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

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Abstract

During his U.S. presidential campaign Donald Trump threatened China with the imposition of high import tariffs on its exports to the United States.. To evaluate the repercussions of such an action, this paper uses Eaton and Kortum's 2002 multi-sector, multi-country general equilibrium model with inter-sectional linkages to forecast how exports, imports, output, and real wages would change if the Trump's threat of 45 percent tariffs is carried out. To view plausible

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scenarios, we evaluate the case of a unilateral action on the part of the United States, as well as a scenario where China retaliates by imposing an equally high 45 percent tariff on its imports from the United States. In addition, since the high U.S. trade deficit with China is a factor which underpins calls for tariff action, we explore simulations where the trade balance is restored to balance as well as a scenario in which the trade balance is unchanged. In all of the scenarios, the calibration exercise suggests that a trade war triggered by high U.S. import tariffs will lead to a collapse in U.S.-China bilateral trade. In all of the scenarios, the United States will experience large social welfare losses, while China may lose or gain slightly depending on the effect of trade war on the U.S.-China trade balance. Globally, some small open economies may experience small benefits, while other countries may suffer collateral damage.

Key words: Tariffs, Gains from Trade, Protectionism

JEL classification: F10, F11

1. Introduction

During his bid for the U.S. presidency, Donald Trump injected strong calls for protectionism. Following his election, Trump used his inaugural speech to call for "America First" and for "Buy American, Hire American". He also started to carry his campaign pledges breaking the trade ties of the United States with its neighboring countries and main trade partners. For instance, Trump formally withdrew the United States from the Trans-Pacific Partnership (TPP), an agreement among 12 countries across three continents that took nearly ten years to negotiate under his predecessor, the former U.S. 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 United States. He ordered his team to initiate a renegotiation of the North American Free Trade Agreement (NAFTA) between the United States, Mexico, and Canada. These actions, along 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 the increasingly protectionist United States.

In light of the administration's protectionist actions, it is important to ask whether the U.S. will pull the trigger on a trade war against the country's main trade partners, such as China? China has been among a primary target of President Trump's campaign and administration. In his Monessen, Pennsylvania speech on 28 June 2016, Trump condemned China's entry to the World Trade Organization (WTO) as a catastrophe for U.S. manufacturing workers. Later, when he met with the editorial board of *The New York Times* in January 2016 he proposed the idea of imposing 45 percent import tariffs on China's exports to the United States . In his well-known tweet, President Trump also described China as the "grand champions" of currency manipulation to boost her exports. Since it is no longer implausible to imagine the outbreak of a trade war between the U.S. and China, it is important to evaluate how such a conflict would affect the U.S. and China, as well as other countries.

To forecast the economic implications of a trade war, we adopt Eaton and Kortum's (2002) multi-country and multi-sector general equilibrium model which is modified to include inter-sectoral linkages of the form proposed by Caliendo and Parro (2015). Through this exercise, we are able to examine the changes in the exports, imports, output, and real wages of 62 major economies in response to a hypothetical 45 percent tariff levied by the United States on its imports from China. We consider three possible tariff hike scenarios involving the agriculture, mining, and manufacturing sectors. In the first scenario, the United States increases its import tariffsto 45 percent on all imports from China and all countries have balanced trade. Balanced trade might well be one of the goals of a trade war as the U.S. government has for a long time blamed China for its large trade surplus.[1] In the second case, we assume China retaliates by also increasing its tariffs on its U.S imports to 45 percent, again evaluating the impacts under the assumption of balanced trade. In the third case, we consider a situation in which both China and the United States impose high tariffs to each other, though trade imbalances for all countries remain unchanged. For simplicity, we name those three cases above as 1) Unilateral U.S. tariffs with balanced trade, 2) U.S.-China retaliatory tariff war with balanced trade, and 3) U.S. -China

[1]For simplicity, we assume all countries achieve trade balance after the trade war starts. We will also consider the case in which trade imbalance remains.

retaliatory tariff war with ongoing trade imbalance, respectively.

Our exercise shows that in all scenarios, high U.S. import tariffs lead to a catastrophic collapse in bilateral trade. In the case of "Unilateral U.S. tariffs with balanced trade," for half of China's 18 tradable sectors, exports to the United States fall by more than 90 percent. These sectors include textiles, metal products, computers, and electrical equipment. In the next two cases, the trade war between China and the United States leads to a similar collapse in bilateral trade. In these scenarios the dramatic decline in trade includes agriculture, mining, and petroleum products, in addition to computers and electrical equipment.

The consequence of a trade war which substantially impairs bilateral trade will be a slump in output and significant decline in social welfare. In the case where both countries engage in trade war, that is "U.S.-China retaliatory tariff war with balanced trade", China's output in textile and computer products is predicted to fall by 6.29 percent and 14.26 percent, respectively. At the same time, the output declines in the U.S, agriculture and food industries will amount to 1.14 percent and 4.18 percent, respectively. To measure social welfare loss, we use changes in real wages before and after the trade war, which accounts for the effects of a rising price index. In the first two scenarios, the United States suffers large losses while China only bears a small welfare loss. By our calculation, the United States experiences welfare losses of 0.66 percent and 0.75 percent, respectively, compared with China's maximum loss of 0.04 percent in the case of "Unilateral U.S. tariffs with balanced trade". In the third case with unbalanced trade, China experiences the largest losses (-0.37 percent) while the losses of the United States are the second largest (-0.32 percent). Some other countries in Asia may gain slightly from the diversion, while other advanced economies may experience collateral damage due to spillover effects transmitted through input-output linkages and the general equilibrium effects of the trade war between the two largest global economies.

