FINAL REPORT

Impacts of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership on the New Zealand Economy

A Dynamic Computable General Equilibrium Analysis

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Acronyms

AVE	ad valorem equivalent
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
CGE	computable general equilibrium
CIF	cost, insurance and freight
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CSQ	country-specific tariff-rate quota
EIF	entry into force
FDI	foreign direct investment
FOB	free on board
FTA	free trade agreement
GDP	gross domestic product
GSP	generalised system of preferences
GTAP	Global Trade Analysis Project
HS	harmonised system
IEDyn	ImpactECON Dynamic
MFAT	Ministry of Foreign Affairs and Trade (New Zealand)
MFN	most favoured nation
MPI	Ministry for Primary Industries (New Zealand)
NTM	non-tariff measure
NZ	New Zealand
SPS	sanitary and phyto-sanitary
TBT	technical barriers to trade
TFA	Trade Facilitation Agreement
TFI	OECD Trade Facilitation Indicators
TFP	total factor productivity
TPP	Trans-Pacific Partnership – original agreement including the United States
TRQ	tariff-rate quota
UNCTAD	United Nations Conference on Trade and Development
UNITC	United Nations International Trade Commission
USITC	United States International Trade Commission
WTO	World Trade Organisation

Executive Summary

This report was prepared at the request of the New Zealand Ministry of Foreign Affairs and Trade (MFAT). It presents results from a large-scale modelling effort undertaken to improve understanding of the potential economic impacts on New Zealand of implementing the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). The CPTPP is an agreement reached between New Zealand and ten other countries: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, Singapore and Vietnam.

We model four scenarios:

- Scenario 1: Tariff reductions and dairy quota liberalisation, plus limited harmonisation of goods and services NTMs;
- Scenario 2: Scenario 1 plus increased harmonisation of goods and services NTMs, and an improvement in trade facilitation;
- Scenario 3: Scenario 2 plus further reductions in goods and services NTMs and a greater improvement in trade facilitation;
- Scenario 4: Scenario 2 with New Zealand excluded from implementing the CPTPP.

Each of these scenarios is modelled against a baseline projection of the global economy to 2040 that does not include the impacts of the CPTPP. While the CPTPP will progressively impact member economies as it is implemented, we focus on reporting changes relative to the 2040 baseline projection, since by this time full implementation of the agreement will have occurred.

The overall impacts on New Zealand's real GDP and real exports for the CPTPP liberalisation scenarios modelled are summarised in Table E1. In the first scenario, real GDP is projected to increase by 0.30 per cent relative to the 2040 baseline, increasing to 0.54 per cent in the second scenario and 1.02 per cent in the third scenario. In constant 2011 dollar terms, these increases range from NZ$1.2b to NZ$4b. New Zealand's total exports to the world also increase progressively as the extent of the liberalisation modelled increases. In Scenario 1, real exports increase by 0.7 per cent, in Scenario 2 the increase is 1.4 per cent and there is a 3.1 per cent increase in real exports in the third scenario. In dollar terms, these quantity increases in New Zealand's exports range from NZ$0.6b to NZ$2.7b.

Table E1: Simulated change in New Zealand's real GDP and exports relative to the 2040 baseline, CPTPP scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
		REAL GDP		
Per cent	0.30	0.54	1.02	-0.05
NZ$m*	1,171	2,110	4,002	-183
		EXPORTS		
Per cent	0.70	1.43	3.15	-0.09
NZ$m*	596	1,218	2,678	-75

** Constant 2011 NZ dollars.*

Source: Authors' model results.

When the scenarios are decomposed by the various components of the CPTPP scenarios modelled, we find that in Scenario 1, tariff and quota liberalisation contributes 65 per cent of the increase in real GDP while increased harmonisation of goods NTMs contributes 31 per cent and services NTMs contribute 4 per cent. In the second and third scenarios, the level of tariff and quota liberalisation remains the same but we model increased harmonisation of NTMs for goods and services trade as well as improved trade facilitation. In the second scenario, goods NTM harmonisation contributes 35 per cent of the GDP increase, services NTM harmonisation contributes 20 per cent and a further 9 per cent of the GDP increase is contributed by improved trade facilitation. In the third scenario, the contribution of tariff and quota liberalisation falls to just under 20 per cent, with goods NTMs contributing 31 per cent, services NTMs contributing 41 per cent and trade facilitation contributing the remaining 9 per cent. Our results, particularly for the more ambitious scenarios, indicate that lowering NTMs could contribute substantially to the gains from CPTPP, although we acknowledge the challenges in quantifying and implementing reductions in NTMs.

If New Zealand were not to implement the CPTPP, Scenario 4 results in Table E1 indicate that in addition to losing the potential gains from CPTPP implementation, New Zealand's real GDP and exports are expected to decline a little as the other member countries implement the agreement.

1 Introduction and Background

This report was prepared at the request of the New Zealand Ministry of Foreign Affairs and Trade (MFAT). It presents results from a large-scale modelling effort undertaken to improve understanding of the potential economic impacts on New Zealand of implementing the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).

The CPTPP is a new agreement reached in January 2018 between New Zealand and ten other countries: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, Singapore and Vietnam. The CPTPP follows a renegotiation of some aspects of the Trans-Pacific Partnership (TPP) agreement, which was signed in February 2016 when it also included the United States. The improved market access through tariff reductions and quota expansion remains the same as agreed under the TPP, with the exception of the United States; however, certain other aspects of the original TPP agreement have been suspended.[5]

In this study, we model implementation of the CPTPP with the current eleven members. This regional grouping is diverse in terms of the size of economies, populations and per capita incomes (Table 1). Total economic size in terms of economic output, as measured by GDP, ranges from more than NZ$7 trillion in the case of Japan to NZ$16 billion for Brunei Darussalam. Per capita GDP ranges from NZ$76 thousand in Singapore to NZ$3.2 thousand in Vietnam.[6] All economies in this regional grouping are relatively strong trading economies in terms of their total trade (exports plus imports) as a proportion of economic output. For eight of these eleven countries, total trade is greater than 50 per cent of GDP; in the case of Singapore and Vietnam, the ratio is significantly higher. In total, this region covers a little under 15 per cent of global GDP and trade and it includes four countries with which New Zealand currently does not have an existing free trade agreement (FTA): Japan, Canada, Mexico and Peru.

1.1 Our approach

To model the potential impacts of implementing a CPTPP agreement, we employ a dynamic computable general equilibrium (CGE) model of the world economy, with detailed regional and commodity disaggregation and global projections to the year 2040. The modelling approach used allows us to capture key features of the various economies involved, including

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5 See https://www.mfat.govt.nz/en/trade/free-trade-agreements/agreements-under-negotiation/cptpp-2/tpp-and-cptpp-the-differences-explained/

6 Though we note that were we to use purchasing power parity (PPP) estimates, rather than current dollar values, some of these values would be significantly higher: for example, PPP estimates of per capita GDP for Vietnam, Malaysia and Brunei Darussalam are almost three times as large as the current value estimates presented in Table 1 (World Bank, 2018).

inter-sectoral and inter-regional linkages. This facilitates simulation of the projected direction and magnitude of impacts on the New Zealand economy.

Table 1: Summary data for CPTPP countries, 2016[7]

	GDP (NZ$ billion)	GDP per capita (NZ$ thousand)	Exports of goods and services (NZ$ billion)	Imports of goods and services (NZ$ billion)	Population (million)
Australia	1,728.4	71.6	326.1	364.4	24.1
Brunei Darussalam	16.4	38.7	8.1	6.2	0.4
Canada	2,194.9	60.5	680.6	732.6	36.3
Chile	354.4	19.8	100.9	97.9	17.9
Japan	7,088.2	55.8	1,144.2	1,069.9	127.0
Malaysia	425.5	13.6	287.9	259.4	31.2
Mexico	1,502.1	11.8	573.2	600.1	127.5
New Zealand	265.4	56.6	70.0	69.3	4.7
Peru	275.8	8.7	61.9	61.7	31.8
Singapore	426.1	76.0	733.5	623.3	5.6
Vietnam	294.5	3.2	275.8	268.2	92.7

Source: World Bank (2018)

The CPTPP agreement covers a range of traditional and new areas. In the current study, we focus our analysis on reductions in tariff and quota barriers on goods trade; increased harmonisation and reductions in the cost of non-tariff measures (NTMs)[8] on goods trade and services trade; and improvements in trade facilitation. We also consider potential impacts of reducing investment NTMs in a separate section. The current study is not intended to be a full cost-benefit analysis that captures all potential implications of the CPTPP. The aspects of the agreement we model, and assumptions made, are discussed in the report, with further detail provided in the appendices.

1.2 Organisation of the report

The report proceeds as follows: Section 2 briefly summarises the modelling framework, baseline construction and policy scenarios modelled, supplemented by much more detailed explanations and data in the appendices. Section 3 presents results from our modelling, focusing first on an overview of the potential impacts of CPTPP on New Zealand and followed by more detailed analysis of selected sectors. Section 4 offers our concluding comments.

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7 Converted to New Zealand dollars (NZ$) applying a 2016 exchange rate of 0.6970, calculated using the simple average of B1 monthly exchange rates from the Reserve Bank of New Zealand https://www.rbnz.govt.nz/statistics/b1/

8 A non-tariff measure (NTM) is a policy measure, other than a tariff, which may restrict trade. Many NTMs are legitimate measures to achieve particular objectives, such as biosecurity or protecting consumer health and safety, and some measures apply equally to domestic and imported products.

2 Modelling Framework and Scenarios

2.1 Model and database

In this study, we employ an extended version of the ImpactECON Dynamic model (IEDyn). This is based on the dynamic GTAP model (GDyn) (Ianchovichina and Walmsely, 2012), which in turn is based on the widely used GTAP model (Hertel, 1997), long considered the benchmark for analysis of trade agreements. GDyn is a recursive dynamic model that provides a theoretically consistent method for projecting long term macro- and micro economic variables, allowing for the modelling of trade policy impacts in the year and economic environment that they are projected to occur.

The IEDyn model improves on the GDyn model in two important areas.[9] First, our model and database include the number of workers and wages by occupation (5 categories), sector and region. This facilitates analysis of the number of jobs created or lost by occupation and sector. It also enables us to model the movement of workers across sectors and the impact of this movement on wages, which differ by occupation. Second, alternative assumptions regarding labour are incorporated. In particular, it is assumed that while wages are upwardly flexible, they fall only gradually over time, thereby potentially creating unemployment.

The IEDyn model is further extended to allow for improved modelling of NTMs, along with more detailed modelling of selected trade flows in dairy products that are subject to tariff-rate quotas (TRQs).[10] Further details of the inclusion of quotas can be found in Appendix III.

The GTAP v9.2 2011 database provides the starting point for our analysis. The data are aggregated into 31 commodities and 21 regions, as detailed in Appendix I, Table A 1 and Table A 2. Dairy imports into Japan, Canada and Mexico are further disaggregated into several sub-categories for analysis of TRQs, with the full list of sectors provided in Appendix III. The GTAP 2011 database is also adjusted[11] to take account of improved estimates of tariffs and TRQs, with the resulting 2011 database then used as the starting point for our simulations.

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9 Other improvements made to the IEDyn model are outlined in Walmsley, Minor and Strutt (2015).

10 The TPP agreement includes TRQs for several products other than dairy, such as eggs, poultry, pig meat, cereals and sugar, but the dairy quotas are of particular relevance to our NZ-focused analysis.

11 Using the altertax facility. However, adjustments were made to the traditional altertax facility developed by Malcom (1998) to minimise changes in the value of exports at fob and cif prices. This ensures a better match between the COMTRADE data and resulting trade data in the updated GTAP Data Base.

2.2 Baseline

A business-as-usual or baseline scenario must be established for the dynamic model. Our baseline extends from 2011 to 2040, giving ample time for implementation of all the components of CPTPP liberalisation we model. To build the baseline scenario, forecasts are obtained for key exogenous variables, including population, labour by education, real GDP, and investment. Forecasts to 2021 for real GDP, investment, savings, and global exports are obtained for 191 countries from the IMF's (2016) World Economic Outlook database. After 2021, we assume that technological change, risk premiums and other relevant rates remain unchanged, unless the evidence prior to 2021 suggests otherwise. Forecasts for labour by education to 2040 are obtained from CEPII (French research organisation Centre d'Etudes Prospectives et d'Informations Internationales), with the methodology documented in Fouré et al. (2012) and updated to reflect more recent forecasts in total labour growth from the ILO (2015). Population forecasts to 2040 are obtained from the ILO (2015) and based on UN (2015) forecasts, except for New Zealand where Statistics New Zealand (2016) forecasts are used.

Various signed free trade agreements involving the CPTPP 11 members, as well as the World Trade Organisation's (WTO) Trade Facilitation Agreement, are also incorporated into the baseline. The tariff reductions over the baseline are implemented using the projected tariff changes prepared by the United Nations International Trade Commission (UNITC),[12] updated for the current study with key tariff-rate quota data. Including existing agreements in the baseline avoids our modelling of the CPTPP double counting the benefits of tariff reductions that have already been agreed. The baseline also tracks selected dairy commodity imports for Japan, Canada and Mexico between 2011 and 2016, after which trade is restricted by WTO TRQs. Further details on the components of the baseline are discussed in Appendix II.

2.3 Scenarios

Table 2 summarises the four scenarios explored to examine the impact of the CPTPP. In each scenario, implementation begins in 2019 and is completed by 2038. Liberalisation is undertaken only by the CPTPP member countries, with New Zealand excluded in the final scenario.

12 http://www.macmap.org/countryanalysis/countrystatistics/GlobalAnalysis.aspx?s=2

Table 2: Summary of CPTPP scenarios modelled

Scenario	Tariffs	TRQs*	Goods NTMs**	Services NTMs	Trade Facilitation
Scenario 1: Conservative	As per signed TPP agreement, applied over 20 years. Tariff reductions taken from UNITC data.	Adjustments in dairy quotas and ad valorem tariff equivalents as per signed TPP agreement, applied over 20 years.	50 per cent harmonisation of current SPS and TBT measures with no reduction in the quantity of NTMs, applied over 10 years.	Harmonisation to the first quintile of CPTPP countries, applied over 10 years.	No change.
Scenario 2: Moderate	As per signed TPP agreement, applied over 20 years. Tariff reductions taken from UNITC data.	Adjustments in dairy quotas and ad valorem tariff equivalents as per signed TPP agreement, applied over 20 years.	Harmonisation of current SPS and TBT measures with no reduction in the quantity of NTMs, applied over 10 years.	Harmonisation to the second quintile of CPTPP countries, applied over 10 years.	7.5 per cent reduction in the number of days to export and import, applied over 5 years.
Scenario 3: Ambitious	As per signed TPP agreement, applied over 20 years. Tariff reductions taken from UNITC data.	Adjustments in dairy quotas and ad valorem tariff equivalents as per signed TPP agreement, applied over 20 years.	Harmonisation of current SPS, TBT and quantitative measures, plus a further 10 per cent reduction in NTMs, applied over 10 years.	Harmonisation to the third quintile of CPTPP countries, applied over 10 years.	15 per cent reduction in the number of days to export and import, applied over 5 years.
Scenario 4: Moderate scenario excluding New Zealand	As per signed TPP agreement, applied over 20 years. Tariff reductions taken from UNITC data (excluding New Zealand).	Adjustments in dairy quotas and ad valorem tariff equivalents as per signed TPP agreement, applied over 20 years (excluding New Zealand).	Same as Scenario 2 (excluding New Zealand).	Same as Scenario 2 (excluding New Zealand).	Same as Scenario 2 (excluding New Zealand).

