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Review

Implications of the US–China Tit-for-Tat Tariff Escalation: A Literature Review of Standard Trade Theory and Empirical Evidence on Economic Consequences and Effects on Both Countries

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Implications of the US–China Tit-for-Tat Tariff Escalation: A Literature Review of Standard Trade Theory and Empirical Evidence on Economic Consequences and Effects on Both Countries

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Abstract

This study reviewed standard international trade theories as they pertain to the impact of trade restrictions. Current empirical studies were reviewed to see whether evidence supports trade theory predictions. Conventional price impacts in standard models of international trade show that trade restrictions are detrimental for trade for both countries involved, and the empirical evidence from current studies confirmed this. The current tit-for-tat tariff escalation between China and the United States has led to, among other things, increased domestic prices to both American consumers and producers; lower export prices to some of the Chinese exporters and American firms based in China; reduced import and export trade between the two countries that would lead to costly adjustments in supply chains; loss in net welfare and employment; and loss in competitive advantage to firms in both countries that produce for export. Therefore, efforts should be made to de-escalate these trade tensions.

Keywords: US–China, tariff escalation; Trade war; Economic consequences.

1. INTRODUCTION

The United States and China are major trading partners to each other, although China has always maintained a trade surplus in its trade with the United States. For China, the United States is its major trading partner; whereas, for the United States, China rose to become its second major trading partner in 2005 and eventually replaced Canada to become the United States' number 1 trading partner from 2015 onward. The types of goods traded, as shown in the trade flow patterns, show that the bilateral trade benefits both. Despite this, the United States has so far imposed various waves of tariffs on Chinese exports, based on its grievances on China that include unfair trade practices, the ever-growing trade surplus China has with the United States, stealing US intellectual properties due to ineffective enforcement of intellectual property rights, discriminatory innovative policies, and irregular implementation of its WTO obligations.

The enactment of China-specific tariffs including steel and aluminum from China began in March 2018. As new tariffs were proposed and taking effect on more products, this escalated to tariffs in July, which affected US$34 billion worth of Chinese exports. With the list of goods updated with more products included, by September 2018, US$200 billion of Chinese exports were targeted (BBC News, 2018; Da Costa, 2018; Amiti *et al.*, 2019: 26; Brown and Kolb, 2019; Bloomberg News, 2019). China retaliated by imposing tariffs on imports from the United States. Trade Partnership Worldwide (2019: 3, 7) notes Chinese retaliatory tariffs of 25% on List 1 (545 products), 25% on List 2 (333 products), 5-25% on List 3 (5,207 products), and additional tariffs of 25% on List 4 (goods not on current retaliation as well as List 3 products whose current retaliatory tariffs were less than 25%) and tariff rate of 10–25% for Services.

As the US–China tit-for-tat escalating tariffs continue, the varied economic impacts (positive or negative) would deepen. This study therefore reviewed standard international trade theories as they pertain to the impact of trade restrictions with current empirical studies and also reviewed to see whether evidence supports trade theory predictions. This was done to show the merits or lack thereof of standard international trade theories in explaining the welfare effects of protectionist trade policy in this trade war. This in turn would bring to the fore the importance of appreciating the relevance of international trade theories in shaping trade policies. The selected effects examined in this article are implications of the import tariffs on consumers, producers, welfare effects, employment, and trade.

2. METHOD(S)

This study is a literature review of conventional price impacts in standard models of international trade often used to show the effects of trade restrictions in a partial equilibrium analysis. A review of current empirical work by other researchers is done and presented to show whether the expected impacts as per trade theories have been realized.

3. RESULTS AND DISCUSSION

Predictions and their justifications on the impact of import tariffs on prices, quantities, welfare, total trade, and employment, as per the standard models of international trade, are presented first followed by empirical evidence from various authors on these same economic effects.

3.1. Conventional Price Impacts: Theory on Impact of an Import Tariff in a Partial Equilibrium Setting

The adjustment processes of relative prices in standard models of international trade are often used to show the effects of trade restrictions in a partial equilibrium analysis using a small country case or a large country case. Such models are used in this section to try and present trade theory predictions, after which empirical evidence from work by various authors is presented to either refute or confirm theory predictions.

