Memo

To: Head of Research
Economic Division
Ministry of Foreign Affairs and Trade

From:  

Date: 8 December 2010

Subject: Employment effects of FTAs

Key points
NZIER was asked to estimate the impact of a range of potential FTAs on the number of jobs in the New Zealand economy. The headline results are:

- The TPP could deliver around 9,700 jobs to New Zealand.

Out of Scope

- If the current TPP negotiations were expanded to include, then this agreement could bring an estimated 35,000 jobs to New Zealand.

- There are significant job losses if New Zealand is excluded from the evolving regional architecture.

- The FTA employment gains are more significant for unskilled workers. Similarly, being excluded from these regional initiatives would have a disproportionately negative impact on unskilled workers.

These results are dependent on the modelling assumptions employed, and should be seen as indicative estimates rather than precise forecasts.

Approach
Scenarios and Policy Stacks
Our analysis compares and contrasts six different FTA scenarios. The first three are based on the following possible regional trade agreements:

Out of Scope

- TPP (Current negotiating group); and
- TPP (expanded to include).

The remaining three scenarios consider the counter-factual. That is, the effect on New Zealand of being excluded from these agreements. Specifically, our analysis covers:

Out of Scope

TPP (less New Zealand);
Our Scope

We make no judgement on which of these scenarios is most likely to eventuate.

The modelling of the potential FTAs has assumed that all tariffs on merchandise trade will be eliminated. Trade in services and investment flows are not included as the GTAP database has only very limited data on services trade and investment barriers. We do not model any dynamic gains from trade.

For each of these six options we also present a scenario including a trade facilitation shock that would occur through more streamlined customs procedures that eventuate from FTA negotiations. The trade facilitation shock is set at 2.5 per cent, which is half the level of reduced business transaction costs set as a goal in APEC’s Trade Facilitation Action Plan. There is limited empirical evidence on the likely magnitude of trade facilitation improvements under FTAs, but we judge 2.5 per cent to be a useful starting point.

Model and closure

Our analysis has made use of the GTAP Computable General Equilibrium (CGE) model. GTAP is a multi-region comparative static model. We have used version 7 of the GTAP database, which is a representation of the world in 2004 and includes 113 regions, 57 commodities, and 5 factors of production.

As the database is based in 2004, New Zealand’s recent FTAs are not included in the model. To be pragmatic we updated the database to include the New Zealand China FTA.

While the database is a reflection of what the world looks like, the model also needs to be told how it operates and how different elements of the economy interact. This is known as the model closure.

As an example, the standard GTAP labour market closure requires wages to vary over time in order to keep the same level of employment in an economy. Using this standard labour market closure implies accepting that New Zealand’s labour force does not adjust to changes in economic activity. Recent empirical work, however, suggests that workers’ decisions about where to live and work are in fact affected by the income differential between New Zealand and overseas economies.

In this analysis we have modified the labour aspects of the standard closure to reflect our view that the size of the labour force in New Zealand will grow over time. We consider this a reasonable assumption as the labour force could grow to include those who are currently unemployed, or from new migrants. Specifically, we flip the standard GTAP closure to allow the level of employment to shift, while holding real wages fixed.

The comparative static nature of the standard GTAP model only allows a one-off policy shock, unlike dynamic CGE models which would allow phased tariff elimination and dynamic factor market adjustments. Our one-off policy shock provides a before and after comparison of the

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1. Trade facilitation refers to improving efficiency in border administration and procedures, along with improving logistics at ports and customs, streamlining regulatory environments and deepening harmonization of standards (Hartel and Mirza, 'The Role of Trade Facilitation in South Asian Economic Integration', Chapter 3 in ADB. (2009). Study on Intraregional Trade and Investment in South Asia). Specifically we check the parameter ‘sms’ – import augmenting technical change – in the GTAP database by 2.5 per cent.

2. We are available to provide further information on the GTAP CGE model, its strengths and weaknesses, and the caveats mentioned in this memo as required.


3. In a dynamic CGE model that allows intertemporal adjustments, it is possible to allow both employment levels and real wages to alter over time. In a static CGE model such as this version of GTAP, this is not feasible – we must either fix real wages or fix total employment.
FTA implementation and does not explicitly show the economy's gradual adjustment to the likely phased tariff liberalisation.

Estimates of Changes in Jobs

GTAP uses both skilled and unskilled labour as factors of production. In this case, we are interested in how the level of skilled and unskilled labour in an economy changes following the implementation of a specific FTA.

GTAP will show the percentage change in the use of each of these factors. We combine these outputs with the level of Full Time Equivalents (FTEs) in the economy in 2004, as reported by Statistics New Zealand. This provides an estimate of the change in FTEs that occurs because of a specific FTA.

Results

Our results for the FTA scenarios that include New Zealand are presented in Table 1 below, shown with and without trade facilitation (TF) effects.

Due to the restricted time-frame of this request, our analysis has focused on the employment effects of these agreements, and as such, we have not discussed the broader impacts on the economy.

The results show that New Zealand's inclusion in these FTAs increases total employment for both skilled and unskilled workers. Lower skilled employment has the largest gains, which reflects two factors:

- New Zealand has a comparative advantage in many primary industries, and these sectors expand rapidly under FTAs due to the removal of high agricultural trade barriers in key markets
- The composition of employment in these industries – primary sectors use a high proportion of unskilled workers.

This result is consistent with previous empirical research on the labour force impacts of trade liberalisation in New Zealand.

New Zealand's employment increases the most under the expanded TPP scenario, with an estimated 35,500 extra FTEs.

The TPP agreement, with current negotiating members, leads to an estimated 24,200 additional FTEs.

Table 1. Employment Impacts of NZ inclusion in FTAs

<table>
<thead>
<tr>
<th></th>
<th>% Change</th>
<th>Estimated Change in FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unskilled</td>
</tr>
<tr>
<td>Baseline (As at Dec 2004)</td>
<td></td>
<td>0.5%</td>
</tr>
<tr>
<td>TPP</td>
<td></td>
<td>2.0%</td>
</tr>
<tr>
<td>TPP+TF</td>
<td></td>
<td>1.6%</td>
</tr>
<tr>
<td>TPP+TF+AGACP</td>
<td></td>
<td>3.0%</td>
</tr>
</tbody>
</table>


We would caution against drawing inferences for the unemployment rate using these estimates, because we do not know where the businesses cycle will be by the time these agreements entry into force.
The results for the counter-factual scenarios are presented in Table 2.

![The impact on New Zealand from not being included in the TPP would be a loss of 1,900 FTEs.](Out of Scope)

| Table 2: Employment Impacts of NZ exclusion from FTAs |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                 | % Change                        | Estimated Change in FTEs        |
|                                | Unskilled | Skilled | Total            | Unskilled | Skilled | Total            |
| Baseline (As at Dec 2004)      |           |         |                  | 822,800   | 355,500  | 1,258,300         |
| **Out of Scope**               |           |         |                  |           |         |                  |
| TPP-NZ                         | 0.1%      | 0.1%    | 0.1%             | -900      | -300     | -1,200            |
| TPP-NZ+TF                      | 0.2%      | 0.1%    | 0.1%             | -1,300    | -600     | -1,900            |

**Discussion**

The key result of this analysis is that trade agreements can create employment opportunities for all types of labour in New Zealand. The strongest increase in unskilled labour employment reflects the concentration of New Zealand’s economy in the primary sectors.

More detailed sectoral analyses of the results could not be completed within the timeframe, but generally employment expanded across many sectors of the New Zealand economy. Sectors with significant increases included dairy products, bovine meat, food products, and their associated industries.

As expected in trade liberalisation analysis, resources flow to areas of comparative advantage, which leads to employment reductions in sectors which compete for resources with dairy and beef production. Examples of these sectors include wool, crops, other meat products, and other animal products. In response to removal of tariffs, employment also contracts in New Zealand’s textile and clothing sectors.

![Out of Scope](Out of Scope)

Trade with more countries focusses the comparative advantage of each country to a more-refined range of products.

Another interesting outcome is that the largest increase in employment in New Zealand is from an expanded TPP.

In the expanded TPP scenario, however, New Zealand gains preferential access to these markets at the expense of those APEC 14 (4) that are not TPP members (Canada, China, Hong Kong, Indonesia, Papua New Guinea, the Philippines, Taiwan, and Thailand). This preferential access gives New Zealand producers a competitive advantage in these large markets to which New Zealand exporters respond by increasing production, and employment.