Our study highlights the important role of the trade imbalance in the evaluation of the consequences of a Sino-U.S. trade war. The trade imbalance matters because one country may finance its consumption through trade deficits when their labor and tariff revenue income is lower in value than their total expenditure. Thus, a country with a trade deficit receives a net income transfer from other countries. Since we use a static trade model to simulate the effects of tariff changes on output and trade, the trade balance is exogeneously determined by assumptions. For simplicity, we consider two possibilities: the trade war restores trade balance or maintains the current trade imbalance. The reality would be in between, but these two possible scenarios explain why the United States is put in a disadvantage due to the current large trade deficits, and China may gain slightly from the trade war if trade achieves rebalance.

Given the current United States-China trade imbalance, the presumption of whether the trade war leads to trade balance or not has different implications for the two countries. If the trade war leads to a trade balance, the United States must export more and import less to move from a trade deficit to balanced trade, while China needs to reduce its exports more than it reduces its imports to achieve balance. In other words, the United States will not receive the net income transfer, which acts a negative income shock. This shock may be further increased if China hikes its tariffs. In contrast, since China will not need to pay for the net income transfer, the reduction in its trade surplus with the United States may alleviate the negative effect of trade war on its economy. Thus, in this case social welfare loss will be even larger for the United States, while China may evev gain slightly if the positive income effect dominates, as shown in the "U.S. vs. China with balanced trade" case. In contrast, if the trade war does not have any effect on the current trade imbalance, China will effectively continue to pay the income transfer while the United States maintains its external borrowing, even the trade war reduces overall trade. Thus, China may be hurt more than the United States by the trade war, as shown in the case of "U.S. vs. China with imbalanced trade." Our analysis implies that trade balance might not be a desirable target for the United States if it launches a trade war against China while planning to maximizing U.S. social welfare.

Admittedly, the quantitative effects of Trump's trade war on output and social welfare are less striking than those on bilateral trade. 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. One key assumption in our model is that all economies function well without any other frictions, aside from trade costs. Given that labor is freely mobile across all sectors within each country, the sectoral reallocation between tradable and non-tradable sectors, together with the import substitution among different source countries, can offset the effects of unilateral import tariff hikes imposed by the other country. Moreover, the presence of input-output linkages also diminishes the effects of unilateral tariff hikes. However, in reality these adjustments may not be smooth, in which case the impact of trade war on the world economy will be magnified. Finally, though a trade war is likely to trigger a tsunami in global financial markets, these effects are not accounted for in our framework.

One of the most popular approaches for evaluating the possible consequences of a trade war is the traditional Computational General Equilibrium (CGE) model, which fully specifies a parametric model of preferences, technology, and trade costs with ad hoc parameters. Our approach differs from this model by following the recent development in quantitative trade models, largely triggered by the seminal work of Eaton and Kortum (2002). The extension of the Eaton and Kortum (EK) model into a multiple-sectors with input-output linkages and other features has become the workhorse model for counterfactual 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) for the following reasons.

First, the EK model offers more parsimony by including a limited number of parameters. The latest version of the GTAP model has approximately 13,000 parameters that cannot be estimated, whereas researchers who adopt new quantitative trade models generally use data to estimate the key parameters before conducting counterfactual analysis. Second, the new quantitative trade models have 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) can capture firm heterogeneity, it is not only difficult to generate a sectoral gravity equation with macro implications but also intractable to identify a rich set of related fixed costs using the actual data. By contrast, the EK model can deliver gravity equations that even incorporate a country's trade deficit/surplus.

Many recent studies have applied or extended the EK framework to analyze various topics, including the evaluation of the possible gains from a trade agreement, technological changes, and infrastructure improvement. For example, Donaldson (2010) applied the EK model to empirical data and assessed the gains from railroad construction in colonial India.

Caliendo and Parro (2015) extended EK framework to include input-output linkage and evaluated the gains from NAFTA.[2] Dekle et al. (2008) showed that the EK framework can also 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 the United States 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. Section 5 presents the concluding remarks with discussions on trade policies.

2. Overview of the trade relationship between the United States and China

2.1 Bilateral trade relationship

At the establishment of the People's Republic of China (PRC, or China) in 1949, the United States retained its diplomatic recognition of Taipei instead of Beijing. The diplomatic and

[2] Di Giovanni et al. (2014) adopted 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]).

economic interactions between the United States and China were at their lowest level during the following years of the Cold War since conflicts in ideology and national security interests greatly impeded bilateral trade between these nations.

Following the China-Soviet border conflicts in the late 1960s, both China and the United States began to realize the potential benefits of normalizing a bilateral relationship. In June 1971, U.S. President Nixon ended the legal barriers of trade with China, and his ice-breaking visit to China in 1972 further provided a pathway to the thawing of trade relations between the two countries.

