

The Impact on Australia of Trump's 45 per cent Tariff on Chinese Imports

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Should Australia be concerned about the consequences of a possible outbreak of protection between the US and China, two of Australia's largest trading partners? Using the Global Trade Analysis Project model, this paper describes the impact of a 45 per cent tariff imposed by the US on Chinese imports, as flagged by US president-elect Donald Trump during the election campaign. Gross Domestic Product (GDP) is reduced in both the US and China, with no appreciable revival of US manufacturing. Terms-of-trade effects cause only minor macroeconomic impacts on Australia. In itself, a US-China tariff would not cause significant global economic damage but could have important demonstration effects. Worldwide tariff hikes would take many economies into recession and reduce world trade volumes by a third.

Keywords: CGE model, manufacturing, multi-country model, tariffs, trade.

1. Introduction

During the US Presidential election campaign, Donald Trump indicated that he would revive protectionist policies in the US. Shortly after Trump entered office, the US withdrew from the Trans-Pacific Partnership (TPP), a trade agreement between the US and 11 other countries on the Pacific rim. During the election campaign, Trump also indicated that he would favour a 45 per cent tariff on Chinese imports.

Detailed modelling by the Peterson Institute (Petri & Plummer, 2016) shows that the US stands to gain relatively little in aggregate from the TPP. Furthermore, the TPP will dampen employment growth in the durable and non-durable manufacturing sectors, negatively impacting the lives of Trump's supporter base through America's rust belt. Based on these results it is not difficult to understand Trump's opposition to the deal.

This paper reports modelling of the impact of a 45 per cent tariff on the import of Chinese manufactured goods to the US, and particularly the impact on Australia. Such a tariff, dismissed as the "entirely ridiculous idea" (Worstell, 2016) of a candidate who seemed unlikely to win the Republican nomination back in January 2016, now emerges as one of the more concrete proposals of the president-elect of the United States of America. Given that the US and China are two out of Australia's three largest trading partners, should Australians be concerned?

Modelling with the Global Trade Analysis Project (GTAP) model finds textbook negative implications on the US and Chinese economies. However, the modelling should alleviate any concerns for

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Australia, finding only minor macroeconomic implications for Australia. Sectoral disturbances are also found to be small.

Following a discussion of the results from the main simulation, simulations based on conjectures on the likely response to US tariffs on China are discussed. The responses simulated are (i) China retaliates with tariffs, and (ii) a global contagion scenario where WTO control breaks down and all countries impose tariffs. The global contagion scenario would be detrimental to Australia, reducing GDP by 4 per cent, equivalent of almost two years' economic growth.

2. GTAP Model and Data

Global Trade Analysis Project is a multi-regional Computable General Equilibrium (CGE) model of the world economy (Hertel, 1997). The theory of GTAP owes much to the ORANI model of the Australian economy (Dixon *et al.*, 1982), in which agents including producers and households make decisions based on constrained optimisation problems. The GTAP model covers the world economy divided into several regions, and the model operates under the constraints that net world trade is equal to zero and world savings is equal to world investment. These constraints do not necessarily hold at the regional level.

The initial solution for the model is derived from the GTAP9 database (Aguilar *et al.*, 2016), which describes the world economy as it was in 2011. There are four regions identified – Australia, the United States, China, and the rest of the world. The model is run at its maximum level of sectoral disaggregation, that is, 57 sectors. The parameter estimates in GTAP9 are taken as given (Hertel & van der Mensbrugghe, 2016). The source substitution elasticities, which effectively determine export demand elasticities and the terms of trade results that are important in this simulation, have been in place since GTAP6 and underpin many major studies of the last decade.

Australia's major trade flows by region and sector, as depicted in the GTAP9 database, are important in determining simulation results for Australia. In GTAP9, Australia's exports to China comprise 27 per cent of Australia's total exports. The overwhelming majority of these exports are iron ore. We see later that when China contracts, iron ore exports decline. Exports of other manufactures (in particular, non-ferrous metals, chemicals and machinery and equipment) are sold mainly to the rest of the world, as is coal (Figure 1). Australia's imports are primarily manufactured goods, with sizeable proportions sourced from all three aggregate regions (Figure 2).

