry	1.4327	0.4992
Products and other manufacturing	9.5502	7.2128	Public administration non-profit institution	0.1295	0.0461

Source: Author's calculations.

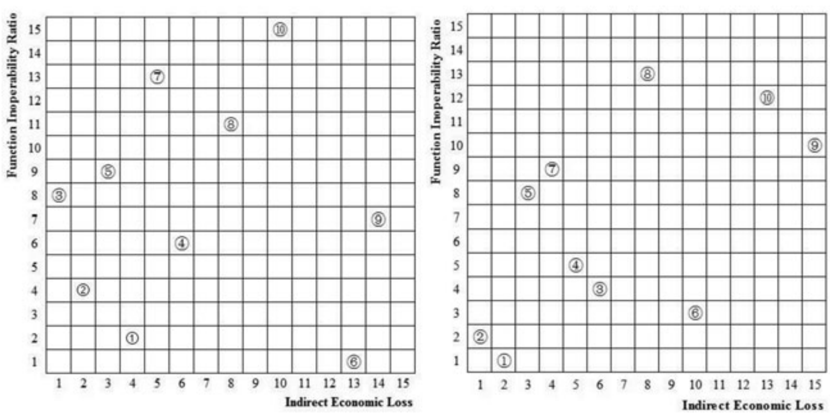


Figure 1. Highly sensitive industries affected by the Diaoyu Islands Dispute in Case 1 and Case 2. *Source*: Author's calculations.

In Case 2, where all imports are used by domestic industries for final consumption only, there are 12 industries with the top 15 values of the inoperability ratio and indirect economic loss dimensions. The total indirect economic loss to these 10 industries is RMB 426.3455 billion, accounting for 78.89% of the overall indirect economic loss of the domestic industry economic system. These industries are electrical equipment and machinery, general special equipment manufacturing, manufacture and processing of metals and metal products, textile, chemical, instruments, meters, and cultural and office machinery, metal smelting and rolling processing, manufacture of nonmetallic mineral products, petroleum and natural gas extraction, and transportation equipment.

The above results suggest that industries sensitive to the dispute include electrical equipment and machinery, general special equipment manufacturing, metal smelting and rolling processing, manufacture and processing of metals and metal products, and chemical. The high sensitivity of these industries may be associated with the commodity structure of Sino–Japanese bilateral trade. The main products that China imported from Japan in recent years are electrical machinery, general machinery, chemical products, raw materials products (e.g. steel, non-ferrous metals, etc.), and auto parts (e.g. engine, transmission, etc.). The main products that China exports to Japan are electrical machinery, general machinery, chemical products, metal products, textiles, and food (Liu 2011). Highly sensitive industries are related to these major Sino–Japanese bilateral trading goods. Comparing the highly sensitive industries with the higher sensitivity coefficient departments listed in the 2007 China input–output table, we find that all the highly sensitive industries have a high sensitivity coefficient, except for the electrical equipment and machinery industry. The departments with a high sensitivity coefficient are the steel rolling industry (3.50) in metal smelting and rolling processing, basic raw chemical materials manufacturing (3.28) in chemical, other general equipment (2.34) in general special equipment manufacturing, plastic products (2.25), special chemical products manufacturing (1.98), the manufacture and processing of metals and metal products (2.40), non-ferrous metal smelting and alloy manufacturing (2.61), and the non-ferrous metal rolling processing industry (1.87). Industrial sectors with a high sensitivity coefficient can be considered as fundamental industries to the national economy and the basic guarantee for the normal operation of the social and economic system.