Following China's 1978 market-oriented economic reforms, the United States started to grant China " Most Favored Nation" (MFN) tariffs in January 1980 subject to annual renewal.[3] MFN status implies that a country provides another partner with the same tariff reatment as it does under obligation to other countries who are formal members of the World Trade Organization (WTO), or its predecessor agreement, the General Agreements on Trade and Tariffs (GATT). MFN status significantly liberalized China's access to the US market, since it supplanted the otherwise high tariffs that were levied on non-WTO countries. The United States soon became the second largest importer for China and China's third largest partner in 1986. In the same year, China applied for GATT membership while the United States was also interested in China's

[3] The Jackson-Vanik Amendment of 1974 which denied preferential trade policies to some countries was often targetted at communist countries. While the application of this amendment was waived by U.S. presidents, the amendment required an annual congressional renewal of China's MFN status.

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 United States granted China "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 the two countries, and their bilateral trade has grown much faster than before. The United States and China have become each other's most important trade partner, though trade conflicts have continued. For instance, China's large trade surplus and inflexible exchange rate have been criticized frequently by the U.S. government. The United States has also 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 reversed the movement towards freer trade. Thus, the 2017 start of the Trump administration brings concerns for the prospects of further liberalization due to Trump's open support of protectionism.

2.2 Bilateral trade flow and trade imbalance

We examine three aspects of Sino-U.S. trade, namely, bilateral trade flows and trade imbalance, bilateral trade structure and trade dispute in key industries such as steel, and current trade conflicts.

The trade volume between China and the United States has grown rapidly over the the last three decades, especially following China's accession to the WTO in 2001. The bilateral trade volume has surged from 97 billion USD in December 2001 to more than 524 billion USD in 2016, which implies an average annual growth rate of 11.11 percent.

The annual growth of bilateral trade volume between these two countries has slowed down since 2008 partly due to the 2008-09 global financial crisis (GFC) that hindered the global economy. The China-U.S. trade volume also shrank by 6.26 percent in 2016, the first time with a negative growth since 2009. While exports edged down by 5.13 percent in 2016, imports decreased by 9.79 percent following a 5.91 percent decline in 2015.

[Insert Table 1 Here]

The fast-growing trade volume between the United States and China has been accompanied by a persistent bilateral trade surplus in China's favor. As shown in Table 1, China's trade surplus reached 260.37 billion USD in 2015 from only 30 billion USD in 2000. This unbalanced trade eventually resulted in a long-lasting dispute in Sino-U.S. relations. 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 percent to 253.99 billion USD in 2016, thereby reflecting a tendency toward a more balanced bilateral trade structure.

2.3 Bilateral trade structure and trade dispute

Table 2 presents bilateral trade flows on three main sectors: steel, textiles, and machines and computers. Machines and computers are China's leading exports to the United States accounting for 44.45 percent (173 billion USD) of its total exports in 2016. These products are followed by textiles, which represented 11 percent (42.42 billion USD) of China's exports to the United States. However, China's exports in traditional competitive industries shrank in recent years in accordance with the slowing pace of bilateral trade. Specifically, China's exports of machinery and computers, as well as textile products decreased by 3.89 percent and 5.35 percent in 2016, respectively.

In terms of China's imports from the United States, machines and computers were also in first place, accounting for 23.13 percent (31.26 billion USD) of China's total imports in 2016.[4] This proportion reflects the intra-industry trade and the global production integration between these two countries. Therefore, a trade war is likely to have adverse effects on related industries. Steel products have provoked ongoing and tense trade arguments between the United States and China. The United States has criticized China's official support of steel and aluminum products claiming China has distorted the global markets and dumped 100 million tons of steel into the global market. Between 2011 and 2015 the United States filed 29 anti-dumping and 25 anti-subsidy investigations against Chinese companies, of which, 11 anti-dumping and 10 anti-subsidy were concentrated on the steel industry.

[Insert Table 2 Here]

2.4 Current trade conflicts

In the past two decades and especially following China's WTO accession in 2001, both the United States and China realized significant gains resulting from their trade liberalization and

[4]The proportion of machine and computer imports also dropped in recent years from 25.11 percent in 2013 to 23.13 percent in 2016.

expanding bilateral markets. However, after President Trump's inauguration, the potential for trade dispute has intensified.

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

Second, the United States 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 the "secure and controllable" policy for information and communication technology; and (iii) techno-nationalism under the auspices of "Made in China 2025."

In response to these criticisms, China has denied adopting 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 provide equal opportunities to foreign and domestic enterprises to strengthen the role of the market.

Third, the United States named China as a significant market barrier for their exporting firms. Specifically, the United States alleged that China has imposed export restraints (e.g., quotas and licensing) to benefit domestic downstream firms at the expense of foreign competitors. The United States 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 United States complained that its enterprises are often required to transfer their technology as a condition to secure investment approvals. The United States also criticized the poor protection and enforcement of trade secrets by the Chinese government.