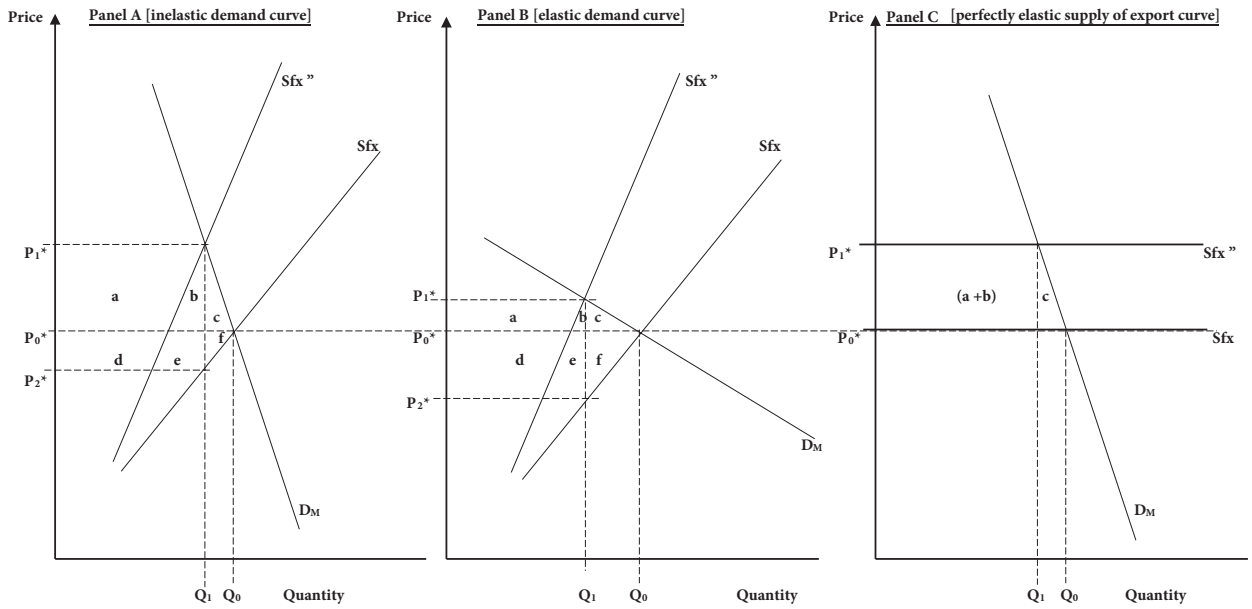
3.1.1. Conventional Price Impacts on Local Production

When tariffs are imposed, the domestic price rises from $\mathbf{P_0}$* to $\mathbf{P_1}$*, as shown in Figure 1. Some of the imported goods whose price rise are essential intermediate inputs needed by local producers. Such a rise in essential imported intermediate inputs has implications for production costs that will rise. When the quantity of home imports demanded falls from $\mathbf{Q_0}$ to $\mathbf{Q_1}$, this constraint in availability of imports may also affect availability of essential inputs for local production, which fuels the rise in production costs further. Such high production costs can be passed to domestic consumers and would also make locally produced goods for export less competitive. Furthermore, domestic production may shrink due to increased production costs as a result of increased prices of imported inputs and the shortages of such inputs. In this regard, small businesses in particular might struggle more to make quick adjustments because they rely on the certainty that comes with entering into multiyear contracts and easier availability of cheaper inputs. Some of the firms may decide to relocate some of their plants into countries where tariffs are not being applied.

Empirical evidence by Li *et al.* (2018) presented in Table 1 (Appendices) shows that when the United States imposed tariffs at whatever level, whether or not China retaliated, China's production in the manufacturing sectors decreased and the magnitude of the decrease increased with higher import tariffs. However, when China retaliated, the United States was not spared the decline in production in its manufacturing sectors, for example, when China retaliated with the same level of tariffs at 15%, production of manufacturing sectors in the United States decreased by −0.538%, and this decline continued to a decrease by −1.409% when China retaliated with the same level of tariff at 60%.

Zoller-Rydzek and Felbermayr (2018: 7, 10) showed that after the United States increased import tariffs by 25 percentage points in September 2018, the prices of intermediate inputs needed in local industry production were really affected, rising by 5.2 percentage points. The imports for intermediate inputs declined by over 40 percentage points, thus negatively affecting US industries that needed these inputs. Empirical

Figure 1. Trade Restrictions in a Partial Equilibrium Setting: The Large Country Case (Using an *Ad Valorem* Tariff) on Homogenous Goods.



Notes: **P_1*** = Domestic tariff-inclusive price; **Sfx** = Supply of foreign exports schedule; **Sfx**″ = Supply of foreign exports schedule after tariff is imposed; **D_M** = Home demand for imports schedule; **P_2*** = Foreign suppliers receive lower price after tariff is imposed. **(a + b)** = Consumer tariff burden; (**d** + **e)** = Foreign producer tariff burden; (**c**) = Consumer deadweight loss; (**f**) = Foreign producer deadweight loss; (**c** + **f**) = Harberger's triangle.

Source: Appleyard and Field (2017: 294); Zoller-Rydzek and Felbermayr (2018: 3); Amiti *et al.* (2019: 30, 31).

work by Amiti *et al.* (2019: 21) shows that there was a cost push effect of the US tariffs that caused domestic producer prices to rise because their input costs had risen.

Evans (2019: 50, 51) notes that some American businesses reported increases in input prices due to the tariffs, which caused them to retrench some of their employees while other businesses decided to delay plans to expand their operations. Furthermore, he noted that some American businesses indicated that they may have to shift production overseas to avoid the tariffs as their exports were currently becoming less competitive due to the tariffs. Russ (2019: 3) also noted that most Chinese goods targeted by the tariffs were imported goods purchased by firms as inputs into their own production, and this increased their production costs as the tariffs increased the prices of the imported inputs. The tariff-inclusive price of imported inputs reduced the imports of such goods, and this disrupted the supply chains for US firms. He also noted that as the tariffs that result in input price increases were not faced by competing producers in other countries, the US firms producing for export found themselves at a significant cost disadvantage. Furthermore, he noted that customs bonds (cash that importers must put down as a guarantee for increased tariff payments on targeted items) that led to an additional production cost for US firms, especially smaller operations, have increased.