As mentioned earlier, one challenge is to separate the effect of the Diaoyu Islands Dispute from those caused by other factors (such as the European debt crisis and the post-earthquake reconstruction). Nevertheless, as a final note, we tried to consider other factors in our estimation. First, according to 2012 China's national economic and social development statistical bulletin (2013),[5] China's political and economic situation kept relatively stable, and the gross value of import and export goods maintained a steady growth from 2009 to 2012. Except the Diaoyu Islands Dispute, no other extreme event that affected the Sino–Japanese trade occurred in China. Therefore, in studying the consequence of the Diaoyu Islands Dispute, we assumed that no other domestic factors affected the 2012

Sino–Japanese trade. Second, although the European sovereign debt crisis could affect Sino–European and Europe–Japan trades, its effect on the 2012 Sino–Japanese trade could be indirect and minimal. Because of this consideration and due to the lack of data, we believe that the 2009 European debt crisis had a negligible direct effect on the 2012 Sino–Japanese trade. Last, we consider the 11 March 2011 Tohoku earthquake as a potential factor that greatly slowed down the growth of Japan's economy and thus impacted the Sino–Japanese trade in 2011 and 2012. Zhang and Wu (2011) believed that the total loss due to the earthquake would be Yen 16 trillion. According to Japanese government and Cabinet Office, the social infrastructure damage caused by the earthquake was estimated to be Yen 25 trillion, and the growth rate of Japan's GDP decreased by 0.5%.[6] Based on some previous studies on the loss caused by the Tohoku earthquake (Mimura et al. 2011;Wang and Chen 2011; Liang, Li, and Bian 2011), this paper assumes that the negative impact of the earthquake on the Sino–Japanese trade lies between 0% and 5% of the annual total Sino-Japanese trade. Excluding the estimated effect of the Japanese earthquake, the new estimated inoperability ratio of China's industrial economic system affected by the Diaoyu Islands Dispute lies between 1.11% and 2.35%, and China's total indirect economic loss lies between RMB 359.0126 billion and RMB 762.2623 billion. The new results could serve as a reference of our earlier estimates.

5. Conclusions and policy implications

This study applied the ITIM based on the Sino–Japanese bilateral trade statistics from 1997 to 2012 to estimate the indirect economic loss to China caused by the 2012 Diaoyu Islands Dispute. The results show that the estimated inoperability ratios of China's industrial economic system affected by the Diaoyu Islands Dispute lie between 1.66% and 3.15% and China's total indirect economic loss of the gross trade lies between RMB 540.4226 billion and RMB 1023.3068 billion. Although the estimated range is quite large, it provides a first reference of the kind. Industries that are sensitive to the dispute include electrical equipment and machinery, general special equipment manufacturing, metal smelting and rolling processing, manufacture and processing of metals and metal product, and chemical. These research results provide the following conclusions:

(1) The indirect economic loss assessment for the Diaoyu Islands Dispute and similar disaster events is important as the degree of global economic integration deepens. Quantitative assessment of the indirect economic loss can contribute to a more comprehensive understanding of the effects of the dispute and provide empirical support for China's policy–making in international relations and international trade. The results can also provide a reference for perfecting the industry's early warning, monitoring, and rescue system, as well as for helping the Chinese react rationally toward the Diaoyu Islands Dispute.

(2) An industry injury early-warning mechanism and a trade adjustment assistance system should be established to provide a timely warning of risk and give reasonable aid for highly sensitive industries. On one hand, national departments should establish and improve the industry's injury early-warning mechanisms to improve the monitoring scope and strength of major trade partners as well as import and export products from highly sensitive industries. The evolution of the Diaoyu Islands Dispute and similar disaster events should be examined, as well as their potential influence on the industrial economic system; the release of disaster early–warning information should be timely; and affiliated enterprises should be supported in taking defense measures. On the other hand, The United States' Trade Adjustment Assistance (TAA) system should be used as a model to establish an effective trade adjustment assistance system that conforms to the actual conditions of China.
(3) Industries highly sensitive to the Diaoyu Islands Dispute are the victims of core national interests. Therefore, relevant governments and industry management departments should provide them with appropriate compensation within a reasonable range. Trade protection measures such as price support can be conducted within a reasonable range. Additionally, trade subsidies in terms of technology and product introduction, or trade remedies such as special policies and funds can be implemented.
(4) A diversification strategy of a multi–outlet market should be adopted and trade partners should be expanded to minimize the negative effect of a similar international trade disturbance on the domestic economy. The implementation of a trade market diversification strategy is conducive to reduction of the dependence of national trade on the local market, gaining trade initiative and weakening the negative effects of similar disaster events on international trade. Domestic upstream and downstream enterprises of highly sensitive industries should also adjust their export strategies and diversify their trade partners to reduce over-reliance on a specific market or particular trading enterprises, as well as enhance their own ability to deal with similar international dispute events.