** Dairy imports of Japan, Canada and Mexico are disaggregated to take account of multiple TRQs and changes under the CPTPP agreement. Details are provided in Appendix III.*

*** Data are not currently available for Australia, therefore, for Australia we assume the same bilateral NTMs as New Zealand has with CPTPP member countries. For bilateral Australia-New Zealand NTMs, we generally assume the reductions in NTM costs are equivalent to the lowest in the region for each product category.*

2.3.1 TARIFFS AND QUOTAS

The assumptions regarding cuts to tariffs, changes to TRQs, reductions in NTM barriers and improved trade facilitation for each scenario are summarised in Table 2. The scenarios modelled provide results on the implications of different levels of liberalisation between CPTPP member countries. In all scenarios, we model the changes in tariffs and dairy TRQs as agreed, while a range of alternatives are considered to examine the potential impact of reductions in the trade costs of NTMs. Scenario 1 may be viewed as a relatively conservative implementation of the CPTPP, Scenario 2 could be regarded as moderate assumptions, while Scenario 3 assumes very ambitious implementation. Scenario 4 examines the potential effects of New Zealand withdrawing from the CPTPP, while other member countries implement the agreement.

The tariff reductions and eliminations are implemented using the projected tariff impacts of the TPP agreement prepared by the UNITC,[13] updated with key tariff-rate quota data. ImpactECON assembled country specific trade data for the GTAP dairy products for Japan, Canada and Mexico, allowing for the identification of in- and out- of quota trade in these products, along with the associated tariff rates and ad valorem equivalents of specific rates. From these detailed data, we incorporate changes in both quantities and in- and out- of quota tariff rates resulting from the TPP agreement on exports of these products. Quota details and expansions for these key commodities are obtained from the TPP Agreements, WTO and New Zealand data sources, including the Ministry for Primary Industries (MPI) and MFAT.

2.3.2 NTMS

In addition to modelling tariff reductions and expansion of quotas, we model reductions in NTMs on goods and services. Available estimates of the impact of NTMs on trade costs, while continuing to improve, remain much less developed than data on tariffs and quotas. In addition, there is considerably more uncertainty about what may be achieved by the CPTPP with respect to NTMs than in more traditional areas of liberalisation. This is in part because NTMs are more difficult to quantify, thus agreements in this area tend to be much less specific than agreements on tariff reductions and quota expansions. We acknowledge that estimates of NTMs are still evolving and have limitations; however, in this study we employ what we believe to be the most appropriate datasets currently available.

Goods NTMs

For goods NTMs, we use newly constructed bilateral estimates of the potential gains from harmonisation of NTMs in goods trade between CPTPP countries. These estimates are based on new, highly detailed and internationally consistent datasets of NTMs collated through significant national and international efforts, led by UNCTAD and supported by other key international agencies.[14] In innovative work, Knebel and Peters (2018) use these detailed datasets to econometrically estimate the costs of NTMs in domestic and foreign markets, taking into account reduced impacts due to measures that are already harmonised. Using these

13 http://www.macmap.org/countryanalysis/countrystatistics/GlobalAnalysis.aspx?s=2

14 New Zealand data were contributed by a team from the University of Waikato (Webb and Strutt, 2017).

data, Knebel and Peters (2018) estimate the impact of countries maintaining the same number of NTMs that are initially in place, while bilaterally harmonising where each country imposes different types of measures.[15] We use these new estimates of goods NTM harmonisation in our scenarios.[16] This type of relatively modest harmonisation would leave the total number of NTMs applied by each country the same, allowing countries to continue to achieve their policy objectives, while also reducing the costs of trade between countries (Knebel and Peters, 2018).

We note that the original TPP agreement includes several chapters focusing on goods NTMs, including Chapter 7 on sanitary and phyto-sanitary (SPS) and Chapter 8 on technical barriers to trade (TBT), with both chapters emphasising the importance of enhancing transparency and eliminating unnecessary obstacles to trade while encouraging greater regulatory cooperation.[17] It is, however, difficult to accurately assess and model the level of actual reductions in these barriers that will be achieved through implementation of the CPTPP. Thus, we consider a range of scenarios based around the harmonisation estimates of Knebel and Peters (2018), all implemented evenly over 10 years from entry into force (EIF).

Services NTMs

For services NTMs, we employ services barrier estimates from CEPII (Fontagné et al. 2011), updated in Fontagné et al. (2016). While these estimates are a good match to the GTAP services trade data, they are estimated with much less detailed data than those we use for goods NTMs. We again model a range of scenarios: for services NTMs these are based on harmonisation to a range of quintiles within the region, implemented evenly over 10 years from EIF.

In each of the scenarios modelled, the reductions in costs imposed by goods and services NTMs are divided into two parts, with half applied as changes in consumers' willingness to pay for goods (Walmsley and Minor, 2015) and the other half applied as a productivity gain to the exporting firm (Walmsley and Strutt, forthcoming).

2.3.3 TRADE FACILITATION

In all scenarios except the first, we include some improvements in trade facilitation, reflecting the possibility of reduced customs clearance times due to the CPTPP. In particular, we assume a 7.5 per cent reduction in customs clearance times in Scenarios 2 and 4 and a 15 per cent reduction in scenario 3, with reductions implemented over a 5-year period.

Further details on the assumptions regarding cuts to tariffs, changes to TRQs, reductions in NTMs and improved trade facilitation are provided in Appendix IV.

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15 This harmonisation is at a fairly broad level of classification: the SPS chapter consists of up to 34 different types of measures and the TPT chapter consists of up to 24 different measures (UNCTAD 2013). Thus, there remains room for some differences within a particular measure type after harmonisation; for example, detailed specifications under the broad measure of 'labelling requirements' may differ between countries.

16 We are very grateful to Christian Knebel for providing us with his early estimates for CPTPP countries.

17 The full text of the TPP is available at https://www.tpp.mfat.govt.nz/text

3 Potential Impacts of CPTPP

In this section, we present results for the four scenarios modelled (Table 2):

- Scenario 1: Tariff reductions and dairy quota liberalisation as agreed in the TPP (excluding the United States), plus limited harmonisation of goods and services NTMs;
- Scenario 2: Scenario 1 plus increased harmonisation of goods and services NTMs, and an improvement in trade facilitation;
- Scenario 3: Scenario 2 plus further reductions in goods and services NTMs and a greater improvement in trade facilitation;
- Scenario 4: Scenario 2 with New Zealand excluded from implementing the CPTPP.

We focus primarily on the effects of these scenarios on New Zealand. We begin by examining the overall impacts of the CPTPP on GDP, investment, overall trade flows and factor markets. We include a brief section exploring some potential impacts of improved investment facilitation before turning to detailed analysis of selected sectors.

We note that even without implementation of the CPTPP agreement, all economies in the world evolve over the baseline period that we model to 2040. We therefore analyse results for the different liberalisation scenarios relative to our baseline which does not include the CPTPP. We generally focus on reporting changes relative to the results for the 2040 baseline projection since by this time full implementation of the CPTPP will have occurred. Results are reported in percentage changes or constant 2011 New Zealand dollar values.[18] Throughout the report, no adjustments are made to reflect the present value of future benefits; readers are cautioned to note that benefits received in the future may be valued differently to present consumption.

3.1 Overview

The results from our simulations are due to the changes in tariffs, quotas, NTMs and trade facilitation that are modelled (Table 2). The changes to tariffs are the same in each of the first three scenarios.[19] Table 3 shows initial average tariffs as well as post-CPTPP tariffs between New Zealand and the rest of the CPTPP region for four aggregate sectors. The initial average tariffs faced by New Zealand are highest in the processed food sector, with relatively high average tariffs also faced by the agriculture sector. Once the CPTPP is fully

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18 Converted to NZ$ applying a 2011 exchange rate of 0.7911, calculated using the simple average of B1 monthly exchange rates from the Reserve Bank of New Zealand https://www.rbnz.govt.nz/statistics/b1/

19 Except in the case of dairy, where the tariff rate depends on in-and out-of-quota shares and therefore changes slightly between scenarios.

implemented, most tariffs are projected to be eliminated or significantly reduced (Table 3); however, as discussed in Section 3.3.2, there are sensitive sectors where tariffs remain, particularly for processed foods.

Table 3: Initial and final average tariff rates by aggregate sector,* New Zealand and CPTPP (per cent)**

	Tariffs imposed by CPTPP countries on imports from New Zealand		Tariffs imposed by New Zealand on imports from CPTPP countries	
	Baseline 2019	Final 2040 with CPTPP	Baseline 2019	Final 2040 with CPTPP
Agriculture	2.31	0.00	0.01	0.00
Processed food	4.09	0.81	0.07	0.00
Manufactures	0.27	0.00	0.85	0.00
Services	0.00	0.00	0.00	0.00
Average (excluding services)	2.17	0.43	0.72	0.00

** Aggregate sector compositions are defined in Appendix I, Table A 1.*

** * Average tariffs may differ slightly across scenarios as shares differ.*

Source: Authors' model results.

Changes in the trade costs of goods NTMs that we model also tend to be relatively high in the processed food and also agricultural sectors (Table 4). For the aggregate agriculture and processed food sectors, the trade-weighted average reductions in costs of NTM are greater for exports from New Zealand to CPTPP than for imports from CPTPP. For the aggregate manufactures sector, the reductions in NTM costs are greater for imports into New Zealand from CPTPP than for exports to CPTPP. The reductions applied in Scenario 1 are half of those in Scenario 2, while Scenario 3 contains further reductions in the costs of goods NTMs.

Table 4: Trade-weighted average reductions in costs of goods NTMs between New Zealand and CPTPP, scenarios 1-3 (per cent)*

	Scenario 1		Scenario 2		Scenario 3	
	Imports to New Zealand	Exports from New Zealand	Imports to New Zealand	Exports from New Zealand	Imports to New Zealand	Exports from New Zealand
Agriculture	1.00	1.44	2.00	2.88	3.07	4.33
Processed food	0.91	1.33	1.82	2.67	3.25	4.45
Manufactures	0.37	0.17	0.73	0.34	1.20	0.73

** Weighted by 2011 base year trade flows.*

Source: Authors' model results.

3.2 Macroeconomics impacts

We first explore the potential impacts of the CPTPP liberalisation scenarios on aggregate economic indicators including real gross domestic product (GDP), investment, real trade flows and factor markets.

3.2.1 REAL GDP

Simulated changes in real GDP in 2040, due to the CPTPP liberalisation scenarios modelled, are summarised in Table 5. In the first scenario, real GDP is projected to increase by 0.30 per cent relative to the baseline. This increases to 0.54 per cent in the second scenario and 1.02 per cent in the third scenario. In constant 2011 dollar terms, these increases range from NZ$1.2b to NZ$4b. As shown in Table 5, other CPTPP countries also gain from the agreement.

Table 5: Simulated change in real GDP relative to the 2040 baseline, New Zealand and other CPTPP countries, scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	PER CENT			
New Zealand	0.30	0.54	1.02	-0.05
Other CPTPP - Average	0.12	0.22	0.38	0.22
	NZ$ MILLION *			
New Zealand	1,171	2,110	4,002	-183
Other CPTPP - Total	30,942	56,908	95,782	56,173

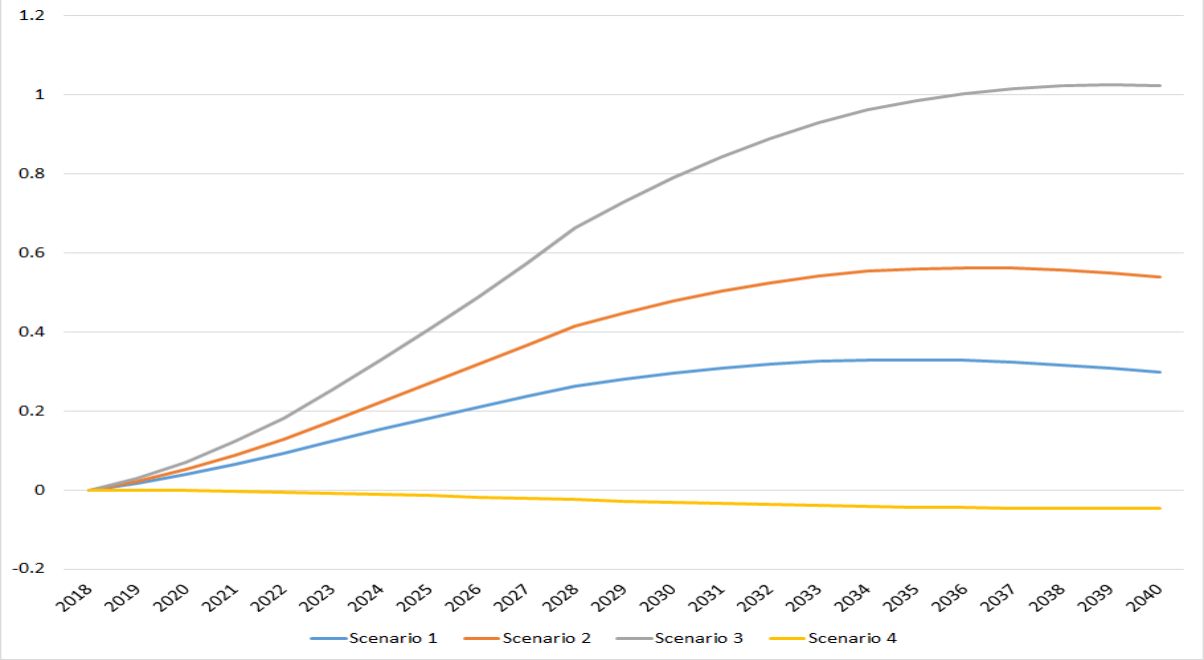
** Constant 2011 NZ dollars.*

Source: Authors' model results.

In the fourth scenario, where New Zealand does not implement the agreement, real GDP declines by 0.05 per cent due to other countries liberalising in the absence of New Zealand. If we compare this final scenario to the outcome where Scenario 2 were implemented, the loss of 0.05 per cent of real GDP needs to be considered along with the 0.54 per cent opportunity cost from New Zealand not implementing the agreement. This final scenario also slightly reduces the gains of other CPTPP countries relative to Scenario 2 (Table 5).

