



Modelling Asian trade integration

Research paper

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The Productivity Commission

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Acknowledgments

This paper updates and extends earlier trade policy modelling undertaken by the Productivity Commission in its 2017 report *Rising Protectionism: Challenges, Threats and Opportunities for Australia*, which explored various then contemporary trade policy issues.

This updated work involved close collaboration with the East Asian Bureau of Economic Research (EABER) at the Australian National University. The work benefited from a work-in-progress seminar held with the EABER and the Australian Department of Foreign Affairs and Trade. The Commission is grateful to all participants to the study for their valuable input.

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1. Introduction

As the influence of geopolitics on trade increases, it is essential that trade and industry policymakers do not lose sight of the economic impacts of their decisions.

Economic modelling is critical to measuring and evaluating those impacts.

This paper illustrates the important role that modelling should play in policymaking by assessing the potential effects of removing tariffs under major trade agreements, particularly in Asia.¹

Tariff reductions are a relatively small part of modern trade agreements. However, the point of this paper is not to comprehensively assess the economic merits of the agreements, but to highlight the insights that policymakers gain from this type of modelling.

Trade agreements have complex, interrelated consequences that modelling is designed to explain. For example, the modelling in this report shows that some of the effects of removing a tariff depend on whether partner economies compete in the same global markets or complement each other. Given the interdependence of the trade system, action on one trade route can also affect third economies. Global trade modelling of the type used in this paper clarifies and explains such effects.

Though limited to the effects of removing tariffs, the modelling in this report also provides some policy insights. The simulations show consistently that reducing an economy's tariffs results in increased activity (real GDP). This increased activity results primarily from improved resource allocation within the economy that reduces its tariffs. There are further benefits from increased market access to their partners' markets. This increase in production benefits mainly domestic and foreign owners of capital (as increased output requires more capital input) with the bulk of additional income accruing to foreigners – thus national income (real GNP) grows less than production (real GDP). These effects are largest for economies such as India and Indonesia, where tariffs are relatively large.

The estimates abstract from the compliance costs that are associated with the complexity of tariff systems. The Productivity Commission investigated these types of costs in a recent report on *The Nuisance Cost of Tariffs* (2022). Modelling the effects of removing these additional transaction costs would add to the benefits that are included in this report.

1.1 Modelling approach

The scenarios examined in this paper anchor to two broad agreements: the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership Agreement (RCEP).

¹ This paper arises from a collaboration between the Productivity Commission (PC) and the East Asian Bureau of Economic Research (EABER). It is an input into a broader regional capability development project designed to analyse the effects of greater integration between Asian economies.

This paper starts with a database representing the global economy as it stood in 2017. From this starting point, it models two very simple tariff reduction scenarios to obtain a new database:

- the formation of CPTPP
- the formation of RCEP.²

The cumulative result of these scenarios produces a new model database that represents a global economy with the preferential tariff structure implied by these agreements in place. Specifically, tariffs among members of the two agreements are all zero, and the allocation of resources is consistent with that tariff regime. This new database forms the starting point for each of the following scenarios in turn:

- What if India joined RCEP?
- What if South Asia joined RCEP?³
- What if the United Kingdom (UK) ratified CPTPP?
- What if China joined CPTPP?
- What if the United States (US) joined CPTPP?
- What if CPTPP and RCEP were combined?
- What if the proposed Indo-Pacific Economic Framework (IPEF) covered trade liberalisation?⁴
- What if Australia removed unilaterally all its remaining tariffs?

The report only models the effects of reducing tariffs on goods. It abstracts from the effects of all other influences and all the other aspects of a modern agreement, including, for example non-tariff barriers on trade in goods, trade in services, and the movement of investment and labour across borders, as well as any pre-conditions that each economy needs to meet for accession.

The report also abstracts from issues of timing – it is purely a comparative-static exercise which describes how the global economy is different under a different tariff regime – this is not meant in any dynamic sense, but rather shows ‘how different would the economy be if tariffs differed from the levels recorded in the database’.

The results isolate the effects of the modelled shocks on the allocation of resources across industries and across economies and exclude any possible further so-called dynamic effects that they might have on economic growth – other than how much greater or smaller a sector or an economy might be as a result of the modelled shocks, as capital and labour are reallocated across industries and capital reallocated across countries, in response to changes in relative returns.

The modelling approach concentrates on tariff reductions, which are only a small part of modern agreements. Further work is imperative to estimate the effects of many other clauses that agreements include. Reports such as *Bilateral and Regional Trade Agreements* (PC 2010) and *Global Gains from Liberalising Trade in Telecommunications and Financial Services* (Verikios and Zhang 2001) provide good illustrations of what is required to research and model other aspects of an agreement.

