Garbage in, garbage out

A review of the modelling of the benefits of the TPPA

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Principal Ian Harrison (B.C.A. Hons. V.U.W., Master of Public Policy SAIS Johns Hopkins) has worked with the Reserve Bank of New Zealand, the World Bank, the International Monetary Fund and the Bank for International Settlements.

Contact: Ian Harrison – Principal Tailrisk Economics ianharrison52@gmail.com

Ph. 022 175 3669

04 384 8570

This report and others are available at http://www.tailrisk.co.nz/index.php

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Introduction

Recently the quality of the analysis of the benefits of the TPPA in the National Interest Analysis papers has become a matter of public debate. Some commentators[1] have raised a number of concerns about the robustness of the economic modelling. The official position is "We are confident that the CGE modelling reported on here is of the highest standard possible."

The centrepiece of the assessment effort was a paper commissioned by MFAT[2] that used an 'off-the-shelf' general equilibrium trade model to assess the impact of changes in tariffs and quotas. The model was then adapted to assess the impact of changes in non-tariff barriers for goods and services, and trade enhancement measures. We refer to this paper as NZMOD. The estimated welfare increases for New Zealand are shown below.

The reported benefits ($2704 million per year by 2030), in particular the non-tariff barrier (NTB) reduction benefits, looked high to us. So we took the trouble to delve into the economic studies that underpinned the benefit estimates. The results of our review and our assessments of the implications for the National Interest Analysis are reported below.

The discussion of the benefits is unavoidably complex and technical. However, a non-technical, and somewhat whimsical, explanation of the political economy of the TPPA is appended for those who would prefer not to wade through the economics.

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[1] The economics of the TPPA Barry Coates, Rod Oram, Dr Geoff Bertram and Professor Tim Hazledine

[2] Anna Strutt, Peter Minor and Allan Rae, "*A Dynamic Computable General Equilibrium (CGE) Analysis of the Trans-Pacific Partnership Agreement: Potential Impacts on the New Zealand Economy*"

	Modelled outcome (Strutt et al.)	Proportion of total, in modelled outcome	Government treatment of results
Tariffs	$624 million	15%	$624 million
Trade Facilitation	$374 million	9%	$374 million
Services NTBs	$250 million	6%	$250 million
Goods NTBs	$2,912 million	70%	$1,456 million (half modelled outcome)
Total	$4,160 million	100%	**$2,704 million**

Key conclusions

- The benefits from reductions in non-tariff barriers and trade facilitation were based on inputs from third party models that are fundamentally flawed and that produce results which are often nonsensical. The outputs from an economic model are only as good as the inputs. The expression used by modellers is 'garbage in, garbage out'.

- The goods non-tariff barrier model identified countries such as Gabon, Albania and Kenya as having no or very low non-tariff barriers while New Zealand is one of the worst performers. New Zealand is rated as having the third highest non-tariff protection on agriculture in the TPPA group.

- The trade facilitation benefits of $374 million a year is based on a reduction in custom clearance times of just 10 hours. Much of the benefits appear to be due to a reduction in the cost of importing and exporting oil where importers are assumed to face an interest rate of 511 percent.

- The model used to calculate services trade barriers puts the effective rate of protection on New Zealand financial services at 70 percent when most financial services are provided by foreign owned companies.

- The estimates of the benefits from non-tariff barriers and trade facilitation are nonsense and should be withdrawn from the National Interest analysis.

- The $624 million a year tariff reduction benefit figure looks too high given the very limited advances in the reduction of protection of key agricultural commodities. More work needs to be done in this area, but in the interim a benefits of $130 million per year would be a more realistic assessment.

- The total benefits are likely to be close to $130 million a year or about .04 percent of GDP. The $2.7 billion figure is obviously wrong.

- The net present value of the benefits and the costs appears to be finely balanced.

Goods Non-tariff barriers

The modelled benefits from the reduction in non-tariff barriers (NTBs) to trade was $2912 million per year in 2030. This was reduced by half in the official assessment because the modelling was based on a relatively immature 'first generation' model inputs.