Torsekar (2017) noted that intermediate goods imports are very important in key US manufacturing sectors and that, since the end of the 2007-2009 global recession, the share of such imports had grown substantially across the leading US manufacturing sectors. Furthermore, the share of imported intermediates in total intermediates used in manufacturing sectors, especially in electronics, transportation industries, and machinery industry, had increased throughout the period 2009-2016. He noted that China is the United States' second largest supplier (after Canada) of components and parts, due to its being a manufacturer of low-cost goods. Therefore, given this observation that shows that US supply chains have become increasingly fragmented with import intermediate goods playing an important role in US domestic manufacturing, imposing tariffs on such products would have detrimental effects on US manufacturing. Although new strategies may be adopted to reduce reliance on imported components, for example, localizing production

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Table 1. Effects of China–US Tariff Trade War on China and the United States (Unit: Percent Change %).

Country	Welfare	GDP	Manuf.	Nonmanuf.	Employ	Trade	Export	Import
Unilateral 15% tariff measures by the United States								
China	−0.179	−0.724	−1.750	0.137	−1.034	−2.082	−3.394	−0.496
USA	0.139	0.125	0.051	0.146	−0.074	−2.125	−0.217	−3.480
Mutual trade war with the same level of 15% tariff measures								
China	−0.163	−0.667	−1.721	0.217	−1.062	−2.601	−3.467	−1.554
USA	0.120	0.007	−0.538	0.161	−0.545	−2.749	−1.583	−3.577
Unilateral 30% tariff measures by the United States								
China	−0.312	−1.260	−3.047	0.239	−1.810	−3.626	−5.909	−0.867
USA	0.184	0.241	0.096	0.282	−0.144	−3.689	−0.397	−6.027
Mutual trade war with the same level of 30% tariff measures								
China	−0.310	−1.152	−2.992	0.391	−1.861	−4.514	−6.036	−2.673
USA	0.152	0.037	−0.920	0.308	−0.957	−4.761	−2.750	−6.189
Unilateral 45% tariff measures by the United States								
China	−0.414	−1.667	−4.033	0.317	−2.407	−4.803	−7.824	−1.152
USA	0.175	0.346	0.136	0.406	−0.210	−4.871	−0.546	−7.941
Mutual trade war with the same level of 45% tariff measures								
China	−0.441	−1.514	−3.955	0.533	−2.479	−5.960	−7.993	−3.502
USA	0.132	0.079	−1.200	0.440	−1.278	−6.276	−3.638	−8.149
Unilateral 60% tariff measures by the United States								
China	−0.493	−1.983	−4.801	0.378	−2.875	−5.720	−9.314	−1.375
USA	0.133	0.442	0.171	0.519	−0.270	−5.783	−0.673	−9.412
Mutual trade war with the same level of 60% tariff measures								
China	−0.559	−1.790	−4.703	0.651	−2.965	−7.079	−9.517	−4.132
USA	0.083	0.126	−1.409	0.559	−1.533	−7.442	−4.330	−9.652

Notes: Manuf. = Production of manufacturing sectors; Nonmanuf. = Production of nonmanufacturing sectors; Employ = Employment in manufacturing sectors.

Source: Li *et al.* (2018: 1564).

of inputs so as to shorten the supply chain and reduce transportation costs, adopting automated technologies, and other initiatives to foster supply chain innovations that yield productive efficiencies, adoption of such strategies would take time.

3.1.2. US Import Tariffs Impacts on US Firms Located in China

Some American companies have long been accustomed to using China as the world's low-cost workshop to produce in and export to the United States. The vast amount of labor available in China, and the fact that all

the raw material suppliers and support functions were readily available, gave China a locational advantage. In response to the US escalating tariff war with China and realizing that the tariffs will not ease any time soon, some companies have decided not to reshore back to the United States, due to the relatively high US labor costs and the challenge they will face in selling the relatively less competitive US-made goods. Several commentators[1] have noted that in response to the US tariffs on China, some American firms are exploring alternative locations for their operations in other low-cost Asian countries such as Taiwan, Malaysia, and Taipei. However, some companies are better prepared than others to shift out of China if necessary as a significant part of their current capacity is already elsewhere. Therefore, the challenge and more costs would be on those not well prepared.

A study by Li *et al.* (2018) showed a continuous decline in US imports whether or not China retaliated (Table 1, Appendices). Amiti *et al.* (2019: 11; 16, 22) also noted a relative decline in US imports from the affected sectors and estimated this to be at least US$136 billion on an annual basis. The decline in imports showed that trade was redirected as a result of import tariffs. Be it for China or the United States, redirecting trade entails very large costs, especially for those multinationals who had made irreversible investments in China. In their study, Lovely and Liang (2018: 6) noted that in sectors such as machinery, electrical equipment appliances, computers, and electronics, exports from China that were made from non-Chinese firms ranged from 59 to 86%. A large number of such firms were US multinationals, and these would not escape the very large costs either through having to write off their investments in China or having to relocate to evade the US import tariffs. In their study, Zoller-Rydzek and Felbermayr (2018: 8, 9) showed that when the United States implemented an optimal tariff strategy by selecting tariffs and products to shift most of the tariff burden on Chinese firms, on average the Chinese producer price declined by over 20 percentage points, affecting all product categories. In this case, the US multinationals located in China who export to the United States were also affected negatively through receiving a lower price for their exports, sharing in the producer tariff burden as well as the producer deadweight loss.