3. Data

We follow Caliendo and Parro (2015) to build a multiple-country and multiple-sector model with rich input-output linkages across different sectors.[5] Then we rely on the most updated 2015 edition of the OECD Inter-Country Input-Output database (ICIO) to simulate the model. The OECD ICIO 2015 data provide a complete input-output matrix for the 34 ISIC Rev. 3 sectors of 61 countries and the rest of the world (ROW) in 2011. Our sample covers 34 OECD countries and 17 non-OECD emerging economies.[6] In particular, our sample includes BRICS (Brazil, Russia, India, China, and South Africa), the four Asian dragons (Korea, Taiwan, Hong Kong, and Singapore), the four Asian emerging tigers (Indonesia, Malaysia, Philippines, and Thailand), and even low-income Asian countries like Cambodia and Vietnam. We drop the last sector (private households with employed persons) because this sector does not provide intermediate

[5] Please see Caliendo and Parro (2015) for details on basic setup and relative changes in equilibiria of the model.
[6] Please see OECD ICIO 2015 for the 61 countries and 34 sectors. The remaining sample countries that are not identified in the text. We also list the main 18 tradable sectors in the following tables and 15 service sectors are not specified in the text.

inputs for production in other sectors and its output is equal to 0 for half of the countries in our sample.[7] In the end, we obtain a sample of $N = 62$ countries and $J = 33$ sectors (18 tradable sectors and 15 service sectors).[8]

The two datasets, OECD ICIO 2015 and OECD STAN ISIC REV3 2011, provide information on bilateral trade flows, bilateral expenditures, share of value added, shares of materials (intermediate input) in production, and shares of final consumption for each country and each sector. The elasticity of substitution across sectors are taken from Table 1 in Caliendo and Parro (2015). Given these values, we can simulate the model and calculate the changes in output, trade flows and welfare given tariff changes.

4. Quantifying the effects of tariff increases

4.1 Tariff increases

Due to the fact that we use 2011 trade and production as our base year, the countries in our sample are all WTO members and impose MFN tariffs on one another. The sectoral mean or median of MFN tariffs are all less than 3 percent for all but three sectors, namely, agriculture (3.47 percent), food (8.07 percent), and textiles (8.77 percent). Therefore, we treat the initial tariff as equal to 0 for all countries and sectors.[9]

President Trump threatened to impose high tariffs of up to 45 percent on products imported from

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[7] Half of countries do not collect the data on this sector.

[8] Athukorala and Khan (2016) suggests that the American relative prices of parts and components are remarkably less sensitive to changes in relative prices compared with that of final goods. For this reason, it would be beneficial to use even more disaggregated industrial data in future research.

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

China in order to offset "currency manipulation". In this paper, we consider an extreme case in which the United States imposes this tariff on *all* imports from China. An alternative but equivalent interpretation is that President Trump labels China as a currency manipulator and forces the Chinese currency to appreciate its currency by roughly 45 percent. Consider an increase from a zero tariff to a 45 percent United States tariff rate on all Chinese goods, $\hat{\tau}^{j}_{USA,CHN} = 1.45$. We follow Caliendo and Parro (2015) to solve for the equilibrium. First, we guess a vector of relative wages $\widehat{\mathbf{w}}$, and then we plug wages in the equilibrium conditions to solve the changes in the unit cost for production $\hat{c}_n{}^{j}(\widehat{\mathbf{w}})$ and good price $\hat{P}_n{}^{j}(\widehat{\mathbf{w}})$. Second, we solve the changes in bilateral import shares $\pi^{j\prime}_{ni}(\widehat{\mathbf{w}})$. Finally, we solve for the total expenditure in each sector $X^{j\prime}_{n}(\widehat{\mathbf{w}})$, and then verify if the trade balance holds. If not, we adjust our guess $\widehat{\mathbf{w}}$ until we achieve the equilibrium condition.

4.2 Sectoral bilateral trade between the United States and China

Before we discuss the effects of a tariff increase on trade flows and output, we discuss the relative tradability of the U.S. and Chinese production 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 United States 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, namely, computers and textiles, have the largest sectoral import shares; both above 45 percent and China is the United State's largest trading partner in each of these sectors. Electrical equipment and minerals are the next two largest sectors of U.S. imports from China. Notably, these four sectors are also among the most important sectors of Chinese export to the United States. The third column, $\frac{M^{j}_{USA,CHN}}{E^{j}_{CHN}}$, shows the share of U.S. imports from China in sector j relative to Chinese total exports in the same sector. It indicates that China intensively exports to the United States in the computer, wood, plastic, papers, and textiles sectors. By contrast, China intensively imports from the United States in the paper, other transport (such as aircraft), and agriculture (fourth column) sectors. Moreover, about 18 percent of the total agricultural exports of the United States are consumed in China (fifth column). In sum, the strength of export capability in the United States and China varies across sectors.

[Insert Table 3]

For further perspective, Table 4 displays sector-level ratios of imports and exports relative to gross output and the relative output shares in the world for China and the United States. These data show that U.S. imports of textiles, computers and electrical equipment are very high compared with domestic output. These goods are mainly exported by China (shown in Table 3). The U.S. imports from China as a share of all U.S. imports in these three sectors (the second column in Table 3) are all above the China's sectoral GDP share in world GDP (the last column in Table 4), respectively. The third column of Table 4 shows that United States export advantages are concentrated in in the other transport, machinery n.e.c., and computer sectors. On the production side the United States is responsible for more than 20 percent of the world output of the paper, petroleum, and other transport sectors.