1. The initial level of protection in the GTAP database may overstate the effective tariff rate in this sector, and thus the adjustment from the FTAs modelled here may be unrealistically high. The TCF sector has already seen significant structural adjustment due to increased import competition from low-cost producers such as China.
Next steps
This analysis should be seen as indicative only, given the limited time available to complete it. There may be value in further exploring areas such as:

- The sectoral analysis to get a deeper idea of the winners and losers, and why.
- Other measures of the impacts of the FTAs, such as GDP welfare (measured as equivalent variation), export growth, etc.
- The relationship between trade liberalisation and enhanced trade facilitation.

Possible Talking Points
- Economic modelling suggests that trade agreements will create opportunities for both skilled and unskilled workers in the economy.
- The sectors which gain the most are those in which New Zealand has a global comparative advantage, such as dairy, meat and food products.
- The TPP could deliver around 9,700 jobs to New Zealand.
- If the current TPP negotiations were expanded to include then this agreement could bring an estimated 35,000 jobs to New Zealand.

Out of Scope
- There are significant job losses if New Zealand is excluded from the evolving regional architecture.

Out of Scope
- The FTA employment gains are more significant for unskilled workers. Similarly, being excluded from these regional initiatives would have a disproportionately negative impact on unskilled workers.

Ends
Labour market effects of TPP
An illustrative CGE analysis

NZIER final report to MFAT
September 2013
About NZIER

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Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

Each year NZIER devotes resources to undertake and make freely available economic research and thinking aimed at promoting a better understanding of New Zealand’s important economic challenges.

NZIER was established in 1958.

Authorship

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It was quality approved by. 9(2)(a)

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Key points

- We have used the static GTAP model of the global economy to gauge the labour market effects of TPP in New Zealand.
- The focus is on New Zealand's membership of TPP, rather than agreement details. Our results should be seen as indicative of the potential size and direction of labour market outcomes from a successful TPP, rather than as a complete or detailed evaluation of a negotiated outcome.
- TPP leads to GDP increasing by 1.8% and household welfare lifting by 0.8%.
- This additional economic activity boosts the demand for labour. TPP would lead to an increase in labour income of around 9.7% or $540 million.
- The additional income would be split between new jobs and higher real wages for existing workers. Assuming the income shock goes entirely to new jobs, it equates to around 9,600 additional full-time equivalent jobs being created in New Zealand.
- Unskilled workers would be the main benefactors from TPP, as they are heavily represented in the sectors that expand their output, such as the dairy, processed food, other animal products, construction and wholesale and retail trade sectors.
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1. Objective

You have asked NZIER to provide an indicative estimate of the potential labour market impacts of the Trans-Pacific Partnership agreement (TPP), using NZIER's static version of the GTAP computable general equilibrium (CGE) model of the global economy.

As well as the labour market effects, we also report some key macroeconomic and sectoral results from the modelling.

We focus solely on the outcomes for New Zealand.

This is not intended to be a full-blown ETA study.\(^1\) Neither are the results forecasts. The results presented here illustrate the size and direction of outcomes from New Zealand’s membership of TPP.

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\(^1\) That would require wider considerations including modelling dynamics in trade and investment over time.
2. Our approach

2.1. GTAP model and database

We have used the GTAP static CGE model of the global economy to estimate the labour market impacts of TPP. GTAP is the pre-eminent model for examining the economic effects of trade agreements. The model draws on a comprehensive database that represents the global economy in a benchmark year.

The latest version of the GTAP database, version 8, was released in 2012, and contains data for 129 countries and 57 sectors of the economy. The benchmark year is 2007.

In order to make the model more manageable, we have aggregated the database into 27 regions and 30 sectors. These are listed in Appendix A.

2.2. Updating the database

We have updated the database to account for a number of trade agreements that have entered into force since 2007, or will do shortly (before TPP enters into force). This is to ensure that the baseline from which the TPP simulation is carried out appropriately reflects level of bilateral tariffs amongst New Zealand's key trading partners.

The selected agreements were modeled by removing all tariffs on bilateral trade between the countries and allowing trade flows to adjust accordingly.

2.3. Simulation design

We then simulate the TPP agreement from this updated database. The simulation is primarily concerned with the implications of membership or non-membership of TPP, rather than prejudging any negotiated outcome. Accordingly, we make a number of simplifying assumptions regarding other aspects of TPP:

1. We assume TPP allows for complete and immediate liberalisation of tariff barriers in all sectors of the economy. To the extent that there is less than full liberalisation in the final agreement, the results will be an upper bound on the potential effects of TPP's market access commitments.

2. We look solely at goods and services liberalisation. We do not incorporate changes to the investment regimes in each economy that may result from TPP, or gains from improved trade facilitation, reduced TBT, SPS

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3 See https://www.gtap.agecon.purdue.edu/about/project.asp for more details on the GTAP model and database.

4 This approach was chosen for simplicity. A detailed updating process that looked closely at each agreement's outcomes by sector was beyond the scope of this project.

5 Any evaluation of the details would require many more simulations and scenarios and these would need to be conducted in the context of a wider FTA-study with much wider considerations.

6 Although because services trade barriers are not included in the GTAP database, this is essentially the same as running a goods-only liberalisation simulation.
barriers, enhanced competition, dynamic gains from trade, etc. These additional effects would likely push up the overall gains from TPP.

3. We do not consider the effects of the phased removal of trade barriers. We essentially compare the New Zealand economy with and without the fully-implemented TPP in place.

We run two simulations: a TPP with New Zealand included, and a TPP where (for whatever reason) New Zealand decides not to join.

2.4. Model closure and the labour market

To run the simulation, a series of choices need to be made about which variables are determined outside the model (exogenous variables) and which are calculated inside the model (endogenous variables) — known as the model closure. These choices have important implications for interpreting the labour market effects of a TPP simulation.

2.4.1. The basic theory

When TPP is modelled, theory and experience tells us to expect an increase in aggregate demand. This comes about via the improved competitiveness of our exports in key TPP markets, plus higher domestic demand as households and firms demand more goods and services to consume or use as intermediate inputs.

This in turn pushes up the demand for resources, including labour. The outcome is higher aggregate labour income, through a combination of more workers being employed and existing workers getting higher real wages.

Figure 1. Labour market effects of TPP

Source: NZIER
In Figure 1, the effects of TPP is shown by the labour demand curve shifting to the right, pushing up the real wage from W0 to WTPP and lifting employment from Q0 to QTTPP. The increase in aggregate labour income due to TPP is the green shaded area.

The distribution of the increased labour income between more jobs and higher real wages is determined by the slope of the labour demand and supply curves. In particular, the flatter the labour supply curve, the more labour market impacts are felt through increased employment.

There are a number of things which affect the slope of the labour supply and demand curves, including whether there might be any long term migration response from a lift in income. Ultimately, these are dynamic and complex effects.

2.4.2. The modelling practice

In practice we consider both ends of the spectrum of possible labour market impacts. The implicit labour market dynamics involved, or ‘closures’, are summarised in Table 1. One reflects a long run view of labour market dynamics and the other a short run perspective.

<table>
<thead>
<tr>
<th>Type</th>
<th>Variable</th>
<th>Endogenous</th>
<th>Exogenous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long run</td>
<td>Fixed</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Short run</td>
<td>Can vary</td>
<td>Yes</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

Source: NZIER

The standard approach assumes aggregate employment in an economy is fixed (labour supply is exogenous and the labour supply curve is vertical at Q0 in Figure 1). The economy is assumed to always be at full employment. The labour market effects of a modelling simulation are felt through movements in employment between sectors as the economy adjusts to new production patterns, and through real wage movements. It is assumed that there can never be any net job creation.

In order to estimate potential job creation impacts, we need to endogenise aggregate employment so that it can vary. Doing so requires making another labour market variable exogenous – real wages. This is the short run closure shown in Table 1, which sees the labour supply horizontal at W0 in Figure 1.