Figure 1 shows the projected changes in real GDP for New Zealand from 2018, just prior to implementation of the CPTPP scenarios modelled, through to 2040. For the first three scenarios, the cumulative impacts on New Zealand's real GDP tends to grow as the agreement is progressively implemented in each of the first three scenarios. In the first three scenarios, the annual increases in GDP due to the CPTPP cumulate over time, such that by 2040 the total annual increase in real GDP relative to the baseline is between 0.3 and 1 per cent, as summarised in Table 5. In Scenario 4, the small annual declines in real GDP resulting from New Zealand being left out of the agreement also cumulate over time such that by 2040, annual GDP is 0.05 per cent lower than without other CTPPP members implementing the agreement (i.e., the baseline).

Figure 1: Simulated change in New Zealand's real GDP relative to the baseline over time, scenarios 1-4 (per cent)



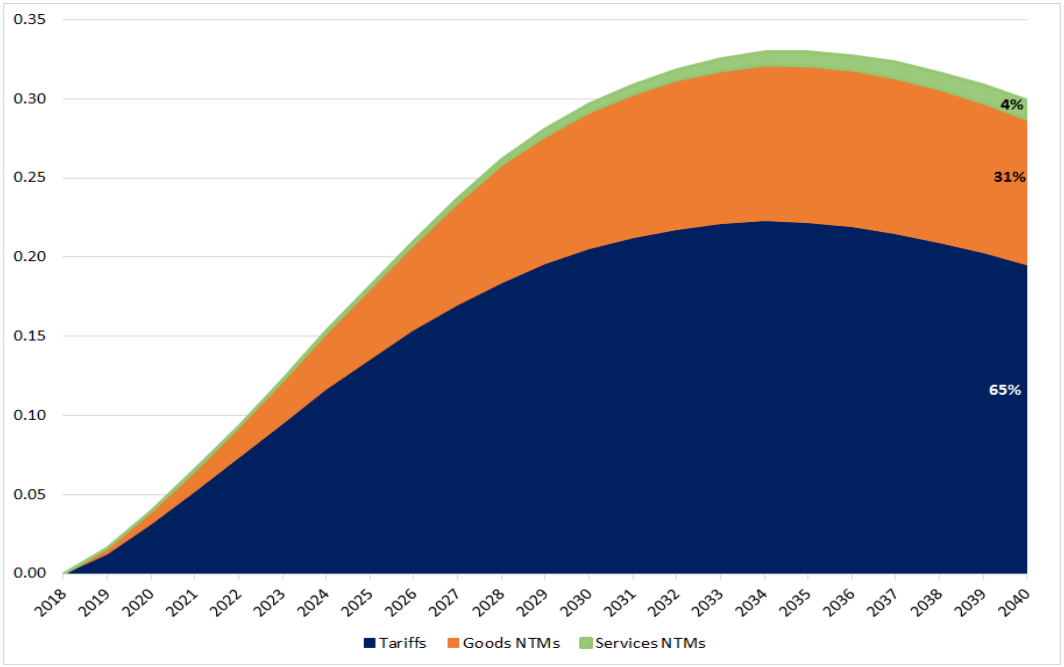
Source: Authors' model results.

3.2.2 DECOMPOSITION BY POLICY INSTRUMENT

Each of the scenarios we model includes various interacting policy components. In Scenario 1, there are reductions in NTMs for goods and services as well as reductions in tariffs and expansions of dairy quotas. For scenarios 2 and 3, there is also improved trade facilitation. Figure 2 provides a decomposition of the real GDP impacts by policy instrument for each of the scenarios modelled. We find that in Scenario 1, reductions in tariffs and expansions in quotas contribute almost two thirds of the gains to New Zealand, with limited harmonisation of goods NTMs contributing just over 30 per cent and services NTMs contributing the remain 4 per cent. In the second scenario, the contribution of tariff and quota liberalisation is 36 per cent, which is approximately the same amount as the contribution of goods NTM harmonisation, while services NTMs contribute 20 per cent of the gains and improved trade facilitation contributes the remaining 9 per cent. In Scenario 3, the cuts to tariffs remain the same as in the first two scenarios thus the larger cuts to NTMs now dominate the results: goods NTMs contribute 31 per cent, services NTMs contribute 41 per cent and trade facilitation contributes 9 per cent, with tariff reductions contributing the remaining 19 per cent. In the final scenario, where New Zealand does not implement the CPTPP, almost 50 per cent of the reductions in GDP are due to goods NTMs being harmonised in other CPTPP countries, with 23 per cent due to services NTMs and 22 per cent due to tariff reductions and quota expansions that now do not include New Zealand.

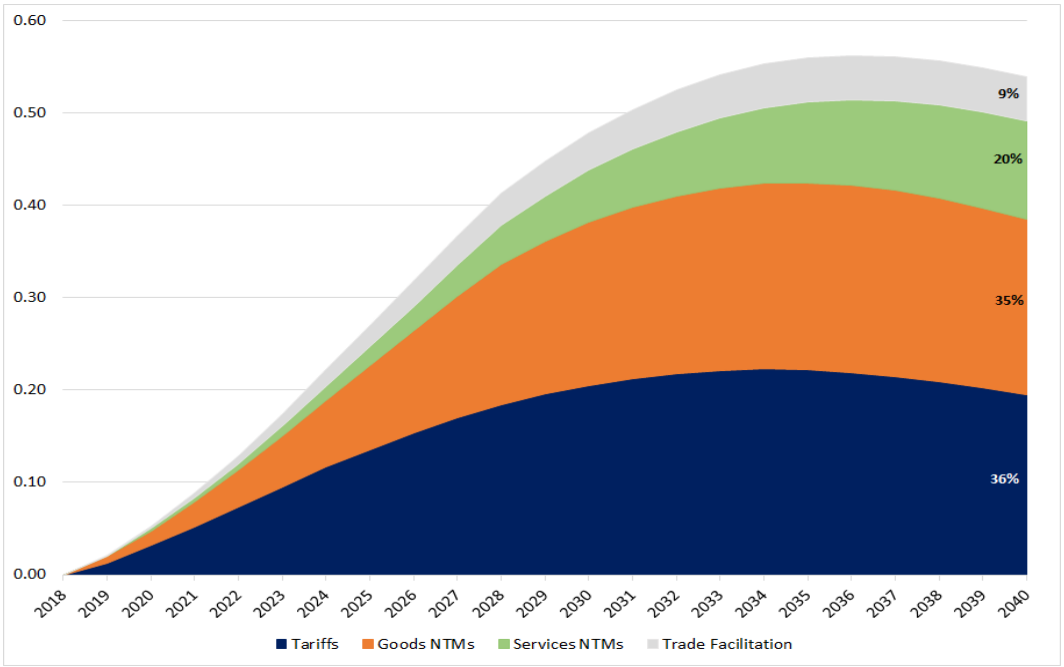
Figure 2: Decomposition of New Zealand's real GDP increase, scenarios 1-4, relative to the baseline (cumulative per cent increase in total GDP and per cent contribution of each component for 2040)

a. Scenario 1



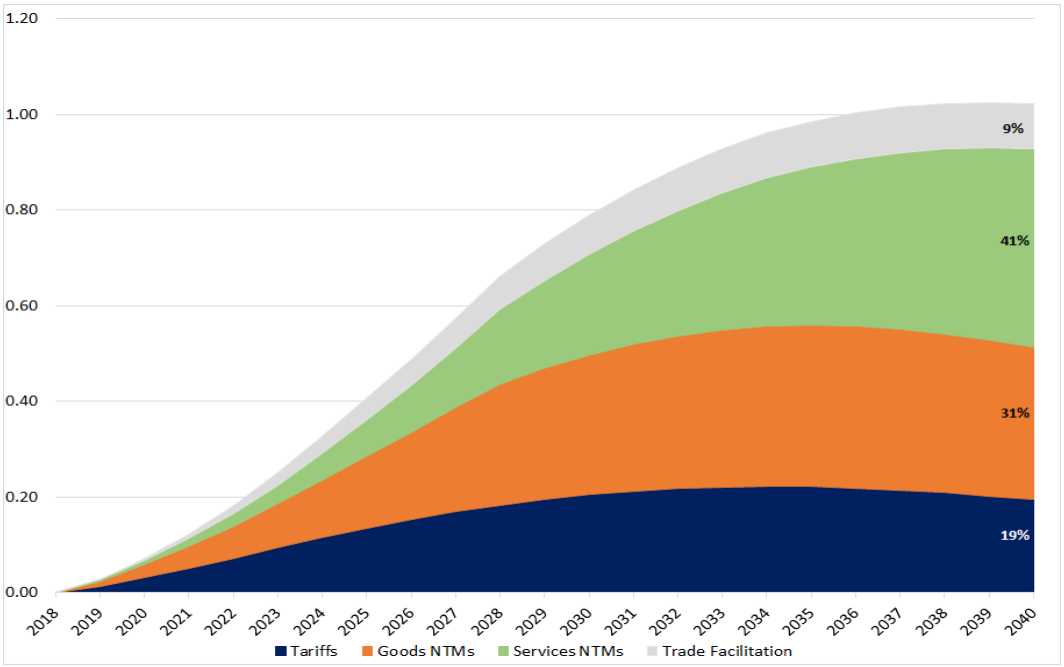
Source: Authors' model results.

b. Scenario 2



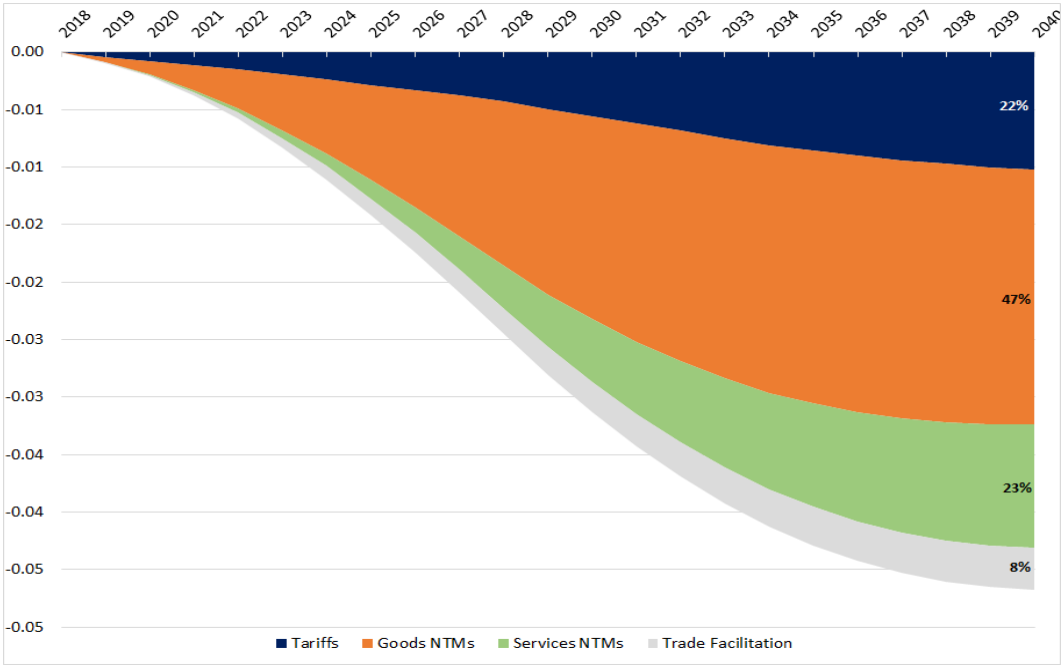
Source: Authors' model results.

c. Scenario 3



Source: Authors' model results.

d. Scenario 4



Source: Authors' model results.

3.2.3 REAL INVESTMENT

The impact of the CPTPP on New Zealand's investment is positive under all three scenarios in which New Zealand implements the agreement, while it is negative in Scenario 4 (Table 6). The increase in investment stems from a rise in New Zealand's rate of return, which is driven by a reduction in the price of imported

capital goods caused by the decline in tariffs, and by an increase in the returns to capital caused by the trade liberalisation.

Table 6: Simulated change in real investment relative to the 2040 baseline, New Zealand and other CPTPP countries, scenarios 1-4 (per cent and NZ$m)

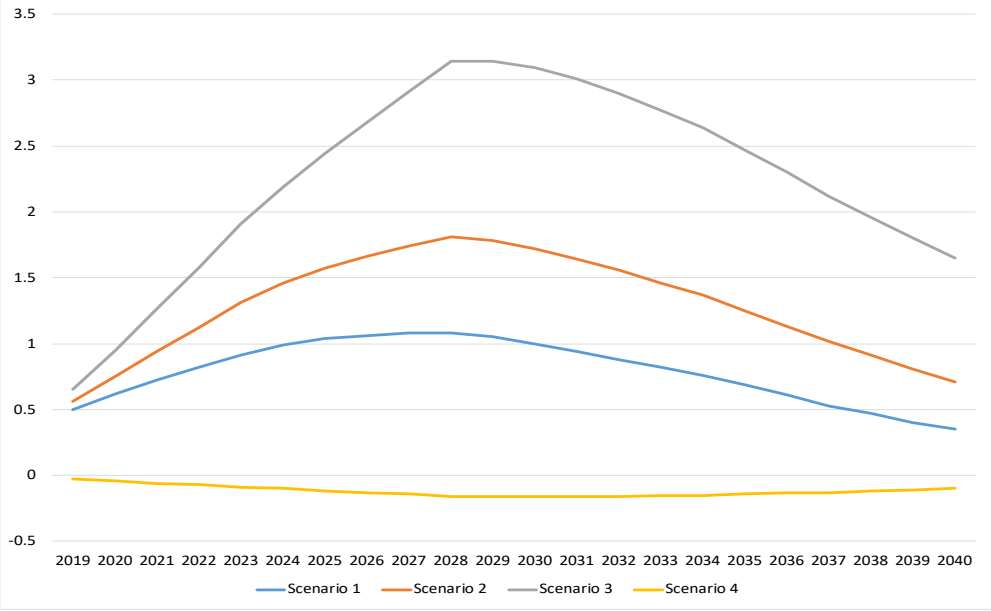
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	PER CENT			
New Zealand	0.35	0.71	1.65	-0.10
Other CPTPP – Average	0.22	0.39	0.63	0.39
	NZ$ MILLION *			
New Zealand	309	633	1,462	-89
Other CPTPP - Total	16,826	29,751	47,797	29,607

** Constant 2011 NZ dollars.*

Source: Authors' model results.

