The Day After Tomorrow: Evaluating the Burden of Trump's Trade War*

Meixin Guo[†] Lin Lu[‡] Liugang Sheng[§] Miaojie Yu[¶]

April 12, 2017

Abstract

President Trump of the United States threatens to impose high import tariffs against China's exports during his presidential campaign. This paper evaluates the possible effects on the world economy if President Trump eventually pulls the trigger on a trade war against China or the rest of the world. Based on the multi-sector and multi-country general equilibrium model of Eaton and Kortum (2002) with inter-sectional linkage, we examine the changes in exports, imports, output, and real wages in 62 major economies in response to the 45% tariffs imposed by America against the imports from China or the rest of the world. By exploring four scenarios in which China and other countries choose whether to retaliate or not, our calibration results suggest that in all scenarios, the high U.S. import tariff will bring catastrophic effects on international trade. However, in terms of social welfare, China barely feels any negative effects, while the USA becomes one of the biggest losers. In addition, some small open economies may receive slight gains, while other countries may receive collateral damage.

Keywords: Tariffs, Gains from Trade, Protectionism

JEL classification: F10, F11

*We thank Professors Wing Tye Woo, Furu Kimura, Berry Eichengreen, and the AEP conference participants at Kuala Lumpur in March 2017 for their very helpful suggestions and comments. We thank Gu Yan, Kai Mu, and Yue Zhou for their excellent research assistance.

[†]SEM, Tsinghua University, guomx@sem.tsinghua.edu.cn

[‡]SEM, Tsinghua University, lulin@sem.tsinghua.edu.cn

[§]The Chinese University of Hong Kong, Department of Economics and HKIAPS, lsheng@cuhk.edu.hk

[¶]Corresponding author. CCER, NSD, Peking University, mjyu@nsd.pku.edu.cn

1 Introduction

Will the U.S. President Donald Trump pull the trigger on a trade war against the country's main trade partners, such as China? Rather than being merely a propaganda in Trump's presidential campaign, protectionism has become a major threat to the world economy and the international trade system. The new president called for "America First" and for "Buy American, Hire American" in his inaugural speech and immediately began carrying out his campaign pledges after taking office to break the trade ties of the U.S. with its neighboring countries and main trade partners. For instance, President Trump formally withdrew the U.S. from the Trans-Pacific Partnership (TPP), an agreement among 12 countries across 3 continents that took nearly 10 years to negotiate under his predecessor, the former United States President Barack Obama. He also signed an executive order to build a wall along the Mexican border and threatened Mexico to pay for its construction by paying taxes on its exports to the U.S.. He ordered his team to initiate a renegotiation of the North American Free Trade Agreement (NAFTA) among the U.S., Mexico, and Canada. These actions, among many others, have dispelled any remaining doubt over the sincerity of President Trump's promises during the election campaign. In the recent meeting of G20 finance ministers and central bankers, the financial leaders of the world's biggest economies dropped a pledge to keep the global trade free and open, thereby acquiescing to an increasingly protectionist of the U.S..

China is among the main targets of President Trump during his campaign and administration. In his speech in Monessen, Pennsylvania on June 28, 2016, Mr. Trump condemned China's entry to the World Trade Organization as a catastrophe for U.S. manufacturing workers. He also proposed the idea of imposing 45% of import tariffs on China's exports to the U.S. during his meeting with the editorial board of The New York Times in January 2016. In his well-known tweet, President Trump also blamed

China as the "grand champion in manipulating the currency" to boost its exports to the U.S.. Therefore, we need to think and evaluate the possible risk scenarios if President Trump does pull the trigger on a trade war against China or the rest of the world (ROW).

In this paper, we adopt a multi-country and multi-sector general equilibrium model of Eaton and Kortum (2002) with inter-sectoral linkages a la Caliendo and Parro (2015) to examine the changes in the exports, imports, output, and real wages of 62 major economies in response to a hypothetical 45% tariff on the imports of China or the ROW to the U.S.. We consider four possible cases of such tariff hike on sectors including agriculture, mining, and manufacture. In the first case, the U.S. increases its import tariffs to 45% for the imports from China. In the second case, the U.S. increases its import tariffs uniformly for the ROW. In the third and fourth cases, China or the ROW would retaliate by increasing their tariffs to the same level for their imports from the U.S.. For simplicity, we name those four cases as "U.S. against China," "U.S. against ROW," "U.S. vs. China," and "U.S. vs. ROW."

Our exercise shows that in all scenarios, the high U.S. import tariff will bring a catastrophe in international trade. In the case of "U.S. against China," China's exports to the U.S. will be cut by 73%, and half of the 18 tradable sectors of China will experience a more than 90% drop in their exports, including textile, metal products, computers, and electrical equipment. In the case of "U.S. vs. China," China's exports to the U.S. will drop by 74% while the U.S. exports to China will be cut by 56%. Moreover, China's imports from the U.S. in nine sectors will be cut by more than 90%, including agriculture, mining, and petroleum products as well as computer and electrical equipment. If the U.S. launches a trade war against the ROW and the other countries retaliate, then the global total imports will drop by approximately 10.73%. In all cases, the U.S. imports will be swept away and the catastrophic effect will be much stronger if China and ROW retaliate against the U.S..

The trade war will not only crash international trade but also lead to a slump in output and social welfare. In the case of "U.S. against China," Chinese output in textile and computer products will drop by 6.51% and 14.67%, respectively; and in the case of "U.S. vs. ROW," the U.S. will lose about 9% of 10% of its output in agriculture and machinery sectors respectively. We use the changes in real wages to measure welfare loss as it takes into account the rising price index due to the rising import prices. In all scenarios, we find that the U.S. will become one of the biggest losers and China will bear only a small welfare loss. Specifically, the U.S. will experience 0.66%, 1.74%, 0.75%, and 2.25% welfare losses in the four above scenarios, respectively, compared with China's maximum loss of 0.16% in the case of "U.S. against ROW." Some other countries in Asia may gain from the trade diversion, while some advanced economies may receive collateral damage due to the spillover effect from the input-output linkage and the general equilibrium effect.

Admittedly, the quantitative effects of Trump's trade war on output and social welfare are less striking as those on exports. However, our calculation of welfare loss is rather conservative and likely to underestimate the effect of the possible trade war on output and social welfare. The key assumption in our model is that all economies function well without any other frictions, except for trade costs. Given that labor is freely mobile across all sectors within country, the sectoral reallocation between tradable and non-tradable sectors, together with the import substitution among different sourcing countries, can offset the unilateral import tariff hikes imposed by the U.S.. Moreover, the input-output linkage also makes these tariff hikes less effective. However, in reality, these adjustments may not be smooth and the impact of trade war on the world economy will be magnified. Nevertheless, the trade war will trigger a tsunami in the global financial market, which has not been taken into account in our framework.

One of the most famous alternative approaches for evaluating the possible consequence of a trade war is the traditional Computational General Equilibrium (CGE) model, which fully specifies a parametric model of preferences, technology, and trade cost with ad-hoc parameters. Our approach differs from this model by following the recent development in quantitative trade models, which is largely triggered by the seminal work of Eaton and Kortum (2002). The extension of the Eaton and Kortum (EK) model into a multiple-sector with input-output linkage and other features has become the workhorse model for counter-factual analysis. This approach is suitable for analyzing trade policy changes and offers at least three significant advantages over the traditional CGE models or the recently developed CGE model with Melitz (2003)-type firm heterogeneity (Petri et al., 2012). First, the EK model offers more parsimony by including a limited number of parameters. The latest version of the GTAP model has about 13000 parameters that cannot be estimated, whereas those researchers who adopt new quantitative trade models generally use data to estimate the key parameters before conducting counter-factual analysis. Second, the new quantitative trade models have more appealing micro-theoretical foundations. For example, one does not need to assume that each country produces one distinct good—the so called "Armington" assumption—to do quantitative work in international trade. Third, although the CGE model combined with Melitz (2003)'s model can capture firm heterogeneity, it is not only difficult to generate the sectoral gravity equation with macro implication but also very intractable to identify a rich set of related fixed costs using the actual data. By contrast, the EK model can deliver a nationwide gravity equation that even incorporates a country's trade deficit/surplus.

Many recent studies have applied or extended the EK framework for various topics, including the evaluation of the possible gains from a trade agreement, technological changes, and infrastructure improvement. For example, Donaldson (2010) takes the EK model to empirical data and assesses the gains from railroad construction in colonial India. Caliendo and Parro (2015) extends EK framework to include input-output linkage and evaluates the gains from NAFTA.[1] Dekle et al. (2008) also shows that the EK framework can be used to analyze hypothetical cases, such as how much the U.S. GDP needs to adjust to eliminate its high current account deficits. The rapid development in this approach provides suitable tools for us to evaluate the possible outcomes of a trade war triggered by the largest economy in the world.

The remainder of this paper is organized as follows. Section 2 reviews the bilateral trade relationship between U.S. and China, the dynamics of the bilateral trade, and the current trade conflicts. Section 3 presents our model, data, and calibration method. Section 4 shows the calibration results, and Section 5 presents the concluding remarks with discussions on trade policies.

2 An overview of the trade relationship between the U.S. and China

2.1 The bilateral trade relationship

From the establishment of the People's Republic of China (PRC, or China) in 1949, the U.S. had retained its diplomatic recognition of Taipei instead of Beijing. The diplomatic and economic interactions between the U.S. and China was in their lowest level during the Cold War. Conflicts in ideology and national security interests greatly impeded the bilateral trade between these nations.

[1]Di Giovanni et al. (2014) adopts a similar framework to evaluate the gain from China's trade integration with the world market and its fast technological changes. A few recent studies have introduced labor migration into the EK framework and explored the impact of goods and labor market frictions on economic growth and gain from trade (Galle et al., 2015; Caliendo et al., 2015; Tombe and Zhu, 2015).

Following the China-Soviet border conflicts in the late 1960s and the end of the Vietnam War in 1968, both China and the U.S. began to realize the potential benefits of normalizing bilateral relationship. In June 1971, the U.S. President Nixon ended the legal barriers of trade with China, and his ice-breaking visit China in 1972 further resumed the trade relation between two countries.

Following China's 1978 market-oriented economic reform, the U.S. granted China the "Most Favored Nation" (MFN) tariff in January 1980. The MFN is a status of treatment granted by one country to another so that the recipient of this status enjoys advantages of low tariff rates or high import quotas. This title also ended the Smoot-Hawley Act that stipulated high tariff rates on imports from China since 1930. The U.S. soon became the second largest importer for China and China's third largest partner in 1986. Despite China's MFN status, the Sino-U.S. trade relationship was impeded by other legal and political issues. In particular, the Jackson-Vanik Amendment of 1974 would deny preferential trade policies to some countries, especially communist countries. The application of this amendment was waived by U.S. presidents, but the amendment required an annual congressional renewal of China's MFN status.