So in a static model such as the one we are using, we either assume fixed employment and variable real wages, or variable employment and fixed real wages.a

Assuming fixed wages generally makes sense when there is some slack in the labour market. Current labour market conditions indicate some slackness. The current unemployment rate, for example, is relatively high compared to a full employment scenariob (Figure 2). Real wage growth has also been moderate (Figure 3). Beyond

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7 All other variables are as per the standard long run STAP closure.
8 More nuanced evaluations demand dynamic modelling. We would be happy to investigate the impacts of TPP using the dynamic version of STAP in slower time.
9 Estimates of the NAIRU – the rate of unemployment below which there is little inflationary pressure – vary in New Zealand.
this, there is potential for persistent (structural) under-employment amongst lower skilled workers. Given these factors, it is reasonable to consider potential job creation effects.

However, it should be noted that the modelling of trade agreements tends to be a long run exercise, so this closure is not the one traditionally used.

**Figure 2 Unemployment rate**

% of labour force

![Unemployment Rate Graph](image)

Source: Statistics New Zealand, NZIER

**Figure 3 Real wages**

Labour Cost Index: All Wages measures less CPI inflation

![Real Wages Graph](image)

Source: Statistics New Zealand, NZIER

The most important result from our analysis is the percentage increase in the real value of labour income\(^{13}\) — the green shaded area in Figure 1. Using a short run labour market assumption we essentially attribute all labour market income changes to job growth. In the long run model closure, we attribute it all to real wage growth.

In reality, the increase in labour income from TPP is likely to be a combination of job growth and real wage growth. The actual combination depends on one’s views on

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\(^{13}\) Suggested values of between 3.5% and 5.0% are feasible. An OECD paper (http://dx.doi.org/10.1787/23176436951) estimated the 2007 HAUU to be 4.5%.

In the jargon, this is the "compensation of employees".
the extent of labour market slack, the ability of unemployed workers to quickly enter
the jobs market, skills shortages, etc.

2.5. Caveats

The simplifying assumptions discussed above, along with the nature of CGE modelling
in general, mean that the modelling results presented here are not precise forecasts.

CGE modelling is best used to indicate the direction (positive, negative) and
magnitude (huge, large, moderate, small) of changes to an economy. The results
should not be seen as precise forecasts.¹¹

¹¹ "Because of its complexity (ironically, in which their strengths are built on), interpretation of results should be focused more
on magnitudes, directions, and distributive patterns rather than numeric outcomes themselves. In that sense, results from
CGE models should be used as "road maps" for policy implementation, which are advised to be complemented by additional
analytical work using alternative quantitative methods. (http://www.iadb.org/en/topics/trade/frequently-asked-questions-
faq-1-112587.htm)."
3. Results

3.1. TPP including New Zealand

Table 2 shows the key macroeconomic results for the simulation where New Zealand is included in TPP.

<table>
<thead>
<tr>
<th></th>
<th>New Zealand</th>
<th>TPP including NZ</th>
<th>TPP excluding NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1.1%</td>
<td>3.1%</td>
<td>3.130</td>
</tr>
<tr>
<td>Welfare (EV) as % of GDP</td>
<td>0.8%</td>
<td>1.410</td>
<td></td>
</tr>
<tr>
<td>Household consumption</td>
<td>1.9%</td>
<td>1,960</td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>2.2%</td>
<td>870</td>
<td></td>
</tr>
<tr>
<td>Government spending</td>
<td>1.9%</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Exports of goods and services</td>
<td>3.2%</td>
<td>990</td>
<td></td>
</tr>
<tr>
<td>Imports of goods and services</td>
<td>3.0%</td>
<td>1,320</td>
<td></td>
</tr>
<tr>
<td>Labour income</td>
<td>9.7%</td>
<td>540</td>
<td></td>
</tr>
</tbody>
</table>

Sources: NZIER ECONOMICS

The New Zealand economy would be some $3.1 billion larger after a fully liberalised TPP is implemented, with exports expected to lift by around $1 billion.

The welfare measure, which provides an indication of how much 'better off' we are overall, suggests a gain of 0.8% or $1.4 billion. This can be decomposed into $290 million from allocative efficiency gains, $320 million from the use of previously under-priced factors of production (i.e. labour) and $530 million from an improvement in New Zealand's terms of trade.

The sectoral results are shown in Table 5 in Appendix B. As would be expected given the very high level of protection amongst TPP countries in the dairy sector, New Zealand's output of dairy products expands significantly, by around 18%.

Some sectors that would compete for resources with the dairy sector, such as the meat sector and fruit and vegetable sector, see their output drop as labour and capital move to the dairy sector.

Other primary sectors that see output expand as a result of TPP are seafood (up 1.7%), processed food (2.8%) and other animal products (8.5%). Outside of primary processing, the manufacturing sectors in the model tend to see output drop – again

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12 In real 2007 dollars; assumes an exchange rate of NZ$1 = US$0.80; rounded to 3 significant figures.
13 By way of comparison, modelling of TPP by Petri, Plummer and Zhai (2013) using a dynamic CDE model indicates that the welfare gains to New Zealand would be between 1.3% to 2.0% of GDP, depending on how the removal of FDI restrictions is treated in the simulations. This modelling includes more detailed treatment of tariff reductions by sector, MFN rates, trade facilitation and other aspects of TPP. See http://economicsresearch.org/wp-content/uploads/2013/03/Macro-TPP-1.3.pdf for more results.
14 This occurs (in the model) through having more labour and capital in the sector, rather than through an expansion in land use.
as a result of resources shifting to areas in which New Zealand has a strong comparative advantage and where barriers to trade are highest.\(^{15}\)

This model ignores any potential expansion into new industries and products or changes to rates of innovation or human capital acquisition.

Sectors that are heavily domestic market-focused, such as business services, wholesale and retail trade and construction see output increase slightly, due to higher household incomes and stronger economic activity in general, pushing demand for their services.

Focusing on the labour market results, total labour income would rise by around 0.7% or $540 million.\(^{16}\) If we assume fixed real wages, this implies employment growth of 0.7%, or some 9,600 full time equivalent jobs.\(^{17}\)

The majority of these additional jobs would be unskilled roles. The unskilled labour share of the change in labour income is around 76%. Given that wages for unskilled jobs are lower than for skilled jobs, this implies that the share of the 9,600 FTE jobs created by TPP is likely to be higher still.

Employment increases (assuming fixed real wages), allow output increases closely, as shown in Table 5 in Appendix B.

### 3.2. TPP excluding New Zealand

If TPP were to conclude without New Zealand participation, New Zealand would be made worse off. GDP would be 0.6% or $1.1 Billion lower than baseline, exports 0.4% or $200 million lower, and welfare some $400 million lower.

Real labour income would be around $220 million lower than baseline. Under a fixed real wage assumption, this suggests New Zealand would see employment shrink by around 9,600 FTE jobs.

### 3.3. Possible extensions

The research could be extended to provide a more nuanced picture of the labour market impacts of TPP by:

- Using a dynamic model that allows for both employment and wages to vary over time.
--looking at interim years during the tariff phase-out period to understand the impacts of less-than-full liberalisation scenarios.
- Incorporating more detailed treatment of services barriers, NTBs, trade facilitation and other potential channels of growth from TPP.

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1. Within these manufacturing sectors, there will of course be success stories of firms that boost their exports following TPP's implementation. However, the model is unable to get to this level of detail. This highlights the value of complementary analysis, such as case studies, in understanding the likely effects of TPP.
2. This reflects the level of household income being $540 million at the point in time of full liberalisation. The cumulative effects would be larger as these gains accrue each year that the agreement is in force.
3. Ideally we would apply the 0.7% to the number of FTEs in the economy at the time of full liberalisation under TPP. Since we do not have details on the timing of TPP commitments, we have used the 2007 baseline. In March 2007, the number of FTEs in New Zealand was 1.32 million.
4. We cannot determine the level of job creation by sector and skill level with any precision because we do not have estimates of the number of skilled and unskilled jobs by GTAP sector. Some indication of the distribution of the $540 million of additional labour income between sectors and skill levels is given in Figure 4 in Appendix B. It shows that unskilled workers in the "Other Animal Products" (which supplies cattle and raw milk to the dairy products sector), dairy, processed food, construction and wholesale and retail trade sectors are the main beneficiaries from TPP.
• Sector-specific analyses to examine how much of any increase in output from TPP would come from improved productivity instead of the use of additional inputs.
4. Conclusion

Given the modelling assumptions, the key insight from our analysis is that TPP would have a significant positive effect on the New Zealand labour market.