The modelling approach
Very briefly the benefits were calculated as follows. NZMOD drew on a 2009 study by Kee et al.[3] that calculated the impact of NTBs on trade and converted these into 'tariff equivalents' for a detailed array of commodity types. These tariff equivalents were then be fed into the NZMOD general equilibrium model.

It was assumed that only non-tariff barriers that are above the current mean for the group are reduced. The rationale is *"Since the World Bank NTB estimates do not differentiate between NTBs which impact domestic and imported goods and those which are in place to protect legitimate public health and risk issues, we take an approach that does not call for the complete removal of NTBs in the TPP negotiations. Instead, we employ a harmonising approach to NTBs, where negotiators seek to define common standards and mutual recognition of regional standards and regulations. Therefore, we estimate NTB reductions by assuming TPP parties will harmonise their NTBs to the level of the mean found in the TPP region."*

We think that the Kee et al. study, which generated the base inputs is fundamentally flawed and generates results that are often nonsensical.

To test the robustness of the inputs from the Kee et al. study we compared the country NTB outputs (there were 82) with the respective rankings on the World

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[3] Kee, Hiau Looi, Alessandro Nicita and Marcelo Olarreaga. 2009. "Estimating Trade Restrictiveness Indices", *Economic Journal*. vol. 119: 172-199.

Bank's 'Ease of doing business' index[4]. A country that scores well on that index is likely to be an easier country to export to, with fewer unnecessary restrictions that impede trade. So the results of the two studies should be correlated. Countries with a low tariff equivalent assessment should rate highly on the World Bank index.

We found that the 12 countries with the lowest nontariff barriers (less than a two percent tariff equivalent – reflecting very low non-tariff barriers) had an average ranking of 98 out the 182 countries rated on the World Bank's index. Only 2 ranked in the top 50. The two countries with the best tariffs estimates - both at zero - were Gabon and Trinidad and Tobago, which were ranked 162 and 88 respectively on the World Bank index.

New Zealand, on the other hand, ranks second on the ease of business index but is the 22nd worst country on an effective protection basis.

The study also provides a measure of effective protection from NTBs from a home country welfare perspective. New Zealand's effective protection rate was 24.9 percent, which was the 14th highest in the sample.

The key problem with the Kee et al. model is that the tariff equivalents of the NTBs are not calculated directly, but are estimated in a simple model of import demand. The impact of non-tariff barriers is picked up by dummy variables for each NTB types which are set at one, regardless of the impact of the barrier. So New Zealand could have been 'pinged' for restricting the importation of raw milk cheese and this would have been given the same weight as a NTB with welfare costs in the billions. For agricultural goods a further measure of the NTB level is the dollar value of agricultural subsidies. This is based on WTO member notifications.

Countries that that are assiduous about reporting various regulatory impositions will tend to score badly because the NTB assessment is largely a count of the number of reported interventions.

The validity of the estimates cannot be tested directly against actual results, which are not observable, but as a test the same model was used to estimate tariff barriers. When compared against actuals the correlation was just 0.37. This suggests that it is a weak model that will generate inaccurate results for NTBs in many cases.

Turning to the tariff equivalent data that was inputted into the NZMOD, we find that the New Zealand effective agricultural tariff is the third highest in the TTPA group, implying New Zealand agriculture is one of the more heavily subsidised. The New Zealand effective tariff rate is 23 percent compared to an average of 20.9 percent.

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[4] doingbusiness.org/rankings Accessed 12 February 2016

Both the absolute size and the relative position of New Zealand's support for agriculture comes as a surprise to us and probably to the reader. We think they are just artifacts of a flawed study.

Generating the NTB welfare benefits
As noted above the welfare benefits from the TPPA flow from a reduction in non-tariff barriers by just those countries with effective tariffs that are above the TPP mean. The reductions, in percentage point terms, are set out below.

Country	Agriculture and food % point reduction	Manufactures % point reduction
New Zealand	2.2	3.0
Australia	7.9	0.0
Japan	2.8	0.0
Malaysia	1.0	1.8
Peru	1.6	0.0
Mexico	5.3	8.0
Vietnam and Brunei	1.0	1.8

Considering where the welfare gains come from, the first point to note is that it is well understood that significant benefits from liberalisation for the home country come from cuts to its own protection rates. So the assumptions about the cuts to New Zealand's manufacturing and agricultural NTB protection presumably explain much of the $2.9 billion of annual benefits.