Figure 3 illustrates the change in investment over time in New Zealand. In 2019, rates of return and hence investment begin to rise as a result of the CPTPP, with the greatest gains occurring in the most ambitious third scenario. As investment increases available capital stocks and hence real GDP, the return to capital and rates of return decline – this occurs around 2028, when most of the liberalisation of tariffs and NTMs has taken place. The dip in investment then causes the growth in real GDP to flatten (Figure 1).

Figure 3: Simulated change in New Zealand's real investment relative to the baseline over time, scenarios 1-4 (per cent)



We note that real GDP in Scenario 1 (Figure 2) starts to decline in the latter years we model, primarily as a result of the tariff cuts. This is a function of the mechanisms in the dynamic model that create a gradual convergence of rates of return across countries in the long run, which also cause investment to cycle before reaching the new steady state equilibrium (Ianchovichina and Walmsley, 2012). The CPTPP raises rates of return with capital stock growing in response, causing rates of return and eventually investment to dip.

Gradually these rates converge across regions and the growth rates in capital and GDP all move to a steady state, but there is usually overshooting and investment cycling during this process caused by not all of these steady state conditions being met at the same time. Much of the reduction in the tariffs occurs in 2019 at EIF, such that by the late 2030s this investment cycling has begun to occur.

In Scenario 4, the lower relative rate of return in New Zealand, caused by the rising rates of return in the other CPTPP member countries, causes investment in New Zealand to decline. This decline in investment, subsequently reduces capital stocks and hence real GDP.

3.2.4 TRADE

In terms of aggregate impacts on international trade, we find that both real exports and imports increase in each of the first three scenarios, with New Zealand's total exports to the world increasing progressively as the extent of the liberalisation increases (Table 7). In Scenario 1, real exports increase by 0.7 per cent, in Scenario 2 the increase is 1.4 per cent and there is a 3.1 per cent increase in real exports in the third scenario. In dollar terms, these quantity increases in New Zealand's exports range from NZ$0.6b to NZ$2.7b. The increase in New Zealand's exports stems from an increase in exports to CPTPP countries, particularly Japan and to a lesser extent Canada. However, New Zealand's exports to non-CPTPP countries decline, with exports diverted towards CPTPP countries.

Table 7: Simulated change in total real exports relative to the 2040 baseline, New Zealand and other CPTPP countries, scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
		PER CENT		
New Zealand	0.70	1.43	3.15	-0.09
Other CPTPP	0.73	1.28	2.07	1.25
		NZ$ MILLION *		
New Zealand	596	1,218	2,678	-75
Other CPTPP	48,105	84,221	136,112	82,212

** Constant 2011 NZ dollars.*

Source: Authors' model results.

When the changes in trade shown in Table 7 are decomposed by policy component, the proportional contributions are similar to those we found for New Zealand's overall GDP (see Section 3.2.2), though with a stronger contribution now coming from goods NTMs and trade facilitation. For example, in Scenario 2, we find that 26 per cent of the increase in New Zealand's total exports is due to tariff and quota liberalisation, while reductions in goods NTMs contribute 41 per cent, services NTMs contribute 20 per cent and improved trade facilitation contributes 12 per cent of the export growth.

New Zealand's real imports also increase in each of the first three scenarios (Table 8). In the first scenario, they increase by 0.7 per cent, around the same percentage as real exports increase. The percentage increase in real imports in the second and third scenarios is a little less than we found for real exports: 1.3 per cent in Scenario 2 and 2.7 per cent in Scenario 3. If, however, New Zealand were not to implement the CPTPP, Scenario 4 results in Table 7 and Table 8 indicate that in addition to losing the potential gains from CPTPP

implementation, New Zealand's total real exports and imports decline a little due to the other member countries implementing the agreement.

Other CPTPP countries are projected to increase their real trade flows in all scenarios. The increase in exports ranges from a 0.7 per cent increase in the first scenario to a 2.1 per cent increase in the third scenario (Table 7). For imports, the increase ranges from 0.6 per cent in the first scenario to 1.7 per cent in the third scenario.

Table 8: Simulated change in total real imports relative to the 2040 baseline, New Zealand and other CPTPP countries, scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
		PER CENT		
New Zealand	0.71	1.29	2.68	-0.12
Other CPTPP	0.61	1.06	1.71	1.04
		NZ$ MILLION *		
New Zealand	764	1,389	2,881	-125
Other CPTPP	51,444	90,016	145,371	88,410

** Constant 2011 NZ dollars.*

Source: Authors' model results.

3.2.5 FACTOR MARKETS

Implementation of the CPTPP leads to increases in factor returns for land, labour and natural resources (Table 9). However, for capital, returns decline by 2040 due to the accumulation of investment and capital in response to the initial increases in rates of return (see Section 3.2.3). The return to land increases significantly, due to increased overall production in agriculture and the processed food sectors. Returns to natural resources also rise, with increased production in the extractive sector. Real wages rise for all workers, particularly 'agricultural and low skilled workers' in the first two scenarios.

While baseline labour supply can expand due to growth in the labour force and education rates over time, in our modelling the total supply of labour does not change in response to a policy change such as the CPTPP. However, our modelling does allow for limited movement of workers between different categories of occupations.[20] With the relatively high demand and increased wages, workers shift into the 'agricultural and low skilled workers' occupation, particularly in the first two scenarios. This is reflected in the increase in employment in this category, shown the second section of Table 9. In the third scenario, the relatively high wage increase for 'technical and assistant professionals' leads to movement of workers into this type of employment. Given that the total labour supply does not change in response to the policy change, there is a reduction in employment for other occupational categories, particularly service workers.

20 See Appendix II for details.

Table 9: Simulated change in factor returns and factor supply in New Zealand relative to the 2040 baseline, scenarios 1-4 (per cent and number of people)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
REAL FACTOR RETURNS (PER CENT)				
Land	2.68	3.16	2.52	-0.06
Professionals and managers	0.31	0.54	1.13	-0.06
Technical and assistant professionals	0.30	0.53	1.16	-0.06
Service workers	0.30	0.52	1.10	-0.06
Clerks	0.31	0.54	1.11	-0.06
Agricultural and low skilled workers*	0.41	0.65	1.13	-0.07
Capital	-0.21	-0.28	-0.36	0.02
Natural Resources	0.46	0.57	0.54	-0.09
FACTOR EMPLOYMENT				
Professionals and managers (number of people)	69	89	-116	-7
Technical and assistant professionals (number of people)	-58	-19	311	6
Service workers (number of people)	-160	-301	-203	36
Clerks (number of people)	-93	-52	-37	-5
Agricultural and low skilled workers (number of people)*	243	284	45	-29

** Note that the data includes all agricultural workers, including farm managers in this category.*

Source: Authors' model results.

3.2.6 INVESTMENT NTMS

In this section we explore the potential impact of including reductions in foreign direct investment (FDI) NTMs in our scenarios, employing productivity shocks obtained from the United States International Trade Commission (USITC, 2016). The productivity shocks are adjusted to remove the US and converted into sectoral productivity shocks using the trade restrictiveness indexes provided by the USITC. In particular we consider:

- Scenario 1: no change in investment NTMs;
- Scenario 2: half of the productivity shocks obtained after adjustments made to USITC estimates, implemented over 5 years;
- Scenario 3: incorporate productivity shocks obtained after adjustments made to USITC estimates, implemented over 5 years;
- Scenario 4: same as Scenario 2 (excluding New Zealand).

Table 10 presents results showing the additional gains in real GDP that may result from a reduction in NTMs on investment (see Appendix IV). We note that the underlying estimates are based on USITC data that includes the US in the TPP (USITC, 2016). It is difficult to assess the extent to which adjustments need to be made to account for the US leaving the agreement; therefore, we have chosen to be conservative and to present these results separately from the main results. The increase in real GDP from the liberalisation of

investment NTMs that we model is estimated to be just under 0.2 per cent in Scenario 2 and an almost 0.4 per cent increase in Scenario 3. These increases would be in addition to those shown in Table 5.

Table 10: Simulated change in real GDP relative to the 2040 scenario, New Zealand and other CPTPP countries, due to investment NTMs, scenarios 2, 3 and 4 (per cent and NZ$m)

	Scenario 2	Scenario 3	Scenario 4
PER CENT			
New Zealand	0.192	0.384	-0.002
Other CPTPP - Average	0.012	0.024	0.020
$NZ (MILLIONS)			
New Zealand	757	1,521	-7
Other CPTPP – Total	3,023	6,128	5,175

** Constant 2011 NZ dollars.*

Source: Authors' model results.

The liberalisation of investment NTMs causes output to increase in all aggregate sectors in New Zealand, although the larger increases are in manufacturing and services (Table 11). This reflects the fact that USITC (2016) reports higher restrictiveness indexes for manufactures and services; therefore, the expected productivity gains are also higher for these commodities (Appendix IV).

Table 11: Simulated change in sectoral output relative to the 2040 scenario due to investment NTMs, New Zealand, scenarios 2, 3 and 4 (per cent and NZ$m)

	Scenario 2	Scenario 3	Scenario 4
Agriculture	0.03	0.05	0.00
Food	0.08	0.16	0.00
Manufactures	0.31	0.63	-0.01
Services	0.16	0.32	0.00

Source: Authors' model results.

3.3 Sectoral impacts

3.3.1 OVERVIEW

Table 12 presents an overview of the change in output, aggregated to four sectors, for each of the scenarios modelled. All aggregated sectors in New Zealand increase output, with the exception of the manufacturing sector. The largest increase in output in percentage terms is for the processed food sector, which increases by between 1.2 and 1.7 per cent for the scenarios when New Zealand implements the CPTPP. Increases of around 0.5 per cent are also evident in the agricultural sector, which provides important inputs into the processed food sector. The increase in services output is smaller in percentage terms than for the agricultural and food sectors in the first two scenarios. However, given the size of this sector in dollar terms, the increase in services sector output is much greater than the increased output in the other sectors, particularly in the third scenario. Output in the aggregate manufactured goods sector declines between 0.1 and 0.45 per cent in

the first three scenarios. In the fourth scenario, all sectors are projected to decline at least slightly in output, with the largest dollar decline being for the services sector.

Table 12: Simulated change in New Zealand's real output relative to the 2040 baseline, aggregated sectors, scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	PER CENT			
Agriculture	0.46	0.54	0.43	-0.01
Processed food	1.21	1.59	1.70	-0.10
Manufactures	-0.10	-0.04	-0.45	-0.05
Services	0.27	0.53	1.16	-0.05
	NZ$ MILLION			
Agriculture	168	199	158	-2
Processed food	658	860	920	-55
Manufactures	-95	-43	-442	-47
Services	1,547	2,971	6,554	-275

Source: Authors' model results.

Table 13 summarises the change in New Zealand's real exports to CPTPP member countries for each of the four aggregate sectors. Exports across all aggregate categories rise to CPTPP countries.[21] In each of the first three scenarios, the largest percentage increases are exports of processed foods. Exports from the aggregate agriculture sector also rise relatively strongly, particularly in the first two scenarios, while exports of services rise strongly in Scenario 3 (Table 12).

Table 13: Simulated change in New Zealand's real exports to CPTPP member countries relative to the 2040 baseline, aggregated sectors, scenarios 1-4 (per cent and NZ$m)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	PER CENT			
Agriculture	5.01	7.96	11.18	-0.72
Processed food	23.06	31.23	40.35	-0.97
Manufactures	1.33	3.80	5.32	-0.53
Services	0.68	5.63	29.44	-0.16
	NZ$ MILLION			
Agriculture	95	151	212	-14
Processed food	1,851	2,506	3,238	-78
Manufactures	107	305	428	-43
Services	59	483	2,524	-13

Source: Authors' model results.

21 Though we note that this is not the case for total exports from all aggregate sectors, since exports to non-CPTPP countries tends to decline.

3.3.2 SPECIFIC SECTOR RESULTS

We now turn to more detailed sectoral results, with a particular focus on the processed food sectors. Table 15 disaggregates the average tariffs from Table 3, showing that relatively high average tariffs are faced by the New Zealand beef and sheep meat sector on exports to CPTPP countries – caused primarily by large tariffs on beef. Other sectors, including fruit and vegetables, dairy, other meats, and other processed foods also face higher than average protection in CPTPP markets. Once the CPTPP is fully implemented, most tariffs are projected to be eliminated or significantly reduced. However, there are sensitive sectors where tariffs remain, including on New Zealand's exports of beef and sheep, as well as dairy products (Table 15).

Processed Food

Overall processed food output expands relatively strongly in the first three scenarios (Table 12). When we decompose this by detailed sector (Table 14), we find that all processed food sectors modelled expand output, with the exception of the dairy sector, which declines by approximately half a per cent. The strongest percentage increase is for the beef and sheep sector, which increases in terms of real output by between 5.5 and 6.6 per cent. Other meats also expand output relatively strongly and there are smaller percentage increases in the other processed food as well as the beverages and tobacco sectors.

In Scenario 3, most of the incremental expansion (relative to Scenario 2) in processed food, is in the other processed food and beverages and tobacco sectors, which gain from the liberalisation of NTMs and the cheaper imported inputs. With the processed food sectors purchasing more imported inputs, demand for domestic agricultural products falls – hence the relative decline in agricultural output in Scenario 3 relative to Scenario 2 (Table 12).

Table 14: Initial proportion of New Zealand's total output and simulated change in real output, processed food products, relative to the 2040 baseline, scenarios 1-4 (per cent)

	Initial proportion of 2019 output	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Beef & sheep meat	1.63	5.55	6.56	6.61	-0.51
Other meats	0.33	2.24	3.46	3.45	-0.33
Dairy	3.21	-0.54	-0.57	-0.54	0.16
Other processed foods	2.14	0.69	1.10	1.37	-0.12
Beverages & tobacco	0.97	0.25	0.31	0.54	-0.09

Source: Authors' model results.

The first column of Table 16 shows the contribution of each processed food sector to New Zealand's baseline 2019 total exports to CPTPP countries (upper section) and to the world (lower section). Subsequent columns show simulated changes in 2040 real exports due to each scenario. Table 16 indicates that all processed food sectors increase exports from New Zealand to the CPTPP region, with particularly strong expansion of beef and sheep meat exports. This is perhaps not surprising given that the beef and sheep meat sector has particularly large average tariff cuts (Table 15) and relatively large reductions in NTMs (Table A 8). However, it is important to note that almost 90 per cent of baseline 2019 exports of beef and sheep go to non-CPTPP countries and we find that exports to these markets reduce by 7.3 per cent in the first scenario, 9.4 per cent

in the second scenario and 12.2 per cent in the third scenario. When we take into account the increases in beef and sheep exports to CPTPP markets, along with reductions to other markets, the total percentage increases in beef and sheep exports are between 7.9 and 9.3 per cent in the first three scenarios, as shown in the lower section of Table 16.