Some issues are worthy of further discussion. First, several factors caused the Sino–Japanese trade fluctuations in 2012, such as the global economic slowdown, the European debt crisis, the legacy of Japan's earthquake, and the Diaoyu Islands Dispute. Separating out the impact of those affected by the Diaoyu Island Dispute is difficult. Thus, this study only conducted relative and general calculations of the impact value. Certainly, on the basis of previous research literatures, this paper attempts to separate out the earthquake impact on Sino–Japanese trade, and obtains an adjusted value of the effects of the Diaoyu Island Dispute on Sino–Japanese trade. Second, more detailed statistics are not available. For example, statistics that indicate whether imports are used as intermediate inputs or for final consumption are not available. Therefore, this study can only be divided into two scenarios to estimate the interval values of the indirect economic loss. Third, this study only estimated the statistics of the indirect economic loss caused by the Diaoyu Islands Dispute. A dynamic model should be constructed to evaluate the comprehensive economic loss under different convalescences. These drawbacks should be addressed in future studies.

Acknowledgements

The authors are particularly grateful to the editor for his guidance in revising the original manuscript and to the referee for her/his appropriate and constructive suggestions and for her/his proposed corrections in improving the original manuscript. The authors are also very grateful to the reviewer for critical comments that improved the paper significantly.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This research was supported by the National Natural Science Foundation of China [71373131], [71140014], [71410307025], [11371292]; National Social and Scientific Fund Program [11CGL100]; National Soft Scientific Fund Program [2011GXQ4B025]; National Industry-specific Topics [GYHY200806017]; Tianjin Higher Education Innovation Team Program [No. TD12-5063, Shunfeng Song]; Scientific Research Foundation for the Returned Overseas Chinese Scholars of MOE [No.2013-693, Ji Guo]. This research was also supported by the Priority Academic Program Development of Jiangsu Higher Education Institutions.

Notes

1. http://www.587766.com/news5/28360.html
2. http://finance.chinanews.com/it/2012/09-12/4176338.shtml
3. http://www.auto-stats.org.cn/
4. http://finance.ifeng.com/hk/sckx/20130110/7539555.shtml
5. http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20130221_402874525.htm
6. http://japan.people.com.cn/35463/7384644.html

References

Adams, Philip David, Karen M. Huff, Robert Andrew McDougall, Ken Robert Pearson, and Alan Anthony Leslie Powell. 1996. “Medium and Long Run Consequences for Australia of an APEC Free Trade Area: CGE Analyses Using the GTAP and MONASH Models.” *Research Paper, Centre Of Policy Studies/IMPACT Centre, Victoria University*.

Adams, Philip David, Mark Horridge, Brian R. Parmenter, and Xiaoguang Zhang. 2000. “Long Run Effects on China of APEC Trade Liberalization.” *Pacific Economic Review* 5 (1): 15–47.

Alston, Richard M., J.R. Kearl, and Michael B. Vaughan. 1992. "Is There a Consensus Among Economists in the 1990's?" *American Economic Review: Papers and Proceedings* 82 (2): 203–209.

Anderton, Charles, and John Carter. 2001. "The Impact of War on Trade: An Interrupted Time-Series Study." *Journal of Peace Research* 38 (4): 445–457.

Bao, Qin, Ling Tang, Shouyang Wang, and Han Qiao. 2013. "Impacts of USA's Carbon Motivated Border Tax Adjustments on China's Economy: An Analysis Based on Dynamic Computable General Equilibrium Model." [In Chinese.] *Systems Engineering Theory & Practice* 33 (2): 345–353.

Barbieri, Katherine, and Jack S. Levy. 1999. "Sleeping with the Enemy: The Impact of War on Trade." *Journal of Peace Research* 36 (4): 463–479.