In contrast, China has a different trade structure and production pattern. First, China imports and exports heavily in a number of sectors including computers which is suggestive of involvement in global value chains and processing trade. Second, China produces much more output than the United States in all sectors, aside from the paper, petroleum, and other transport sectors.

[Insert Table 4]

Based on Tables 3 and 4, we can draw three conclusions about Sino-U.S. production and trade patterns in 2011. First, the United States and China together produce more than 40 percent of the world tradable goods on average and specialize in different sectors. Second, the total trade of these two countries represents more than 20 percent 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: Unilateral U.S. tariffs with balanced trade

We first discuss how output and trade would be affected if President Trump unilaterally imposes a 45 percent import tariff on Chinese goods, under the assumption that all countries achieve balanced trade afterward. In this case, China's exports to the United States face higher tariffs, but China does not raise its tariffs on its imports from the United States, which in fact facilitates trade rebalancing between the two countries. Table 5 presents our calibration results regarding changes in output, imports, exports, and bilateral trade between the United States and China.

First and as expected, U.S. imports from China in most sectors plummet. Bilateral imports in half of 18 sectors decline by more than 90 percent. This also leads to a significant decline in sectoral imports for the United States For example, imports in the petroleum, textiles, wood, and computer sectors decline by more than a quarter. To compensate for the fall in imports, domestic production in the United States increases, particularly in the computer, textile, and electrical equipment sectors, which heavily rely on imports from China before the tariff hike.[10] The United States exports increase moderately due to the effects of trade rebalancing.

By contrast, the high unilateral U.S. tariff hike has a catastrophic effect on Chinese exports which fall by roughly 13 percent, with the greatest impacts occuring in the textile, wood, and computer sectors. This tariff shock also leads to a significant decline in China's sectoral gross output. For example textile and computer sector output decreases by 6.51 percent and 14.67 percent, respectively. China's total imports also decrease heavily in the petroleum and computer sectors by 26.62 percent and 7.68 percent. The China's imports from the U.S. increase in 17 sectors because of trade rebalance. In particular, China's imports from the U.S. in the petroleum sector increase heavily because the U.S. petroleum production increases 14.47 percent and also takes a very large share in the world petroleum (20.56 percent in Table 4).

We use the real wage to measure social welfare in each country. By this measure, Table 6 shows that the United States experiences a 0.66 percent welfare loss, while China also encounters a welfare loss at the much smaller magnitude of 0.04 percent. On first glance, this result may appear to be counter-intuitive; however, since trade rebalance prevents U.S. residents from financing their consumption by borrowing abroad, the welfare decline occurs as U.S consumption demand and the real wage in turn are depressed. In contrast, the trade rebalancing

[10] Column Y_{USA}^{j} (L_{USA}^{j}) presents the changes in the U.S. output (labor). 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 country, the changes in labor shares across different sectors in a country is proportional to the sectoral output changes. This result holds for all cases.

benefits the Chinese as they do not need to save for other countries, which partially offsets the negative effect of trade war on Chinese domestic production. If we do not impose trade rebalance and assume that trade imbalance remains the same, then the United States real wage would decline by 0.28 percent and Chinese real wage would drop by 0.21 percent.

While some countries are also harmed due to their participation in global value chains and due to general equilibrium effects, some small countries, such as Singapore and Luxembourg benefit as the unilateral tariff hike leads to trade diversion. China might increase its exports from those countries in response to the sharp decline in its exports to the United States. Finally, since the U.S. produces more and expands its exports small importing countries will benefit from the lower prices as the prices of goods in equilibrium fall.

[Insert Tables 5 and 6]

4.4 Case 2: U.S. – China retaliatory tariff war with balanced trade

Next, we consider the case when China chooses to retaliate by increasing its tariff to 45 percent on its imports from the United States. As with the first scenario, we assume that all countries achieve trade balance afterward. Our calibration results in Table 7 show that the bilateral trade between the U.S. and China collapses due to the trade war. The bilateral imports in half of 18 sectors drop by more than 90 percent. The collapse of trade is particularly pronounced in the sectors where countries have their comparative advantage - ,U.S. exports of agriculture, wood, paper, and computers, and China’s exports of textile, computer, and electrical products. Overall, the imports of the United States and China decrease by 17 percent and 6 percent respectively. While the declines in imports in two countries are consistent, their exports show sharp differences due to trade rebalancing. U.S. overall exports rise by 9 percent to achieve trade balance, while Chinese exports fall by 15 percent.

In this scenario, the United States faces more severe challenges than China because it needs to boost its exports to restore trade balance. As shown in Table 8, the real wage in the United States decreases by 0.75 percent, which represents a larger welfare loss than the first case. By contrast, China actually gains slightly. In this case the real wage increases by 0.08 percent, because the income effect driven by trade rebalancing outweighs the the negative effect of import tariff hike in the United States

[Insert Tables 7 and 8]

4.5 Case 3: U.S. – China retaliatory tariff war with ongoing trade imbalance

The previous two cases show that trade rebalancing plays an important role in reshaping the trade pattern, output, and real wage for the United States and China. Thus, we consider the third case where trade remains unbalanced and the United States and China both increase their bilateral import tariffs against each other to 45 percent. More specifically, we assume the United States maintains trade deficits while China remains in trade surplus as before the trade war. Tables 9 and 10 present our calibration results, demonstrating three differences compared with the case 2 in previous subsection.