Since 1986, China began to apply for membership to the General Agreements on Trade and Tariffs (GATT) and its successor, the World Trade Organization (WTO), while the U.S. was also interested in China's further trade and FDI liberalization. Thus, the annual waiver of the Jackson-Vanik Amendment and the congressional renewal of China's MFN status came to an end in 1999, and the U.S. granted China with "Permanent Normal Trade Relations,"thereby paving the road for China to join the WTO in 2001.

The decade and a half following China's accession to the WTO has been a honeymoon for two countries, and their bilateral trade has grown much faster than before. The U.S. and China have become the most important trade partner of each other. However, these countries still faced trade conflicts. For instance, China's large trade surplus and inflexible exchange rate have been criticized frequently by the U.S. government. The U.S. also often accused China of dumping textile, steel, and other manufactured products at unfairly low prices. The Bush and Obama administrations imposed quotas and high tariffs on the imports of Chinese textile and other low-end industrial products to protect U.S. domestic industries. However, these trade conflicts have not changed the direction toward free trade for these two countries until the 2017 U.S. presidency of Trump, who openly supported protectionism.

2.2 Bilateral trade flow and trade imbalance

We examine the Sino-U.S. trade from three perspectives, namely, bilateral trade flow and trade imbalance, bilateral trade structure and trade dispute in some key industries such as steel, and current trade conflicts.

The trade volume between China and the U.S. has grown rapidly over the the last three decades, especially after China's participation in WTO in 2001. The bilateral trade volume has surged from 97 billion USD in December 2001 to more than 524 billion USD in 2016, with an average annual growth rate of 11.11%. Indeed, China and the U.S. have become the most important trade partner of each other.

The annual growth of bilateral trade volume between these two countries has slowed down since 2008, partly due to the financial crisis that hindered the global economy. The China-U.S. trade volume shrunk by 6.26% in 2016, the first time with a negative growth since 2009. While the exports edged down by 5.13% in 2016, the imports decreased by 9.79% consecutively following a decline of 5.9% in 2015.

[Insert Table 1 Here]

The fast-growing trade volume between the U.S. and China has been accompanied by a persistent bilateral trade surplus in favor of the latter. As shown in Table 1, China's trade surplus reached 254 billion USD in 2016 from only 30 billion USD in 2000. This unbalanced trade eventually resulted in a long-lasting dispute in the Sino-U.S. relationship. However, as the bilateral trade volume growth slowed down recently, the trade surplus growth also started to cool down. China's bilateral trade surplus narrowed by 2.45% to 254 billion USD in 2016, thereby reflecting a tendency toward a more balanced bilateral trade structure.

[Insert Figures 2 and 3 here]

2.3 Bilateral trade structure and trade dispute

Machine and electronic equipment are the leading exports of China to the U.S. that account for 44.45% (173 billion USD) of its total exports in 2016. These products are followed by textile products, which account for 11% (42 billion USD) of China's exports to the U.S.. These figures illustrate China's competitive edge in light product manufacturing. However, the exports of China in traditionally competitive industries shrunk in recent years in accordance with the slowing pace in bilateral trade. Specifically, China's exports of machinery and electronic equipment as well as textile products decreased by 3.89% and 5.35% in 2016, respectively. Both industries remained at the same export level as of 2013.

In terms of China's imports from the U.S., machine and electronic equipment also come in first place accounting for 23.13% (31.26 billion USD) of its total imports in 2016.[2] This proportion reflects the intra-industry trade and the global production integration between these two countries, and therefore a trade war is more likely to hurt the related industries.

[2] The proportion of machine and electronic equipment imports also dropped in recent years from 25.11% in 2013 to 23.13% in 2016.

Steel products are among the highly disputed issues in the bilateral trade relationship between the U.S. and China. The U.S. criticized that China's official supports on steel and aluminum products had distorted the global markets and accused China of dumping 100 million tons of steel into global market. At the same time, the U.S. filed 29 anti-dumping and 25 anti-subsidy investigations against Chinese companies from 2011 to 2015, including 11 anti-dumping and 10 anti-subsidy on steels. The case of anti-dumping on Chinese steel products reflects the tension of the trade conflicts between these two countries.

[Insert Table 2 Here]

2.4 Current trade conflicts

In the past two decades and especially after China's WTO accession in 2001, both the U.S. and China realized significant gains from their trade liberalization and expanding bilateral markets. However, after President Trump's inauguration, the trade dispute between these countries has intensified in the following aspects.

First, the U.S. government blamed its long period of slow GDP growth, weak employment growth, and sharp net loss of manufacturing employment to the accession of China to the WTO. The U.S. government also argued that multilateral trade agreements (e.g., WTO rules) should be intended for countries that pursue free-market principles and implementing transparent and functional legal and regulatory systems.

Second, the U.S. has criticized China for its unequal treatment of foreign companies with measures in favor of domestic firms and state-owned enterprises (SOEs, including: (i) state-driven industrial policies that groom domestic firms, particularly favoring SOEs; (ii) government procurement process that is biased toward domestic firms, such as "secure and controllable" policies for information and communication technology; and (iii) the techno-nationalism under the auspices of "Made in China 2025."

In response to these criticisms, China has denied the "secure and controllable" policies to limit foreign trade and notified the WTO Technological Barrier to Trade committee. In the case of the "Made in China 2025" initiative, the Chinese government promised to bring equal opportunities to foreign and domestic enterprises as well as to strengthen the role of the market.

Third, the U.S. named China as a significant market barrier for their exporting firms. Specifically, the U.S. alleged that China has imposed export restraints (e.g., quotas and licensing) to benefit domestic downstream firms at the expense of foreign competitors. The U.S. also accused China of using anti-monopoly law investigations to protect its domestic industries.

Fourth, intellectual property rights have become a hot topic in recent years. The U.S. complained that its enterprises are being required to transfer their technology as a condition to secure investment approvals. The U.S. also criticized the poor protection and enforcement of trade secrets by the Chinese government.

3 Model

We follow Caliendo and Parro (2015) to build a multiple-country and multiple-sector model to study how tariff changes influence the output and trade flows via the rich input-output linkage across different sectors.

3.1 Basic setup

The world consists of N countries, and country n has a measure of L_n representative households. These households collect their total income I_n from wages $w_n L_n$, a lump-sum transfer of tariff revenue, and trade surplus/deficit. They have standard Cobb-

Douglas utility function on consuming final goods from each sector:

$$U(C_n) = \prod_{j=1}^{J} C_n^{j\,\alpha_n^j}, \text{where } \sum_{j=1}^{J} \alpha_n^j = 1. \tag{3.1}$$

Each sector j in each country n also produces a continuum of tradable intermediate goods ω^j. As illustrated in Figure 1, the labor and composite intermediate goods in each sector are combined in the production of each tradable intermediate ω^j in country n.

$$q_n^j(\omega^j) = z_n^j(\omega^j)[l_n^j(\omega^j)]^{\gamma_n^j} \prod_{k=1}^{J} [m_n^{k,j}(\omega^j)]^{\gamma_n^{k,j}} \tag{3.2}$$

where $m_n^{k,j}$ is the composite intermediate good from sector k used in the production of sector j, while $z_n^j(\omega^j)$ indicates the efficiency in producing the intermediate good ω^j in each country n. The summation of shares of materials from each sector k used in the production of intermediate good (ω^j) $\gamma_n^{k,j} \geq 0$, and the share of valued added $\gamma_n^j \geq 0$ is equal to one, i.e., $\sum_{k=1}^{J} \gamma_n^{k,j} + \gamma_n^j = 1$.

[Insert Figure 4]

Given that the production of intermediate goods is at constant returns to scale and that the market is perfectly competitive, the unit production cost is expressed as follows:

$$c_n^j = B_n^j w_n^{\gamma_n^j} \prod_{k=1}^{J} P_n^{k\,\gamma_n^{k,j}} \tag{3.3}$$

where P_n^k is the price of a composite intermediate good from sector k, while B_n^j is a constant.

A sectoral composite intermediate good is then produced using a continuum of tradable intermediate goods ω^j, which are imported from the lowest cost suppliers across countries:

$$Y_n^j = \left[\int y_n^j(\omega^j)^{1-1/\sigma^j} d\omega^j \right]^{\frac{\sigma^j}{\sigma^j-1}} \tag{3.4}$$

where $\sigma^j > 0$ is the elasticity of substitution across intermediate goods within sector j, while $y_n^j(\omega^j)$ is the demand for each intermediate good.

Given the Frèchet distribution of productivity, the price of a sector j good in region n is then given by

$$P_n^j = A^j \left[\sum_{i=1}^{N} \lambda_i^j (c_i^j \tau_{ni}^j)^{-\theta^j} \right]^{-1/\theta^j} \tag{3.5}$$

where τ_{ni}^j is the bilateral trade cost for country i's exports shipping to country n (paid in exports), while θ^j and λ_i^j are the shape and location parameters of the Frèchet distribution.

Eaton and Kortum (2002) shows that equilibrium trade share can be written as

$$\pi_{ni}^j = \frac{\lambda_i^j [c_i^j \tau_{ni}^j]^{-\theta^j}}{\sum_{h=1}^{N} \lambda_h^j [c_h^j \tau_{nh}^j]^{-\theta^j}} \tag{3.6}$$

Bilateral trade costs τ_{ni}^j include tariff (t_{ni}^j) and any other variable transaction costs from distance and information frictions. Any changes in tariffs can affect trade shares via these trade costs.

The total expenditure on goods j is the sum of firms' expenditures on composite intermediate goods and households' expenditure on final goods:

$$X_n^j = \sum_{k=1}^{J} \gamma_n^{j,k} \sum_{i=1}^{N} X_i^k \frac{\pi_{in}^k}{1 + \tau_{in}^k} + \alpha_n^j I_n \tag{3.7}$$

where

$$I_n = w_n L_n + R_n + D_n \tag{3.8}$$

represents the total final income or absorption, including labor income, tariff revenues (R_n), and trade deficits (D_n). In particular, $R_n = \sum_{j=1}^{J} \sum_{i=1}^{N} t_{ni}^j M_{ni}^j$, where $M_{ni}^j = X_i^j \frac{\pi_{ni}^j}{1+\tau_{ni}^j}$ is country n's imports of sector j goods from country i. The summation of trade deficits across countries is equal to 0, while the national deficits are the summation of sectoral deficits, $D_n = \sum_{k=1}^{J} D_n^k$. Sectoral deficits denote the difference between total imports and total exports as defined by $D_n^j = \sum_{i=1}^{N} M_{ni}^j - \sum_{i=1}^{N} M_{in}^j$.