Table 15: Initial and final tariff rates by detailed sector (per cent)

	Tariffs imposed by CPTPP countries on imports from New Zealand		Tariffs imposed by New Zealand on imports from CPTPP countries	
	Initial 2019	2040 with CPTPP*	Initial 2019	2040 with CPTPP*
AGRICULTURE				
Rice	n.a.	n.a.	0.00	0.00
Fruit & vegetables	3.13	0.00	0.00	0.00
Sugar	0.01	0.00	0.00	0.00
Other crops	0.58	0.02	0.01	0.00
Cattle & sheep	0.02	0.00	0.00	0.00
Other animals	1.57	0.00	0.00	0.00
Wool	0.00	0.00	0.00	0.00
Fisheries	0.57	0.00	0.01	0.00
PROCESSED FOOD				
Beef & sheep meat	15.89	1.93	0.00	0.00
Other meats	2.25	0.00	0.01	0.00
Dairy	3.87	0.97	0.00	0.00
Other processed foods	2.16	0.23	0.09	0.00
Beverages & tobacco	0.71	0.00	0.02	0.00
MANUFACTURES				
Forestry, wood and paper	0.60	0.00	0.03	0.00
Extractive	0.30	0.00	0.07	0.00
Textiles	0.10	0.00	0.71	0.00
Apparel & leather	1.11	0.00	1.16	0.00
Motor vehicles	0.03	0.00	4.59	0.00
Electronics	0.01	0.00	0.06	0.00
Other Machinery	0.06	0.00	0.94	0.00
Other Manufactures	0.13	0.00	0.19	0.00
Chemicals, rubbers and plastics	0.48	0.00	0.32	0.00
Mineral Products	0.08	0.00	0.17	0.00
Metal Products	0.00	0.00	0.28	0.00
Average	2.17	0.43	0.72	0.00

** Tariffs are the same in Scenarios 1, 2 and 3, except in the case of dairy, where the tariff rate depends on in-and out-of-quota shares and therefore changes slightly between scenarios. Tariffs do not change from their initial rates in Scenario 4, except to the extent that trade is over-quota. Average tariffs may also differ slightly across scenarios as shares differ.*

Source: Authors' model results.

Table 16: Initial proportion of New Zealand's total exports and simulated change in real exports to CPTPP member countries and the world, processed food products, relative to the 2040 baseline, scenarios 1-4 (per cent)

	Initial proportion of 2019 exports	Scenario 1	Scenario 2	Scenario 3	Scenario 4
		EXPORTS TO CPTPP			
Beef & sheep meat	3.32	124.0	153.8	176.2	-9.1
Other meats	0.65	31.7	48.8	63.5	-1.9
Dairy	14.92	14.6	21.5	32.3	1.1
Other processed foods	10.41	8.1	13.0	18.6	-0.9
Beverages & tobacco	4.38	1.3	1.6	3.0	-0.3
		EXPORTS TO THE WORLD			
Beef & sheep meat	10.12	7.9	9.3	9.3	-0.7
Other meats	1.20	3.8	5.9	6.0	-0.5
Dairy	22.04	-0.6	-0.6	-0.5	0.2
Other processed foods	7.13	2.4	4.0	5.5	-0.3
Beverages & tobacco	2.92	0.4	0.4	0.7	-0.2

Source: Authors' model results.

In our modelling, we pay particular attention to dairy trade and quotas, particularly to Japan, Canada and Mexico (see Appendix III). Table 17 summarises the in-quota and out-of-quota tariffs faced by New Zealand, both in the initial baseline data and after implementation of CPTPP. The detailed dairy commodity breakdown facilitates analysis of where the main increases in market access are likely to arise. For exports to Japan, we find reasonably significant reductions in average tariffs on skim milk powder to Japan (reducing from 26.3 to between 19 and 20 per cent) and cheese (reducing from 20 per cent to approximately 1.5 per cent). For exports to Canada, the 3 per cent average tariff on milk protein concentrate is eliminated and the average tariff on butter reduces from 12.8 to just over 10 per cent. For exports to Mexico, average tariffs of 20 per cent applied to both cheese and butter are reduced significantly – for cheese, the tariffs are halved and for butter the average tariff after CPTPP falls to around 6 per cent.

The average CPTPP tariffs capture where exports are sufficiently high to exceed the CPTPP quota, in which case the tariff is an average of the CPTPP tariff and the WTO tariff (Table 17). In the case of Japan's imports of New Zealand cheese, the average CPTPP tariffs of 1.5 to 1.6 per cent, captures the average of the duty-free access provided to mixed (with domestic) cheese[22] and the 2.2 per cent CPTPP tariff on cheese that is not subject to a mixing requirement.

22 Where imported cheese must be mixed with domestic cheese.

Table 17: Tariffs on New Zealand's exports of dairy to Japan, Canada and Mexico, scenarios 1-4

	Initial tariffs (2019)			CPTPP tariffs (2040)			Average tariff rates after CPTPP (2040)			
	In-quota tariff	Out-of quota tariff	Average	In-quota tariff	Out-of quota tariff	Third tier out-of- quota tariff*	Scenario 1	Scenario 2	Scenario 3	Scenario 4
JAPAN										
Skim milk powder	26.3	Prohibitive	26.3	12.9	26.3	Prohibitive	19.2	19.6	20.1	26.3
Whey	5.2	Prohibitive	5.2	4.9	5.2	Prohibitive	5.0	5.1	5.1	5.2
Butter	35.7	Prohibitive	35.7	35.0	35.7	Prohibitive	35.3	35.4	35.4	35.7
Cheese***	0.0 (under mixing ratio)	34.6 (not under mixing ratio)	20	0.0 (under mixing ratio)	2.2 (not under mixing ratio)	n.a	1.5	1.6	1.6	22.0
Other constrained dairy	0.0	Prohibitive	0.0	0.0	prohibitive	n.a.	0.0	0.0	0.0	0.0
CANADA										
Whole milk powder & buttermilk	0.0	Prohibitive	0.0	0.0	Prohibitive	n.a**	0.0	0.0	0.0	0.0
Milk Protein Concentrate	3.0	Prohibitive	3.0	0.0	Prohibitive	n.a**	0.0	0.0	0.0	3.0
Butter	1.9	298.5	12.8	0.0	298.5	n.a**	10.2	10.3	10.5	10.4
Cheese	0.0	Prohibitive	0.0	0.0	Prohibitive	n.a**	0.0	0.0	0.0	0.0
MEXICO										
Skim & whole milk powder	0.0	Prohibitive	0.0	0.0	0.0	prohibitive	0.0	0.0	0.0	0.0
Cheese	20.0	Prohibitive	20.0	0.0	20.0	Prohibitive	10.1	10.1	10.2	20.0
Butter	20.0	Prohibitive	20.0	0.0	20.0	Prohibitive	5.9	6.0	6.0	20.0

** Third tier is created when tariffs are lowered by Japan and Mexico, however, it is only available up to the new quota. Items beyond that pay the original WTO in quota tariff rate.*

*** Canada lowers tariffs on all goods coming through WTO quota and increases quantities, hence third tier is not created.*

**** Japan does not have WTO quota constraints on cheese, although as explained in the text, the mixing ratio behaves like a quota and is therefore treated as a quota for modelling purposes. Cheese therefore includes cheese that is imported duty free under the mixing ratio, and cheese that is not imported under the mixing ratio and is subject to an average tariff of 34.6 per cent.*

Source: Authors' model results.

Table 18 details the simulated percentage changes in exports of dairy products to Japan, Canada and Mexico under each scenario modelled. All categories of exports of dairy products from New Zealand to Japan increase in the first three scenarios modelled, with the exception of the 'other constrained dairy' exports – where the tariff was already zero and quotas were unchanged as a result of the CPTPP. The cheese sector is the largest component of dairy exports to Japan (see column 1 of Table 18) and with the significant reduction in average tariffs faced by cheese exports (caused by the increase in the mixing ratio and lowering of tariffs on cheese that does not enter through the missing ratio), exports of these products from New Zealand to Japan more than double in the first three scenarios, making the strongest contribution to the overall expansion of dairy exports to Japan. Overall dairy exports from New Zealand to Japan expand by 85 per cent in Scenario 1 and more than 100 per cent in scenarios 2 and 3 (Table 18). To provide context, in the 2019 baseline Japan takes about 3.7 per cent of New Zealand's dairy exports while Canada takes less than 1 per cent.

Table 18: Initial proportion of exports and simulated change in New Zealand's real exports of dairy to Japan, Canada and Mexico, relative to the 2040 baseline, scenarios 1-4 (per cent)

	Initial proportion of dairy exports from NZ, 2019	Scenario 1	Scenario 2	Scenario 3	Scenario 4
JAPAN					
Skim fat powder	4.1	40.2	49	59.4	-2.6
Whey	2.0	7.8	20.4	35.7	-2.6
Butter	7.0	8.2	20.3	35	-1.3
Cheese	62.8	112.1	129.7	150.1	0.9
Other constrained dairy	11.7	-23.4	-17.8	-17.6	-33.1
Other (Unconstrained) dairy	12.5	48.5	66.5	88.5	-2.7
Dairy Total/Average	100.0	84.9	100.8	119	-2.5
CANADA					
Whole milk powder & buttermilk	2.3	-77.2	-76.1	-75	-79.9
Other milk products	12.4	165.3	188	214.3	-20.9
Butter	67.5	65.8	66.6	67.6	64.3
Cheese	0.1	7.5	19.4	33.6	0.3
Other (Unconstrained) dairy	17.7	5.8	16.8	30.1	-1.7
Dairy Total/Average	100.0	60.2	65.8	72.4	35.9
MEXICO					
Skim & whole milk powder	14.9	6	15.9	28.9	0
Butter	1.6	167.2	178.1	192.3	0.1
Cheese	7.6	128.4	139.5	154.1	-0.5
Other (Unconstrained) dairy	75.9	8.5	17.6	29.6	-0.3
Dairy Total/Average	100.0	19.6	29	41.4	-0.2

Source: Authors' model results.

Turning to New Zealand's dairy exports to Canada, we find scenarios 1-3 lead to expansions in all export components, with the exception of the 'whole milk powder and buttermilk' sector and the cheese sector, where tariffs were already very low prior to the CPTPP. Overall exports to Canada of dairy products from New Zealand expand by between 60 and 72 per cent in the first three scenarios (Table 18). In the case of New

Zealand's exports to Mexico, all components of dairy products expand exports in the three CPTPP scenarios that involve New Zealand. There are particularly significant percentage increases for cheese and even more so for butter, with the average cheese tariff faced halving and the average tariff on butter reducing by approximately 70 per cent of its initial level in the CPTPP scenarios modelled.

4 Conclusions

In this report we explore the potential economic impacts of the CPTPP on New Zealand. We use detailed databases on agreed tariff reductions and changes in dairy TRQs to model reductions in these barriers. We also model increased harmonisation of goods and services NTMs, improved trade facilitation and, separately, reductions in investment NTMs. We model four scenarios, each making the same assumptions on tariffs and quota liberalisation, with the first three scenarios modelling progressively increasing harmonisation of NTMs and improved trade facilitation. The final scenario models the effects of the CPTPP with New Zealand left out of the agreement.

Our modelling finds that in all three scenarios where New Zealand engages in CPTPP liberalisation, there are aggregate economic gains from liberalisation in terms of indicators such as real GDP. In the most conservative scenario modelled, the CPTPP leads to New Zealand's real GDP increasing by 0.3 per cent relative to the 2040 baseline. In the moderate second scenario, real GDP increases by 0.54 per cent and in the most ambitious scenario we model, real GDP for New Zealand increases by just over 1 per cent relative to the 2040 baseline. We model separately the potential impacts of reductions in FDI NTMs that may result from the CPTPP and find that these this liberalisation may increase real GDP by a further 0.2 to 0.4 per cent in the second and third scenarios. When New Zealand does not implement the CPTPP, as well as losing the potential gains of 0.54 per cent of real GDP in the second scenario, there are further losses: in Scenario 4, the New Zealand economy contracts by approximately 0.05 per cent when other countries implement in the absence of New Zealand.

We decompose the scenarios to determine how each component of the CPTPP modelled impacts the real GDP outcome. In Scenario 1, we find that tariff and quota liberalisation contributes 65 per cent of the increase in real GDP. Increased harmonisation of goods NTMs contributes 31 per cent and services NTMs contribute 4 per cent. In the second and third scenarios, the level of tariff and quota liberalisation remains the same but we model increased harmonisation of NTMs for goods and services trade as well as improved trade facilitation. In the second scenario, the level of NTM harmonisation we model contributes 35 per cent in the case of goods NTMs and 20 per cent in the case of services NTMs, with a further 9 per cent contributed by improved trade facilitation. In the third scenario the contribution of tariff and quota liberalisation falls to just under 20 per cent, with goods NTMs contributing 31 per cent, services NTMs contributing 41 per cent and trade facilitation contributing the remaining 9 per cent.

We also explore the sectoral impacts resulting from the scenarios modelled, with a particular focus on the processed foods sector for which we find exports and output expand relatively strongly in percentage terms. When we drill into these results for merchandise trade, we find a relatively large expansion in the beef and sheep sector output, with significantly increased exports to CPTPP markets and trade diversion from other markets.