The 9,600 FTE jobs figure should be seen as an indicative maximum job creation impact from complete trade liberalisation amongst TPP economies under a scenario where considerable slack exists in the New Zealand labour market. The actual employment impacts will be lower than this maximum in the period in which bilateral trade barriers are being phased out.

Recall that to show any net employment expansion in our comparative static analysis, we have to assume that real wages do not change. In reality, both wages and aggregate employment would adjust in response to the TPP being implemented (unless the economy is at full employment). We would therefore expect the employment increase to be moderated by wage increases. The increased demand for labour could also be met in part through existing employees working for longer.
## Table 3 Regional aggregation

<table>
<thead>
<tr>
<th>Region</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ</td>
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</tr>
<tr>
<td>Australia</td>
<td>Australia</td>
</tr>
<tr>
<td>Japan</td>
<td>Japan</td>
</tr>
<tr>
<td>Brunel, Timor L'Est, Myanmar</td>
<td>Brunel, Timor L'Est, Myanmar</td>
</tr>
<tr>
<td>USA</td>
<td>USA</td>
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<tr>
<td>Canada</td>
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<td>Mexico</td>
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<td>Singapore</td>
<td>Singapore</td>
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<td>Vietnam</td>
<td>Vietnam</td>
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<td>Korea</td>
<td>Korea</td>
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<td>Taiwan</td>
<td>Taiwan</td>
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<tr>
<td>China</td>
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<tr>
<td>Rest ASEAN</td>
<td>Cambodia, Indonesia, Laos, Philippines, Thailand</td>
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<tr>
<td>Rus, Bel, Kaz</td>
<td>Russia, Belarus, Kazakhstan</td>
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<tr>
<td>GCC</td>
<td>Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE</td>
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<td>India</td>
<td>India</td>
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<td>Colombia</td>
<td>Colombia</td>
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<tr>
<td>EU</td>
<td>EU countries</td>
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<tr>
<td>Rest of Asia</td>
<td>Hong Kong, Mongolia, Rest of East Asia</td>
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<td>South Asia</td>
<td>Bangladesh, Nepal, Pakistan, Sri Lanka</td>
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<td>Rest of Western Asia, Egypt, Morocco, Tunisia, Rest of North Africa</td>
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<tr>
<td>ESA</td>
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Source: NZIER
<table>
<thead>
<tr>
<th>Sector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairyprod</td>
<td>Dairy products (excl raw milk)</td>
</tr>
<tr>
<td>Meatprod</td>
<td>Meat and meat products</td>
</tr>
<tr>
<td>Wood_paper</td>
<td>Forestry, wood &amp; paper products</td>
</tr>
<tr>
<td>Oil</td>
<td>Oil</td>
</tr>
<tr>
<td>Coal</td>
<td>Coal</td>
</tr>
<tr>
<td>Fruit_veg</td>
<td>Fruit &amp; veg</td>
</tr>
<tr>
<td>Bev_Tob</td>
<td>Beverages &amp; tob (wine)</td>
</tr>
<tr>
<td>Seafood</td>
<td>Seafood</td>
</tr>
<tr>
<td>ElecMach</td>
<td>Electrical &amp; medical eqmt</td>
</tr>
<tr>
<td>AlumNonferr</td>
<td>Non-ferrous metals, incl Alum</td>
</tr>
<tr>
<td>Wool</td>
<td>Wool &amp; silk</td>
</tr>
<tr>
<td>Iron_steel</td>
<td>Iron and steel</td>
</tr>
<tr>
<td>ProdFood</td>
<td>Vegetable oils and fats; Sugar; Food products nec</td>
</tr>
<tr>
<td>OtherAniProd</td>
<td>Livestock other than milk</td>
</tr>
<tr>
<td>Opt_Med_eqm</td>
<td>Optical and medical equipment</td>
</tr>
<tr>
<td>Oilcoalprods</td>
<td>Oil &amp; coal products</td>
</tr>
<tr>
<td>GrainsCrops</td>
<td>Grains and Crops</td>
</tr>
<tr>
<td>Extraction</td>
<td>Mining and extraction</td>
</tr>
<tr>
<td>TextWool</td>
<td>Textiles and Clothing</td>
</tr>
<tr>
<td>LightInd</td>
<td>Light Manufacturing</td>
</tr>
<tr>
<td>HeavyInd</td>
<td>Heavy Manufacturing</td>
</tr>
<tr>
<td>Utilities</td>
<td>Electricity; Gas manufacture, distribution; Water</td>
</tr>
<tr>
<td>Construction</td>
<td>Construction</td>
</tr>
<tr>
<td>Comms</td>
<td>Communications</td>
</tr>
<tr>
<td>WholeTrade</td>
<td>Wholesale and Retail trade</td>
</tr>
<tr>
<td>Transport</td>
<td>Transport and Communication</td>
</tr>
<tr>
<td>GovServ</td>
<td>Government services</td>
</tr>
<tr>
<td>Business</td>
<td>Business Services</td>
</tr>
<tr>
<td>OtherServ</td>
<td>Recreation &amp; Other services</td>
</tr>
<tr>
<td>DOD</td>
<td>Dwellings</td>
</tr>
</tbody>
</table>

Source: NZIER
Appendix B Sector results

Withheld:
- S6(4)
- S9(2)(C)

Page 14 also withheld on similar grounds.
For clarity, all redactions to be withheld under sections 6(a) or 9(2)(j) of the 2014.

A Dynamic Computable General Equilibrium (CGE) Analysis of the Trans-Pacific Partnership Agreement: Potential Impacts on the New Zealand Economy

Prepared For:
New Zealand Ministry of Foreign Affairs & Trade (MFAT)
Date: June 18, 2014

By:
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Peter Minor², and
Allan Rae³

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2 Managing Director, ImpactECON, LLC, GTAP Research Fellow.
3 Professor Emeritus, Massey University, past GTAP Research Fellow.
Acknowledgments

The authors gratefully acknowledge the input of MFAT officials, including many useful discussions and suggestions, during the preparation of this report.
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASEAN</td>
<td>Association of South East Asian Nations</td>
</tr>
<tr>
<td>AVE</td>
<td>Ad valorem equivalent</td>
</tr>
<tr>
<td>CGE</td>
<td>Computable general equilibrium</td>
</tr>
<tr>
<td>EIF</td>
<td>Entry into force</td>
</tr>
<tr>
<td>EV</td>
<td>Equivalent variation</td>
</tr>
<tr>
<td>FAS</td>
<td>Foreign affiliate sales</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign direct investment</td>
</tr>
<tr>
<td>FTA</td>
<td>Free trade agreement</td>
</tr>
<tr>
<td>GATS</td>
<td>General Agreement on Trade in Services</td>
</tr>
<tr>
<td>GATT</td>
<td>General Agreement on Tariffs and Trade</td>
</tr>
<tr>
<td>GTAP</td>
<td>Global Trade Analysis Project</td>
</tr>
<tr>
<td>HTS</td>
<td>Harmonised Tariff System</td>
</tr>
<tr>
<td>MFAT</td>
<td>Ministry of Foreign Affairs and Trade (New Zealand)</td>
</tr>
<tr>
<td>NAMA</td>
<td>Non-Agricultural Market Access</td>
</tr>
<tr>
<td>NTB</td>
<td>Non-tariff barrier</td>
</tr>
<tr>
<td>NTM</td>
<td>Non-tariff measure</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>RoO</td>
<td>Rules of origin</td>
</tr>
<tr>
<td>SPS</td>
<td>Sanitary and phytosanitary</td>
</tr>
<tr>
<td>TBT</td>
<td>Technical barriers to trade</td>
</tr>
<tr>
<td>TFP</td>
<td>Total factor productivity</td>
</tr>
<tr>
<td>TPP</td>
<td>Trans-Pacific Partnership</td>
</tr>
<tr>
<td>TRQ</td>
<td>Tariff rate quota</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>USTR</td>
<td>United States Trade Representative</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organisation</td>
</tr>
</tbody>
</table>
Executive Summary

This report, prepared for the New Zealand Ministry of Foreign Affairs and Trade (MFAT), details results from a large-scale economic modelling effort designed to improve understanding of the potential impacts on New Zealand of entering into a Trans-Pacific Partnership (TPP) agreement.