3.2 Relative changes in equilibria

The changes in wages and prices can be solved after identifying the changes in tariff (trade costs) from $(1 + t_{in}^j)$ to $(1 + t_{in}^{j'})$ (τ to τ'), without estimating the technology parameters, using the so-called exact-hat algebra used in the literature. We can express equilibrium conditions in relative terms as follows, where $\hat{x} = \frac{x'}{x}$ denotes the relative change of the variable x.

$$\hat{\tau}_{ni}^j = (1 + t_{ni}^{j'})/(1 + t_{ni}^j) \tag{3.9}$$

$$\hat{c}_n^j = \hat{w}_n^{\gamma_n^j} \prod_{k=1}^{J} (\hat{P}_n^k)^{\gamma_n^{k,j}} \tag{3.10}$$

$$\hat{P}_n^j = \left\{ \sum_{i=1}^{N} \pi_{ni}^j [\hat{c}_i^j \hat{\tau}_{ni}^j]^{-\theta^j} \right\}^{-1/\theta^j} \tag{3.11}$$

$$\hat{\pi}_{ni}^j = \left[\frac{\hat{c}_i^j \hat{\tau}_{ni}^j}{\hat{P}_n^j} \right]^{-1/\theta^j} \tag{3.12}$$

$$X_n^{j'} = \sum_{k=1}^{J} \gamma_n^{j,k} \sum_{i=1}^{N} X_i^{k'} \frac{\pi_{in}^{k'}}{1 + \tau_{in}^{k'}} + \alpha_n^j I_n' \tag{3.13}$$

$$\sum_{j=1}^{J} \sum_{i=1}^{N} X_n^{j'} \frac{\pi_{ni}^{j'}}{1 + \tau_{ni}^{j'}} - D_n' = \sum_{j=1}^{J} \sum_{i=1}^{N} X_i^{j'} \frac{\pi_{in}^{j'}}{1 + \tau_{in}^{j'}} \tag{3.14}$$

$$I_n' = \hat{w}_n w_n L_n + R_n' + D_n' \tag{3.15}$$

Given the changes in tariffs, we can solve for the changes in output, total and bilateral trade flows, and real (nominal) wages for each country. Using the changes in real wages, we can study the welfare implications of trade conflicts. In the following sections, we consider four experiments on tariff changes.

3.3 Taking the model to the data

In order to solve the equilibrium in relative changes, we need the values of α_n^j, $\gamma_n^{j,k}$, γ_n^j, π_{ni}^j, and θ_n^j. The data on bilateral expenditure X_{ni}^j (or bilateral trade flows M_{ni}^j- imports of n from i on sector j in Caliendo and Parro (2015)), value added (V_n^j), gross production (Y_n^j), and I-O tables are required.

We rely on the most updated 2015 edition of the OECD Inter-Country Input-Output database (ICIO) to obtain the data for bilateral expenditures X_{ni}^j and trade share $\pi_{ni}^j = \frac{X_{ni}^j}{\sum_{i=1}^N X_{ni}^j}$. The OECD ICIO 2015 data provide a complete input-output matrix for the 34 ISIC Rev. 3 sectors of 61 countries and ROW in 2011. These 61 countries cover 34 OECD countries and 17 non-OECD but main emerging economies. Our country sample includes the BRICS (Brazil, Russia, India, China, and South Africa), the Asian four dragons (Korea, Taiwan, Hong Kong, and Singapore), the Asian four emerging tigers (i.e., Indonesia, Malaysia, Philippines, and Thailand), and even low-income Asian countries like Cambodia and Vietnam. It is worth to emphasize that data in 2011 are the latest available data set. The international trade has slowly recovered from the effects of the 2008 global financial crisis. Thus, the current global trade flow and trade structure are close to their counterparts in 2011. In this case, the data in 2011 provide a good proxy for us to examine the global trade structure and trade policy. We drop the last sector (private households with employed persons) since this sector is not the intermediate input to produce goods in all other sectors and its output is equal to 0 in half of the countries in our sample. In the end, we obtain a sample of $N = 62$ countries and $J = 33$ sectors (18 tradable sectors and 15 service sectors).[3]

[3] Athukorala and Khan (2016) suggested that the American relative price of parts and components are remarkably less sensitive to changes in relative prices compared with that of final goods. In line with this, it would be a plus if we could cover more disaggregated industrial data in future research.

To calculate final consumption share, α_n^j, we take the final expenditure of sector j goods over the total final expenditure of all sectors (equal to the total expenditure of sector j goods minus the intermediate goods expenditure and divided by the total final absorption) from the OECD STAN input-output database. From the OECD STAN input-output matrix, we also obtain the value added share $\gamma_n^j = V_n^j / Y_n^j$ and the share of intermediate consumption of sector j in sector k over the total intermediate consumption of sector k times one minus the share of value added in sector j, $\gamma_n^{j,k}$. The parameters θ_n^j are taken from Table 1 in Caliendo and Parro (2015).

4 Quantifying effects of tariff increases

4.1 Tariff increases

Given that we use 2011 trade and production as our base year, our sample countries are all WTO members and impose MFN tariffs on one another. The sectoral mean or median of MFN tariffs are all less than 3% except for three sectors, namely, agriculture (3.47%), food (8.07%), and textiles (8.77%). Therefore, we treat the initial tariff as equal to 0 for all countries and sectors.[4]

President Trump threatened to impose prohibitive high tariffs of up to 45% on some products imported from China. In this paper, we consider an extreme case in which the U.S. will impose such prohibitive tariffs on *all* imports from China. An alternative but equivalent interpretation is that President Trump labels China as a currency manipulator and forces the Chinese Yuan to appreciate by around 45%. Consider an increase from a zero tariff to a 45% U.S. tariff rate on all Chinese goods, $\hat{\tau}^j_{USA,CHN} = 1.45\%$. We borrow the procedures in Caliendo and Parro (2015) to solve for the equilibrium. First,

[4] Admittedly, China's current average import tariff is around 9%. Therefore, a hypothesized 45% high import tariff against China is similar to the effective 36% import tariff against the same country, which is a typical number of China's special safeguard imposed by the USA in the past years.

we guess a vector of wages $\hat{\mathbf{w}}$, and then we plug wages in the equilibrium conditions above to solve $\hat{c_n}^j(\hat{\mathbf{w}})$ and $\hat{P_n}^j(\hat{\mathbf{w}})$. Second, we solve $\pi_{ni}^{j'}(\hat{\mathbf{w}})$. Given $\pi_{ni}^{j'}(\hat{\mathbf{w}})$, t', α_n^j, $\gamma_n^{j,k}$, and γ_n^j, we solve for the total expenditure in each sector $X_n^{j'}(\hat{\mathbf{w}})$, and then verify if the trade balance holds.[5] If not, we adjust our guess $\hat{\mathbf{w}}$ until we achieve the equilibrium condition.

4.2 Sectoral bilateral trade between the U.S. and China

Before we discuss the effects of tariff increase on trade flows and output, we discuss the relative tradability of the U.S. and China across different sectors. Table 3 presents the Sino-U.S. bilateral trade flows in 18 tradable goods sectors in 2011. Particularly, the table presents the shares of bilateral import over the total imports and exports in each sector for the U.S. and China. The second column, $\frac{M^j_{USA,CHN}}{M^j_{USA}}$, provides the share of U.S. imports from China in sector j over the U.S. total imports in sector j. Two sectors, computer and textiles, have the largest sectoral import shares that are both above 45%. China is the largest trade partner of the U.S. in these two sectors. Electrical equipment and minerals are the next two large sectors that the U.S. imports intensively from China. These four sectors are also among the biggest exporting sectors of China to the U.S.. The third column, $\frac{M^j_{USA,CHN}}{E^j_{CHN}}$, shows the share of U.S. imports from China in sector j over the Chinese total exports in the same sector. China exports to the U.S. in many sectors, including computer, wood, plastic, papers, and textiles. Additionally, more than 23% of Chinese exports to the U.S. are from these sectors. Meanwhile, China intensively imports from the U.S. in the paper, other transport (such as aircraft), and agriculture (fourth column) sectors. Moreover, 18.07% of the total agricultural exports of the U.S. are consumed in China (fifth column). To sum up, the capability to export for the U.S.

[5] One of the reasons that President Trump proposed high import tariffs is to reduce the large U.S. current account deficit. Here we solve the new equilibrium with the total trade balance for each country and then compare the new equilibrium with the real data.

and China varies across each sector. The U.S. intensively imports from China in the computer, textiles, and electrical equipment sectors, while China intensively imports from the U.S. in the paper, other transport, and agriculture sectors.

[Insert Table 3]

Table 4 examines the two countries' import and export shares of gross outputs and their relative output shares in the world. The second column shows that the U.S. has massive imports in the textiles, computer, and electrical equipment sectors, which have a 68.91% total import share. These goods are mainly exported by China (shown in Table 3). The imports from China's textiles sector is 1.4 times larger than that from the U.S.. The third column of Table 4 shows that the U.S. has exporting advantages in the other transport, machinery N.E.C., and computer sectors, which export more than 1/3 of their output. The U.S. also produces more than 20% of the world output of the paper, petroleum, and other transport sectors. On the contrary, China follows a very different trade structure and production pattern. First, China imports and exports heavily in sectors including computer (33.55% versus 47.92%, respectively, which may have resulted from the global value chain and processing trade. Second, China imports heavily in the mining sector (29.81% import share), but exports intensively in the textiles (20.83%) and other transport sectors (28.6%). Third, China produces much more output than the U.S. in all sectors, except for the paper, petroleum, and other transport sectors.

[Insert Table 4]

Based on Tables 3 and 4, we can draw three conclusions on the Sino-U.S. production and trade patterns in 2011. First, the U.S. and China together produce more than 40% of the world tradable goods on average and are specialized in different sectors.

Second, the total trade of these two countries contribute to more than 20% of the world trade on average. Third, the trade in the textiles, computer, electrical equipment, machinery N.E.C., and other transport sectors is essential to understand the Sino-U.S. trade relationship.

4.3 Case 1: U.S. against China

First, we discuss how output and trade can be affected once President Trump imposes a 45% import tariff on Chinese goods unilaterally. Table 5 shows the changes in the output and bilateral trade between the U.S. and China. Column Y^j_{USA} (L^j_{USA}) presents the changes in the U.S. output (labor).[6] In sum, the U.S. imports less and produces more when such a large tariff is imposed. Domestic production significantly increases by more than 20% in the computer, textiles, and electrical equipment sectors even though the U.S. imports these goods heavily (mainly from China) before the tariff hike. While the U.S. output grows, all of its sectoral imports decrease except for the basic metals and other transport sectors (Column M^j_{USA}). The imports in the petroleum, textiles, wood, and computer sectors experience the largest decline of at least a quarter.

By contrast, China's gross output in 11 sectors declines after losing the large U.S. market (Column Y^j_{CHN}). However, the high tariff only has a minimal effect (less than 5% reduction) on the production of all its sectors, except for the textiles (6.51% reduction) and computer sectors (14.67% reduction). These large declines on selected Chinese sectoral output and exports are consistent with the large expansion of the corresponding sectoral output in the U.S.. The last two columns focus on the bilateral trade instead of the total trade. Given a unilateral import tariff, China's exports to the U.S. collapse by

[6] We use Cobb-Douglas production function with labor and intermediate inputs for all sectors. The changes in sectoral labor inputs are equal to the output changes minus the changes in nominal wage. Since wage is equalized in all sectors within a country, the changes in labor shares across different sectors within a country is proportional to the sectoral output changes. This result holds for all four cases.

an average of 83%. By contrast, China's imports from the U.S. increase in 17 sectors. However, such increase is less than 5% for all sectors except for five, including the petroleum, mining, and paper sectors.