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Appendix I: Aggregation

Table A 1: Sectoral aggregation

No	Sectors modelled	Description	GTAP sectors*	Aggregated sectors for reporting
1	Rice	Rice (paddy and processed)	PDR, PCR	Agriculture
2	Fruit & vegetables	Vegetables, fruit, nuts	V_F	Agriculture
3	Sugar	Sugar (raw and processed)	C_B, SGR	Agriculture
4	Other crops	Other crops: wheat, other grains, oilseeds, plant fibres etc.	WHT, GRO, OSD, PFB, OCR	Agriculture
5	Raw milk	Raw milk	RMK	Agriculture
6	Cattle & sheep	Cattle, sheep, goats, horses etc.	CTL	Agriculture
7	Other animals	Pigs, poultry etc.	OAP	Agriculture
8	Wool	Wool, silk etc.	WOL	Agriculture
9	Beef & sheep meat	Beef and sheep meat	CMT	Processed Food
10	Other meats	Other meat: pork, chicken etc.	OMT	Processed Food
11	Dairy	Dairy products	MIL	Processed Food
12	Other processed foods	Vegetable oils, other processed foods incl. fish	VOL, OFD	Processed Food
13	Beverages & tobacco	Beverages and tobacco products	B_T	Processed Food
14	Forestry, wood and paper	Forestry, wood and paper products	FRS, LUM, PPP	Manufactures
15	Fisheries	Fisheries (not including processed fish)	FSH	Agriculture
16	Extractive	Extract of coal, oil, gas & other minerals; petroleum & coke	COA, OIL, GAS, OMN, P_C	Manufactures
17	Textiles	Textiles	TEX	Manufactures
18	Apparel & leather	Wearing apparel and leather products	WAP, LEA	Manufactures
19	Motor vehicles	Motor vehicles & parts	MVH	Manufactures
20	Electronics	Electronic equipment	ELE	Manufactures
21	Other machinery	Other machinery and equipment	OME	Manufactures
22	Other manufactures	Manufactures nes: metal prods, transport equip & other	FMP, OTN, OMF	Manufactures
23	Chemicals, rubbers and plastics	Chemicals, rubber and plastic products	CRP	Manufactures
24	Mineral products	Non-metallic mineral prods: cement, plaster, concrete etc.	NMM	Manufactures
25	Metal products	Iron & steel and non-ferrous metals	I_S, NFM	Manufactures
26	Construction	Construction	CNS	Services
27	Business & financial services	Business, insurance and financial services	OBS, OFI, ISR	Services
28	Air & other transportation	Air and other transport	ATP, WTP, OTP	Services
29	Trade & communications	Trade and communications	TRD, CMN	Services
30	Public sector	Government services	OSG	Services
31	Other services	Other services	ELY, GDT, WTR, ROS, DWE	Services

* *See www.gtap.agecon.purdue.edu/databases/contribute/detailedsector.asp for details of the 57 GTAP sectors.*

Table A 2: Regional aggregation

No.	Country/region modelled	Original GTAP regions*	Aggregated regions for reporting
1	New Zealand	NZL	New Zealand
2	Australia	AUS	Other CPTPP
3	Brunei	BRN	Other CPTPP
4	Canada	CAN	Other CPTPP
5	Chile	CHL	Other CPTPP
6	Japan	JPN	Other CPTPP
7	Malaysia	MSY	Other CPTPP
8	Mexico	MEX	Other CPTPP
9	Peru	PER	Other CPTPP
10	Singapore	SGP	Other CPTPP
11	Vietnam	VNM	Other CPTPP
12	Other ASEAN countries	KHM, IDN, LAO, PHL, THA, XSE**	Rest of the world
13	United States	USA	Rest of the world
14	China	CHN	Rest of the world
15	Hong Kong	HKG	Rest of the world
16	Taiwan	TWN	Rest of the world
17	South Korea	KOR	Rest of the world
18	South Asia	IND, BGD, NPL, PAK, LKA, XSA,	Rest of the world
19	Western Europe: EU28 and EFTA	AUT, BEL, CYP, CZE, DNK, EST, FIN, FRA, DEU, GRC, HUN, IRL, ITA, LVA, LTU, LUX, MLT, NLD, POL, PRT, SVK, SVN, ESP, SWE, GBR, CHE, NOR, XEF, BGR, ROU	Rest of the world
20	Rest of Central & Latin America	BRA, ARG, XNA, BOL, COL, ECU, PRY, URY, VEN, XSM, CRI, GTM, HND, NIC, PAN, SLV, XCA, XCB	Rest of the world
21	Rest of the World	XOC, MNG, XEA, ALB, BLR, RUS, UKR, XEE, XER, HRV, KAZ, KGZ, XSU, ARM, AZE, GEO, TUR, BHR, IRN, ISR, KWT, OMN, QAT, SAU, ARE, XWS, EGY, MAR, TUN, XNF, BEN, BFA, CMR, CIV, GHA, GIN, NGA, SEN, TGO, XWF, XCF, XAC, ETH, KEN, MDG, MWI, MUS, MOZ, RWA, TZA, UGA, ZMB, ZWE, XEC, BWA, NAM, ZAF, XSC, XTW	Rest of the world

* *See http://www.gtap.agecon.purdue.edu/databases/regions.asp?Version=9.211 for details of the GTAP countries and regions*

*** This region comprises Myanmar and Timor-Leste: while Timor-Leste is not currently an ASEAN member country, Myanmar is a much larger economy and dominates this composite region.*

Appendix II: Baseline

Table A 3 lists the sources of the projections employed in this study.

Forecasts to 2021 for real GDP, investment, and global exports are obtained for 191 countries from the IMF's (2016) World Economic Outlook database. Implementation of these forecasts provides estimates of technological change and changes in risk premiums over the period 2011 to 2021. For instance, the imposition of real GDP forecasts, along with forecasts of labour and capital (or investment) growth, determine the level of technological change that must have occurred to achieve the increases in real GDP. This level of technological change is region-specific, but we apply it differentially across factors and sectors using factor- and sector-specific multipliers estimated from OECD data on differential productivities. The productivity differentials apply to all factors, except land, and the rate of productivity applied to natural resources is also significantly reduced. After 2021, we assume some limited convergence of technological change to the rate of technological change in developed countries.

A similar procedure is used to estimate risk premiums. Growth in capital is the result of the accumulation of investment to existing capital stocks, less depreciation. Growth in capital is therefore driven primarily by the level and growth in investment. Growth in investment in the model is determined by the gradual equalisation of rates of return across countries. When investment forecasts are imposed in the baseline, rates of return may deviate from this equalisation path. We attribute this deviation to changes in risk premiums. After 2021, we assume that these risk premiums remain unchanged or gradually reduce, depending on pre-2021 behaviour.

Forecasts for labour by education to 2040 are obtained from CEPII (methodology documented in Fouré et al. (2012)) and updated to reflect more recent forecasts in total labour growth from the ILO (2015). The GTAP v9.2 Data Base has five labour categories based on occupation. In order to develop a baseline scenario, it is important to include forecasts of the supply of labour. Forecasts of labour supply are usually developed for total labour (ILO, UN) or sometimes for labour by education level (Fouré et al., 2012). In the case of labour by occupation, forecasts are usually for labour demand, not supply. In this baseline, we use forecasts of total labour from the IMF (2016) and of labour supply by education (Fouré et al., 2012) to determine the supply of labour by occupation. We do this using ILO mappings between education and occupations, ILO data on labour by occupation and education by country, and then allow for some endogenous movement of educated workers across occupational categories in response to wages and as countries' education rates improve over time. Sticky wages are also incorporated to allow for changes in unemployment in the baseline. Further information on the techniques used in the IEDyn model are documented in Walmsley, Minor and Strutt (2015).

Table A 3: Sources of macroeconomic forecasts

	Source	Original data units	Countries	Time frame of data provided	Period tracked in baseline
Real GDP	IMF (2016)	National currency	191	1980-2021	2011-2021 Post 2021: continue trend shown in pre-2021 TFP rates. Generally, some limited convergence towards TFP of developed countries.
Investment	IMF (2016)	Share of GDP	191	1980-2021	2011-2021 Post 2021: risk premiums remain constant or decline gradually based on pre-2021 behaviour.
New Zealand population	Statistics New Zealand (2016)	Thousands	1	2016, 2018-2068 (five yearly estimates)	2016-2040
Population	UN (2015) forecasts	Thousands	228	2007-2100	2011-2040
Labour force	Fouré et al. (2012)	Thousands of people	167	1980-2050	2011-2040
Labour force by education	Fouré et al. (2012)	Percentage of working-age population	167	1980-2050	2011-2040
Bilateral dairy trade growth	Country specific trade data for Japan, Canada and Mexico	volumes	Selected bilateral pairs	1012-2016	2012-2016

Source: Authors' compilation

Finally, population forecasts to 2050 are obtained from the ILO (2015) and based on UN (2015) forecasts. Population forecasts for New Zealand are taken from Statistics New Zealand's (median) estimates of population over time.

Free trade agreements

The GTAP V9.2 Data Base employed in this study is calibrated to 2011 trade and tariffs. The IEDyn model projects trade, production, and prices from 2011 to 2040. Projecting these values requires the database to be adjusted to include important trade agreements and the effects of their tariff reductions on trade flows. Baseline tariffs also set the stage for tariff reductions to be implemented in the CPTPP scenarios—if tariffs have already been reduced between partner countries, any CPTPP agreement must reflect the lower tariffs in place, or risk crediting the CPTPP for tariff reductions which were already made under another agreement.

Two sets of data are employed to adjust 2011 tariffs to 2019 and beyond:

— United Nations International Trade Center (UNITC) Trans-Pacific Partnership (TPP) data files of baseline tariffs in the TPP region (for the original twelve TPP countries);[23]

— World Integrated Tariff Systems (WITS) reported tariffs for tariffs reflecting important recent trade agreements concluded between New Zealand and China (PRC) and New Zealand and Taiwan.

Table A 4 lists trade agreements concluded between the CPTPP members and the entry into force of each agreement. There are 55 possibilities for country pairs in the CPTPP region. Of those, 37, or just over two-thirds of those countries, have concluded FTAs. CPTPP is projected to enter into force in 2019. In that case, most trade agreements in the region will have been in place for five or more years. Countries such as Chile, Australia, and the ASEAN countries (Singapore, Brunei and Malaysia) have been active in negotiating FTAs in the CPTTP region. In contrast, countries such as Mexico and Canada have lagged in regional integration.

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23 United Nations International Trade Centre (ITC). Market Access Map (MAcMap). "Tariff Rates for 2014–2031 between TPP Member Countries absent the TPP Agreement." Prepared for the Global Economic Partnership Agreement Research Consortium, 2015.

Table A 4: Trade agreements in the baseline (CPTPP partners and year of entry into force)

Reporter\Partner	Australia	Brunei	Canada	Chile	Japan	Mexico	Malaysia	New Zealand	Peru	Singapore	Vietnam
Australia	--	2010	1995	2009	2015	--	2010	1983	--	2003	2010
Brunei	2010	--	--	2006	2008	--	1993	2006	--	1993	1995
Canada	1995	--	--	1997	--	1993	--	--	2009	--	--
Chile	2009	2006	1997	--	2007	1999	2012	2006	2009	2006	2014
Japan	2015	2008	--	2007	--	2005	2005	--	2012	2002	2008
Mexico	--	--	1993	1999	2005	--	--	--	2012	--	--
Malaysia	2010	1993	--	2012	2005	--	--	2010	--	1993	1995
New Zealand	1983	2006	--	2006	--	--	2010	--	--	2001	2010
Peru	--	--	2009	2009	2012	2012	--	--	--	2009	--
Singapore	2003	1993	--	2006	2002	--	1993	2001	2009	--	1995
Vietnam	2010	1995	--	2014	2008	--	1995	2010	--	1995	--

Source: Authors' compilations. Years entered are for the earliest trade agreement established between partner countries. Some agreements may have significant product exemptions

Trade Facilitation Agreement

The WTO trade facilitation agreement (TFA) is included in the baseline using the approach outlined in Walmsley and Minor (2015). To estimate the potential reduction in customs clearance times resulting from the WTO TFA we employ two data sets: the World Bank Doing Business (2016) Trading Across Borders Data and the OECD Trade Facilitation Indicators (TFI) (Moïsé, Orliac, and Minor, 2011). Improvements in customs clearance times as a result of the TFA (measured in days) are then converted to tariff equivalents by employing Hummels, Minor, Reismann and Endean (2007), which found that a one-day reduction in trade time was roughly equivalent to a one-per cent reduction in import tariffs in influencing importer preferences on where to source traded goods. The tariff equivalents are then implemented in the model as changes in consumers' willingness to pay for faster delivery of goods (Walmsley and Minor, 2015).

WTO quotas

Imports of WTO quota constrained dairy are treated as either constrained by a prohibitive WTO quota, constrained by the WTO quota but with out-of-quota imports, or unconstrained by the WTO quota due to low fill rates. In addition to the WTO quotas, we also consider the impact of the mixing ratio applied to Japanese cheese. Further details are provided in Appendix III.

Appendix III: Modelling Quotas

Dairy is an important component of New Zealand's trade and is covered by a number of WTO TRQs, some of which are liberalised as part of the CPTPP, with new quotas introduced. A major constraint in modelling these quotas is that the quotas involve products that, in our modelling database, are aggregated into broader commodity groups. For instance, butter, milk powders, cheeses and other protein products are aggregated into 'dairy products' (MIL). Given the number and complexity of the dairy quotas, we chose to disaggregate the GTAP dairy imports of selected CPTPP member countries (Japan, Canada and Mexico) to allow the model to capture the impact of changing quotas and in-quota or out-of-quota tariffs. To explain how quotas are incorporated we will first discuss the disaggregation of the data, followed by how they were modelled.

Disaggregating dairy imports

In deciding how to disaggregate the GTAP dairy sector, two points are worth mentioning:

— First, dairy imports of Japan, Canada and Mexico by source are disaggregated. Production is not disaggregated, and neither are imports of any other country. For example, we disaggregate Japan's imports of butter from New Zealand, Australia, Europe and other countries from total dairy imports, but we do not disaggregate Singapore's imports of butter from New Zealand, Australia, Europe, and other countries.

— Second, since only bilateral imports are disaggregated, and bilateral imports of Japan are separate from bilateral imports of Canada or Mexico, the disaggregation does not have to be the same across all importing countries. For instance, the data suggest that the quotas on skim milk products are binding in Japan, while in Canada the focus is on imports of other milk products. Hence, we can disaggregate imported skim milk products to Japan, and imports of other milk products to Canada, without having to also disaggregate imports of skim milk products to Canada or other milk products to Japan.[24] The commodities disaggregated for each country therefore depend on that country's TRQ policies.

Table A 5 lists the relevant quotas imposed by Canada, Japan and Mexico on dairy products that were found to be binding and/or are relevant for New Zealand in its negotiations of the CPTPP. Column I of Table A 5 lists the quotas that are considered in the baseline. Except for the

[24] This makes the disaggregation easier, since we do not have to find a common set of dairy products over which to disaggregate all imports – which would be the case if both production and trade were disaggregated.

quota on some Japanese cheese imports, that will be discussed separately below, they are WTO quotas. Column III of Table A 5 indicates whether the WTO quota is:

- Constrained – this means that the fill rate is sufficiently high that the quota is binding or may become binding during the analysis. Moreover, the out-of quota tariff is considered sufficiently high that the quota is prohibitive and hence there are no out-of-quota imports.

- Over quota – this means that the quota is binding, with some imports being charged out-of-quota tariff rates. That is, the out-of quota tariffs are not considered prohibitive.

- Unconstrained – this means that the fill rate is sufficiently low that the quota is not expected to become binding during the analysis.

Column IV indicates quotas that will be altered as part of the CPTPP. The CPTPP quotas are listed adjacent to the relevant WTO quota. In most cases, there is a simple one-to-one mapping between CPTPP and WTO quotas; however, this is not always the case. For instance, Japan's country specific quotas on whey (CSQ-JP18/21) include whey that may be classified under the WTO JPNQ007 or the JPNQ012 quota. In this case, New Zealand whey that is categorised under JPNQ007 and CSQ-JP18 is considered small relative to the whey categorised under JPNQ009 and CSQ-JP18, hence we aggregate (see column VI) and assume all whey is constrained in the baseline, as is the case under JPNQ012. The same is true for butter, but again butter classified under JPNQ008 is also a small share of the total imports of butter. Aggregating these smaller categories allows us to keep the model manageable. Finally, commodities classified under JPNQ012 and JPNQ011 that are not subject to any revisions in quotas under the CPTPP are aggregated into one category (column VI), other constrained dairy. Since both these groups of commodities have similar fill rates, aggregating them into a single category allows us to examine them while keeping the model tractable.