The TPP negotiations are not yet concluded but involve New Zealand and eleven other countries that together comprise almost 40 per cent of the world’s economy: Australia, Brunei, Chile, Japan, Malaysia, Mexico, Peru, Singapore, the United States of America and Vietnam. A dynamic computable general equilibrium (CGE) model of the world economy is employed to undertake this analysis, with projections made to the year 2020. The model projects the direction and magnitude of changes in the New Zealand economy due to changes brought about by the TPP, namely:

- reductions in tariff and quota barriers on goods trade;
- reductions in barriers on services trade;
- reductions in non-tariff barriers on goods trade;
- improved trade facilitation measures.

We estimate the impact on New Zealand of TPP from these channels only, making use of global modelling techniques that are widely employed by the international trade modelling community. While the factors we model are likely to account for a significant share of the TPP’s impact on New Zealand, other factors not considered will also influence the impact of the TPP on New Zealand. A full cost-benefit appraisal of the impact of the TPP is outside the scope of this report.

Reductions in tariff barriers can be modelled using very detailed and credible data on tariffs, though simplifying assumptions need to be made in the modelling of tariff rate quotas (TRQs) applied to some agricultural exports. A conservative approach is taken, ensuring that tariff reductions already committed to in other agreements are captured in the baseline; thus the results of these are not attributed to TPP. We also pay careful attention to identifying sensitive sectors that may be excluded from tariff liberalisation. In contrast to tariff barriers, international estimates of non-tariff barriers (NTBs) to goods and services trade remain at a lower stage of development. While reductions in NTBs are likely to contribute significantly to the benefits from trade liberalisation, caution needs to be used when assessing results generated using currently available measures of these trade restrictions. Therefore we are careful to separate out the impacts of reform in these areas.

Given the current uncertainty on what may be agreed in the TPP, we model scenarios that explore a range of potential agreements:
— Scenario 1: Conservative tariff reductions;
— Scenario 2: Moderate tariff reductions with some dairy TRQ expansion;
— Scenario 3: Ambitious tariff reductions, i.e. Q(2)(j);
— Scenario 4: Conservative tariff reductions (Scenario 1), i.e. Q(2)(j)
— Scenario 5: Moderate tariff reductions (Scenario 2), plus reductions in barriers to services trade, reductions in NTBs for goods trade and improved trade facilitation;
— Scenario 6: Ambitious tariff reductions (Scenario 3), i.e. Q(2)(j).

Our key findings are that the liberalisations modelled are likely to lead to substantial gains to TPP economies, including New Zealand. The more ambitious the reforms, the greater the benefits tend to be, as shown in Table E.1. The increases in New Zealand’s real gross domestic product (GDP) from the 2030 projected baseline are relatively small for the first three scenarios ranging from $6,400 million with conservative tariff reductions to $6,600 million in the most ambitious scenario, to $6,800 million in the most ambitious Scenario 6, relative to the 2030 baseline and expressed in constant 2007 dollars.

When we also include liberalisation of NTBs in goods and services trade, along with reductions in customs delays, the results for Scenarios 4 to 6 indicate that real GDP increases are much larger, ranging from $6,000 million to $6,800 million in the most ambitious scenario. The overall change in economic welfare, as measured by an equivalent variation in income, is projected to increase for New Zealand in 2030 by between $6,000 million in the most conservative tariff-only scenario, to $6,600 million in the most ambitious Scenario 6, relative to the 2030 baseline and expressed in constant 2007 dollars.

Table E.1
Projected impacts on New Zealand’s economic welfare and real GDP, TPP Scenarios 1-6, 2030 relative to the baseline

<table>
<thead>
<tr>
<th>Scenario modelled</th>
<th>Description</th>
<th>Economic welfare (constant 2007 dollars)</th>
<th>Real GDP (constant 2007 dollars and per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>Conservative tariff liberalisation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>Moderate tariff liberalisation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>Ambitious tariff liberalisation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
<tr>
<td>Scenario 4</td>
<td>Scenario 1 plus reductions in services trade and improved trade facilitation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
<tr>
<td>Scenario 5</td>
<td>Scenario 2 plus reductions in services trade and improved trade facilitation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
<tr>
<td>Scenario 6</td>
<td>Scenario 3 plus reductions in services trade and improved trade facilitation</td>
<td>$6,400 million</td>
<td>$6,400 million</td>
</tr>
</tbody>
</table>

*Note:* Scenarios 2, 3, and 4 are described as the new tariff levels (i.e. Q(2)(j)) after liberalisation. The table entries are calculated using a 2007 exchange rate of 0.7581 (calculated using a simple average of series B1 monthly exchange rates from the Reserve Bank of New Zealand). In the remainder of the report, only 2007 US dollar values are presented; these are the units reported in the GTAP database.

Source: Authors’ GTAP model results.
Scenarios 4-6 include multiple interacting components, including reductions in tariffs, liberalisation of goods and services NTBs, and trade facilitation improvements. Each of these scenario components will contribute to the overall results and will vary over time. The decomposition of Scenarios 4-6 in Figure E.1 indicates that tariff liberalisation alone contributes only between 3.4 percent of the increase in 2030 real GDP for New Zealand. While our results indicate that some of the most important potential gains from a TPP agreement are likely to come from reductions in barriers to trade other than tariffs, we acknowledge that currently available international data on non-tariff barriers to trade are ‘first-generation’ estimates and results need to be viewed with appropriate caution.

**Figure E.1**
*Decomposition of New Zealand’s real GDP growth, TPP Scenarios 4-6 relative to the 2019, 2029 and 2030 baseline (per cent contribution indicated on bars, cumulative per cent increases in total GDP on vertical axis)*

Our modelling assumes that available labour is fully employed, therefore, rising demand for workers will bring increases in real wages. We find that real wages for skilled and unskilled workers increase in all scenarios. By 2030, the cumulative change in real wages relative to the baseline ranges from a 1.7 percent increase for skilled workers in Scenario 1 to a 3.1 percent increase for unskilled workers in Scenario 6. We test the sensitivity of our results in Scenarios 4 through 6 to an alternative assumption in which real wages are fixed and the level of employment changes in 2015 and 2016. While real wages can no longer change in these years, we find that by 2016, employment of skilled and unskilled labour increases by between 1.2 percent and 3.3 percent for skilled labour in Scenario 6.
In addition to macroeconomic impacts, TPP liberalisation will have sectoral implications which will depend partly on the degree to which sensitive sectors are liberalised. We undertake detailed analysis of the tariff lines that may be excluded from liberalisation and the impacts of these.

If New Zealand were not to participate in the implementation of a TPP agreement while other TPP members do, the overall impacts on the New Zealand economy, as measured by changes in real GDP, are negative (see Table E.2, Column 2). The difference between New Zealand's potential GDP if it were a party to the TPP agreement (Table E.2, Column 1) compared to its GDP if it were not part of the agreement may be thought of as measuring the real opportunity cost of New Zealand opting out of TPP while other members conclude an agreement. If New Zealand does not implement a TPP agreement while other member countries do, 2030 real GDP is projected to be between 0.6 and 0.9 per cent less than it would be with implementation of a TPP agreement that includes reductions in tariffs to goods and services trade, along with tariff reductions (Table E.2, Column 3).

Table E.2
*Effect on New Zealand's real GDP, with TPP Scenarios 4-6 excluding New Zealand, 2030 relative to the baseline (per cent and constant 2007 US$ million)*

<table>
<thead>
<tr>
<th>Scenario</th>
<th>TPP with New Zealand</th>
<th>TPP without New Zealand</th>
<th>Difference if New Zealand does not participate in TPP (Column 2 - Column 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 4</td>
<td>0.6</td>
<td>0.8</td>
<td>-0.2</td>
</tr>
<tr>
<td>Scenario 5</td>
<td>1.78</td>
<td>0.3</td>
<td>-1.48</td>
</tr>
<tr>
<td>Scenario 6</td>
<td>0.5</td>
<td>0.2</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

*Source: Authors' GDP model results.*

Overall our study finds that TPP liberalisation is likely to offer some significant opportunities for New Zealand, with ambitious reforms covering reductions across a range of different trade barriers likely to lead to the greatest overall gains.
1. Introduction and Background

This report, prepared for the New Zealand Ministry of Foreign Affairs and Trade, details results from a large-scale modelling effort designed to improve understanding of potential impacts on New Zealand of entering into a TPP agreement. The report was contracted on January 14, 2014 and all modelling and analysis completed by June 2014 including: the development of baseline projections, tariff reduction scenarios; inclusion of non-tariff barriers (NTBs) in goods and services trade and customs trade facilitation.