Table 5 shows that the U.S. produces more and imports less from other countries, particularly from China.[7] However, the real wages in the U.S. also decline because of the high tariffs and import prices. Table 6 shows that the U.S. experiences a 0.66% welfare loss as measured by the decrease in its real wages. China also encounters a welfare loss yet at a much smaller magnitude than that experienced in the U.S. because its real wage declines by only -0.04%. Some small countries, such as Singapore and Luxembourg, gain from this tariff increase due to trade diversion. China might increase its exports to those countries in response to the sharp decline in its exports to the U.S.. By contrast, the U.S. produces more and expands its exports. This large supply increase in non-U.S. world market reduces the prices of goods in equilibrium, thereby allowing those small importing countries to benefit from the lower prices.

[Insert Tables 5 and 6]

4.4 Case 2: U.S. against ROW

We now consider a case where the U.S. imposes a high 45% tariff against ROW unilaterally. Table 7 shows the consequent changes in trade and output. With such prohibitive high tariffs, the imports from all tradable industries shrink significantly as shown in column (2) of Table 7. In particular, the U.S. no longer imports petroleum after imposing such tariff. This finding echoes the stylized fact shown in Table 4, that is, the U.S. is one of the most important petroleum production countries in the world

[7] Table B.7 in the appendix presents the changes in the real wages of these countries for all four cases.

that produces around 21% of the total petroleum supply in the world. Simultaneously, the import-output ratio of petroleum is only 12%. The paper, mining, wood, and electrical equipment sectors also suffer from a significant reduction in their imports as a consequence of the high tariff.

If the U.S. insists on an isolated trade policy, can this country increase its own production for all sectors? Column (1) of Table 7 proposes an affirmative answer to such question. Specifically, the textiles sector doubles its size to become the most expansive sector in the U.S., followed by the computer sector with an 80% increase and the electrical sector with a 70% increase. Such rapid expansion of the computer and electrical equipment sectors may be attributed to the strong comparative advantage of the U.S. in the TMT sectors. Meanwhile, the significant expansion of the textiles sector may be explained by its currently small production capacity. As shown in Table 4, the U.S. textiles sector has an input-output ratio of 1.41, yet its production only accounts for 3% of the global production of textiles.

Intuitively, the global isolation policy of the U.S. does not have a significant influence on China's production, as shown in column (3) of Table 7. Although the U.S. is currently the largest trading partner of China (i.e., the U.S. accounts for 13% of China's trade volume), China can still rely on both the enlarging domestic market and the ROW to maintain its "world factory" role. Without a doubt, China's exports to the U.S. will decrease significantly. The top five sectors to be severely affected in this scenario include petroleum, mining, paper, wood, and electrical equipment. As a key feature of the global supply chain, China has imported a large amount of intermediate goods from the U.S. and re-exported its final products to the U.S. after local processing. As a result, the declining U.S. imports from China will consequently reduce China's imports of raw and intermediate inputs from the U.S. (Ludemay et al., 2016). The last column of Table 7 illustrates this feature. The top three Chinese sectors to face the largest reductions in their imports from the U.S. are petroleum, electrical, and mining, respectively.

Who gains and who loses if President Trump imposes high tariffs against the ROW? Table 8 lists the top 10 countries with potential trade gains and the bottom 10 countries with greatest welfare losses. Without loss of generality, we use the changes in real wages as a proxy for welfare changes following the work of Caliendo and Parro (2015). The U.S. emerges as the biggest loser in its global isolation game. Specifically, the real wages in the U.S. will decline by around 2% in the global isolation game compared with the case of free trade. Given that Canada and Mexico are in the same trading bloc as the U.S., they both also suffer significantly from such isolation policy. By contrast, small open economies (e.g., Luxembourg and Singapore) and petroleum-abundant countries (e.g., Brunei, Norway, Netherlands, and Saudi Arabia) gain from this policy. The bottomline take-away message in Table 8 is that the U.S. will never gain from its global isolation policy, which reconfirms the Ricardian orthodox, that is, free trade is the best.

[Insert Tables 7 and 8]

4.5 Case 3: U.S. vs. China

Case 3 studies the effect of the Sino-U.S. trade war on production, trade flows, and welfare. Compared with Case 1, China also charges a 45% import tariff on the exports of the U.S. in the tradable goods sectors in Case 3. Specifically, cases 1 and 3 share four similarities. First, given that the U.S. imposes the same tariff on Chinese goods, the output and total imports of the U.S. as well as the imports from China show similar patterns as those presented in Case 1. The U.S. also expands its production in the computer, textiles, and electrical equipment sectors. Second, the U.S. reduces its imports in most sectors, with the petroleum, textiles, wood, and computer sectors suffering the largest reduction. Third, the output and total exports of China change at a similar magnitude as that described in Case 1. The production and exports in the textiles and computer sectors significantly decline. Small countries still gain from the tariff war like in the Case 1.

The differences between Case 1 and Case 3 lie in the bilateral Sino-U.S. trade and the changes in their real wages (welfare). In contrast to the unilateral decrease in the U.S. imports from China, both the imports of the U.S. from China and the imports of China from the U.S. collapse because of the tariff competition between the two countries. More importantly, following China's repatriation to the high tariffs imposed by the U.S., China does not suffer from the welfare loss whereas the USA clearly bear welfare loss. This observation contradicts the findings in Case 1 in which the U.S. unilaterally imposes high tariffs against China. The intuition that China will not suffer from its retaliation may be due to the possible terms-of-trade gain. Faced by high import tariffs, China faces a softer import competition from the U.S.. Accordingly, the aggregate prices go up. However, according to the Stopler-Samuelson theorem, those factors that have been used intensively to produce the importable goods will face an increase in terms of real returns. As a result, China's welfare increase, albeit insignificantly, when the input-output multi-sectoral linkages are taken into account.

[Insert Tables 9 and 10]

4.6 Case 4: U.S. vs. ROW

We consider an extreme case in which both the U.S. and ROW increase their import tariffs to 45% for their bilateral trade, while the bilateral tariffs remain the same for those countries within ROW. This is the case when U.S. withdraws its membership from WTO, and our calibration results show that this situation presents the worst scenario for the U.S. economy.

Table 11 shows our calibration results for the sectoral changes in output, imports, and bilateral imports between the U.S. and China. One important feature that distinguishes this case from the three aforementioned cases is that the agricultural output in the U.S. will shrink by about 9%. In the case of U.S. vs. China, even if China imposes a high tariff on agricultural goods imported from the U.S., Americans can still sell their products to other countries with low import tariff. Therefore, the impact of the Chinese tariff hike on the agricultural output of the U.S. is limited. However, in this case, all countries in ROW will impose high import tariffs on U.S. exports, and the world demand for U.S. agricultural goods will be significantly reduced.

The effect of this worldwide trade war on U.S. imports and exports will be significantly larger than that of the previous three cases. For example, the last column of Table 11 shows that the Chinese imports from the U.S. in 9 out of 18 tradable sectors will be reduced by more than 90%. Given that the role of international trade in the U.S. economy has been significantly reduced, the U.S. domestic production must expand, especially for those sectors that previously rely on imports. For instance, the U.S. textile output must increase by 86% to fill the gap between consumer demand and limited domestic supply. In this case, President Trump is less likely to trigger a worldwide trade war against ROW, such as by withdrawing from WTO.

Table 12 shows the welfare loss for a selected group of countries. The U.S. experiences the biggest welfare loss, and its real wages will drop by 2.2%. Canada and Mexico receives the biggest collateral damage as the U.S. is their most important trade partner. By contrast, China faces an ignorable welfare loss, and some small open economies may receive slight gains from the lowered import prices resulting from the shrinking demand from the U.S..

[Insert Tables 11 and 12]

5 Conclusion

President Trump threatened to trigger a trade war against China or the ROW (by withdrawing from WTO). This paper examines the possible catastrophic effect of this trade war on international trade and social welfare by using a standard multi-country and multi-sector general equilibrium model. We simulate four different scenarios depicting how other countries will respond to such trade war. All scenarios show that the trade war will have a devastating effect on international trade, that the U.S. will be one of the biggest losers in terms of social welfare, and that China will only face limited losses.

Two possible extensions merit special considertaion. First, regional trade agreements and regional integration are two other topics that warrant the attention of both the academia and policy makers. The U.S. may build a new trading bloc or reconstruct NAFTA to strengthen its current trading bloc. Simultaneously, China is actively engaging in regional trade agreements, such as the ongoing regional comprehensive economic partnership (RCEP) and the one-belt-one-road initiative. Therefore, the U.S. may impose high tariffs against China and its associated trading blocs, and vice versa. Second, we presume no dramatic exchange rate adjustments in responses to President Trump's trade war. However, we cannot rule out such a possibility. These two issues are beyond the scope of this paper and will be reserved for future research.[8]

[8]We thank Professors Wing Tye Woo and Fuku Kimura for this insightful suggestion.

References

Athukorala, P.-c., Khan, F., 2016. Global production sharing and the measurement of price elasticity in international trade. Economics Letters 139, 27–30.

Caliendo, L., Dvorkin, M. A., Parro, F., 2015. Trade and labor market dynamics. Yale University working paper.

Caliendo, L., Parro, F., 2015. Estimates of the trade and welfare effects of nafta. The Review of Economic Studies 82 (1), 1–44.

Dekle, R., Eaton, J., Kortum, S., 2008. Global rebalancing with gravity: measuring the burden of adjustment. IMF Economic Review 55 (3), 511–540.

Di Giovanni, J., Levchenko, A. A., Zhang, J., 2014. The global welfare impact of china: Trade integration and technological change. American Economic Journal: Macroeconomics 6 (3), 153–183.

Donaldson, D., 2010. Railroads of the Raj: Estimating the impact of transportation infrastructure. National Bureau of Economic Research working paper.

Eaton, J., Kortum, S., September 2002. Technology, geography, and trade. Econometrica 70 (5), 1741–1779.

Galle, S., Rodriguez-Clare, A., Yi, M., 2015. Slicing the pie: Quantifying the aggregate and distributional effects of trade. Unpublished manuscript, Univ. Calif., Berkeley.

Ludemay, R., Mayday, A. M., Yu, M., Yu, Z., 2016. Endogenous trade policy in a global value chain: Evidence from chinese micro-level processing trade data. Unpublished manuscript, Peking University.

Melitz, M., 2003. The impact of trade on aggregate industry productivity and intra-industry reallocations. Econometrica 71 (6), 1695–1725.

Petri, P. A., Plummer, M. G., Zhai, F., 2012. The Trans-pacific partnership and Asia-pacific integration: A quantitative Assessment. Vol. 98. Peterson Institute.

Tombe, T., Zhu, X., 2015. Trade, migration and productivity: A quantitative analysis of China. Manuscript, University of Toronto.