The simulation described in this paper is a 45 per cent tariff imposed by the US on China. More than 95 per cent of trade from China to the US consists of manufactured goods. Existing tariffs on manufactured goods imported by the US are given in Table 1. On average these tariffs are quite low, with the exceptions of sugar (26 per cent) and textiles, clothing and footwear (TCF) (average 12

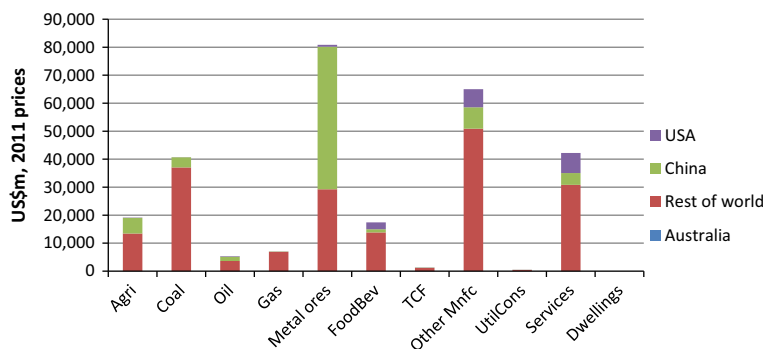


Figure 1. Australia's Exports by Aggregated Sector and Destination, US\$m, 2011
Source: GTAP9 database [Colour figure can be viewed at wileyonlinelibrary.com]

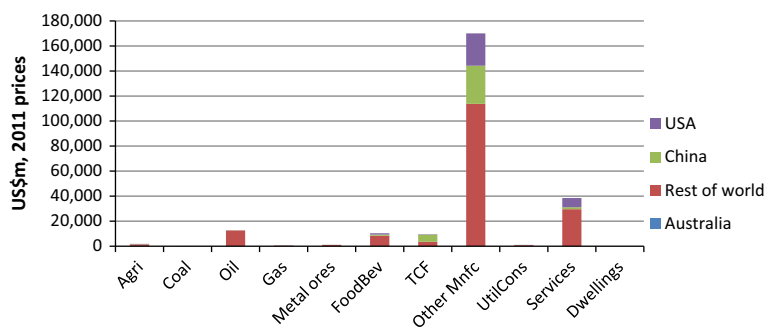


Figure 2. Australia's Imports by Aggregated Sector and Destination, US\$m, 2011
Source: GTAP9 database [Colour figure can be viewed at wileyonlinelibrary.com]

Table 1. US Tariff Rates on Imports of Manufactured Goods from China, 2011

Sector	Tariff (%)
Cattle meat	1.6
Other meat	2.4
Vegetable oils	1.9
Milk	5.9
Processed rice	4.4
Sugar	25.9
Other food	2.8
Beverages and tobacco	4.1
Textiles	8.8
Wearing apparel	11.6
Leather	13.5
Lumber	0.6
Paper & paper products	0.0
Petroleum & coke	0.2
Chemical rubber products	2.7
Non-metallic minerals	4.7
Iron & steel	1.0
Non-ferrous metals	3.2
Fabricated metal products	2.3
Motor vehicles and parts	0.9
Other transport equipment	3.4
Electronic equipment	0.3
Other machinery & equipment	1.5
Other manufacturing	1.5
Total manufacturing	3.0

Source: GTAP9 database.

per cent). The simulation is based on all US tariffs on Chinese imports moving to 45 per cent. Consequently, the shocks to tariffs on sugar and TCF are smaller than the shocks on the remaining commodities.

The model is run under a modified comparative static long run closure. Under this closure, results can be interpreted as deviations from business-as-usual after around five to ten years. The closure is characterised by endogenous/exogenous settings in the factor markets. Rates of return on capital in every sector in every region are assumed to be exogenous in the long run. That is, to achieve a long run adjustment in which there are sufficient global savings to meet global investment, regional sectoral rates of return are assumed to return to their initial levels. This is standard treatment in the single-country ORANI model but represents a departure from the standard GTAP long run closure, in which the aggregate regional supply of capital is fixed and sectoral rates of return adjust uniformly. This treatment was chosen because the long run response to an increase in tariffs is unlikely to be achieved with no change in regional and sectoral capital stocks. The change in regional capital stocks can be explained by a combination of reduced investment in the short and medium run, and idle capital stock. Note that the rate of return on idle capital stock is assumed to be zero, and the assumption of exogenous rates of return applies only to capital stock in operation.