This rather begs the question of why New Zealand would not go all the way and cut as much of the 24.9 percent NTB percent effective protection as possible. This would not involve a complex and lengthy negotiation with a host of trading partners. With a trip to the countries with the lowest effective protection (under 2percent) MFAT would learn how it is done. The trip would cover Saudi Arabia, Uganda, Albania, Costa Rica and Sri Lanka.

The second point is that there is nothing for New Zealand in the foreign cuts on manufacturing. New Zealand doesn't export manufacturing goods, to any material

extent, to Malaysia, Mexico, Vietnam and Brunei and the small reductions in effective protection by these countries (that presumably would benefit all exporting countries) is not going to change that.

On the foreign agricultural NTB cuts the big event is the Australian cut. Their high rate of protection is probably news to them so if is unlikely that they will be making any cuts as part of their TTPA membership. The possibility that the TPPA will engender a change of heart on the apples front is at best a faint hope. With respect to Japan NTBs are largely redundant as the damage is done by explicit tariff and quota protection.

Third, even if the NTB cuts were all real, they are all small and should not be generating benefits of around 1 percent of GDP. This raises the question of whether there is something wrong with the economic logic and/or calibration of NZMOD.

Adjusting for the 'first generation results'
The Government's response to possible issues with the NTB modelling has been to cut estimated benefits in half.

Half a pile of garbage is still a pile of garbage. The goods NTB estimates should be dropped from the National Interest Analysis altogether.

Trade facilitation

The annual benefits from improved trade facilitation are estimated to be $357 million.

Modelling approach
The trade facilitation benefits were calculated by assuming that the effect of the TPPA would be to reduce customs clearance times by 25 percent. NZMOD uses estimates of the economic value of time savings in trade presented in a paper by Minor[5] to generate the welfare estimate. This paper, in turn, drew on an analysis of the value of time in trade as revealed by choices between sea and airfreighting.[6]

The values, per day, of a reduction in customs delays used in the NZMOD analysis

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[5] Minor, Peter. 2013. "Time as a Barrier to Trade: A GTAP Database of Ad Valorem Trade Time Costs". ImpactECON, LLC, Second Edition.

[6] Hummels, David and George Schaur. 2013. "Time as a Trade Barrier", *American Economic Review*, vol. 103: 1-27.

were as follows:

Commodity	Imports	Exports
Rice	0.1	0.1
Sugar	0	0.2
Other grain crops	0.0	0.3
Live animals and stock	1.1	0.3
Beef and sheep meat	0	0.2
Other meats	0.1	0.3
Dairy	0.2	0.1
Wool	0.7	0.8
Fruit and veg	1.0	0.5
Processed food and beverage	1.3	1.1
Natural resources	1.3	0.6
Extractive (oil, gas, coal, mining)	1.4	0.7
Light manufactures	0.6	0.7
Heavy manufactures	1.3	1.6

We have two problems with the analysis.

There isn't a problem to fix
There doesn't seem to be a problem with customs clearance times in the TPPA group. NZMOD states that the average clearance time in 2012 was just 1.6 days and it seems unlikely that governments will be putting resources into bringing it down further. 25 percent of 1.6 days is just 10 hours. Certainly there is no mention in the MFAT background documents of any TPPA driven initiatives to improve New Zealand customs clearance times.

The figure used don't all make sense

There is a discussion of the value of time in NZMOD.

"*The value in clearing customs more efficiently depends on a customer's willingness to pay to receive a good one day sooner than later. For goods such as fashionable apparel, electronics, parts for production or assembly, and products which may perish rapidly, the consumer's and producer's willingness to pay to save time will be higher. For standardised goods, which are readily inventoried, the consumer's and producer's willingness to pay to save time will be lower.*"

But the figures used simply don't reflect this. All of the commodities with the high daily costs could be described as standardised goods. The grossly inflated daily costs for these commodities appear to be driving the welfare results. For example New Zealand both exports and imports high dollar values of oil, so even 10 hours reduction in time taken to clear customs funding can generate large savings.