3.1.3. Conventional Price Impacts on Consumers

Figure 1 (Appendices) shows the standard international trade model of the effects of trade restrictions in a partial equilibrium setting in the large country case. By using this model and diagram, the economic effects and consequences with regard to prices, quantities, and welfare can be established. When an import tariff is imposed, the domestic price rises from $\mathbf{P_0}$* to $\mathbf{P_1}$* (a tariff-inclusive price); the foreign export supply schedule rises with the prices from **Sfx** to **Sfx**″; quantity of home imports demanded falls from $\mathbf{Q_0}$ to $\mathbf{Q_1}$; whereas, price now received by foreign producers falls from $\mathbf{P_0}$* to $\mathbf{P_2}$*. The relative price impact on consumers depends on the availability of substitutes that has implications for relative price elasticity. With a relatively inelastic demand schedule (Panel A) where the reaction of consumers to a price increase is smaller than the reaction of the foreign producer, the tariff-inclusive price ($\mathbf{P_1}$*) the consumer pays is higher than that in the case of a more elastic demand curve (Panel B).

Imperfect substitution can exist between the foreign- and the domestic-produced good, and in this case the single market approach is not appropriate. In this case, Figure 2 (Appendices) shows the tariff effect on nonhomogeneous goods (close but not perfect substitutes), where the impact of the tariff is examined in the two markets. As the cross-price elasticity of the goods is positive, imposing a tariff on the foreign good raises its price on the domestic market from $\mathbf{P'}_0$ to $\mathbf{P'}_1 = \mathbf{P}_{int}$ **(1 + t)**, as shown in Panel B, thus reducing the quantity demanded of the foreign good and causing consumers to increase their demand for the domestically produced substitute (i.e., $\mathbf{D}_{Dom}$ shifts to $\mathbf{D'}_{Dom}$) as shown in Panel A. The increase in the demand for the domestically produced substitute raises its price ($\mathbf{P_0}$ to $\mathbf{P_1}$ in Panel A), which in turn triggers an increase in demand for the foreign good ($\mathbf{D_F}$ shifts to $\mathbf{D'}_F$) in Panel B. As a result, the price increases in both markets, and the two groups of consumers experience a decline in their consumer surplus; that is, area (**d** + **e** + **f** + **g** + **h**) is the estimated loss in consumer surplus in the import market, and area (**a** + **b** + **c**) is the estimated loss in consumer surplus in the domestic market due to the tariff on the foreign substitute. Area (**a** + **b** + **c**) is the gain in producer surplus in the domestic market, whereas in the import good market

[1] These include, but not limited to, Wu and Bergen (2019), Politi and Wong (2019), Aeppel and Prentice (2019), and Hao (2019).

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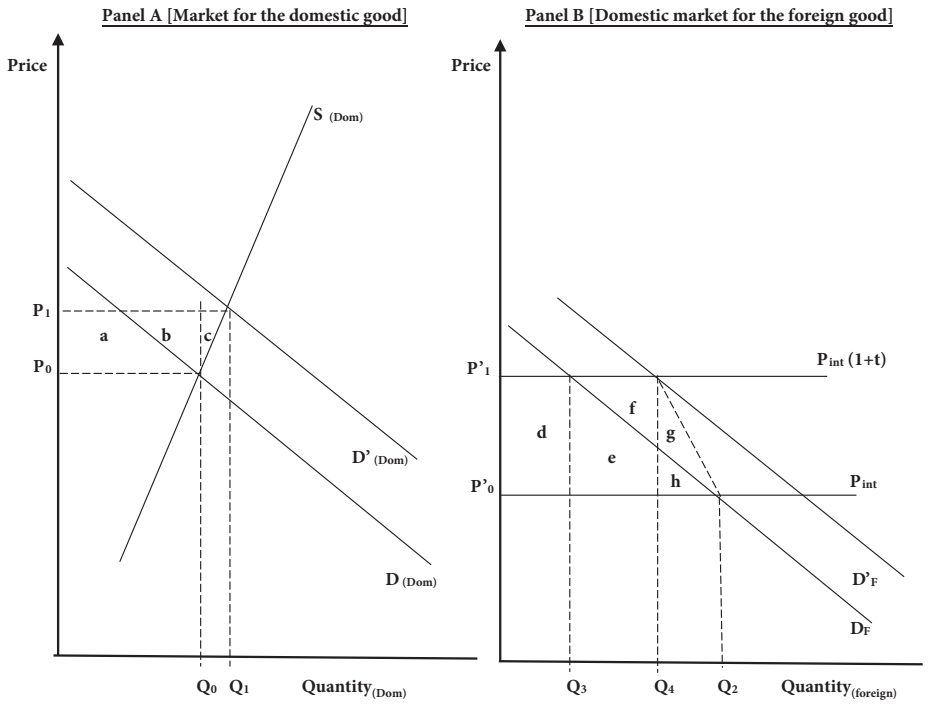
Figure 2. The Impact of Protection in a Market with Nonhomogeneous Goods: Effects of a Tariff.



Notes: $\mathbf{D}_{(Dom)}$ = Demand for domestically produced good before tariff; $\mathbf{D}'_{(Dom)}$ = Demand for domestically produced good after tariff; $\mathbf{S}_{(Dom)}$ = Domestic supply of good; $\mathbf{D}_F$ = Demand for foreign produced good before tariff; $\mathbf{D}'_F$ = Demand for foreign produced good after tariff; $\mathbf{P}_{int}$ = International price of the good before tariff; $\mathbf{P}_{int}\,\mathbf{(1 + t)}$ = Tariff-inclusive price. The goods are close (but not perfect) substitutes. Therefore, the demand for each good is linked positively to the price of the other (i.e., the cross-price elasticity of the goods is positive).