Figure 1: China-U.S. Bilateral Trade

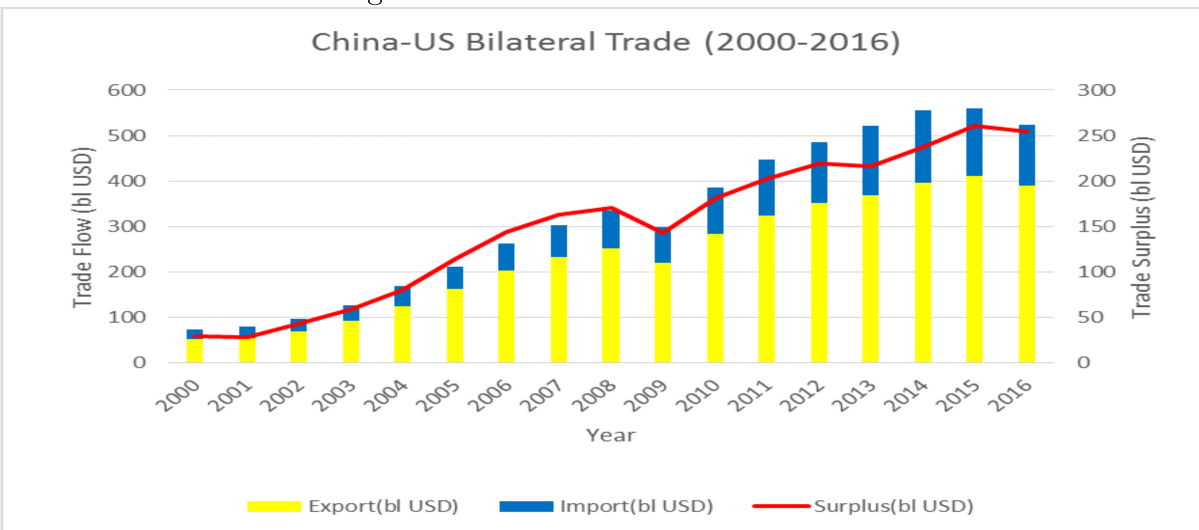

Figure 2: China-U.S. Bilateral Trade Growth

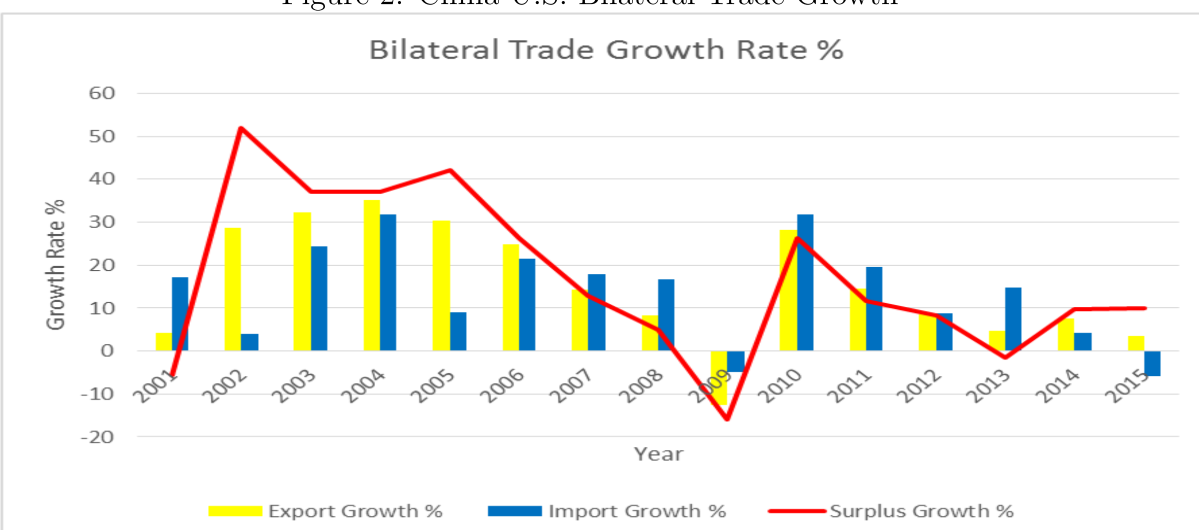

Figure 3: Chinese Steel Exports and Imports from the U.S.

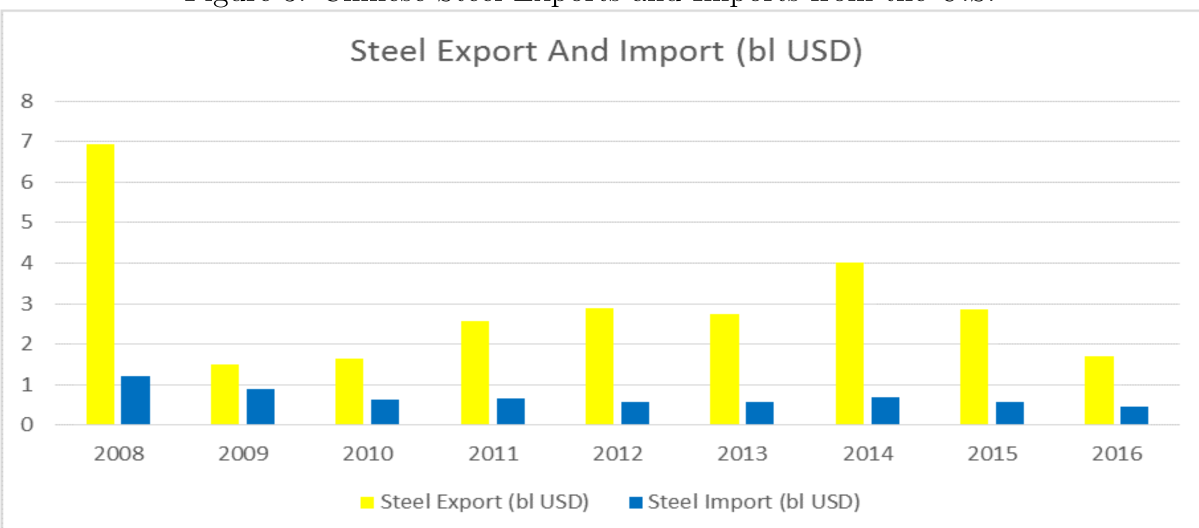

Figure 4: Multi-Sector Model Production

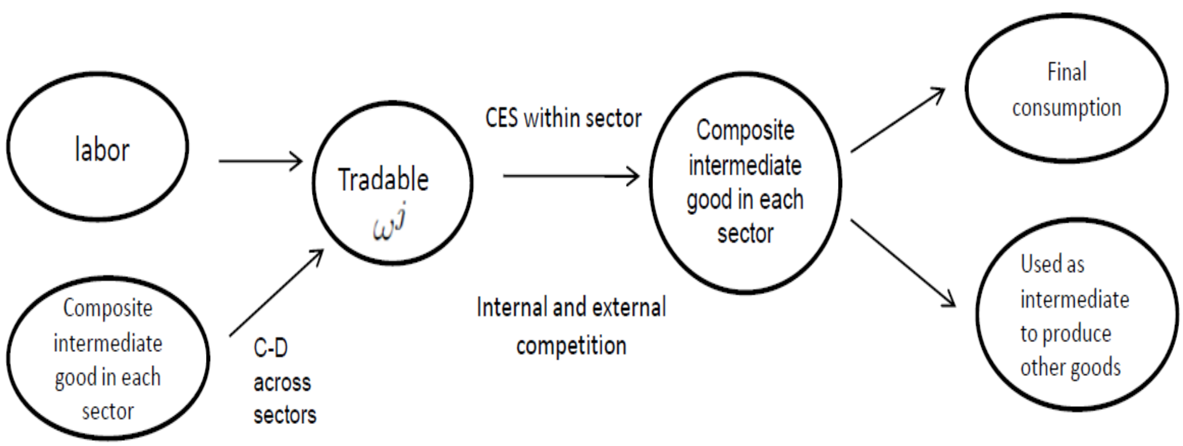

Table 1: Sino-U.S. Bilateral Trade Volume and Growth Since 2000

	Trade Flows, Billion U.S. Dollars		Growth Rate, %	
Year	$M_{USA,CHN}$	$M_{CHN,USA}$	$M_{USA,CHN}$	$M_{CHN,USA}$
2000	52.14	22.36		
2001	54.32	26.20	4.17	17.17
2002	69.96	27.23	28.79	3.91
2003	92.51	33.88	32.23	24.44
2004	124.97	44.65	35.09	31.78
2005	162.94	48.73	30.38	9.14
2006	203.52	59.22	24.90	21.52
2007	232.76	69.86	14.37	17.96
2008	252.33	81.50	8.41	16.66
2009	220.90	77.46	-12.45	-4.95
2010	283.37	102.06	28.28	31.76
2011	324.56	122.14	14.54	19.68
2012	352.00	132.88	8.45	8.79
2013	368.48	152.55	4.68	14.81
2014	396.15	159.19	7.51	4.35
2015	410.15	149.78	3.53	-5.91
2016	389.11	135.12	-5.13	-9.79

$M_{USA,CHN}$ denotes the total imports of the U.S. from China. $M_{USA,CHN} + M_{CHN,USA}$ denotes the total trade volume. $M_{USA,CHN} - M_{CHN,USA}$ denotes China's trade balance.

Table 2: Sino-U.S. Bilateral Trade Flows on Selected Sectors from 1993 to 2016, Billion U.S. Dollars.

	Steel		Textile		Machine and Electronic	
Year	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$
1993			3.31	0.23	2.93	3.84
1994			3.16	0.86	4.60	4.53
1995			3.17	1.35	5.53	5.13
1996			3.23	1.13	6.52	5.59
1997			3.57	0.99	8.34	5.37
1998			3.80	0.42	10.48	6.54
1999			3.98	0.24	12.48	8.02
2000			4.56	0.31	16.39	9.20
2001			4.57	0.35	17.99	11.38
2002			5.43	0.44	26.24	11.17
2003			7.19	1.08	39.39	11.42
2004			9.06	2.31	56.68	15.46
2005			16.67	2.11	72.79	16.84
2006			19.87	3.00	92.55	21.38
2007			22.90	2.42	107.85	23.72
2008	6.92	1.22	23.28	2.60	113.48	26.17
2009	1.51	0.90	24.60	1.71	104.72	22.32
2010	1.63	0.63	31.45	3.06	132.90	28.74
2011	2.58	0.65	35.06	4.18	150.01	29.45
2012	2.88	0.57	36.18	4.96	163.37	28.96
2013	2.75	0.58	38.95	3.82	169.34	38.31
2014	4.02	0.69	41.88	2.53	182.86	38.30
2015	2.85	0.58	44.79	1.98	179.89	35.67
2016	1.71	0.45	42.42	1.28	172.87	31.26

$M^j_{USA,CHN}$ denotes the imports of the U.S. from China in sector j.