Aggregate employment in each region responds weakly to wages. This is equivalent to assuming that changes to tariffs have a small impact on employment in the long run. Good or bad economic news is mainly reflected in changes to wage rates commensurate with maintaining the employment rate (broadly defined as the ratio of employment to population) at close to its initial level. Again, this represents a departure from the standard long run treatment in both GTAP and ORANI, in which aggregate employment is assumed to be exogenous and all long run adjustment is absorbed by changes in wage rates.

The system of non-linear equations that comprises the model is solved using the GEMPACK software (Harrison & Pearson, 1996). The GEMPACK approach uses linearised (log differential) equations to approximate the non-linear system. To reduce linearisation error, the model is solved using the Euler method, whereby the shock is broken into small increments, or steps, and updated after each step. With many steps, linearization error becomes negligible. In the simulations reported in this paper, twenty steps were used. This relatively large number of steps was chosen because the shocks (of up to 45 per cent) are large in percentage change terms.

3. Modelling Results

3.1 Macro Results

Simulation of the long run impacts of a 45 per cent tariff imposed by the US on imports of Chinese manufactured goods reveals textbook results for China and the USA. By imposing a tariff, the US will import less and divert resources to producing goods that otherwise would have been imported. As a result, the US also exports less, leading to a gain in the terms of trade. The diversion of resources from export activities into relatively less productive import-replacement activities also leads to an efficiency loss. Dixon (2015) explains that at low levels of tariffs, the terms-of-trade gain outweighs the efficiency loss, but at high levels, such as Trump's 45 per cent, the efficiency loss will be greater. The GTAP simulation finds that, in the long run, USA GDP will be 0.6 per cent lower than it otherwise would have been (Figure 3).

The gain in the terms of trade, of close to 1 per cent, increases US purchasing power, so the loss of real income (GDP deflated by consumer prices rather than producer prices) is somewhat less than the fall in GDP. Note that real income results reported here do not account for foreign ownership of capital. As a net importer of capital, the US may actually lose less than is suggested by these results, with some of the loss in capital income accruing instead to creditors including China.

With a new tariff imposed on around 20 per cent of its exports, China suffers a terms-of-trade loss of almost 3 per cent, and China's aggregate exports fall by more than 4 per cent. GDP falls by more than 1 per cent. With a terms-of-trade loss reducing China's purchasing power, the loss in real income exceeds the fall in GDP, falling by almost 2 per cent.

Given that the US and China account for around one-third of Australia's exports and imports, we might expect that reduced activity in both economies would have a negative impact on the Australian economy. With no direct change to tariff policy in relation to Australia, the main mechanism through

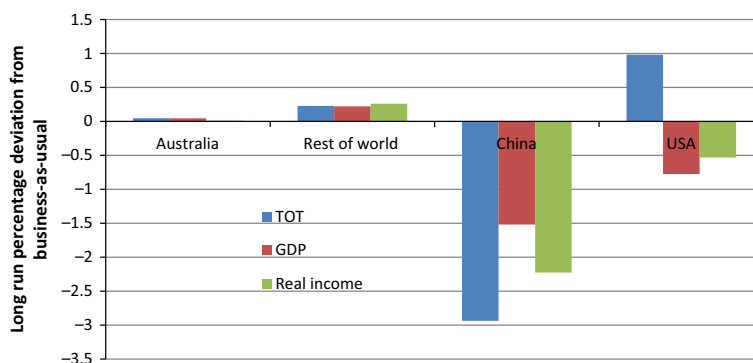


Figure 3. Long Run Macroeconomic Impacts by Region

Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

which Australia is affected is through the terms of trade. As shown in Figure 3, the macroeconomic impact on Australia is barely perceptible. This is the net result of several factors.