The TPP negotiations involve New Zealand and eleven other countries - Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, Singapore, the United States of America and Vietnam. These negotiations evolved from efforts to expand the scope of the existing Trans-Pacific Strategic Economic Partnership (P4) Agreement in 2008, with negotiations for an expanded TPP agreement beginning in 2010.

In this study, we model implementation of TPP with the current twelve members. This is a significant regional grouping: current membership of TPP comprises almost 40 per cent of global GDP, approximately one quarter of global trade and just over ten per cent of the world’s population (Table 1.1).

### Table 1.1

*Contribution of TPP countries to the global economy, 2013*

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (US$ million)</th>
<th>Exports of goods and services (US$ million)</th>
<th>Imports of goods and services (US$ million)</th>
<th>Population (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1,552,408</td>
<td>325,795</td>
<td>321,908</td>
<td>22.7</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>12,923</td>
<td>13,795</td>
<td>5,286</td>
<td>0.4</td>
</tr>
<tr>
<td>Canada</td>
<td>1,779,635</td>
<td>541,303</td>
<td>576,307</td>
<td>34.8</td>
</tr>
<tr>
<td>Chile</td>
<td>269,869</td>
<td>92,328</td>
<td>91,333</td>
<td>17.5</td>
</tr>
<tr>
<td>Japan</td>
<td>5,281,945</td>
<td>873,844</td>
<td>992,054</td>
<td>127.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>369,233</td>
<td>265,794</td>
<td>228,624</td>
<td>29.2</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,178,126</td>
<td>387,307</td>
<td>405,082</td>
<td>120.8</td>
</tr>
<tr>
<td>New Zealand</td>
<td>171,281</td>
<td>49,045</td>
<td>49,727</td>
<td>4.4</td>
</tr>
<tr>
<td>Peru</td>
<td>208,790</td>
<td>52,261</td>
<td>68,567</td>
<td>30.0</td>
</tr>
<tr>
<td>Singapore</td>
<td>274,701</td>
<td>551,209</td>
<td>490,307</td>
<td>5.3</td>
</tr>
<tr>
<td>United States</td>
<td>16,244,600</td>
<td>2,195,900</td>
<td>2,743,100</td>
<td>313.9</td>
</tr>
<tr>
<td>Vietnam</td>
<td>155,820</td>
<td>124,701</td>
<td>119,242</td>
<td>88.8</td>
</tr>
<tr>
<td>Proportion of world (%)</td>
<td>38.8</td>
<td>24.0</td>
<td>27.4</td>
<td>11.3</td>
</tr>
</tbody>
</table>

To model potential impacts of a TPP agreement, we employ a dynamic computable general equilibrium model of the world economy, with considerable regional and commodity disaggregation and projections made to the year 2030. This allows us to estimate the projected direction and magnitude of changes on the New Zealand economy from changes brought about by the TPP under alternative liberalisation scenarios, including:

- reductions in tariff and quota barriers on goods trade;
- reductions to barriers on services trade;
- reductions to non-tariff barriers on goods trade;
- trade facilitation measures.

We estimate the impact on New Zealand of TPP from these channels only, using relatively conservative assumptions and making use of global modelling techniques that are widely employed by the international trade modelling community. While these factors are likely to contribute a significant share of TPP’s impact on New Zealand, other factors that are not considered will also influence the impact of TPP on New Zealand. A number of potentially important issues lie outside the scope of this report, including those indicated in the section on limitations. As such, this report is not intended to be a complete cost-benefit analysis of the TPP.

The TPP negotiations are ongoing and outcomes are currently unknown; therefore information on specific trade liberalisation measures is limited. Given uncertainty on what may be agreed, we model scenarios that explore a range of potential outcomes:

- Scenario 1: Conservative TPP tariff liberalisation
- Scenario 2: Moderate TPP tariff liberalisation assuming half a per cent of products are sensitive and not liberalised, but that there is a ten per cent expansion of exports to key markets covered by dairy tariff rate quotas;
- Scenario 3: Ambitious TPP tariff liberalisation
- Scenario 4: Conservative tariff reductions (Scenario 1)
- Scenario 5: Moderate tariff reductions (Scenario 2), plus reductions in barriers to services trade, reductions in NTBs for goods trade and improved trade facilitation;
- Scenario 6: Ambitious tariff reductions (Scenario 3)

The first three scenarios modelled focus on the impacts of cutting tariffs. Data on international tariff barriers are at an advanced stage of development and the trade community has largely converged on a
common set of data and methods for analysis, though we note that simplifying assumptions need to be made when modelling the tariff rate quotas (TRQs) applied to some agricultural exports.\(^4\) In contrast to tariff barriers, international estimates of NTBs to goods and services trade remain at a lower stage of development. No single database or set of estimates of these barriers has garnered widespread support and use within the trade community. Indeed much of the current effort in modelling NTBs and services barriers is focused on improving the underlying data, along with improving estimation and modelling techniques. The estimates we employ are based on some of the best measures of these barriers which are publicly available; while they can provide useful insights into the impacts of liberalisation in these areas of reform, we recommend that the reader view them with appropriate caution.

Main TPP Negotiating Topics

In 2011, leaders of the (then nine) TPP partners announced the broad outline of an ambitious, 21\(^{st}\) century agreement that incorporates next-generation issues and strengthens competitiveness of TPP countries within the global economy. Some key features identified were:

- Comprehensive market access: to eliminate tariffs and other barriers to trade in goods and services, and cross-border investment, and to open markets in government procurement. This includes significant commitments beyond existing World Trade Organisation (WTO) obligations, and elimination of non-tariff measures that serve as trade barriers. Customs procedures are to be transparent and facilitative of trade, and ensure goods are released as quickly as possible. A common set of rules of origin (RoOs) will be sought. Agreement will be pursued in building upon existing WTO agreements in regards to Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT).

- TPP is to be fully regional agreement negotiated as a single undertaking.

- Cross-cutting trade issues: regulatory coherence to make inter-partner trade more efficient and seamless; encouragement of the participation of small and medium business enterprises in regional trade; enhance domestic and regional competitiveness and promotion of economic growth and higher living standards; and advancement of TPP countries' economic development priorities.

- New trade issues involving innovative products and services including those related to the digital economy and green technologies. Trade and environment challenges will be addressed.

- The need to address sensitivities and unique challenges faced by developing countries, such as technical assistance and trade capacity building requirements.

- TPP is to be a living agreement which can evolve to facilitate extension to new trade issues and new countries.

\(^{4}\) The detailed data defining TRQs applied to some agricultural exports are not able to be generated for this study, particularly as many TRQs are defined beyond the HTS-4 digit level which would have required an impossibly large sectoral disaggregation. We therefore follow the GTAP approach of modelling them as tariff equivalents.
Our Approach and Limitations

Several, but not all, of the key TPP negotiating topics outlined above are considered in our analysis—tariffs on goods trade are reduced or eliminated in a fully regional approach; sensitivities are recognised to the extent that sensitive products are identified and excluded from tariff reductions; non-tariff barriers restricting trade in agricultural and non-agricultural goods are reduced and harmonised to some extent, as are barriers impeding trade in services; and we model improved trade facilitation by reducing the time taken for goods to clear customs.

We do not explicitly address regional development priorities or the encouragement of small and medium business enterprises. Trade issues involving innovative products and services such as those related to the digital economy and green technologies, along with trade and environment challenges, are also not modelled. We do not model Investor-State dispute settlement (ISDS) or intellectual property (IP) provisions. The scope of the current report also does not include modelling foreign direct investment (FDI) which may occur as a result of lowering barriers to FDI. Nor do we employ assumptions about how labour markets might expand, including due to migration (Foot and Strain, 2010), with changes brought about by TPP. To the extent that issues such as FDI or employment market assumptions might boost gains from trade agreements, our estimates may be viewed as understating potential gains.