Table 3: Bilateral Trade Flows between the U.S. and China in 2011,%

Sector	$\frac{M^j_{USA,CHN}}{M^j_{USA}}$	$\frac{M^j_{USA,CHN}}{E^j_{CHN}}$	$\frac{M^j_{CHN,USA}}{M^j_{CHN}}$	$\frac{M^j_{CHN,USA}}{E^j_{USA}}$
Agriculture	2.34	6.24	21.93	18.07
Mining	0.13	4.50	0.71	6.13
Food	7.63	15.17	13.61	7.69
Textiles	45.61	23.89	6.21	8.40
Wood	27.85	26.90	13.08	16.45
Paper	14.48	24.58	43.91	15.70
Petroleum	1.67	6.07	6.20	2.08
Chemicals	7.77	12.93	11.17	9.59
Plastics	25.88	25.82	6.77	6.64
Minerals	31.79	16.57	13.20	11.60
Basic Metals	3.53	4.84	3.57	9.96
Metal Prod.	28.23	19.92	11.01	5.25
Machinery n.e.c.	20.67	20.39	8.86	8.18
Computer	47.06	29.04	5.88	16.52
Electrical	31.18	21.61	6.02	11.61
Auto	5.43	23.47	8.17	5.73
Other Transport	7.44	4.27	27.83	5.18
Others	30.02	24.83	15.55	2.76

$\frac{M^j_{USA,CHN}}{M^j_{USA}}$ (or $\frac{M^j_{USA,CHN}}{E^j_{CHN}}$): Imports of the U.S. from China in sector j over the total imports of the U.S. in sector j (the total exports of China in sector j) in 2011.

Table 4: Trade Shares in the Total Output of Countries and Output Shares of Countries in ROW,%

Sector	M_i^j/Y_i^j	E_i^j/Y_i^j	Y_i^j/Y_w^j	M_i^j/Y_i^j	E_i^j/Y_i^j	Y_i^j/Y_w^j
		USA			CHN	
Agriculture	7.51	14.48	8.02	3.86	0.91	25.28
Mining	52.90	6.43	9.95	29.81	0.81	18.68
Textiles	141.96	25.87	3.25	2.69	20.83	44.79
Wood	15.49	7.26	8.37	1.79	3.14	42.66
Paper	4.49	12.03	26.30	8.67	5.34	13.04
Petroleum	11.80	15.53	20.56	7.24	4.52	14.85
Chemicals	23.40	24.26	14.98	13.79	9.31	22.67
Plastics	25.04	13.29	10.39	4.02	7.74	33.67
Minerals	17.21	9.70	5.67	1.06	4.09	45.79
Basic Metals	33.99	12.72	7.23	6.77	4.73	37.82
Metal Prod.	13.79	10.78	14.39	3.74	14.23	19.77
Machinery n.e.c.	43.87	36.64	9.11	9.65	12.67	31.97
Computer	86.95	35.13	10.02	33.55	47.92	29.48
Electrical	68.91	26.28	5.84	6.95	13.64	42.57
Auto	42.42	21.10	12.00	7.93	5.25	22.40
Other Transport	14.38	37.82	20.08	8.04	28.60	17.60

M_i^j/Y_i^j denotes the import share in country i's output, while Y_i^j/Y_w denotes the output share in the world.

Table 5: Changes in Trade and Output— Case 1, %

Sector	$Y^j_{USA}(L^j_{USA})$	M^j_{USA}	$Y^j_{CHN}(L^j_{CHN})$	E^j_{CHN}	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$
Agriculture	2.37	-8.04	0.83	-1.63	-97.80	8.57
Mining	12.31	-4.11	2.22	3.84	-99.55	14.63
Food	-3.42	-11.03	1.32	-10.12	-75.37	3.31
Textiles	24.85	-29.34	-6.51	-21.30	-95.69	1.24
Wood	5.46	-28.42	-0.68	-23.53	-99.06	7.54
Paper	5.48	-19.57	-2.84	-21.75	-99.86	11.24
Petroleum	14.47	-45.05	2.45	17.27	-100.00	61.40
Chemicals	1.85	-8.19	-2.39	-9.55	-78.54	0.21
Plastics	4.94	-12.42	-3.31	-14.96	-61.17	-1.94
Minerals	6.55	-18.63	1.03	-10.56	-70.31	2.99
Basic Metals	6.81	3.07	-0.87	-2.41	-78.33	0.25
Metal Prod.	7.65	-24.63	-3.09	-16.94	-94.69	3.49
Machinery nec	-3.05	-18.28	-0.26	-11.30	-62.37	1.18
Computer	31.84	-27.53	-14.67	-25.63	-96.05	0.47
Electrical	22.24	-18.27	-2.43	-17.97	-99.32	6.08
Auto	-0.28	-3.96	0.55	-14.26	-65.33	1.00
OtherTrans.	3.58	1.46	1.03	-1.43	-37.59	1.67
Others	-0.07	-27.89	-4.83	-19.96	-84.91	2.59

Y^j_{USA} denotes the output of the U.S. in sector j. We use Cobb-Douglas production function with labor and intermediate inputs for all sectors. The changes in sectoral labor inputs are equal to the output changes minus the changes in nominal wages. Given that wage is equalized in all sectors, the changes in labor shares across different sectors within a country is proportional to the sectoral output changes.

Table 6: Changes in Real Wages—Case 1,%

Rank	Name	w_n/P_n, %	Rank	Name	w_n/P_n,%
1	Singapore	2.58	53	France	-0.35
2	Luxembourg	2.17	54	Costa Rica	-0.37
3	Ireland	2.04	55	Cambodia	-0.39
4	Brunei	1.90	56	Romania	-0.51
5	Iceland	1.42	57	Tunisia	-0.57
6	Malaysia	1.40	58	India	-0.65
7	Switzerland	1.19	59	USA	-0.66
8	Norway	1.19	60	Portugal	-0.66
9	Saudi Arabia	1.12	61	Greece	-0.99
10	Netherlands	1.08	62	Turkey	-1.12
38	China	-0.04			

w_n/P_n denotes the real wages in country n.

Table 7: Changes in Trade and Output— Case 2, %

Sector	$Y^j_{USA}(L^j_{USA})$	M^j_{USA}	$Y^j_{CHN}(L^j_{CHN})$	E^j_{CHN}	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$
Agriculture	8.96	-95.63	0.64	-5.81	-96.12	-29.30
Mining	55.28	-98.33	-0.74	-3.95	-98.63	-46.53
Food	3.86	-68.88	0.97	-10.62	-69.48	-9.00
Textiles	103.84	-86.86	-6.78	-21.95	-87.23	-34.82
Wood	18.58	-97.83	-1.35	-27.49	-98.08	-38.39
Paper	4.46	-99.60	-1.35	-23.65	-99.69	-46.18
Petroleum	-0.34	-100.00	0.50	-0.76	-100.00	-97.32
Chemicals	16.80	-67.67	-2.66	-10.38	-67.57	-16.86
Plastics	15.62	-50.56	-3.63	-14.62	-51.05	-11.81
Minerals	18.23	-60.90	0.51	-11.28	-61.58	-9.93
Basic Metals	43.03	-58.27	-1.65	-6.06	-59.63	-23.51
Metal Prod.	21.24	-89.35	-3.71	-18.58	-89.80	-36.16
Machinery nec	5.90	-48.22	-0.33	-9.87	-48.46	-9.50
Computer	80.68	-89.68	-15.52	-27.34	-89.79	-35.45
Electrical	70.27	-97.01	-3.32	-21.31	-97.24	-55.75
Auto	12.85	-48.71	0.56	-11.79	-48.91	-16.34
OtherTrans.	6.05	-31.98	0.74	-1.77	-32.06	-1.37
Others	11.43	-75.44	-4.33	-18.37	-76.04	-17.79

Table 8: Changes in Real Wages—Case 2,%

Rank	Name	w_n/P_n, %	Rank	Name	w_n/P_n,%
1	Luxembourg	1.64	53	India	-0.61
2	Singapore	1.45	54	Israel	-0.62
3	Brunei	0.96	55	Greece	-0.74
4	Iceland	0.63	56	Viet Nam	-0.75
5	Ireland	0.62	57	Turkey	-0.81
6	Norway	0.59	58	Cambodia	-0.92
7	Switzerland	0.54	59	Costa Rica	-1.22
8	Netherlands	0.50	60	Canada	-1.33
9	Malaysia	0.45	61	Mexico	-1.43
10	Saudi Arabia	0.40	62	USA	-1.74
33	China	-0.16			

w_n/P_n denotes the real wages in country n.

Table 9: Changes in Trade and Output— Case 3, %

Sector	$Y^j_{USA}(L^j_{USA})$	M^j_{USA}	$Y^j_{CHN}(L^j_{CHN})$	E^j_{CHN}	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$
Agriculture	-1.14	-10.67	2.45	-4.84	-97.94	-97.27
Mining	14.05	-4.75	1.93	-0.27	-99.57	-99.44
Food	-4.18	-11.85	2.28	-10.80	-75.81	-72.45
Textiles	23.80	-30.31	-6.29	-22.47	-95.84	-96.40
Wood	3.75	-30.15	0.38	-25.56	-99.11	-98.90
Paper	3.12	-22.26	2.30	-25.71	-99.88	-99.81
Petroleum	16.51	-50.34	2.32	2.23	-100.00	-100.00
Chemicals	-0.30	-9.58	-0.67	-10.28	-79.08	-77.61
Plastics	4.02	-13.27	-2.46	-15.42	-61.73	-62.96
Minerals	5.43	-19.47	1.69	-11.04	-70.80	-70.45
Basic Metals	4.72	1.35	-0.13	-2.98	-78.88	-79.13
Metal Prod.	6.48	-26.16	-2.35	-18.20	-94.89	-94.46
Machinery nec	-4.52	-18.98	0.56	-11.66	-62.84	-58.59
Computer	27.49	-29.13	-14.26	-26.98	-96.24	-96.88
Electrical	19.87	-19.95	-1.95	-19.90	-99.36	-99.35
Auto	-1.27	-4.65	1.42	-14.72	-65.76	-64.25
OtherTrans.	3.05	0.89	1.60	-1.55	-38.04	-38.69
Others	-0.60	-28.69	-4.13	-21.01	-85.29	-83.27

Table 10: Changes in Real Wages—Case 3,%

Rank	Name	w_n/P_n, %	Rank	Name	w_n/P_n,%
1	Singapore	2.63	53	France	-0.35
2	Luxembourg	2.17	54	Costa Rica	-0.37
3	Ireland	2.04	55	Cambodia	-0.40
4	Brunei	1.93	56	Romania	-0.51
5	Malaysia	1.47	57	Tunisia	-0.57
6	Iceland	1.42	58	India	-0.65
7	Switzerland	1.19	59	Portugal	-0.67
8	Norway	1.17	60	USA	-0.75
9	Saudi Arabia	1.13	61	Greece	-1.00
10	Netherlands	1.07	62	Turkey	-1.12
37	China	0.08			

w_n/P_n denotes the real wages in country n.