Source: Appleyard and Field (2017: 313); Appleyard *et al.* (2010: 313).

part of the loss in consumer surplus, that is, area (**d** + **e** + **f**) is a government revenue gain and area (**g** + **h**) is a consumer deadweight loss.

Therefore, whether the analysis is for the impact of a tariff on a market with homogeneous or nonhomogeneous goods, the price impact on consumers is a rise in domestic prices. Empirical evidence showed that indeed domestic prices paid by the US consumers rose with the imposition of tariffs by the United States. Amiti *et al.* (2019: 2, 6, 28) showed that import tariffs were costing American consumers, and some import tariffs had an almost immediate effect on prices in the US economy. There were large increases in prices of goods that were subjected to tariffs, with such significant price increases observed with the China-specific tariffs that began in July 2018. Bui and Irwin (2018) showed that irrespective of income levels, American households were impacted negatively by the import tariffs the United States imposed not only on Chinese products. For example, they noted that with regard to $80 billion in tariffs the United States placed on washing machines and solar energy cells and panels; on most steel and aluminium imports; and on hundreds of Chinese products enacted on July 6, 2018, this cost an average of $60 a year per household, that is, about one-tenth of 1% of a typical household's income. They noted that the newly enacted tariffs on Chinese imports contributed most (i.e., US$33) to this cost. With further tariffs on US$200 billion worth of Chinese goods that were with effect in September 2018, they estimated that this would increase the total annual costs for the average American family to US$127. If a further 10% tariff on all goods imported from China was imposed, they estimated it would cost the average American household $270. In all these scenarios, irrespective of household income level, over ⅔ of the cost was due to the tariffs on Chinese goods.

A study by Trade Partnership Worldwide (2019: 10, 15, 16) supported the view that actual and threatened US tariffs on Chinese imports negatively affected American consumers. They showed that steel and aluminum tariffs and quotas in effect and the tariffs of 25% on US imports of selected goods from China plus retaliation by November 2018 had an annual impact of US$767 on an average American family of four. When they considered additional tariffs of 25% on all remaining imports from China plus retaliation, the annual impact on an average American family of four rose to US$2,294. These amounts were extra money the household had to pay for higher costs for goods and services resulting from the tariffs, for every year they are in effect. Zoller-Rydzek and Felbermayr (2018: 7, 8) also showed that US tariffs on Chinese imports impacted negatively on American consumers through an increase in consumer goods prices. After an increase in US tariffs by 25 percentage points on the 702 HS92 4-digit product categories they considered, they showed that consumer goods prices were the most affected and yet these were the ones that affect consumers directly. They estimated that the average increase in US consumer prices for consumer goods was 6.5 percentage points and 4.2 percentage points for mixed goods. They note that some consumer goods experienced price increases of over 20% and that low-income American households would be affected most, as they spend a significant share of their income on cheap Chinese imports and thus would experience a stronger decline in their real income.

When producers face increased costs of production due to price increases in imported intermediate inputs, they pass some of these costs to consumers leading to an increase in consumer prices for American consumers. Producers protected by tariffs (who do not use the targeted imported inputs), but now experience reduced import competition, have an incentive to raise their prices and mark-ups due to the new tax on rival foreign goods, thus burdening consumers more. Amiti *et al.* (2019: 21) found that the 2018 US tariffs increased the prices charged by American producers through both of these channels, and thus consumers bore the brunt of price increases. Bui and Irwin (2018) estimated that the price increase by producers on their products would lead to a US$20 increase in the average cost borne by consumers, with those consumers who consumed such goods more, bearing more costs than those who did not.

As shown in Figures 1 and 2 (Appendices), in both cases, quantity of home imports demanded falls from $\mathbf{Q}_0$ to $\mathbf{Q}_1$ and $\mathbf{Q}_2$ to $\mathbf{Q}_4$, respectively, thus providing domestic consumers with a narrower range of goods. Amiti *et al.* (2019: 17, 32) showed that imposing tariffs was associated with sharp drops in a number of imported varieties entering the United States, except in products such as washing machines and solar panels. The introduction of China-specific tariffs that began in July 2018 and rolled out in three waves saw a very significant drop in imported varieties entering the US market. Amiti *et al.* (2019: 18) noted that tariffs that cause varieties in differentiated products to reduce or completely disappear tend to be more costly on consumer welfare than tariffs that cause varieties of homogenous products to be reduced or disappear. Such welfare costs are more pronounced when it comes to varieties with high quality relative to their cost. Therefore, a reduction or a complete removal of varieties of differentiated products would have a much bigger impact on consumer welfare.

Therefore, when US–China tariffs escalate and cover more goods and the total value of goods affected rises substantially, cost to consumers could rise substantially. Furthermore, as more tariffs imposed include more and more products that consumers purchase directly, the tariffs would directly hit the consumers. Substantive costs would be to people whose livelihoods are tied to industries directly affected, that is, industries that face more expensive raw materials because of tariffs, and those that are subject to retaliation, such as soybean farmers who will see lower incomes because of Chinese tariffs on their products. It can thus be argued that ultimately, the impact of the US tariffs would to some extent erode some of the gains the American families saw from the tax cut that had put in place to benefit Americans. This would be especially so for low- to middle-income households, as these tend to spend more of their income on consumption goods and many of the goods they consume are often subject to higher tariffs than more expensive goods of the same type.