While the daily time value figures seem small they actually represent very high time values. The 1.4 percent daily cost (an annual cost of 511 percent) applying to oil suggests that an oil importer values oil received in 30 days time at a third less than oil received today because of the time value effect. That is hopelessly wrong. In reality the difference will primarily reflected the funding cost of the oil shipment, which at, say, 5 percent per annum would mean that future oil is valued at 99.6 percent of oil today.

The direct financial cost savings also appears to be amplified by the General Equilibrium model.

To get a handle on a realistic assessment of the welfare value of time saved we assumed that the affect of the 10 hours savings is captured by importers' and exporters' funding costs for that period.   In most cases the interest savings would be nil because interest accrue on a daily basis. If one third incurred an extra days funding cost then, assuming a 5 percent funding rate, and that exporters and importers share the benefits, the value to New Zealand would be about $1 million. This is about right for the non-time sensitive goods that dominate our exports and imports. An adjustment could be made for time critical goods but this would also be small.

In any event as the TPPA countries are hardly likely revamp their customs clearance procedures. The facilitation benefit is so small and unlikely that it should be dropped from the National Interest Analysis.

Services Non-tariff barriers

The annual welfare value of the assumed reduction in non-tariff barriers on services is estimated to be $250 million.

Modelling approach

The approach is to take the set of tariff equivalents estimated by Fontagne et al [7]. These were calculated by taking the share of foreign services in a benchmark country and assuming that any shortfall in the services share in other countries is due to non-tariff barriers. This is a very strong assumption as there are a myriad of reasons why foreign services penetration should differ from country to country for reasons that have nothing to do with trade defeating measures. These reasons are not captured by the model.

The approach can also generate some absurd results. In most cases the main vehicle for exporting services is to set up a company in the foreign country. In New Zealand most of the financial services and significant parts of the retail industry are foreign owned. Once the company is set up in New Zealand its sales to New Zealand consumers become domestic transactions and fall out of the international service trade statistics. The country is then identified in the model as having weak international service penetration and hence higher barriers to services trade.

By way of example, New Zealand, in table AV. 5 in NZMOD, has a 52.5 percent tariff on financial and business services. The financial services component is 70.5 percent (Fouregere). However, New Zealand's financial services sector is heavily dominated by foreigners and the idea that extremely high non-trade barriers are stopping New Zealand from benefiting from international competition in financial services is simply absurd.

Most of the numbers in presented in AV. 5 don't seem to make much sense. For example Australia has an effective protection rate on construction of 126.8 percent. This is probably news to Australia and to the New Zealand firms that operate in Australia. For New Zealand Government services have a 45.9 percent protection rate and the protection of construction is 88.1 percent.

The second step in the NZMOD methodology is described as follows.

"As with NTBs, it is unlikely all barriers to services will be eliminated. However, as with NTBs, harmonisation, regional standards or mutual recognition of regulations,

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[7] Fontagné, Lionel, Amelie Guillin and Cristina Mitaritonna. 2011. "Estimation of Tariff Equivalents for the Services Sectors". CEPII, No 2011-24 December.

licensing and ownership are possible in a comprehensive agreement. We, therefore, estimate the reduction in services barriers within the region which would harmonise restrictions to the mean of importers in the TPP region. Table AV.5 lists the ad valorem equivalent of these services barriers in the six services sectors employed in our model."

From New Zealand's perspective some of key assumed reductions in service NTB protection are as follows:

Country	Sector	Implied tariff equivalent reduction
New Zealand	Government services	10.1
New Zealand	Trade and commerce	6.4
Australia	Construction	35.4
Chile	Construction	41.9
Mexico	Construction	44.4
Peru	construction	67.7

Apparently New Zealand will benefit from its reduction of its protection of Government and trade and commerce services and there should be a boom in the export of construction services.

We think that the services benefit numbers are pure noise and the benefits estimate should be removed from the National Interest Assessment.