First, although bilateral imports decrease dramatically as in case 2, China suffers more than the United States in this case, as is shown in Table 11. The reason is that China needs to maintain the trade surplus as before and the United States can still increase its consumption and imports by running trade deficits. Second, the U.S. exports increase in case 2 to restore trade balance despite the trade war, while in case 3 they are depressed by the tariff hike in China.

The United States and China both lose in this case as they become the two largest losers in the trade war. The real wage in China and the United States decrease by 0.37 percent and 0.32 percent, respectively. China experiences larger losses in this case because the country needs to maintain its large trade surplus while losing its largest market-that is, the United States. By contrast, the United States slightly improves compared with their situation in case 2 because the U.S. can still maintain its consumption through external borrowing by running trade deficits. However, if we take into account China's future return on their current saving and the United States' future payment on its current debt, the welfare loss would be smaller for China and larger for the United States

[Insert Tables 9, 10, and 11]

5. Concluding remarks

This paper examines the possible effects of a U.S.-China trade war on international trade, output, and social welfare. Through the use of a standard multi-country and multi-sector general equilibrium model we evaluate the effects of high U.S. tariffs, as were proposed in Donald Trump's campaign for the U.S. presidency. We simulate three different scenarios depending on whether China chooses to retaliate and whether the U.S.-China trade imbalance is eliminated. In any of the scenarios we find that the trade war will lead to a collapse in bilateral U.S.-China trade. As a consequence the United States will suffer from social welfare welfare losses, while China will also experience social welfare losses if the trade imbalance remains. However, the first two cases imply that China's best defensive move, given the risk of a trade war with the U.S. is to reduce the total trade surplus and the share of imports she purchases from the U.S.. Thus, our findings have important policy implications. On one hand, the U.S. should try to credibly commit to continued WTO-based trade with China since the tariff threat against China leads to further deterioration of the real wage and welfare. On the other hand, China's focus on "One-Belt-One-Road" (OBOR) countries might be particularly fruitful given China's already large trade volumes with these countries. Consequently, China can increase its import from non-U.S. countries to reduce the potential losses tied to a trade war with the United States.

Two possible extensions merit special considerations. The first is the evaluation of trade policy in the context of regional trade agreements and regional integration. In particular, China is currently active in the pursuit of regional trade agreements, such as the ongoing regional comprehensive economic partnership (RCEP) and the OBOR initiative. For this reason, if the United States were to launch a protectionist action against China, it might also take action against China's associated trading bloc partners. In turn, the trade war could expand further if China and its partners were to impose trade barriers not only on the United States, but also in the trade bloc partners of the U.S.Second, this paper does not discuss the exchange rate adjustments in which would be triggered by a trade war, but which may play an important role in reshaping the trade imbalance(Woo 2008).[11] Nonetheless, our case studies under a number of trade balance scenarios may still shed light on the consequences of a trade war which coincides with an ongoing trade imbalance or a subsequent trade balance. A careful treatment of this question will require the endogenization of the exchange rate and trade imbalance. However, the analysis of this question is reserved for future research.

[11]We thank Professors Wing Thye Woo and Fukunari Kimura for these insightful suggestions.

References

Athukorala, Prema-chandra and Khan, Fahad. 2016. Global production sharing and the measurement of price elasticity in international trade, *Economics Letter*s 139: (27-30).

Caliendo, Lorenzo and Parro, Fernando. 2015. Estimates of the Trade and Welfare Effects of NAFTA. *The Review of Economic Studies* 82(1): (1-44).

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

Eaton, Jonathan and Kortum, Samuel. 2002. Technology, Geography, and Trade. *Econometrica* 70(5): (1741-1779).

Galle, Simon and Rodriguez-Clare, Andres and Yi, Moises. 2015. Slicing the pie: Quantifying the aggregate and distributional effects of trade. *Manuscript*. Univ. Calif., Berkeley.

Tombe, Trevor and Zhu, Xiaodong. 2015. Trade, migration and productivity: A quantitative analysis of China. *University of Toronto Working Paper* No. 542.

Woo, Wing Thye. 2008. Understanding the sources of friction in US–China trade relations: The exchange rate debate diverts attention from optimum adjustment. *Asian Economic Papers* 7(3): (61–95).

Table 1. Bilateral trade between the U.S. and China

	Trade Flows, Billion USD		Growth Rate, percent	
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

Source: CEIC.

Note: $M_{USA,CHN}$ *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. Bilateral trade flows on selected sectors (Billion USD)

	Steel		**Textiles**		**Machines and Computers**	
year	$\boldsymbol{M^j_{USA,CHN}}$	$\boldsymbol{M^j_{CHN,USA}}$	$\boldsymbol{M^j_{USA,CHN}}$	$\boldsymbol{M^j_{CHN,USA}}$	$\boldsymbol{M^j_{USA,CHN}}$	$\boldsymbol{M^j_{CHN,USA}}$
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

Source: CEIC.