Table 11: Changes in Trade and Output— Case 4, %

Sector	$Y^j_{USA}(L^j_{USA})$	M^j_{USA}	$Y^j_{CHN}(L^j_{CHN})$	E^j_{CHN}	$M^j_{USA,CHN}$	$M^j_{CHN,USA}$
Agriculture	-8.81	-97.25	2.80	-3.80	-97.57	-97.54
Mining	43.82	-99.07	0.61	-4.03	-99.26	-99.57
Food	-4.00	-73.01	2.63	-9.51	-73.57	-73.32
Textiles	86.25	-90.55	-5.47	-21.12	-90.81	-96.91
Wood	7.18	-98.70	0.67	-26.09	-98.85	-99.06
Paper	-6.94	-99.80	2.41	-21.86	-99.85	-99.84
Petroleum	-4.33	-100.00	1.44	-4.97	-100.00	-100.00
Chemicals	-3.83	-73.89	0.45	-6.53	-73.77	-79.12
Plastics	4.96	-56.85	-1.51	-13.62	-56.90	-64.32
Minerals	8.02	-66.29	2.10	-10.58	-66.87	-71.68
Basic Metals	20.37	-67.74	0.52	-3.46	-68.42	-82.20
Metal Prod.	5.47	-92.67	-1.42	-15.67	-92.79	-95.67
Machinery nec	-10.13	-54.53	1.64	-7.65	-54.40	-60.87
Computer	52.60	-93.22	-11.89	-24.05	-93.15	-97.21
Electrical	50.14	-98.40	-1.17	-17.56	-98.38	-99.59
Auto	3.08	-55.21	2.30	-9.30	-53.38	-68.75
OtherTrans.	-1.90	-37.46	2.46	0.36	-37.29	-39.34
Others	-9.19	-79.86	-1.74	-14.23	-80.17	-84.51

Table 12: Changes in Real Wages—Case 4,%

Rank	Name	w_n/P_n, %	Rank	Name	w_n/P_n,%
1	Singapore	1.30	53	Greece	-0.79
2	Luxembourg	1.24	54	Turkey	-0.90
3	Netherlands	0.55	55	Viet Nam	-0.93
4	Norway	0.54	56	Colombia	-0.95
5	Ireland	0.41	57	Israel	-1.01
6	Czech Republic	0.36	58	Cambodia	-1.24
7	Switzerland	0.34	59	USA	-2.25
8	Russia	0.32	60	Costa Rica	-2.43
9	Denmark	0.31	61	Canada	-2.77
10	Iceland	0.26	62	Mexico	-2.79
22	China	-0.03			

w_n/P_n denotes the real wages in country n.

Appendices

A Data information and source

- 61+1 countries: 34 OECD countries, 27 non-OECD countries, and ROW.
- ISIC-Rev3: 33 sectors.
- Bilateral trade flows in 2011 (initial), $M^j_{ni}(= X^j_{ni})$ and outputs, Y^j_n : OECD ICIO (2015) and STAN.
- Parameters to be calculated: α^j_n, π^j_{ni}, $\gamma^{j,k}_n$, and γ^j_n from OECD ICIO (2015), and STAN.
- Parameters borrowed from Caliendo and Parro (2015): θ^j, elasticity of substitution.

B Additional tables and results

Table B.1: List of Countries

ID	ISO	OECD	ID	ISO	Non-OECD
1	AUS	Australia	35	ARG	Argentina
2	AUT	Austria	36	BGR	Bulgaria
3	BEL	Belgium	37	BRA	Brazil
4	CAN	Canada	38	BRN	Brunei Darussalam
5	CHL	Chile	39	CHN	China
6	CZE	Czech Republic	40	COL	Colombia
7	DNK	Denmark	41	CRI	Costa Rica
8	EST	Estonia	42	CYP	Cyprus
9	FIN	Finland	43	HKG	Hong Kong
10	FRA	France	44	HRV	Croatia
11	DEU	Germany	45	IDN	Indonesia
12	GRC	Greece	46	IND	India
13	HUN	Hungary	47	KHM	Cambodia
14	ISL	Iceland	48	LTU	Lithuania
15	IRL	Ireland	49	LVA	Latvia
16	ISR	Israel	50	MLT	Malta
17	ITA	Italy	51	MYS	Malaysia
18	JPN	Japan	52	PHL	Philippines
19	KOR	Korea	53	ROU	Romania
20	LUX	Luxembourg	54	RUS	Russia
21	MEX	Mexico	55	SAU	Saudi Arabia
22	NLD	Netherlands	56	SGP	Singapore
23	NZL	New Zealand	57	THA	Thailand
24	NOR	Norway	58	TUN	Tunisia
25	POL	Poland	59	TWN	Taipei
26	PRT	Portugal	60	VNM	Viet Nam
27	SVK	Slovak Republic	61	ZAF	South Africa
28	SVN	Slovenia	62	ROW	Rest of the world
29	ESP	Spain			
30	SWE	Sweden			
31	CHE	Switzerland			
32	TUR	Turkey			
33	GBR	UK			
34	USA	USA			

Table B.2: List of Sectors

ISIC Rev3	Sector	Description
C01T05	Agriculture	Agriculture, hunting, forestry, and fishing
C10T14	Mining	Mining and quarrying
C15T16	Food	Food products, beverages, and tobacco
C17T19	Textiles	Textiles, textile products, leather, and footwear
C20	Wood	Wood and products of wood and cork
C21T22	Paper	Pulp, paper, paper products, printing, and publishing
C23	Petroleum	Coke, refined petroleum products, and nuclear fuel
C24	Chemicals	Chemicals and chemical products
C25	Plastics	Rubber and plastic products
C26	Minerals	Other non-metallic mineral products
C27	Basic Metals	Basic metals
C28	Metal Prod.	Fabricated metal products
C29	Machinery nec	Machinery and equipment, nec
C30T33X	Computer	Computer, electronic, and optical equipment
C31	Electrical	Electrical machinery and apparatus, nec
C34	Auto	Motor vehicles, trailers, and semi-trailers
C35	OtherTrans.	Other transport equipment
C36T37	Other manufacturing	Manufacturing nec; recycling
C40T41	Electricity	Electricity, gas, and water supply
C45	Construction	Construction
C50T52	Wholesale and retail	Wholesale and retail trade; repairs
C55	Hotels and restaurants	Hotels and restaurants
C60T63	Transport	Transport and storage
C64	Post	Post and telecommunications
C65T67	Finance	Financial intermediation
C70	Real estate	Real estate activities
C71	Renting	Renting of machinery and equipment
C72	Computer service	Computer and related activities
C73T74	R&D and other business	R&D and other business activities
C75	Public administration	Public administration, defense, and social security
C80	Education	Education
C85	Health	Health and social work
C90T93	Other social service	Other community, social, and personal services

Table B.3: Share of Intermediate Inputs in the Total Intermediate Inputs across Sectors, %

Sector	Textiles	Machinery nec	Computer	Electrical	Auto
Textiles	12.405	0.217	1.454	0.147	0.250
Machinery nec	0.238	21.769	3.781	4.559	4.757
Computer	0.026	1.016	34.778	3.106	0.665
Electrical	0.027	4.410	6.005	10.286	0.570
Auto	0.818	8.344	4.203	1.029	35.951

This table presents the sectoral share of intermediate inputs in the total intermediate inputs. The data are calculated from the U.S. input-out matrix. The columns are the source sectors, while the rows are the destination sectors.

Table B.4: Changes in the Output in Four Cases, %

Name	Case1	Case2	Case3	Case4	Name	Case1	Case2	Case3	Case4
ARG	-0.649	-1.330	-0.674	-0.227	ITA	-0.904	-1.795	-0.909	-0.717
AUS	0.267	-0.405	0.371	0.668	JPN	-0.145	-1.138	-0.023	0.135
AUT	1.734	0.473	1.746	1.538	KHM	1.505	-6.280	1.496	-5.465
BEL	0.984	-0.302	0.933	0.938	KOR	0.129	-1.737	0.431	-0.065
BGR	-0.848	-1.814	-0.867	-0.627	LTU	0.403	-0.678	0.350	0.402
BRA	-1.322	-1.954	-1.324	-0.792	LUX	-0.805	-2.491	-0.803	-1.938
BRN	12.126	10.961	12.189	12.152	LVA	0.230	-0.639	0.232	0.325
CAN	-0.565	-3.703	-0.749	-3.437	MEX	-0.198	-4.978	-0.441	-3.789
CHE	1.959	0.215	1.966	1.163	MLT	0.848	-0.002	0.876	0.753
CHL	0.394	0.414	0.360	1.476	MYS	3.670	0.567	3.925	1.789
CHN	-0.684	-1.150	-0.072	0.404	NLD	2.446	1.026	2.409	2.137
COL	-1.149	-2.249	-1.237	-1.228	NOR	3.596	2.412	3.580	3.224
CRI	-0.398	-3.394	-0.477	-2.460	NZL	0.629	-0.411	0.702	0.689
CYP	-1.533	-2.029	-1.543	-1.319	PHL	-0.233	-1.542	-0.045	-0.240
CZE	1.861	0.222	1.905	1.577	POL	0.777	-0.248	0.785	0.884
DEU	1.409	0.105	1.412	1.179	PRT	-0.995	-1.599	-1.031	-0.586
DNK	1.261	0.066	1.264	0.963	ROU	-0.456	-0.854	-0.473	0.196
ESP	-0.796	-1.248	-0.832	-0.277	ROW	-0.040	-0.889	-0.026	0.002
EST	1.460	-0.142	1.466	0.919	RUS	1.963	0.594	1.980	1.646
FIN	0.108	-1.234	0.109	-0.048	SAU	8.230	7.474	8.264	8.611
FRA	-0.693	-1.228	-0.709	-0.239	SGP	2.142	-1.368	2.382	0.314
GBR	0.000	-0.671	-0.031	0.054	SVK	1.075	-0.314	1.122	1.005
GRC	-1.550	-1.408	-1.590	-0.513	SVN	0.965	-0.206	0.983	0.974
HKG	0.368	-0.155	0.528	0.586	SWE	1.281	-0.018	1.275	1.037
HRV	0.371	-0.486	0.370	0.506	THA	0.797	-1.095	0.961	0.221
HUN	1.258	-0.698	1.307	0.715	TUN	-1.423	-2.128	-1.398	-0.979
IDN	1.046	-0.183	1.139	0.932	TUR	-1.829	-2.008	-1.820	-0.906
IND	-1.472	-2.398	-1.463	-1.224	TWN	-0.201	-2.913	0.147	-1.225
IRL	2.696	0.161	2.660	1.243	USA	-0.719	3.369	-1.080	-0.681
ISL	2.962	1.628	2.946	2.251	VNM	0.167	-2.922	0.327	-1.700
ISR	-0.020	-3.025	-0.071	-2.197	ZAF	0.169	-0.632	0.186	0.445
					World	-0.095	-0.216	-0.042	-0.004

This table presents the changes in output for all 62 countries in four cases.