Tariffs

The welfare benefits from tariff reductions are assessed at $624 million per year, equivalent to 0.21 percent of GDP.

It is not possible to assess the reasonableness of this estimate on the very limited information provided in NZMOD. There are a number of possible issues.
- It is not an assessment of the actual TPPA agreement but on some prior assessment on what was likely to transpire.
- It is based on an 'off-the-shelf' model that will not necessarily use the best

information on the New Zealand economy.
- The estimates will be highly sensitive to the technical assumptions and behavioral inputs in the model. These have not been disclosed and discussed.
- The welfare increase benefits look high given the very small reductions in tariff rates and market access. The tariff and quota changes should have a very limited (perhaps indiscernible) impact on production and consumption decisions, and hence on New Zealand's welfare gains.

We think the following should be done to ensure the public and officials are better informed about the impact of the tariff reductions and quota allowances.
- The analysis should be recalculated to reflect the actual TTPA agreement.
- The GTAP model inputs should be adjusted, as appropriate, to reflect best assessments of New Zealand relevant evidence.
- A sensitivity analysis should explore the impact of different technical and behavioral assumptions.
- The general equilibrium modelling could be complemented by simpler and more transparent partial equilibrium modelling.
- The welfare impact should be decomposed into its key components (allocative efficiency, terms of trade); and by the contributions from tariff reductions by key markets and commodities.
- The key behavioral inputs that are driving the results should be disclosed so they can be subject to independent scrutiny.
- The results should be explained in plain English.

For now the jury is out on the magnitude of the tariff reduction welfare gains. Our view is that the $624 million estimate is very much a high water mark. The suggestion in the Coates et al. paper that the benefits are perhaps half of the value of the tariff reductions, or around $130 million per annum, appears to be much more realistic than the $624 million estimate.

Present value of the benefits and costs

In a document that was recently released under the OIA, Treasury put the present value of the benefits at $13.3 billion. This assessment was based on the NZMOD benefit numbers. If we scale this back by our assessment of the annual benefits then the net present value of the benefits is $665 million. Treasury's assessment of the net present value of the costs is $800 million (not including biologic costs).

Appendix one

The political economy of the TPPA: A non-technical explanation

Once upon a time, but not very long ago, there lived a little boy who wanted to be friends with the big boy who lived on the other side of town.

The big boy was very popular and a smooth talker, but he really wasn't very nice. He was very selfish.

But even though the little boy was very clever the big boy didn't want to be his friend.

"I know", thought the little boy. "I'll start a club to do lots of fun things. The big boy will want to join and then he will be my friend. It will only cost $10 to join and the benefits will be zillions of dollars."

The little boy was very clever so he could figure these things out.

So the little boy started a club with three other little boys. But the big boy didn't want to join.

It was only when another boy (who was also big) arrived in town, all the way from China, that the big boy changed his mind. He still didn't want to be friends with the little boy, but he also didn't want the little boy to join the Chinese boy's club.

So the big boy said "I'll join your club if you give me your PlayStation. And I don't want to pay the $10 joining fee. I'll give you a rotten apple and a dead rat instead."

 "Also," said the big boy "my dad will rewrite the club rules and my mum will settle things if there are any disagreements."

The little boy was so happy he immediately rushed home to get the PlayStation.

The club didn't do anything much, but one day the big boy invited the little boy to his house.

The little boy was so happy to go the big boy's house. It was the big white house in the best area of town. "I have never been invited there before, so he must be my friend" thought the little boy.

When the little boy got there the big boy said some nice things about him. The little boy was so happy. But afterwards he overheard the big boy laughing with his friends. "That little boy was so dumb to give me his PlayStation, just so I would join his silly club" he heard the big boy say.

The little boy was very happy. " The big boy and his friends have noticed me" he thought.

The very next day he heard that the big boy was leaving his house and that a boy called Donald would soon be living there.

This made the little boy very happy. "If Donald joins my club then he will become my friend" thought the little boy. "I'm sure he will join if I give him my bike".

But Donald was a mean boy. He also took the little boy's skateboard and stamp collection and called him nasty names.

The little boy said he was very happy.

But it wasn't really true.