Note: $M^j_{USA,CHN}$ *denotes the imports of the U.S. from China in sector* j. *The statistics of steel has been available since 2008, as the product "steel" was classified in the group of "iron and steels" before 2008.*

Table 3. The sectoral bilateral trade flows in 2011, percent

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

Source: OECD ICIO, 2015 and OECD STAN ISIC REV3, 2011.

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

Table 4. Summary statistics on trade and output percent

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
	US			China		
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

Source: OECD ICIO, 2015 and OECD STAN ISIC REV3, 2011.

Note: M_i^j/Y_i^j *and* E_i^j/Y_i^j *denote the import share and export share in country* i*'s output respectively, and* Y_i^j/Y_w *denotes the output share of country* i *in the world.*

Table 5. Changes in trade and output— Case 1, percent

Sector	Y^j_{USA}	M^j_{USA}	E^j_{USA}	$M^j_{USA,CHN}$	Y^j_{CHN}	M^j_{CHN}	E^j_{CHN}	$M^j_{CHN,USA}$
Agriculture	2.37	-8.04	7.29	-97.80	0.83	0.49	-1.63	8.57
Mining	12.31	-4.11	15.90	-99.55	2.22	-5.66	3.84	14.63
Food	-3.42	-11.03	1.94	-75.37	1.32	0.93	-10.12	3.31
Textiles	24.85	-29.34	4.84	-95.69	-6.51	-3.78	-21.30	1.24
Wood	5.46	-28.42	6.66	-99.06	-0.68	-3.90	-23.53	7.54
Paper	5.48	-19.57	14.01	-99.86	-2.84	1.10	-21.75	11.24
Petroleum	14.47	-45.05	60.96	-100.00	2.45	-26.62	17.27	61.40
Chemicals	1.85	-8.19	2.71	-78.54	-2.39	-2.93	-9.55	0.21
Plastics	4.94	-12.42	0.93	-61.17	-3.31	-3.28	-14.96	-1.94
Minerals	6.55	-18.63	2.09	-70.31	1.03	1.01	-10.56	2.99
Basic Metals	6.81	3.07	2.40	-78.33	-0.87	-1.81	-2.41	0.25
Metal Prod.	7.65	-24.63	5.08	-94.69	-3.09	-3.27	-16.94	3.49
Machinery nec	-3.05	-18.28	2.32	-62.37	-0.26	0.16	-11.30	1.18
Computer	31.84	-27.53	8.24	-96.05	-14.67	-7.68	-25.63	0.47
Electrical	22.24	-18.27	9.72	-99.32	-2.43	-4.82	-17.97	6.08
Auto	-0.28	-3.96	0.85	-65.33	0.55	0.38	-14.26	1.00
OtherTrans.	3.58	1.46	1.66	-37.59	1.03	1.51	-1.43	1.67
Others	-0.07	-27.89	3.00	-84.91	-4.83	0.07	-19.96	2.59
Average	7.98	-16.71	8.37	-83.11	-1.80	-3.23	-11.23	7.00

Source: Authors' calculations.

Note: $Y^j_{USA}, M^j_{USA}, E^j_{USA}, M^j_{USA,CHN}$ *denotes the sector* j*'s output, imports, exports, and imports from China in the United States.*

Table 6. Changes in real wages—Case 1, percent

Rank	Name	w_n/P_n, percent	Rank	Name	w_n/P_n, percent
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			

Source: Authors' calculations.

Note: w_n/P_n *denotes real wages in country* n.

Table 7. Changes in trade and output— Case 2, percent

Sector	Y_{USA}^{j}	M_{USA}^{j}	E_{USA}^{j}	$M_{USA,CHN}^{j}$	Y_{CHN}^{j}	M_{CHN}^{j}	E_{CHN}^{j}	$M_{CHN,USA}^{j}$
Agriculture	-1.14	-10.67	-10.12	-97.94	2.45	-18.69	-4.84	-97.27
Mining	14.05	-4.75	11.64	-99.57	1.93	-2.75	-0.27	-99.44
Food	-4.18	-11.85	-3.47	-75.81	2.28	-7.84	-10.80	-72.45
Textiles	23.80	-30.31	-1.40	-95.84	-6.29	-7.72	-22.47	-96.40
Wood	3.75	-30.15	-9.12	-99.11	0.38	-14.44	-25.56	-98.90
Paper	3.12	-22.26	-0.26	-99.88	2.30	-41.50	-25.71	-99.81
Petroleum	16.51	-50.34	72.33	-100.00	2.32	-26.74	2.23	-100.00
Chemicals	-0.30	-9.58	-4.20	-79.08	-0.67	-9.16	-10.28	-77.61
Plastics	4.02	-13.27	-2.94	-61.73	-2.46	-6.12	-15.42	-62.96
Minerals	5.43	-19.47	-6.04	-70.80	1.69	-7.64	-11.04	-70.45
Basic Metals	4.72	1.35	-5.20	-78.88	-0.13	-3.21	-2.98	-79.13
Metal Prod.	6.48	-26.16	1.03	-94.89	-2.35	-11.83	-18.20	-94.46
Machinery nec	-4.52	-18.98	-2.32	-62.84	0.56	-3.90	-11.66	-58.59
Computer	27.49	-29.13	-4.97	-96.24	-14.26	-9.67	-26.98	-96.88
Electrical	19.87	-19.95	0.11	-99.36	-1.95	-8.06	-19.90	-99.35
Auto	-1.27	-4.65	-2.89	-65.76	1.42	-3.66	-14.72	-64.25
OtherTrans.	3.05	0.89	-0.34	-38.04	1.60	-8.99	-1.55	-38.69
Others	-0.60	-28.69	1.50	-85.29	-4.13	-11.03	-21.01	-83.27
Average	6.68	-18.22	1.85	-83.39	-0.85	-11.27	-13.40	-82.77