Table B.5: Changes in Exports in Four Cases %

Name	Case1	Case2	Case3	Case4	Name	Case1	Case2	Case3	Case4
ARG	-4.202	-8.288	-3.994	-7.415	ITA	2.688	-0.240	2.673	0.834
AUS	1.612	-1.570	2.035	-1.080	JPN	3.705	-1.648	4.072	-1.561
AUT	-0.955	-3.334	-0.929	-2.328	KHM	8.472	-4.005	8.124	-4.187
BEL	1.133	-1.381	1.113	-0.179	KOR	-2.037	-6.806	-1.384	-6.260
BGR	-0.788	-1.888	-0.815	-0.586	LTU	3.783	2.179	3.644	3.261
BRA	4.027	-2.280	4.382	-2.188	LUX	-6.848	-8.727	-6.818	-8.089
BRN	-33.538	-35.051	-33.444	-34.723	LVA	7.759	6.350	7.755	7.324
CAN	3.173	-21.534	3.058	-28.663	MEX	5.975	-29.958	5.725	-38.755
CHE	-8.889	-12.614	-8.830	-11.839	MLT	-0.803	-1.486	-0.787	-1.319
CHL	-2.475	-9.222	-2.060	-8.867	MYS	-7.665	-13.892	-7.143	-13.288
CHN	-12.959	-13.126	-14.704	-13.047	NLD	-10.041	-12.608	-9.973	-11.410
COL	3.618	-9.588	3.713	-11.633	NOR	-18.073	-20.671	-18.088	-19.842
CRI	11.036	-7.612	11.332	-13.245	NZL	-1.142	-3.879	-0.934	-3.331
CYP	8.291	7.210	8.292	7.925	PHL	6.603	1.313	6.963	0.983
CZE	-0.783	-3.437	-0.752	-1.744	POL	3.054	1.126	3.017	2.402
DEU	-4.704	-8.325	-4.617	-7.233	PRT	7.342	5.322	7.238	6.406
DNK	-5.321	-7.566	-5.278	-6.545	ROU	8.763	7.299	8.801	8.762
ESP	1.876	-0.044	1.828	0.865	ROW	0.995	-3.685	1.129	-3.951
EST	-0.884	-3.700	-0.934	-2.750	RUS	-16.990	-19.326	-17.019	-18.597
FIN	1.880	-1.126	1.894	0.445	SAU	-26.148	-29.140	-26.034	-28.464
FRA	6.998	4.406	7.019	5.174	SGP	-12.694	-17.386	-12.317	-16.120
GBR	4.098	1.089	4.062	1.027	SVK	1.029	-0.876	1.081	0.695
GRC	19.832	19.531	19.787	20.511	SVN	0.368	-1.501	0.380	-0.167
HKG	-2.262	-2.999	-2.044	-2.383	SWE	-5.297	-8.436	-5.253	-6.940
HRV	2.928	2.016	2.892	2.592	THA	-0.398	-4.612	-0.084	-3.557
HUN	-2.738	-5.921	-2.644	-4.002	TUN	9.266	7.943	9.300	8.949
IDN	-2.221	-6.517	-2.077	-5.915	TUR	20.918	18.878	20.914	18.978
IND	16.801	13.430	16.709	13.764	TWN	-5.291	-11.258	-4.603	-10.538
IRL	-9.101	-15.656	-9.018	-14.392	USA	11.392	-28.284	9.249	-46.298
ISL	-3.313	-6.268	-3.267	-5.608	VNM	3.174	-2.635	3.247	-2.121
ISR	2.601	-8.353	2.558	-9.470	ZAF	-0.159	-2.830	-0.036	-2.074
					World	-0.902	-9.044	-1.196	-10.726

This table presents the changes in exports for all 62 countries in four cases.

Table B.6: Changes in Imports in Four Cases, %

Name	Case1	Case2	Case3	Case4	Name	Case1	Case2	Case3	Case4
ARG	5.788	1.276	6.019	2.241	ITA	-3.008	-5.774	-3.022	-4.759
AUS	-0.338	-3.458	0.077	-2.978	JPN	-2.703	-7.725	-2.359	-7.643
AUT	3.691	1.200	3.719	2.254	KHM	-2.067	-13.332	-2.382	-13.496
BEL	1.422	-1.099	1.402	0.106	KOR	1.171	-3.754	1.845	-3.190
BGR	-3.180	-4.254	-3.207	-2.983	LTU	-2.626	-4.131	-2.757	-3.117
BRA	-2.722	-8.620	-2.391	-8.534	LUX	8.005	5.826	8.040	6.566
BRN	102.368	97.760	102.655	98.758	LVA	-4.696	-5.942	-4.699	-5.080
CAN	-1.578	-25.147	-1.687	-31.948	MEX	1.355	-33.012	1.115	-41.425
CHE	13.581	8.937	13.654	9.904	MLT	2.452	1.747	2.469	1.920
CHL	5.117	-2.155	5.565	-1.772	MYS	11.976	4.425	12.608	5.156
CHN	-4.170	-4.354	-6.092	-4.267	NLD	18.521	15.139	18.611	16.718
COL	-1.273	-13.855	-1.181	-15.803	NOR	21.200	17.357	21.179	18.584
CRI	-2.754	-19.086	-2.494	-24.019	NZL	0.579	-2.206	0.791	-1.648
CYP	-3.721	-4.683	-3.720	-4.046	PHL	-5.895	-10.565	-5.577	-10.856
CZE	4.454	1.660	4.486	3.442	POL	-1.311	-3.157	-1.347	-1.936
DEU	8.889	4.752	8.989	5.999	PRT	-7.165	-8.912	-7.255	-7.974
DNK	5.457	2.956	5.505	4.093	ROU	-7.289	-8.537	-7.256	-7.289
ESP	-2.615	-4.451	-2.661	-3.582	ROW	0.187	-4.456	0.320	-4.719
EST	3.793	0.845	3.741	1.840	RUS	14.684	11.456	14.644	12.464
FIN	-1.197	-4.112	-1.184	-2.589	SAU	44.459	38.608	44.683	39.930
FRA	-5.218	-7.514	-5.199	-6.834	SGP	16.562	10.298	17.065	11.987
GBR	-2.312	-5.136	-2.345	-5.193	SVK	1.051	-0.855	1.103	0.717
GRC	-13.975	-14.192	-14.007	-13.488	SVN	1.517	-0.373	1.530	0.976
HKG	1.940	1.171	2.167	1.814	SWE	6.316	2.793	6.366	4.472
HRV	-1.516	-2.388	-1.551	-1.837	THA	1.684	-2.618	2.005	-1.541
HUN	4.162	0.753	4.263	2.809	TUN	-6.834	-7.963	-6.806	-7.104
IDN	2.997	-1.528	3.149	-0.894	TUR	-13.997	-15.448	-14.001	-15.377
IND	-9.506	-12.118	-9.577	-11.859	TWN	4.237	-2.329	4.996	-1.537
IRL	13.528	5.341	13.632	6.920	USA	-15.045	-45.305	-16.679	-59.043
ISL	10.532	7.153	10.584	7.908	VNM	-2.497	-7.986	-2.428	-7.500
ISR	-0.720	-11.320	-0.762	-12.401	ZAF	0.481	-2.207	0.605	-1.446
					World	-0.902	-9.044	-1.196	-10.726

This table presents the changes in imports for all 62 countries in four cases.

Table B.7: Changes in Real Wages in Four Cases, %

Name	Case1	Case2	Case3	Case4	Name	Case1	Case2	Case3	Case4
ARG	0.352	0.070	0.350	-0.012	ITA	-0.076	-0.257	-0.076	-0.238
AUS	0.065	-0.157	0.101	-0.315	JPN	-0.142	-0.233	-0.116	-0.262
AUT	0.565	0.108	0.569	0.094	KHM	-0.386	-0.918	-0.403	-1.241
BEL	0.271	-0.013	0.262	-0.080	KOR	0.296	-0.231	0.379	-0.352
BGR	-0.131	-0.335	-0.133	-0.287	LTU	-0.024	-0.256	-0.036	-0.281
BRA	-0.072	-0.191	-0.067	-0.259	LUX	2.171	1.642	2.168	1.243
BRN	1.896	0.961	1.927	-0.434	LVA	-0.246	-0.473	-0.248	-0.435
CAN	-0.164	-1.335	-0.196	-2.766	MEX	-0.105	-1.429	-0.146	-2.786
CHE	1.194	0.539	1.194	0.338	MLT	0.445	0.172	0.443	0.105
CHL	0.337	-0.070	0.346	-0.445	MYS	1.403	0.449	1.467	0.207
CHN	-0.042	-0.158	0.080	-0.033	NLD	1.081	0.502	1.073	0.550
COL	-0.080	-0.532	-0.105	-0.954	NOR	1.188	0.593	1.175	0.544
CRI	-0.365	-1.221	-0.374	-2.427	NZL	0.192	-0.126	0.213	-0.311
CYP	-0.082	-0.142	-0.085	-0.277	PHL	-0.321	-0.542	-0.284	-0.644
CZE	0.969	0.271	0.976	0.356	POL	0.154	-0.160	0.150	-0.146
DEU	0.829	0.314	0.831	0.250	PRT	-0.663	-0.594	-0.666	-0.591
DNK	0.747	0.292	0.743	0.310	ROU	-0.510	-0.489	-0.511	-0.408
ESP	-0.070	-0.146	-0.076	-0.185	ROW	0.110	-0.260	0.112	-0.644
EST	0.666	0.147	0.662	0.132	RUS	0.887	0.344	0.887	0.322
FIN	0.181	-0.182	0.185	-0.144	SAU	1.121	0.402	1.132	0.065
FRA	-0.348	-0.384	-0.352	-0.464	SGP	2.577	1.454	2.633	1.298
GBR	-0.072	-0.240	-0.083	-0.492	SVK	0.375	-0.045	0.383	0.018
GRC	-0.990	-0.742	-1.000	-0.789	SVN	0.379	0.003	0.382	0.015
HKG	0.185	0.125	0.209	-0.179	SWE	0.756	0.246	0.756	0.234
HRV	0.099	-0.121	0.096	-0.131	THA	0.341	-0.167	0.384	-0.278
HUN	0.759	0.211	0.764	0.227	TUN	-0.567	-0.596	-0.572	-0.670
IDN	0.253	-0.060	0.273	-0.138	TUR	-1.119	-0.810	-1.121	-0.901
IND	-0.650	-0.607	-0.648	-0.705	TWN	0.752	0.027	0.847	-0.211
IRL	2.040	0.622	2.040	0.411	USA	-0.661	-1.739	-0.753	-2.246
ISL	1.422	0.634	1.419	0.262	VNM	-0.100	-0.747	-0.067	-0.927
ISR	-0.058	-0.615	-0.066	-1.008	ZAF	0.093	-0.174	0.106	-0.342

This table presents the changes in real wages for all 62 countries in four cases.