Given our objective of conducting analysis of a broad range of tariff and non-tariff scenarios in a dynamic CGE context, simplifying assumptions need to be made. We have already noted that measures of non-tariff barriers in goods and services are “first generation” estimates and work is currently underway by a number of organisations to improve the data sources, estimates, and modelling in this area; this should facilitate improved estimates in the future. Caution is also required in interpreting results from TRQ liberalisation since these are not able to be explicitly modelled in the current framework used. We note areas where these issues may be particularly significant in interpreting results, especially in the complete liberalisation scenario, where the impacts of TRQ liberalisation will be greatest.

Review of Existing Studies

Much has been written on the TPP, including on political, economic and strategic issues, but studies that attempt to quantify various aspects of the TPP are relatively few. We briefly review five quantitative studies:

- Foot et al. (2011, 2012) analyse the TPP out to 2025 and provide the most comprehensive of the studies we review. The focus of their studies is on two emerging trade liberalisation tracks in the Asia-Pacific region: the TPP and an Asian track that envisions a free trade arrangement including among some smaller Asian economies. A 12-region, 18-sector (including services) dynamic CGE model based on the Global Trade Analysis Project (GTAP) database is developed. Their dynamic model differs from the standard GTAP model.

- For example, the Organisation for Economic Co-operation and Development (OECD) is preparing a comprehensive service barriers database which is based on a systematic review of OECD countries. In goods trade, the World Bank and UNCTAD, with other related parties, are advancing efforts to improve information on NTBs in goods by conducting comprehensive reviews of key economies, many of which have not seen their data updated since 2001 (UNCTAD 2010).
model in that it incorporates possibilities for increasing varieties of goods and services and the shifting of resources among firms with heterogeneous productivity within each sector. As with our own approach, their baseline contains details of many completed trade agreements. Petri et al. (2011) use the 2007 version of the GTAP database and assume that membership of Japan and South Korea would be implemented in 2020. Their scenarios incorporate tariff reductions, utilisation rates of tariff preferences, reduction of non-tariff barriers to trade in both goods and services, and costs associated with meeting rules of origin. They compare a TPP track and an Asian track that builds on Association of South East Asian Nations (ASEAN) integration efforts. Benefits and strategic incentives of these tracks are examined over the period 2010-2025. As expected, annual gains to the world economy increase as the scope of each agreement expands. They conclude that strong incentives would emerge for the United States of America (USA) and China to press for a consolidation of the two tracks into a region-wide agreement.

Petri et al. (2012) differs substantially from their earlier study, with the model introduced as an expanded version of their 2011 study. Their updated modelling incorporates foreign direct investment (FDI) effects, and liberalisation on the ‘extensive margin’ of trade—exports by companies not involved in international markets prior to liberalisation. In this later model, membership of Japan and South Korea is brought forward to 2015. These and other changes have increased estimated benefits when compared to their 2011 results, and at the global level, 33 per cent of income gains are due to FDI effects and 44 per cent are due to extensive margin trade effects. These authors updated their studies in 2013 by simulating other TPP configurations, including a 12-country grouping identical to that of the current study (Petri et al., 2013). Given the ambitious modelling effort undertaken by Petri et al. it may be of interest to view a comparison of the key differences between their study and ours, which we include in Appendix I.6

Aareerat et al. (2012) use the static GTAP model and version 7 2004 database aggregated to 17 regions and 14 sectors. They examine consequences of an extension of their definition of TPP7 to include Japan, South Korea and China. In all scenarios, tariffs are eliminated. When China and Korea are added separately to the TPP, each suffers a loss in welfare but the simultaneous addition of these countries plus Japan provides welfare gains to all the new ten TPP partners with the exception of Peru. Our own study improves on Aareerat et al. (2012) in several ways, including modelling all current TPP partners, using a dynamic model and therefore enabling phasing in of agreements over time, careful modelling of potentially sensitive sectors and incorporating several key features of the negotiations in addition to tariff reductions.

Ikeda and Lee (2012) examine alternative sequencing of free trade agreements, by comparing a gradually-enlarging TPP with two alternative East Asian agreements. As do we, they use the GDyn dynamic CGE model with projections out to 2030, but they use an older 2004 base data aggregated up to 22 regions and 20 sectors. A feature of their methodology is that tariff-equivalents of non-tariff barriers are estimated, though just for sectors in their scenarios, tariffs are gradually cut to zero over the projection period, but non-tariff barriers to non-tariff barriers to services are lowered by 25 per cent. A conclusion is that the TPP track would be an attractive option for most countries in the Asia-Pacific region.

6 Petri et al. (2012) do not analyse a TPP2 agreement. Their TPP Track begins with a TPP9 agreement in 2013 and then adds Canada, Japan, Mexico and South Korea in 2016. The TPP-12 analysis appears in their online 2013 report (Petri et al., 2013).

7 Aareerat et al. (2012) model the region excluding Australia, Chile, New Zealand, Peru, Singapore, USA and Vietnam.
Li and Whalley (2013) quantify how China’s participation or otherwise in the TPP could affect that economy and other members. They model both tariffs and non-tariff barriers using gravity models. They use a static 11 country CGE model with two goods (tradeable and non-tradeable) and two factors (labour and capital). Australia and New Zealand, Chile and Peru, and ASEAN participants are aggregated into single regions. Their scenarios eliminate all tariffs and then either halve or totally eliminate non-tariff costs. They conclude that China suffers a minor loss if it does not participate in TPP, but gains considerably should it participate, as do most other members under that scenario. Perhaps the most interesting feature of this study is its inclusion of trade costs. However, our own methodology goes further, including dynamics, more disaggregated regions and sectors, some focus on services and consideration of sensitive trade issues.

Organisation of the Report

In the following sections we outline our modelling approach, data, scenarios, and the impacts of TPP on New Zealand. Section 2 briefly summarises the modelling framework, assumptions, baseline construction and policy scenarios modelled, with further details of our modelling approach, along with supplementary data tables included in appendices for keen readers. In Section 3, we present the results of our modelling, with a particular focus on the potential impacts of TPP on New Zealand. Finally we offer some concluding comments in Section 4.
2. Modelling Framework and Scenarios

In this section we review the modelling framework and databases employed, including briefly reviewing the construction of the baseline projection of the world economy to 2000, which is an important characteristic of a dynamic model and the consequent simulations and results. We then outline the trade liberalisation scenarios modelled. These sections are intentionally brief. Further details on data sources and methodology are included in two Appendices: Appendix IV - Baseline Development and Appendix V - Scenarios and Data Sources. Readers are encouraged to explore these resources for a deeper understanding of the modelling context and limitations.

Model and Database

The modelling framework used to analyse potential impacts of various TPP liberalisation scenarios is GDyn (Ianovitchina and Walmsley, 2012), a dynamic version of the GTAP model and database. The standard GTAP model is a well-known and widely used comparative static multi-regional CGE model that captures interactions between regions and sectors within a fully consistent framework (Hertel 1997). The model and supporting database are widely used for policy analysis: they are fully documented and publicly available.8

The GDyn model we use is a recursive dynamic version of the standard GTAP model that permits modelling and implementation of policy changes over time, as well as capital accumulation along with international mobility and foreign ownership of capital (Ianovitchina and McDougall, 2012). Other features of the standard GTAP model are retained, including: consumers maximise welfare subject to their budget constraints; while firms maximise profits, within perfectly competitive markets with constant returns to scale; and using the limited resources available in the economy.9 Five primary factors of production (land, natural resources, physical capital, and unskilled and skilled labour) combine with intermediate inputs, both domestically produced and imported, to produce final output. Elasticities specify the extent to which substitution is possible between imports from different sources and imports and domestic production. When a policy change such as TPP liberalization is simulated, prices and quantities of commodities along with related impacts on welfare and incomes are endogenously determined within the model.10

8 See gtap.econ.purdue.edu for detailed information on the GTAP model and current database.
9 In contrast, some CGE models, such as those employed by Petri et al. (2011, 2012) assume monopolistic competition between products.
10 This model is solved with GEMPACK software (Harrison and Pearson 1996), using the RunDynam interface.
In the current study, we use the GDyn v8.1 database benchmarked to 2007. The full database comprises 144 countries and regions, disaggregated into 57 sectors (Narayanan et al., 2012). However, we aggregate the database to model 31 sectors and 21 countries or regions (Appendix Tables II and III), further aggregating some results for reporting purposes.