Australia's exports to China fall, unsurprisingly given that China's economy is smaller. On the other hand, Australia's exports to the US increase. Although the US economy is also smaller, the US substitutes against Chinese imports, and as a result Australia is able to increase its exports to the US. Australia is also able to increase its exports to the rest of the world. With the US focused on servicing its domestic market, the supply of US exports to the world is curtailed, creating opportunities for Australia to expand exports into the rest of the world.

The tariff-imposed reduction in US demand for Chinese manufactured products depresses Chinese wages in the long run, relative to where they otherwise would have been. This reduces the price of Chinese manufactured goods, contributing to a decrease in the c.i.f. import price index for Australia, and consequently, an improvement in the terms-of-trade. On the other hand, manufacturing cost pressures in the US mean that the c.i.f. price of US imports to Australia increases. However, for Australia, imports of manufactured goods from the US are less important than imports from China.

The net result of Australia's terms-of-trade gains from cheaper imports from China and better access to the US, and Australia's terms-of-trade losses from reduced exports to China and more expensive imports from the US, is very small: an increase in the terms-of-trade of less than 0.05 per cent and an increase in GDP of around 0.04 per cent. While the macroeconomic impacts are small, however, it does not automatically follow that industry disturbances, with their attendant adjustment costs, will be small. Sectoral changes are discussed in the following section.

3.2 Sectoral Results: Australia

Sectoral results for Australia can be understood in the context of the directions of change in trade discussed in the previous section. Figure 4 shows results for the long run change in sectoral output in dollar terms (\$USm, 2011 prices) broken down into exports, import replacement, and domestic growth. For example, domestic output of TCF (textiles, clothing and footwear) falls because domestic output is replaced by increased imports from China.

Output declines in sectors for which China is a significant sales destination, such as metal ores (mainly iron ore), agriculture, and coal.¹ Exports of food and beverages are mainly destined for the rest of the world, into which Australia is able to expand its exports replacing food and beverage exports from the US.

¹ Recall that the GTAP9 database reflects the world economy as it was in 2011.

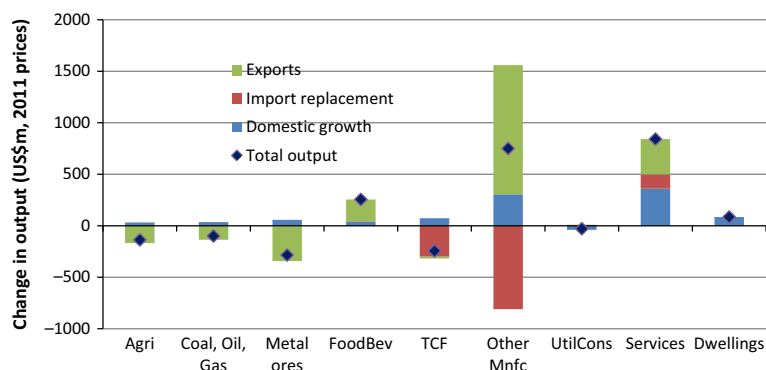


Figure 4. Long Run Sectoral Impacts in Australia

Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

The sectoral results derived from this long-run comparative-static simulation need to be interpreted with care. The results are very dependent on the initial solution to the model, provided by the GTAP9 database in respect of the year 2011. Auster and Foo (2016) note that in the next decade, Australia's trade with China will diversify and in particular China's share of services exports could increase significantly from their 2011 levels. Furthermore, exports of coal to China are likely to decline. Taking into account these likely changes, it is possible that the simulation has overstated the negative impact on Australia's coal output, and overstated the positive impact on services.

3.3 Impact on US Manufacturing: The Wrong Policy

Ironically, the tariff leads to only modest increases in US output of manufactured goods. However, wrongly conceived, the intention of the tariff hike should be to increase activity in domestic industries by cutting off imports and creating a supply shortage that domestic industry would expand to fill. Unfortunately for Trump and his constituents in the rustbelt, modelling shows that a tariff-induced reduction in imports from China would be met by a combination of higher imports from the rest of the world and Australia, lower US exports, lower US domestic usage, and only a modest increase in US output.