3.1.4. Conventional Price Impacts on the Incidence of the Tariff and Welfare Effects

Figure 1 (Appendices) shows the incidence of the tariff and the deadweight loss (shown by the Harberger's triangle) that result from the imposition of a tariff. The availability of substitute products determines whether the home country demand for imports schedule will be more inelastic or more elastic. As Panel A shows (inelastic demand curve), most of the tariff burden is borne by the domestic consumer than the foreign

exporter; that is, area (**a** + **b**) > area (**d** + **e**). Furthermore, consumer deadweight loss is higher in the home country than the producer deadweight loss in the foreign exporting country; that is, area (**c**) > area (**f**). In this regard ***net welfare*** in the home country depends on whether area (**d** + **e**), which is a transfer from the exporting country through its share of the tariff burden, offsets area (**c**). In the exporting country, there is net welfare loss as area (**d** + **e**) is their share of the tariff burden and area (**f**) is a deadweight loss. Where consumers can easily substitute the more expensive imported goods (i.e., Panel B), most of the economic burden (incidence of the tariff and deadweight loss) is borne by the foreign exporting country; that is, area (**d** + **e**) > area (**a** + **b**) and area (**f**) > area (**c**). In this regard, there is a gain in net welfare in the home country as area (**d** + **e**), which is a transfer from the exporting country through its share of the tariff burden, offsets area (**c**). In the exporting country, there is net welfare loss as area (**d** + **e**) is their share of the tariff burden and area (**f**) is a deadweight loss. In the special case where the supply of foreign export schedule is perfectly elastic (i.e., Panel C), imposing a tariff will have no impact on the foreign country, leaving the domestic country to bear the burden of the tariff alone as well as having a consumer deadweight loss.

Therefore, irrespective of the panel considered, the tariff introduces distortions in consumption and production decisions, and this implies welfare loss for both countries although this depends on the quantity reductions in imports, the change in prices due to the tariff, and the relative price elasticities of consumers and producers. Figure 2 (Appendices) also shows that with nonhomogeneous markets, the deadweight consumer loss, which implies loss in welfare, is also experienced.

A study by Li *et al.* (2018) where they separately simulated the impacts of four different import tariff levels showed that tariffs in the US–China trade had effects on both countries' ***net welfare***, as shown in Table 1 (Appendices). At each unilateral tariff measure and level by the United States, the United States gained on welfare while China's welfare decreased. As the unilateral tariff measures by the United States rose, China's loss on welfare rose, for example, a decrease by −0.179% when the unilateral 15% tariff measure by the United States was in place to a decrease by −0.493% when the US unilateral 60% tariff measure was in place. However, the United States was not spared the negative effects on its welfare because as the US unilateral tariff measures rose beyond 30%, the levels of its gain on welfare fell continuously, for example, from a rise of 0.184% when the unilateral tariff was 30% to a rise of 0.133% when the unilateral tariff measure was 60%. When China retaliated at each tariff measure, it still experienced loss on welfare, although this loss was reduced when it retaliated at lower tariff levels than when it retaliated at higher tariff levels, for example, when it retaliated at the 30% tariff measure, its loss on welfare improved slightly from a decrease by −0.312% to a decrease by −0.310%. When it retaliated at higher tariff measures, its loss on welfare rose even further, for example, from a decrease by −0.441% when it retaliated at a tariff measure of 45% to a decrease by −0.559% when it retaliated at a level of 60% tariff measure. The United States was not spared a decrease on its welfare each time China retaliated, for example, when China retaliates at 15% tariff measure, the US welfare gain by 0.139% fell to a gain by 0.120%, when China retaliated at 30% tariff measure, the US gain on welfare by 0.184% fell to a gain by 0.152%, and this fall in welfare gain continued when its welfare gain fell to a gain by just 0.083% when China retaliated at 60% tariff measure.

This empirical evidence by Li *et al.* (2018) that showed decreasing net welfare in the United States when its unilateral tariff measure rose beyond 30% and each time China retaliated at whatever tariff level is consistent with what happens when the tariff rate is higher than the optimal tariff[2] rate. As noted by Appleyard and Field (2017: 325-326) and Krugman *et al.* (2012: 255), the optimal tariff is the tariff rate at which the marginal gain from improved terms of trade (gain from better prices) due to the tariff equals the marginal efficiency loss from production and consumption distortions (the loss from reduced quantity of imports). Thus, as the tariff rate is increased and becomes higher than the optimal tariff rate, the costs (additional loss from reduced quantity of imports, efficiency loss from production and consumption distortions) eventually begin to grow faster than the benefits and offset such benefits. Given that more tariffs were rolled and others out with effect from May 10, 2019 by the United States with China having retaliated and promising to retaliate on the May 2019 ones with its own with effect from early June 2019, what is depicted in the results by Li *et al.* (2018) in Table 1 (Appendices) accurately portrayed that beyond the optimal tariff or when the

[2] The optimal tariff theory applies to the large country case as the countries are large and powerful importers of goods and have power over pricing. A large country has power to influence global prices and can use tariffs as a means to control world prices of goods.

injured partner country retaliates, both countries end up with reduced welfare compared to their situations under free trade. Zoller-Rydzek and Felbermayr (2018: 11) confirmed that as the trade conflict between the United States and China escalates, the US welfare may decrease as China retaliates with countervailing duties designed to shift the tariff burden on US exporters and to ensure that more of the tariff incidence falls on US consumers. In their empirical work, Amiti *et al.* (2019: 13, 34) also came to the conclusion that with each wave of additional tariffs during the course of 2018, deadweight welfare losses for the United States mounted steadily, with such losses accelerating after September 2018 when the United States imposed an additional wave of tariffs on US$200 billion of Chinese exports. Therefore, as Evans (2019: 49) noted, when deadweight losses worsen, this has significant long-term negative effects on economic trends.