Source: Authors' calculations.

Note: See table notes in Table 5.

Table 8. Changes in real wages—Case 2, percent

Rank	Name	w_n/P_n, percent	Rank	Name	w_n/P_n, percent
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			

Source: Authors' calculations.

Note: w_n/P_n *denotes real wages in country* n.

Table 9. Changes in trade and output— Case 3, percent

Sector	Y_{USA}^{j}	M_{USA}^{j}	E_{USA}^{j}	$M_{USA,CHN}^{j}$	Y_{CHN}^{j}	M_{CHN}^{j}	E_{CHN}^{j}	$M_{CHN,USA}^{j}$
Agriculture	-3.97	-2.13	-20.56	-97.49	0.24	-28.55	0.66	-97.84
Mining	-3.49	-0.94	-9.41	-99.50	2.46	-6.56	3.63	-99.59
Food	-0.27	-4.78	-6.58	-73.30	-0.56	-12.17	-9.07	-74.62
Textiles	20.83	-19.80	-12.03	-95.05	-5.65	-13.20	-17.45	-96.97
Wood	1.16	-20.36	-20.66	-98.90	-1.12	-21.54	-18.13	-99.14
Paper	-3.14	-9.81	-20.36	-99.83	4.75	-51.70	-14.86	-99.86
Petroleum	-3.02	5.11	-9.93	-100.00	4.22	-40.04	35.44	-100.00
Chemicals	-1.20	-4.31	-8.55	-77.70	-1.45	-11.27	-8.46	-79.15
Plastics	1.84	-13.25	-4.32	-61.40	-3.39	-7.59	-15.26	-64.46
Minerals	1.99	-19.40	-9.42	-70.31	-1.46	-12.05	-10.56	-72.78
Basic Metals	0.00	-0.45	-8.81	-78.72	-1.68	-6.11	-2.30	-80.58
Metal Prod.	2.22	-21.45	-6.82	-94.33	-3.07	-16.18	-14.55	-95.26
Machinery nec	-0.07	-8.97	-5.70	-57.96	-1.48	-6.81	-10.12	-60.77
Computer	12.19	-25.21	-19.23	-95.98	-13.14	-11.53	-24.86	-97.39
Electrical	4.59	-15.29	-16.75	-99.27	-2.71	-13.20	-15.40	-99.50
Auto	-0.65	-1.81	-4.71	-64.24	-1.06	-6.72	-14.05	-66.23
OtherTrans.	-0.43	-2.78	-2.50	-40.11	-0.30	-11.63	-1.76	-40.70
Others	3.58	-17.61	-3.63	-82.40	-4.06	-16.40	-16.30	-85.02
Average	1.79	-10.18	-10.55	-82.58	-1.64	-16.29	-8.52	-83.88

Source: Authors' calculations.

Note: See table notes in Table 5.

Table 10. Changes in real wages—Case 3, percent

Rank	Name	w_n/P_n, percent	Rank	Name	w_n/P_n, percent
1	Cambodia	0.22	53	Canada	-0.01
2	Costa Rica	0.11	54	South Africa	-0.01
3	Singapore	0.09	55	Korea	-0.02
4	Viet Nam	0.08	56	Saudi Arabia	-0.02
5	Mexico	0.06	57	Australia	-0.02
6	Israel	0.05	58	Brunei	-0.03
7	Cyprus	0.04	59	Chile	-0.03
8	Italy	0.04	60	HongKong	-0.04
9	Taipei	0.03	61	USA	-0.32
10	Estonia	0.03	62	China	-0.37

Source: Authors' calculations.

Note: w_n/P_n *denotes real wages in country* n.

Table 11. Comparison of the three tariff policies, percent

	China			US		
Var.	Case1	Case2	Case3	Case1	Case2	Case3
Output	-0.68	-0.07	-1.36	-0.72	-1.08	-0.11
Price Index	0.01	0.38	-0.42	-0.74	-0.98	0.42
Exports	-12.96	-14.70	-10.61	11.39	9.25	-6.68
Imports	-4.17	-6.09	-10.60	-15.05	-16.68	-6.70
Nominal wage	-0.03	0.46	-0.79	-1.39	-1.73	0.10
Real Wage	-0.04	0.08	-0.37	-0.66	-0.75	-0.32

Source: Authors' calculations.
Note: This table compares the output, price index and trade for China and the U.S. for the three policy experiments.