Bashir, Malik Fahim, Changsheng Xu, Khalid Zaman, Ghulam Akhmat, and Muhammad Ikram. 2013. "Impact of Foreign Political Instability on Chinese Exports." *Economic Modelling* 33: 802–807.

China Customs Statistics. 2013. "China Customs Statistics Data Catalogue." [In Chinese.] Accessed April 2013. http://www.chinacustomsstat.com.

Chor, Davin, and Kalina Manova. 2012. "Off the Cliff and Back? Credit Conditions and International Trade During the Global Financial Crisis." *Journal of International Economics* 87 (1): 117–133.

Felbermayr, Gabriel, and Jasmin Gröschla. 2013. "Natural Disasters and the Effect of Trade on Income: A New Panel IV Approach." *European Economic Review* 58: 18–30.

Fuchs, Andreas, and Nils-Hendrik Klann. 2013. "Paying a Visit: The Dalai Lama Effect on International Trade." *Journal of International Economics* 91 (1): 164–177.

Gassebner, Martin, Alexander Keck, and Robert Teh. 2010. "Shaken, Not Stirred: The Impact of Disasters on International Trade." *Review of International Economics* 18 (2): 351–368.

General Administration of Customs of the People's Republic of China. 2013. "General Administration of Customs Data Catalogue." [In Chinese.] Accessed April 2013. http://www.customs.gov.cn.

Glick, R., and A. Taylor. 2010. "Collateral Damage: Trade Disruption and the Economic Impact of War." *The Review of Economics and Statistics* 92 (1): 102–107.

Haidar, Jamal Ibrahim. 2012. "Currency Crisis Transmission Through International Trade." *Economic Modelling* 29 (2): 151–157.

Haimes, Yacov Y., Barry M. Horowitz, James H. Lambert, Joost R. Santos, Chenyang Lian, and Kenneth G. Crowther. 2005a. "Inoperability Input-Output Model (IIM) for Interdependent Infrastructure Sectors. I: Theory and Methodology." *Journal of Infrastructure Systems* 11 (2): 67–79.

Haimes, Yacov Y., Barry M. Horowitz, James H. Lambert, Joost R. Santos, Kenneth G. Crowther, and Chenyang Lian. 2005b. "Inoperability Input-Output Model (IIM) for Interdependent Infrastructure Sectors. II: Case Study." *Journal of Infrastructure Systems* 11 (2): 80–92.

Jung, Jeesang, Joost R. Santos, and Yacov Y. Haimes. 2009. "International Trade Inoperability Input-Output Model (IT-IIM): Theory and Application." *Risk Analysis* 29 (1): 137–154.

Keshk, Omar M.G., Brian M. Pollins, and Rafael Reuveny. 2004. "Trade Still Follows the Flag: The Primacy of Politics in a Simultaneous Model of Interdependence and Armed Conflict." *Journal of Politics* 66 (4): 1155–1179.

Lai, Mingyong, and Jingchi Li. 2007. "Tariff Reduction and Exemption of the Agricultural Import from Asian and Its Impact on China's Macro Economy and Industry – An Analysis of the C of the Computable General Equilibrium Model Contemporary Finance & Economics." [In Chinese.] *Contemporary Finance & Economics* (4): 98–104.

Leontief, Wassily W. 1951. *Input-Output Economics*. 2nd ed. —Oxford: Oxford University Press.

Le, Thaiha, and Youngho Chang. 2013. "Oil Price Shocks and Trade Imbalances." *Energy Economics* 36: 78–96.

Liang, Zong, Yafen Li, and Weihong Bian. 2011. "The Impact of the March 11 Japan's Earthquake on Global Economy and Financial Market." [In Chinese.] *Studies of International Finance* (4): 56–61.

Liu, Changli. 2011. "New Development, Trends, and Problems in China-Japan Trade." [In Chinese.] *Japanese Research* 25 (4): 16–23.

Long, Andrew G. 2008, "Bilateral Trade in the Shadow of Armed Conflict." *International Studies Quarterly* 52: 81–101.