Zoller-Rydzek and Felbermayr (2018) considered 702 Chinese product categories (HS92 4-digits) split into four broad categories and examined the total economic effect of import tariffs on both countries after the 25 percentage point increase in tariffs by the United States in September 2018. The total economic effect is given by combining the incidence of the tariff and the consumer and producer deadweight losses. They found that the aggregate welfare losses in China and the United States were around US$1.6 billion. This is the Harberger's triangle; that is, the sum of the consumer deadweight loss (deadweight losses sustained by US consumers) and the producer deadweight loss (deadweight losses sustained by Chinese exporting firms) and is shown by area (**c** + **f**) in Figure 1 Panel B (Appendices), as they considered that the United States had strategically levied import duties on goods with high import elasticities (thus a more elastic home country import demand schedule). They noted that about ⅓ (i.e., US$522 million) of these losses were borne by US consumers while ⅔ (i.e., US$1.078 billion) fell on Chinese exporting firms. In considering potential tariff revenues and the incidence of the tariff, they found that total tariff revenues generated by the tariffs amounted to US$22.5 billion and most of the tariff incidence; that is, US$18.9 billion fell on Chinese firms with the US consumers' incidence of the tariff being US$3.6 billion (Zoller-Rydzek and Felbermayr, 2018: 11). Using Panel B, in Figure 1 (Appendices), this translated to a ***net welfare loss*** for China of area (**d** + **e**) + area (**f**) = US$18.9 billion + US$1.078 billion = US$19.978 billion; whereas, the United States experienced a ***net welfare gain*** of area (**d** + **e**) − area (**c**) = US$18.9 billion − US$522 million = US$18.378 billion.

Therefore, work by Zoller-Rydzek and Felbermayr (2018), Li *et al.* (2018), and Amiti *et al.* (2019) supported the conventional price impacts on welfare effects as predicted in the standard models of international trade.

3.2. Traditional Arguments for Protectionist Trade Policies

Some of the arguments for protectionist trade policies are to have a trade policy that is part of broader social policy objectives of a nation. Such arguments include imposing a tariff to reduce aggregate unemployment, improve the balance of trade, and improve the terms of trade. These arguments are among those that the United States is using to justify its current imposition and escalation of tariffs on China.

3.2.1. Tariff to Reduce Aggregate Unemployment

The justification for this argument is based on the view that imposing an import tariff shifts domestic demand from imports to home produced goods. With the increase in home produced goods, home industries will expand their output, which in turn leads them to hire more labor. The new labor hired earn income that they spend on goods produced in other industries, and through the Keynesian multiplier effect, other industries will also expand and hire more labor (Appleyard and Field, 2017: 327). In this argument, it is assumed that jobs gained through increased domestic production from protection would outweigh any job losses due to retaliation.

Empirical evidence in work by Li *et al.* (2018) showed that tariffs at any level, in the US–China trade, had negative effects on employment (Table 1, Appendices). Any unilateral increase in tariff measures by the United States led to a decrease in employment in both countries but by a bigger magnitude in China. Such decreases in employment in both countries got bigger the higher the tariff levels. In China, the decrease in employment was higher when it did not retaliate than when it retaliated. For the United States, its decrease in employment, although lower than that in China, rose when China retaliated. This empirical evidence is consistent given that Section 3.1.1 showed that domestic manufacturing production decreased whenever China retaliated. Furthermore, Section 3.1.1 showed that input costs rose due to tariffs, thus constraining domestic production, with some businesses laying off workers as well as delaying expansion plans. Therefore, although the main purpose for the United States in initiating the trade war with China was to increase

employment (create more jobs), these results showed that the United States actually cannot increase aggregate employment through tariffs.

Appleyard and Field (2017: 327) point out that the tariff imposing country may lose jobs in export industries to such an extent that the ***net effect on employment*** is negligible or negative. Loss of jobs in the export industries occurs when retaliatory tariffs that reduce the home country exports are imposed. Furthermore, when the home country imposes tariffs, the national income of the foreign country falls, causing it to cut its spending on the home country's exports, thus reducing employment in the exporting industries in the home country. Empirical evidence by Li *et al.* (2018) showed that at whatever import tariff level and whether or not China retaliated, China experienced a decrease in its GDP, with such decreases increasing in magnitude as the United States increased tariffs (Table 1, Appendices). With the argument that with the fall in its national income, the foreign country would cut its spending on home country exports, this would be a logical conclusion for China, as it diverts to source imports from other countries.

From 2007, China is the United States' third major export destination (after Mexico and Canada), absorbing 8.4% of the United States' total exports by 2017 (http://www.trademap.org). Loss of such a market would definitely have a negative effect on some of its local producers, especially if alternative markets are found to be costly. China's exports from the United States have seen a constant decline since June 2018, falling from 14.78% in May 2018 to 8.0% by February 2019 (Table 2, Appendices). Therefore, given Russ (2019: 1) estimate that US exports to China support nearly 1 million American jobs and that US agricultural exports have fallen by half since 2017, the overall fall in US exports to China as depicted in Table 2 (Appendices) would definitely have negative effects on employment.