The quotas implemented by Canada and Mexico are much less complicated and hence the disaggregation of dairy is relatively straightforward. The only caveat is that there are two categories of Canadian dairy that are not currently constrained by their WTO quotas, however, tariff reductions will be subject to new quotas thus they are considered in the analysis. These two categories, whole milk powder and buttermilk, are aggregated since both are unconstrained in the baseline.

Table A 5: Relevant quotas on imported dairy

I Baseline quota	II Details of baseline quota	III Baseline quota	IV CPTPP quota/s	V Details of TPP quota	VI Assigned dairy category
			JAPAN		
JPNQ007	Prepared whey infant	Unconstrained	CSQ-JP18/21	Whey: Country specific quotas (NZ and Australia)	Whey
JPNQ008	Butter	Unconstrained	TWQ-JP9	Butter	Butter
JPNQ011	Other dairy for general use	Constrained	None	No change in quota under CPTPP	Other constrained dairy
JPNQ012	Designated other for general use	Constrained	TWQ-JP9	Butter	Butter
			TWQ-JP10	Skim milk powder	Skim milk powder
			CSQ-JP18/21	Whey	Whey
			None	Other JPNQ012 not subject to a CPTPP quota	Other constrained dairy
Mixing ratio	Cheese*	Constrained**	Mixing ratio	Increased mixing ratio	Cheese
			CANADA		
CANQ007	Skim and whole milk powder	Unconstrained	TRQ-CA4	Whole milk powder	Whole milk powder & buttermilk
CANQ009	Buttermilk powder	Unconstrained	TRQ-CA8	Buttermilk	Whole milk powder & buttermilk
CANQ011	Milk Protein Concentrates	Constrained	TRQ-CA10	Milk Protein Concentrates (MPC)	Milk Protein Concentrate
CANQ012	Butter	Over quota	TRQ-CA11	Butter	Butter
CANQ013	Cheese	Constrained	TRQ-CA12/13/14	Cheese	Cheese
			MEXICO		
MEXQ003	Skim & whole milk powder	Constrained	CSQ2	Skim and whole milk powder	Skim & whole milk powder
MEXQ004	Cheese	Unconstrained	CSQ7	Cheese	Cheese
None	Butter	Unconstrained	CSQ6	Butter	Butter

** includes cheese subject to mixing ratio (in-quota) and not subject to mixing ratio (out-of-quota).*

*** Cheese subject to mixing ratio (in-quota) is constrained; cheese not subject to mixing ratio (out-of-quota) is over-quota and unconstrained.*

Source: Authors' construction

Turning to Japanese cheese imports, Japan has an arrangement that allows for a certain amount of cheese to be imported duty free if it is combined with domestic cheese in a certain ratio – this is referred to as the "mixing ratio". Although it is not technically a quota, its behavior is somewhat similar to a quota, since a certain amount of imported cheese, that is to be mixed with domestic cheese, is allowed to enter Japan duty free. This amount is strictly enforced with other cheese, that is not mixed with domestic cheese, facing the MFN tariff in the baseline. As part of the CPTPP agreement, this mixing ratio is being raised, thereby causing a rise in the amount of imported cheese for mixing that can be imported duty free. This is akin to raising the "quota" on imported cheese that can enter duty free (due to mixing) – hence we have chosen to treat it as a TRQ in our analysis.

Finally, all dairy not included in one of the categories listed in Table A 5 are included in other (unconstrained) dairy. This dairy category is not subject to quotas in either the baseline or the CPTPP. The disaggregation of the dairy imports is done using shares obtained from the country specific trade data (HS6, 8, 9 and 10 digit).[25] The initial proportion of Canadian butter imports that are subject to in- and out- of quota tariffs, and the proportion of Japanese cheese that is mixed and not mixed are also obtained from the country specific trade data. The fill rates for these dairy commodities are obtained from the WTO and national data sources, including MPI and MFAT.

Modelling dairy quotas

Table A 6 illustrates how each of the new disaggregated dairy categories is treated in the baseline and policy scenarios. In the baseline, imports of dairy that fall under a constrained WTO quota are prohibited from expanding above the quota limit after 2016.[26] Once that limit is reached rents, that accrue to the exporter, increase endogenously to keep imports at the quota limit. Imports that are labelled unconstrained have low fill rates and hence the quotas are not constraining, and growth is determined by the baseline scenario. Imports that are labelled 'over quota' in Table A 5, such as Canadian butter, are permitted to exceed the quota. That means that imports within quota are taxed at the in-quota tariff rate and imports out-of-quota are taxed at the out-of-quota tariff rate. In the case of Japanese cheese, the in-quota tariff rate is that applied to cheese subject to the mixing ratio (zero tariff) and the out-of-quota tariff is that tariff applied to cheese, not subject to mixing (i.e., the MFN rate). The final tariff rate on Canadian butter and Japanese cheese is then an average of the two tariffs with appropriate shares. As imports rise or decline, the value of out-of-quota imports also rises or falls,[27] and the shares adjust.

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25 National level trade data for Mexico were not available and hence HS6 digit trade data was used.

26 Prior to 2016, actual growth in imports by country is tracked.

27 If the fall in imports is sufficient, then in-quota imports may also fall.

In the policy scenarios, tariffs between CPTPP members fall (Table 17) and quotas are expanded.[28] The treatment of Canada, on the one hand, and Japan and Mexico, on the other, differ slightly. In the case of Canada, tariffs are eliminated on all dairy subject to WTO quotas and the relevant quotas expanded under CPTPP. The final tariff is then zero, or in the case of Butter greater than zero to the extent that imports exceed the new quota and are therefore subject to the out-of-quota tariff (Table 17).

Table A 6: Treatment of dairy

	Baseline	TPP Policy
JAPAN		
Skim milk powder	Constrained by WTO quota JPNQ012	Tariff lowered for TPP members up to quota determined by TPP quota TWQ-JP10
Whey	Constrained by WTO quota JPNQ012	Tariff lowered, and quotas implemented on imports from New Zealand and Australia CSQ-JP18/21
Butter	Constrained by WTO quota JPNQ012 and JPNQ008	Tariff lowered for TPP members up to quota determined by TPP quota TWQ-JP9
Cheese	Constrained by mixing ratio	Tariffs are reduced on cheese that is not subject to mixing and the quantity of cheese that is subject to mixing and may enter duty free is increased by 1 per cent over 3 years to reflect the increase in the mixing ratio.
Other constrained dairy	Constrained by WTO quotas JPNQ011 and JPNQ012	No new TPP quotas on these commodities. Constrained as in baseline
Other (Unconstrained) dairy	Some are included in JPNQ12 but not constrained. No quotas for remaining lines.	No quotas
CANADA		
Whole milk powder & buttermilk	WTO quotas CANQ007 and CANQ009 but not constraining	Tariffs on WTO quotas eliminated. Tariff eliminated for TPP members up to quota determined by TPP quota TRQ-CA4/CA8
Milk Protein Concentrate (MPC)	Constrained by WTO quota CANQ011	WTO in-quota tariff eliminated, and quantity expanded for TPP countries under TPP quota TRQ-CA10
Butter	WTO quota CANQ012, some butter supplied at over-quota rates	WTO in-quota tariff eliminated, and quantity expanded for TPP countries under TPP quota TRQ-CA11
Cheese	Constrained by WTO quota CANQ013	WTO in-quota tariff reduced, and quantity expanded for TPP countries under TPP quota TRQ-CA12/13/14
Other (Unconstrained) dairy	No existing WTO quotas are applied.	No change in quotas

28 In addition quota rents accumulated in the baseline are removed.

	Baseline	TPP Policy
MEXICO		
Skim & whole milk powder	Constrained by WTO quota MEXQ003	Tariff lowered for TPP members (excluding Peru and Chile) up to quota determined by TPP quota CSQ2
Cheese	WTO quota MEXQ004, but not constraining	Tariff lowered for TPP members (excluding Peru and Chile) up to quota determined by TPP quota CSQ7
Butter	Not subject to a WTO quota	Tariff lowered for TPP members (excluding Peru and Chile) up to quota determined by TPP quota CSQ6
Other (Unconstrained) dairy	No quotas	No quotas, or any TPP quotas not applied

Source: Authors' construction

In Japan and Mexico, on the other hand, tariffs fall up to a new quota limit. Imports above that limit are taxed at the WTO MFN rate, hence we introduce a new in-quota tariff rate and quota limit, thereby creating a 3-tiered quota (CPTPP quota, WTO quota and out-of-quota).[29] Imports are assumed to come in under the CPTPP quota and then the WTO quota such that the final tariff is then a weighted average of the new CPTPP in-quota tariff and the WTO MFN out-of-quota tariff, depending on the shares of each in total imports.[30]

As mentioned above, the Japanese quota on cheese, which allows cheese that is imported and combined with domestic cheese to enter duty free, is not a WTO quota and is therefore treated slightly differently from the Japanese WTO TRQs. Japan is expected to raise the mixing ratio, allowing more imported cheese to enter Japan duty free. This is modelled as a rise in the quota on Japanese cheese subject to mixing. At the same time the out-of quota tariff rate, i.e., that applied to cheese that is not subject to mixing, is also lowered considerably (Table 17).

29 Although in most cases the out-of quota tariff rates are considered prohibitive and hence there are no out-of-quota imports.

30 Since the WTO out-of quota tariff rates for Japan and Mexico are considered prohibitive, there are no out-of-quota imports and the WTO quota is considered a binding constraint.

Appendix IV: Policy Scenarios

Tariffs

The UNITC has created a dataset that estimates the proposed tariff reductions submitted under the former TPP agreement.[31] We assume that the CPTPP tariff reductions follow those agreed in TPP, with the exception of the United States. The tariff reductions for the CPTTP agreement are based on each country's most favored nation (MFN) rates—not preferential rates, if they exist. The UNITC data account for tariff line exceptions and a phase-out period starting in 2016. The data were re-calibrated for a 2019 EIF for the purposes of this study.

The CPTPP stands out as a comprehensive and advanced agreement. Members have agreed on a high proportion of tariffs to be zero upon entry into force (EIF). Table A 7 list exemptions from the EIF product groups in the CPTPP region, by CPTPP member and sector.

Table A 7: Exempt sectors in CPTPP (ad valorem rates by sector, 2019-2038)

Country	Study sector	Trade weighted ad valorem tariff (or equivalent)				
		2019	2023	2028	2033	2038
Australia	Motor vehicles and parts	15.0	15.0	15.0	15.0	15.0
Canada	Clothing and leather	4.2	1.0	0.5	0.0	0.0
Canada	Motor vehicles and parts	1.6	0.0	0.0	0.0	0.0
Canada	Sugar	2.1	0.4	0.0	0.0	0.0
Canada	Textiles	2.9	0.0	0.0	0.0	0.0
Chile	Rice	3.6	1.4	0.0	0.0	0.0
Chile	Sugar	5.9	5.9	5.9	5.9	5.9
Japan	Sugar	4.3	0.0	0.0	0.0	0.0
Japan	Beverages and tobacco	1.4	0.2	0.0	0.0	0.0
Japan	Vegetables, fruit, nuts	0.9	0.3	0.0	0.0	0.0
Japan	Pigs, poultry etc.	2.1	1.0	0.1	0.0	0.0
Japan	Clothing and leather	0.8	0.5	0.2	0.0	0.0
Japan	Fisheries	1.3	0.7	0.2	0.2	0.2

31 United Nations International Trade Centre (ITC). Market Access Map (MAcMap). "Tariff Rates for 2016 – 2046 between TPP Member Countries under the TPP Agreement." Prepared for the Global Economic Partnership Agreement Research Consortium, 2016.

Country	Study sector	Trade weighted ad valorem tariff (or equivalent)				
		2019	2023	2028	2033	2038
Japan	Forestry, wood and paper products	1.0	0.9	0.7	0.5	0.0
Japan	Processed foods	2.5	1.4	0.9	0.8	0.8
Japan	Cattle, sheep, goats, horses	8.0	6.9	3.7	0.6	0.0
Japan	Beef and sheep	23.0	20.0	17.0	9.1	7.6
Japan	Pork, chicken etc.	45.0	44.0	44.0	44.0	44.0
Japan	Rice	94.0	94.0	94.0	94.0	94.0
Mexico	Beef and sheep	1.6	0.8	0.0	0.0	0.0
Mexico	Fisheries	0.8	0.4	0.0	0.0	0.0
Mexico	Processed foods	2.9	1.3	0.8	0.7	0.7
Mexico	Textiles	5.1	3.8	1.4	0.2	0.0
Mexico	Clothing and leather	18.0	14.0	4.2	0.4	0.0
Mexico	Sugar	42.0	42.0	42.0	42.0	42.0
Malaysia	Rice	20.0	20.0	3.6	0.0	0.0
Malaysia	Beverages and tobacco	55.0	43.0	25.0	4.6	0.2
Peru	Textiles	0.7	0.7	0.4	0.1	0.0
Peru	Clothing and leather	6.2	6.1	3.5	0.6	0.0
Vietnam	Beef and sheep	3.8	0.0	0.0	0.0	0.0
Vietnam	Forestry, wood and paper products	0.6	0.0	0.0	0.0	0.0
Vietnam	Vegetables, fruit, nuts	4.7	0.0	0.0	0.0	0.0
Vietnam	Chemicals, rubber and plastic products	0.7	0.1	0.0	0.0	0.0
Vietnam	Other machinery and equipment	0.5	0.1	0.0	0.0	0.0
Vietnam	Non-metallic mineral products	5.2	0.9	0.2	0.0	0.0
Vietnam	Pork, chicken etc.	4.2	2.1	0.2	0.0	0.0
Vietnam	Other manufactures	5.1	1.8	0.5	0.1	0.0
Vietnam	Extractive sectors and petroleum	3.1	1.9	1.5	0.0	0.0
Vietnam	Motor vehicles and parts	13.0	9.2	2.8	0.0	0.0
Vietnam	Sugar	5.4	5.2	3.5	0.0	0.0
Vietnam	Beverages and tobacco	34.0	29.0	15.0	2.2	0.0

Source: Authors' compilations from UNITC database. Exempt sectors are those which do not go to zero on EIF of the agreement. Does not include dairy products covered elsewhere in this report.

While numerous products in Table A 7 have their duties phased out over 20 years, several sectors stand out for their complete exemption from CPTPP. These include Australian motor vehicles (15.0 per cent), and Chilean and Mexican sugar (5.9 and 42.0 per cent respectively), Japanese rice, pork and chicken etc. (94.0 and 44 per cent respectively).