Figure 5 shows that output results across the manufacturing sectors are variable. Import replacement has a positive effect in most sectors, and reductions in exports have a negative effect. In most sectors, there is also a small negative contribution from lower domestic growth. The tariff has positive impacts in TCF and electronic equipment, which includes computing and communication equipment. In these sectors, a strong impact from reduced imports plays a large role. The US gets 47 per cent of its electronic equipment imports and 45 per cent of its TCF imports from China, so the tariff covers a relatively large proportion of imports for these commodities.

3.4 Optimal Tariffs

Dixon and Rimmer (2010) caused a minor stir at the 2008 Bracks inquiry into the automotive industry by suggesting that Australia not cut tariffs on imported motor vehicles. After advocating for tariff cuts in Australia since the 1970's, they found that Australia's tariffs had fallen to sufficiently low levels that there was no benefit in cutting them further. Efficiency gains are related to the size of the initial tariff, while terms-of-trade losses are related to the size of the import at c.i.f. prices. Efficiency gains from cutting small tariffs are not sufficient to outweigh the accompanying terms of trade losses.

Figure 6 shows the impact on the US of acting unilaterally to change tariffs on China to various levels between zero and Trump's 45 per cent. Tariffs on imports from China currently average around

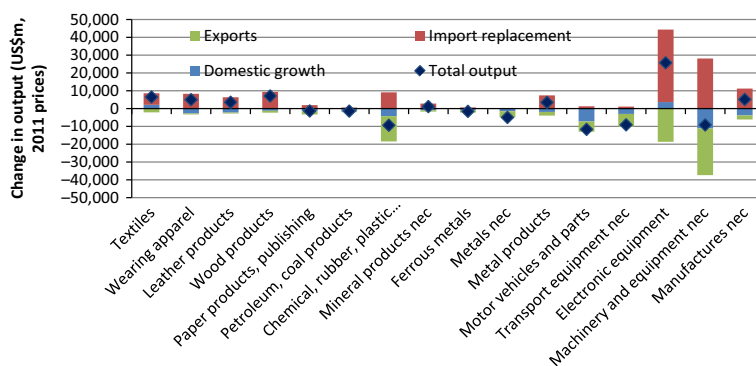


Figure 5. Long Run Sectoral Impacts in the US, Manufacturing Activity Only

Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

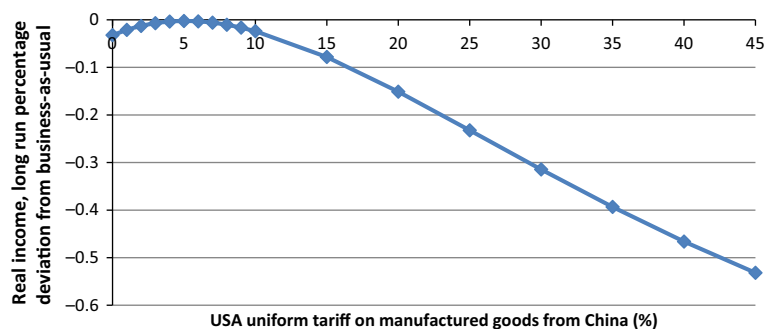


Figure 6. US Long Run Real Income Impacts by Tariff Rate

Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

3 per cent. We find that Trump could do worse by cutting tariffs to zero, and that an increase to between 5 and 10 per cent would confer a small welfare gain on the US economy. An increase to 45 per cent, however, is well outside the range that would be beneficial to the US economy.

3.5 Retaliation

So far we have seen that a US tariff on China would not have significant negative implications for Australia or the rest of the world. Much of the danger in Trump's protectionist leanings lie not in the direct impact of tariffs imposed by the US, but in the risk of self-harming retaliatory actions by other countries. Here we consider two scenarios: firstly, that China retaliates with a 45 per cent tariff on the US, and secondly, that the whole world gets dragged into a trade war and all countries impose 20 per cent tariffs (and the US and China persist with 45 per cent tariffs).

Figure 7 shows that tariff retaliation by China would harm the US, but it would harm China more. As a threat to dissuade the US from implementing tariffs therefore, tariff retaliation by China is not credible. Rather than impose tariffs of its own, China would be better off letting the US go ahead with its tariffs unanswered. Alternatively, as the world's largest creditor, China may retaliate more effectively by withholding capital from the US government.