We develop a baseline ‘business as usual’ projection from the 2007 benchmark year to 2030. To project the global baseline, we use projections of gross domestic product (GDP), population, skilled and unskilled labour growth for each region in our aggregation, as detailed in Appendix IV, Table AIV.1. The purpose in projecting baseline growth and changes in the global economy is to try to approximate the state of economies at the time they liberalise. An important aspect of building the baseline is the inclusion of key trade agreements already concluded by TPP partners. More than two dozen preferential trade agreements are included in the baseline. Appendix IV Table AIV.2 details the key trade agreements incorporated into the baseline. Simulations that include TPP implementation can then be compared with this baseline, which does not include TPP liberalisation, allowing us to isolate the potential impacts of TPP.

In the analysis contained in this report, we model international investment endogenously, with rates of return between regions changing in response to policy shocks. For example, a reduction in services trade barriers could lead to lower services prices within an economy, increasing the competitiveness of sectors which use this input intensively, along with capital goods and their associated rate of return. The result would be, holding other things constant, the movement of capital investment toward that economy until global rates of return equilibrate. We do not model changes in investment resulting from changes in investment laws or the removal of FDI barriers which might result from a TPP agreement. Our parsimonious approach to modelling investment by not including specification of barriers to investment acknowledges the dearth of relevant FDI data required to estimate the impacts of removing these barriers. Current efforts to model FDI in CGE models generally focus on representing “portfolios” of foreign investment by country and sector. These specifications require bilateral data on foreign investment, capital stocks and asset ownership at the sector level, which may be econometrically estimated since these detailed data are rarely available consistently for large groups of countries. We take the GDyn approach to estimating investment endogenously, without more complex representation of FDI, recognising that while these effects are likely important, they are not well represented in the current state of mainstream policy research and modelling.12

**Liberalisation Scenarios**

Historically, negotiating a Free Trade Agreement (FTA) like the TPP focused on reducing or eliminating tariffs and expanding or eliminating quotas between prospective FTA members. Further negotiations might be undertakion in areas which ranged from harmonising customs procedures and paper work to greater access for labour movement and foreign investors in members’ markets, to mutual recognition of

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11) Brunei is not available as a separate region in the GTAP v8.1 database (it is included in a region combined with Myanmar and Timor Leste). While more disaggregated databases are used to calculate liberalisation appropriate for Brunei’s contribution to this group, we are not able to model Brunei separately and any results will therefore be for the ‘Brunei group’.

12) Wintersley et al. (2012) illustrate sensitivity analysis of investment parameters in the GDyn model which can be employed to simulate declining barriers to investment and reduced risks associated with better governance, however, this approach must be viewed as exploratory, since econometric estimates of the required parameters are not available.
standards and technical barriers to trade and sanitary and phytosanitary regulation. However, discussions beyond tariff reduction and elimination were frequently not the main focus of negotiations.

As indicated in the introduction to this report, the TPP promises to be a "comprehensive and high-standard" next generation FTA which recognises that tariff barriers, while important, will only be a part of the negotiations that are also aimed at lowering barriers to services trade, non-tariff barriers in goods trade, intellectual property, and e-commerce among other issues. Moreover, the TPP is envisioned to address the concerns of overlapping and often contrasting trade agreements which have proliferated in the Asia-Pacific region (US Congressional Research Service, 2013), with regulatory and policy coherence being goals of TPP negotiators.

As with most trade negotiations, the exact outcome and substance of tariff and non-tariff barrier reductions will not be known until negotiations are concluded and the agreements are released for ratification by national governments. Given this uncertainty, we conduct six liberalisation scenarios that include four areas of trade liberalisation: tariff reduction or elimination along with some export quota expansion; reductions to services trade barriers; reductions to non-tariff barriers in goods trade; and improved customs and trade facilitation resulting in the swifter movement of goods through customs.

World wide data on tariffs have been developed as a result of decades of WTO negotiations and there exists considerable consensus around these data. In contrast efforts to prepare data on barriers to trade in services and non-tariff barriers in trade in goods are still in the relatively early stages of development. We employ two leading databases of "next generation" econometric estimates of these barriers, while recognising the relatively early stage of research and data in services and goods NTBs.

Tariff negotiations take place in an environment of national policy and sectoral interests. For many countries, tariffs and TRQs are a part of industrial and agricultural policies with long legislative histories. These sensitivities are recognised in the tariff negotiating process by providing flexibilities in reducing or eliminating tariffs. While we do not explicitly model TRQs, our analysis does incorporate these nuances. We also recognise that although the TPP is an ambitious agreement, that tariff elimination in all sectors may not be achieved. Our tariff cutting formulas, therefore, are comprised of three main parameters: 1) the percent of tariff lines to have tariffs eliminated upon entry into force (EIF) of the agreement; 2) the number of products to be phased to zero within 10 and 15 years; 3) the number of tariff lines exempt from tariff cutting. We further stratify the TPP negotiating parties into three groups, recognising that certain countries have a history of lowering tariffs rapidly, here listed as Group A including New Zealand, Australia, Chile, Singapore, and Brunei. The large developed economies, Canada, Japan, and the United States are included in Group B. Finally, Group C includes Mexico, Peru, Malaysia and Vietnam, recognising TPP members'...
commitments to provide flexibilities for developing country members. Our principal distinctions provided to the developing countries in the conservative and moderate tariff-reduction scenarios are a longer 15 year phase out of tariffs and a less ambitious goal for lowering tariffs when the agreement enters into force.

Table 2.1
Tariff and non-tariff scenarios for Trans-Pacific Partnership (TPP) with 12 members

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Tariffs</th>
<th>NTBs</th>
<th>Services</th>
<th>Trade facilitation</th>
<th>New Zealand, include/exclude</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Sensitive (per cent HTS lines free)</td>
<td>EIF (2015)</td>
<td>Years to implement</td>
<td></td>
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<tr>
<td>Scenario 1 (conservative)</td>
<td>A: 0.5%</td>
<td>A: 50%</td>
<td>A: 15%</td>
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<tr>
<td>Scenario 2 (moderate)</td>
<td>B: 5.5%</td>
<td>B: 75%</td>
<td>B: 10%</td>
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<tr>
<td></td>
<td>C: 0.5%</td>
<td>C: 65%</td>
<td>C: 45%</td>
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<tr>
<td></td>
<td>Ten per cent increase in dairy quota in Japan, USA, and Canada</td>
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<td>Scenario 3 (ambitious)</td>
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<td>Scenario 4 (conservative)</td>
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<td>Scenario 5 (moderate with non-tariff barriers)</td>
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<td>Scenario 6 (ambitious)</td>
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</table>

Note: Group A = New Zealand, Australia, Chile, Singapore and Brunei; Group B = Canada, Japan, and the United States; Group C = Mexico, Peru, and Multimedia Partnership.

Source: Authors' Analysis.

Sensitive products are those either exempt from tariff reduction or those provided partial, though not free, access. Following Jean et al. (2008), we define exempt products by a tariff revenue formula for each TPP member, in which products projected to result in the greatest tariff revenue changes are ranked most highly to be exempt from tariff reductions as sensitive. We further adapt this formula to account for the politically sensitive nature of agricultural TRQs in the large developed economies of Canada, Japan and the United States, by recognising these products are likely to be the first to be excluded from tariff reductions (see Appendix VII). In the case of other countries, both manufactures and agricultural imports are ranked without distinction.

In all scenarios, we assume 2015 is the initial year of implementation of any agreement. Scenario 1 is the most conservative scenario we model.
2, our moderate scenario, we assume only 0.5 per cent sensitive products and increased liberalisation at the commencement of implementation. We also estimate partial liberalisation of certain dairy quotas in Canada, Japan, and the United States by including an expansion of in-quota trade taken per cent, but maintaining the out-quota restrictions for these products (in contrast, other TPs are either exempt from elimination, or the entire protection is eliminated).

\[ \text{some text} \]

Finally, we supplement our brief consideration of the overall impacts of whether participating in the TPP is worthwhile for New Zealand by modelling the potential impact on real GDP if New Zealand were not to participate in a TPP agreement, implemented by other member countries along the lines of Scenarios 4-6.

\[ \text{some text} \]
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