Goods NTMs

For goods NTMs, we use newly estimated bilateral measures of potential gains from harmonisation of NTMs in goods trade between CPTPP countries generated by UNCTAD

researchers.[32] These estimates draw on a highly detailed new international database. In conjunction with their Multi-Agency Support Team (MAST),[33] UNCTAD has been leading efforts to improve information on NTMs in goods by collecting comprehensive data within a consistent framework that helps to make data transparent and internationally comparable (UNCTAD 2013). The latest version of the database systematically covers 90 per cent of world trade.[34] As part of this international effort, a highly detailed database of New Zealand's NTMs was prepared and recently updated by a team at the University of Waikato (Webb and Strutt, 2017).[35]

The estimates we use in the current modelling follow from the innovative work of Knebel and Peters (2018). In this approach, the impacts of NTMs on goods prices are econometrically estimated for both the home and destination market. Exporters and importers, as well as local producers, need to comply with a multitude of regulations and requirements, with SPS and TBT requirements often costly for producers to comply with (Knebel and Peters, 2018). Countries may each impose a range of measures on particular products, some of which may overlap, while others will differ in terms of the type of regulation imposed. Harmonisation of regulations between countries tends to reduce trade costs and the estimates we use account for existing regulatory overlap between the home and foreign market, which reduces the price-raising effect of NTMs. After accounting for any existing overlap between countries, Knebel and Peters (2018) develop a simple reform scenario whereby countries each maintain the same total number of NTMs, while moving to increase regulatory overlap. This harmonisation of existing SPS and TBT measures involves no change in the total number of NTMs applied by each country, however, where countries impose different types of measures, they move to using the same measure as defined in the UNCTAD classification system (UNCTAD 2013).[36] Knebel and Peters provide the example that if one country requires a special authorisation (measure A14) and the other country requires an SPS certificate (measure A83), the special authorisation might be replaced with an SPS certificate. This harmonisation would leave the total number of NTMs applied by each country the same and still achieve the required objectives, but is expected to reduce the costs of trade between the two countries (Knebel and Peters, 2018).

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32 We are very grateful to Christian Knebel of UNCTAD for making preliminary estimates for CPTPP countries available for us to use in this study.

33 Composed of eight international organisations: Food and Agricultural Organisation of the United Nations, International Monetary Fund, International Trade Centre, Organisation for Economic Cooperation and Development, United Nations Industrial Development Organisation, World Bank and World Trade Organisation. Further details are available from http://unctad.org/en/Pages/DITC/Trade-Analysis/Non-Tariff-Measures/MAST-Group-on-NTMs.aspx

34 www.unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1627

35 Examples of recent studies using these new data include Webb, Strutt and Rae (2017); and Webb, Gibson and Strutt (2018).

36 This classification system was developed by the MAST. In total, there are currently 177 disaggregated measure codes, of which the SPS chapter A consists of 34 and the TPT chapter B consists of 24 codes at the most disaggregated level.

We make the following assumptions for goods NTMs in the scenarios we model:

- Scenario 1 models 50 per cent of harmonisation of current SPS and TBT measures with no reduction in the quantity of NTMs, applied over 10 years ;
- Scenario 2 models harmonisation of current SPS and TBT measures with no reduction in the quantity of NTMs, applied over 10 years; and
- Scenario 3 assumes the harmonisation of current measures from scenario 2, along with removal of quantitative restrictions[37] and a further 10 per cent reduction in the ad valorem equivalent (AVE) of remaining measures. This scenario recognises that there may be further scope to reduce the trade costs of NTMs, for example by eliminating NTMs that are not necessary or replacing several NTMs with one more efficient measure.
- Scenario 4 identical to Scenario 2 but with New Zealand excluded from the CPTPP implementation.

In each scenario, implementation is assumed to be evenly split over ten years from EIF.

The database that we draw on for estimates of the shocks required to harmonise NTMs is aggregated to match the GTAP goods commodities modelled. Table A 8 summarises for New Zealand the reduction in trade costs imposed by goods NTMs that we simulate in each scenario. While Table A 8 shows the average reductions imposed on imports into New Zealand and faced by exports from New Zealand, we note that in our modelling these are applied bilaterally: Table A 8 is simply a summary of the average shocks that we impose. For Australia, we apply the bilateral estimates that have been generated for New Zealand, since these two countries have relatively similar regulatory systems. For Australia-New Zealand bilateral trade, we assume the regulatory barriers are generally relatively low, thus for each sector we set these equal to the lowest level of harmonisation required between New Zealand and other regional trading partners.[38]

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37 These estimates of quantitatively restrictive NTMs were also supplied by Christian Knebel. We note these estimates tend to be relatively small and we do not apply them to dairy products where we explicitly model quotas.

38 Ignoring a small number of zero values.

Table A 8: Trade weighted average reductions in trade costs of goods NTMs for New Zealand, scenarios 1-3 (per cent)*

Sector	Scenario 1		Scenario 2		Scenario 3	
	Imports	Exports	Imports	Exports	Imports	Exports
Rice	1.4	n.a.	2.8	n.a.	3.9	n.a.
Fruit & Vegetables	1.5	1.8	3.1	3.7	4.7	5.4
Sugar	1.0	0.6	2.1	1.1	3.6	2.4
Other Crops	0.8	1.0	1.5	2.0	2.4	3.1
Cattle & sheep	0.8	0.8	1.5	1.6	1.9	2.0
Other Animals	0.5	0.9	1.0	1.8	1.7	2.8
Wool	0.7	3.0	1.3	6.0	2.4	7.3
Beef & Sheep meat	1.3	2.6	2.5	5.3	4.3	7.4
Other Meats	2.0	1.8	3.9	3.6	5.8	5.4
Dairy	0.6	1.4	1.2	2.7	3.2	4.8
Other processed foods	1.0	1.1	1.9	2.2	3.4	3.6
Beverages & tobacco	0.3	0.3	0.7	0.7	1.9	1.9
Forestry, wood and paper	0.2	0.3	0.5	0.6	0.8	1.0
Fisheries	2.0	0.8	4.1	1.5	5.8	3.1
Extractive	0.2	0.1	0.4	0.2	0.8	0.6
Textiles	0.1	0.1	0.1	0.1	0.3	0.3
Apparel & leather	0.2	0.2	0.4	0.4	0.9	0.9
Motor Vehicles	1.5	1.1	2.9	2.1	3.8	2.7
Electronics	0.2	0.2	0.5	0.3	0.9	0.7
Other Machinery	0.3	0.1	0.5	0.3	1.1	0.7
Other Manufactures	0.1	0.1	0.2	0.1	0.4	0.4
Chemicals, rubbers and plastics	0.3	0.3	0.6	0.6	1.2	1.4
Mineral Products	0.0	0.0	0.0	0.0	0.1	0.1
Metal Products	0.0	0.0	0.0	0.1	0.1	0.3

** Weighted by 2011 base year trade flows.*

While we believe the NTM estimates we use are the best available for the current study, they may be regarded as preliminary and this remains an emerging area of research. In addition to the evolving nature of estimating NTMs, there remains considerable uncertainty about exactly what level of reductions in NTM costs may be achieved through implementation of agreements such as the CPTPP. Thus, caution is appropriate when assessing the results of liberalisation of these barriers.

Services NTMs

The CPTPP is expected to be a deep trade agreement, going beyond goods trade and including reductions to services NTMs. In this report, we employ services barrier estimates from the French research organisation CEPII. CEPII (Fontagné et al. 2011), updated in Fontagné et al.

(2016), estimates for each GTAP sector, barriers to GATS mode 1 services trade, that is cross border services barriers. These estimates are a good match to the GTAP sectors and the GTAP services trade data, which are restricted to mode 1 services trade. However, the CEPII estimates are aggregate econometric estimates that do not discriminate between services barriers that are actionable through trade negotiations and those which are in place for reasons such as health and safety. As with goods NTMs, caution is recommended when assessing the results of liberalisation in this area—recognising not all barriers are actionable within an FTA negotiation. Research by ECORYS on a proposed US and EU FTA and barriers to services trade indicated that fifty per cent or less of services NTMs were actionable within an ambitious FTA negotiation (Berden et al., 2015). Therefore, for each scenario, we identify a benchmark NTM estimate within our group of members as the target NTM level in services against the other CPTPP members are compared.[39] Practically, this is done by calculating quintiles for each sector and comparing a country against the benchmark—if the country has NTM estimates higher than the benchmark countries, we project they must reduce barriers to services trade *in that sector*. Each of the three scenarios in this report assumes a different benchmark. First, we disregard the best quintile, since few FTAs have been able to achieve aggressive reductions in services NTMs. We then disregard the worst quintile, since it reduces to the trivial case of few, if any reductions to services NTMs. The remaining three quintiles are used as benchmarks for each scenario, the best quintile (targeting the lowest services barriers in the region) being Scenario 3. The median is Scenario 2, and the lowest is Scenario 1. Each quintile is calculated, then we identify an actual country which is closest to the quintile value and we apply that as the benchmark.[40]

Table A 9 includes the results of these data and calculations for New Zealand's exports to CPTPP partners for each scenario. New Zealand's CPTPP market access for its exports in services under Scenario 1 are relatively low, with the largest trade weighted reduction in services NTMs it receives from other CPTPP members being 1.6 per cent on government services. Under Scenario 2, the moderate scenario, there are significant cuts to construction services NTMs in the CPTPP region, with the ad valorem equivalent reduction in construction services NTMs approximately 25 percentage points. Business and financial services cuts are also significant in Scenario 2, about 5 percentage points. In Scenario 3, the most ambitious scenario, the result of targeting some of the lowest services NTMs in the region as the benchmark can be seen. Scenario 3 reductions in services NTMs range from 30.2 percentage points in construction to 4.7 percentage points in trade and communication services. Notably,

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39 Benchmarking means that we do not target a zero level of services barriers in any case. This recognises the best performers as the best outcome of the negotiations. In the case of bi-lateral agreements, it is possible to simply reduce the barriers by a fixed percentage. In a regional agreement, with 11 members, the fixed percentage approach neglects the harmonisation of rules that are the goal of negotiators—some countries cut more than others depending on their original level of barriers. Some countries may not be required to make substantial cuts if their services barriers are already low.

40 The use of an actual country estimate of services NTMs ensures that the results are not simply a mathematical possibility, but reflect the reported estimate of a service NTM applied in the region as a benchmark.

per our data, New Zealand's largest service export air and other transport services, has an 11 percentage point reduction in services NTMs in the CPTPP region.

Table A 9: CPTPP partners' average reduction in services NTMs

Sector	New Zealand exports to CPTPP partners (Million US$, 2011)	Reduction in services NTM (%) (average ad valorem equivalent by all CPTPP partners)		
		Scenario 1	Scenario 2	Scenario 3
Air and other transport	1,024	0.1	1.2	11.0
Construction	4	1.5	24.6	30.2
Government services	285	1.6	2.4	14.2
Business and financial services	649	0.3	5.5	14.7
Trade and communication	703	0.5	0.6	4.7

Source: Services trade data from the GTAP V9 Database. Estimates of services NTM reductions are the Authors' calculations based on CEPII 2016 updated services NTMs.

In contrast to New Zealand's market access to other CPTPP members, New Zealand is not required to reduce its services barriers by more than two percentage points in any scenario.[41] This is because New Zealand ranks among the lowest barriers in services among the CPTPP countries.

We phase in the reduction to and services NTMs over the first ten years of the agreement. This recognises that commitments in the agreement are likely to require refinement by committees and implementing legislation, since barriers are complex.

Trade facilitation

The CPTPP is assumed to reduce customs clearance times by 7.5 per cent in Scenario 2 and 15 per cent in Scenario 3, over 5 years. Customs clearance times are obtained from the World Bank Doing Business (2016) Trading Across Borders Data. Improvements in customs clearance times, as a result of the trade facilitation (measured in days), are then converted to tariff equivalents by employing Hummels et al. (2007), which found that a one-day reduction in trade time was roughly equivalent to a one per cent reduction in import tariffs in influencing importer preferences on where to source traded goods. These time to trade estimates differ by commodity. The tariff equivalents are then divided into two parts, with half being applied as changes in consumers' willingness to pay for faster delivery of goods (Walmsley and Minor,

41 The New Zealand construction sector is projected to reduce its barriers to services trade by 1.43 percentage points in Scenario 3. All other sectors require a cut of less than one percentage point.

2015); and half as an iceberg productivity gain to the importing country. The apportioning of the shock across the two mechanisms reflects the fact that faster delivery of good increases consumers' willingness to pay and may also reduce the physical loss of goods as they wait in customs.

Investment NTMs

We model reductions to foreign direct investment NTMs using productivity shocks obtained from the USITC (USITC, 2016). Following discussions with Marinos Tsigas (USITC) and Csilla Lakatos (World Bank), we adjust the average productivity shocks provided in the report in two ways to obtain sector- and country- specific productivity shocks due to the liberalisation of NTMs on FDI:

- The region specific average productivity shocks provided by the USITC are estimated prior to the US leaving the TPP. Hence, we first need to remove the share that can be attributed to the US by adjusting for their share of foreign investment in each of the CPTPP countries. The FDI shares are taken from the GTAP FDI database (Lakatos and Walmsley (2011) and Gouel, Guimbard and Laborde (2012)). This substantially reduces the shocks, since the US is an important source of foreign investment.

- Since the productivity shocks are regional averages, they are converted into sector specific productivity shocks by taking into account the share of foreign ownership in the sector and the USITC's estimates of investment restrictiveness and how these are impacted by the TPP.

- Finally, we also adjust these shocks to remove inherent capital accumulation included in the productivity estimates, since our model captures this separately.

The shocks indicate that gains are expected in most sectors in New Zealand and Canada, while in other countries the gains are likely to be more focused on specific sectors, particularly services (Table A 10). Given the extent of the adjustments required, we have some reservations about these estimates. While the allocation of the productivity gains from the removal of investment NTMs across sectors is believed to be in line with the USITC estimates, it is difficult to assess the extent to which the average productivity shock should be reduced due to the removal of the US from the agreement and the dynamics. In general, we have chosen to be conservative.

Table A 10: Annual changes in sectoral productivity by country due to liberalisation of FDI NTMs based on USITC (2016), Scenario 3*

	New Zealand	Australia	Brunei	Canada	Chile	Japan	Malaysia	Mexico	Peru	Singapore	Vietnam
Agriculture	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0117	0.0000
Processed food	0.0365	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Manufactures	0.0799	0.0000	0.0000	0.0001	0.0000	0.0000	0.0369	0.0004	0.0000	0.0000	0.0000
Services	0.0797	0.0025	0.3310	0.0003	0.0000	0.0000	0.1370	0.0140	0.0001	0.0023	0.0037

** Half of these productivity shocks are applied in Scenario 2.*

Source: Based on USITC (2016) data