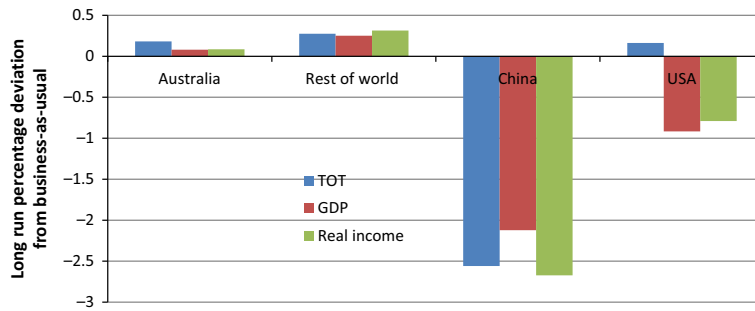


Figure 7. *China Retaliates – 45 per cent Tariffs on China-US Trade in Both Directions*
Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

Figure 8 shows the impact on world GDP if there was a worldwide outbreak of protectionism. In this simulation, the US and China impose 45 per cent tariffs on each other, and all other trade is subject to tariffs of 20 per cent. For this to eventuate would require a breakdown in the regulatory framework of the WTO. The scenario is reminiscent of the Smoot Hawley tariffs of the Great Depression era, which preceded the WTO and its predecessor the General Agreement on Tariffs and Trade. If this was to occur, the volume of world trade would fall by more than one-third, and there would be large declines in GDP in all regions akin to a major recession. McKibbin and Stoeckel (2009) find similar results (adjusted for scale) for GDP in a simulation of a similar “trade war,” in which all countries impose tariffs of 10 per cent. In a simulation of a similar global trade war with 10 per cent tariffs, Harris and Robertson (2009) find that if the Australia-US free trade agreement was maintained in the face of a trade war, there would be a benefit to Australia of one per cent of GDP per capita.

4. Conclusions

Global Trade Analysis Project is a well-established global CGE model used worldwide by the many thousands of economists in the GTAP network. The GTAP model and database are well maintained, and the simplicity of a long-run comparative static simulation belies the value of results that are produced quickly from a tested and well-understood CGE framework and a credible database. The model results highlight three main messages.

Firstly, a message for Trump: high tariffs on China will not provide the stimulus you seek for American manufacturing. Instead, the policy will lead to more imports from other destinations, lower exports from the US, and lower demand in the US.

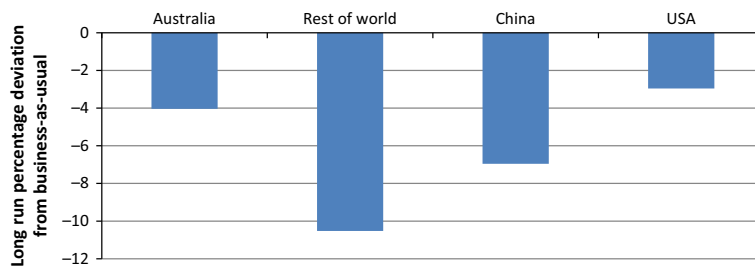


Figure 8. *World GDP Impacts, 45% Tariff on US-China Trade, 20% Tariffs on All Other Trade*
Source: GTAP model [Colour figure can be viewed at wileyonlinelibrary.com]

Secondly, a message for Australia: While US tariffs on China inflict economic bad news on two of our three largest trading partners, this need not be bad news for Australia. Various terms-of-trade impacts have a net impact that is close to neutral.

Thirdly, a message for the world: US tariffs on China will be least harmful if there is no response. China may feel entitled to retaliate with tariffs of its own, but this would be ill-advised. On their own, Trump's high tariffs will inflict some damage on the US and Chinese economies and have minor impacts on the rest of the world. The greater danger is that Trump's tariffs will act as a green light to those pursuing protectionism in other parts of the world, weakening the WTO and increasing the likelihood of high tariffs everywhere. If a retreat into global protectionism was to eventuate, a large contraction in world trade would send the world economy into deep recession.

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