A study by Trade Partnership Worldwide (2019: 10,11,15,16) showed that as of November 1, 2018, the effect of tariffs and quota on steel and aluminium together with tariffs of 25% on US imports of selected goods from China plus retaliation had a one-time net impact on US jobs of −934,700 jobs, with every state experiencing net job losses. In monetary terms, this was a net cost of US$490,900 for each job created. When US tariffs of 25% were put on all remaining imports from China with China retaliating, the one-time net impact on US jobs was worsened to −2,159,500 jobs, which translated to a net cost of US$555,584 for each job gained. In all this, the Services sector was always the worst hit. Therefore, if the United States imposed all the remaining tariffs on all the remaining goods as promised, the net US job decline would worsen. Therefore, just as the empirical study by Li *et al.* (2018), the Trade Partnership Worldwide (2019) study showed that the United States actually cannot increase aggregate employment through tariffs.

3.2.2. Tariff to Improve the Balance of Trade with China

This argument is based on the reasoning that the tariff will reduce imports assuming that exports will not be negatively affected. Therefore, with imports falling, the balance of trade (i.e., value of exports – value of imports) becomes less negative. As the trade deficit continues to be reduced, in time the trade deficit turns into a trade surplus. The US trade deficit with China only started falling after October 2018, falling from US$45.5 billion in October 2018 to US$22.2 billion by March 2019, as shown in Table 3 (Appendices).

Li *et al.* (2018) showed that tariffs in the US–China trade have had a negative effect on both US exports and imports (Table 1, Appendices), which is contrary to the assumption that exports will not be affected, and only the imports will be reduced. The results showed that the decrease in exports continuously rose with unilateral tariff increases by the United States, for example, exports decreased by −0.217% with a unilateral 15% tariff declining continuously to a decrease by −0.673 with a unilateral 60% tariff. When China retaliates, the US exports decrease by a bigger magnitude, for example, decreasing by −1.583 when China retaliated with the same level of 15% tariff, and continuously falling to a decrease by −4.330% when China retaliated with the same level of 60% tariff. This is consistent with the argument often given by trade economists, that when tariffs are used to try and improve the balance of trade, exports fall by a bigger magnitude when trading partners retaliate, therefore defeating the improvement of balance of trade objective. Another argument, given for the fall in exports (such that the trade balance may not improve as expected), is that the imports now excluded were essential inputs into the production process of the home country's exports (Appleyard and Field, 2018: 324). As shown in Section 3.1.1, some of the imports subjected to the US tariffs were indeed essential inputs into US firms. Section 3.2.1 showed that employment was actually reduced when tariffs were imposed, and trade economists argue that foreign retaliation can create an even severe unemployment in the export industries, thus reducing exports further as noted by Kreinin (2006: 80) and Appleyard

Table 2. US–China Trade (2017-2019) US$ Billion.

	2017					2018												2019		
	M08	M09	M10	M11	M12	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M01	M02	M03
China's imports from the United States(US exports)	12.62	12.71	11.12	14.29	16.21	15.73	10.81	15.34	14.08	14.78	13.66	13.34	13.3	12.68	11.03	10.76	10.49	9.30	8.00	11.40
US imports from China (China exports)	47.68	47.31	50.12	49.97	46.19	47.62	40.71	39.75	39.78	45.7	46.57	49.12	49.92	52.2	54.61	48.65	48.23	43.55	34.73	32.57

Source: Own table using trade data from the ITC trade database available at http://www.trademap.org.

Table 3. US–China Trade Balances (US$ Billion) for the Period 2017-2019

	2017					2018												2019		
	M08	M09	M10	M11	M12	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	M01	M02	M03
US trade balance with China	−36.8	−36.5	−37.2	−37.3	−32.5	−37.8	−30.9	−27.4	−29.5	−35.1	−35.5	−38.9	−40.6	−42.4	−45.5	−40.0	−39.1	−36.4	−26.3	−22.2
China trade balance with the United States	26.47	28.33	26.51	27.58	25.61	21.89	20.87	15.33	21.96	24.52	28.74	28.05	31.1	34.08	31.77	35.54	29.84	27.3	14.7	20.47

Source: Own table using trade data from the ITC trade database available at http://www.trademap.org.

and Field (2017: 327). Empirical work by Amiti *et al.* (2019: 15, 35) showed that US exporters were being negatively affected by retaliatory tariffs. They showed that a 10% foreign tariff was associated with a 32% decline in the value of US exports, and that by the end of 2018 foreign retaliatory tariffs, not just by China, costed US exporters approximately US$2.4 billion per month in lost exports.

4. CONCLUSION

All the empirical work examined and reviewed for this article confirms the conventional price impacts as predicted in the often-used standard models of international trade. Both the United States and China are negatively affected by the ongoing tit-for-tat tariff war, impacting negatively on producers, employment, and the volume of trade. Consumers are the most affected, as they bear high prices directly and indirectly as producers pass on the higher input costs. Consumer and producer deadweight losses are experienced in both countries as tariffs distort and bring in inefficiencies in consumption and production decisions, and thus have negative net welfare effects.

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