Mansfield, Edward D., and Jon C. Pevehouse. 2000. "Trade Blocs, Trade Flows, and International Conflict." *International Organization* 54 (4): 775–808.

Mansfield, Edward D., and Rachel Bronson. 1997. "Alliances, Preferential Trading Arrangements, and International Trade." *American Political Science Review* 91 (1): 94–107.

Mimura, Nobuo, Kszuya Yasuhara, Seiki Kawagoe, Hiromune Yokoki, and So Kazama. 2011. "Damage from the Great East Japan Earthquake and Tsunami – A Quick Report." *Mitigation and Adaptation Strategies for Global Change* 16 (7): 803–818.

Ministry of Commerce of the People's Republic of China. 2013. "Ministry of Commerce Data Catalogue" [In Chinese.] Accessed April 2013. http://www.mofcom.gov.cn.

Morrow, James, Randolph Siverson, and Tressa Taberes. 1998. "The Political Determinants of International Trade: The Major Powers, 1907–1990." *American Political Science Review* 92 (3): 649–661.

Morrow, James, Randolph Siverson, and Tressa Taberes. 1999. "Correction to: The Political Determinants of International Trade." *American Political Science Review* 93 (4): 931–933.

National Economic Accounting Department of China's National Bureau of Statistics. 2009a. *2007 China Input-Output Table*. [In Chinese.] Beijing: China Statistical Press.

National Economic Accounting Department of China's National Bureau of Statistics. 2009b. *Establishment Method of 2007 China Input-Output Table* [In Chinese.]. Beijing: China Statistical Press.

Naude, Wim, and Riaan Rossouwc. 2008. "South African Quotas on Textile Imports from China: A Policy Error?" *Journal of Policy Modeling* 30 (5): 737–750.

Okuyama, Y. 2003. "Economics of Natural Disasters: A Critical Review." *Research paper*, Regional Research Institute, West Virginia University, Morgantown.

Qureshi, Mahvash Saeed. 2013. "Trade and Thy Neighbor's War." *Journal of Development Economics* 105: 178–195.

Santos, Joost R. 2006. "Inoperability Input-Output Modeling of Disruptions to Interdependent Economic Systems." *Systems Engineering* 9 (1): 20–34.

Statistics and Analysis Department of the People's Republic of China. 2013. "Statistics and Analysis Department Data Catalogue." [In Chinese.] Accessed April 2013. http://www.pbc.gov.cn/publish/Diaochatongjisi.

Tang, Wenjin, Chaojie Song, and Wen Zhou. 2012. "Economic Influences of Sudden Impacts on China's Industries: Based on the Analysis of IMPLAN System." [In Chinese.] *Research on Economics and Management* (4): 50–57.

The Editorial Board of Customs Import and Export Tariff. 2012. *The Customs Import and Export Tariff of the People's Republic of China in 2012*. [In Chinese.] Beijing: Economic Daily Press.

The National Bureau of Statistics of the People's Republic of China. 2013. *2013 China Statistical Yearbook*. [In Chinese.] Beijing: China Statistical Press.

The National Bureau of Statistics of the People's Republic of China. 2013. "The National Bureau of Statistics Data Catalogue." [In Chinese.] Accessed April 2013. http://www.stats.gov.cn.

Wang, Jun, and Liuqin Chen. 2011. "Analysis of the Impact of Japan's Earthquake and Nuclear Crisis on World Economy." [In Chinese.] *Northeast Asia Forum* (4): 3–13.

Yang, Dean. 2008. "Coping with Disaster: The Impact of Hurricanes on International Financial Flows, 1970–2002." *The B.E. Journal of Economic Analysis & Policy* 8 (1): 1935–1982.

Zhang, Jifeng. 2011."The Effect of Japan's Earthquake on the Japanese and World Economy." [In Chinese.] *Asia & Africa Review* (3): 1–5.

Zhang, Zhige, and Wei Wu. 2011. "A Dynamic Analysis of the Dependence Ratio of China's Foreign Trade." [In Chinese.] *International Economics and Trade Research* 27 (10): 19–26.