The structure of this paper is as follows. Chapter 2 provides an overview of the international trading environment and of the trade agreements modelled. Chapter 3 provides an overview of the eight scenarios modelled. Chapters 4 to 11, respectively, present the results from each of the eight scenarios listed above. Chapter 12 summarises the findings of these eight scenarios. The appendix to this paper provides an overview of the PC Global model used in the report and more information on the scenarios modelled.

² Chapter 2 details the membership of CPTPP and RCEP and provides an overview of the agreements.

³ South Asia is used here as a shorthand way of referring to Bangladesh India, Pakistan and Sri Lanka. It does not include Afghanistan, Bhutan, Maldives and Nepal that are conventionally included in South Asia.

⁴ The proposed IPEF agreement involves Australia, Brunei, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Thailand, United States and Vietnam (chapter 2).

2. The international trading environment

This chapter provides a brief overview of the trade agreements covered in the remainder of this paper. It focuses on three agreements to which Australia is a party, two of which have been negotiated and are in force and a third that is being negotiated:

- CPTPP
- RCEP
- IPEF.

There is substantial overlap between agreements, both in terms of their membership (table 2.1), but also in terms of the commitments made. Six economies – Australia, Brunei Darussalam (Brunei), Malaysia, New Zealand, Singapore and Vietnam – are parties to all three agreements.

Table 2.1 – Trade agreements examined

Trade agreement	No. of members	Status	Current members
CPTPP^a	11	Came into force 8 March 2018	Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam
RCEP	15	Came into force 1 January 2022	Australia, Brunei, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Philippines, Singapore, South Korea, Thailand and Vietnam
IPEF	14	Under negotiation (commenced 9 September 2022)	Australia, Brunei, Fiji, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Thailand, United States and Vietnam

a. Excludes the UK, which is in the process of ratifying the agreement (effects of ratification examined in chapter 6).

The chapters that follow examine, illustratively, the contribution of tariff reductions to the effects of specific economies acceding to these agreements.

The remainder of this chapter discusses these agreements in the order that they became operational. The agreements are all centred on the Asia-Pacific region. The agreements get progressively broader, covering increasing shares of global Gross Domestic Product (GDP), population and trade. They are all modern trade agreements in the sense that they cover significantly more than barriers to commodity trade and market access.

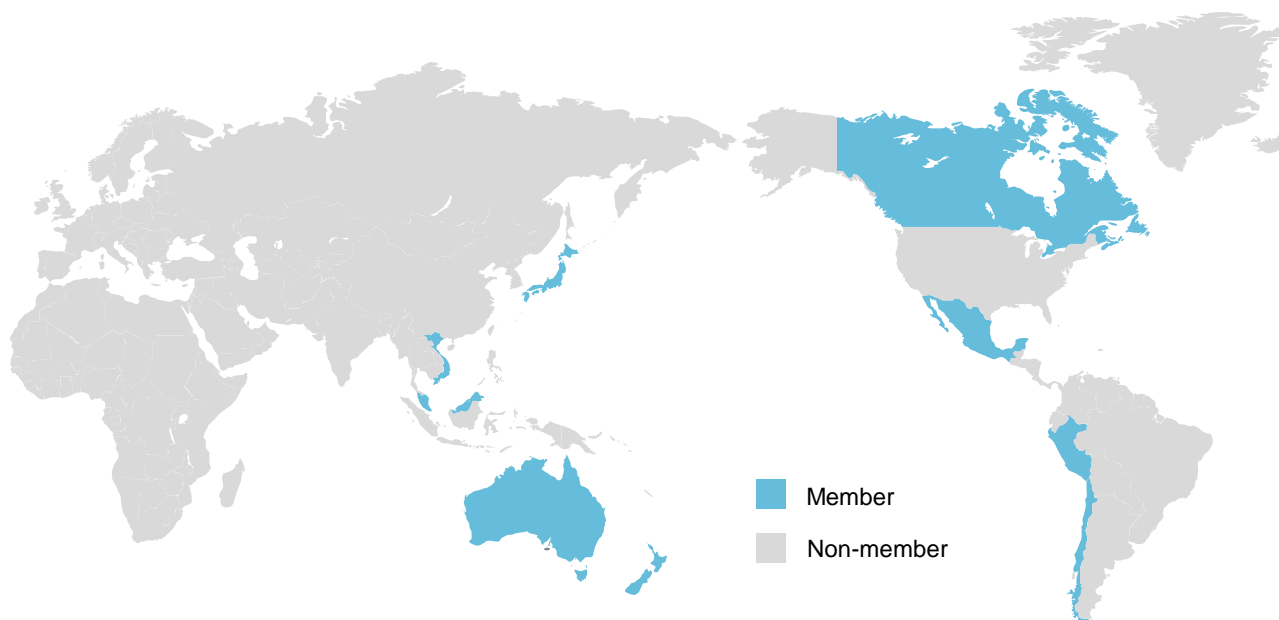
2.1 Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)

The CPTPP grew out of the previously negotiated Trans Pacific Partnership (TPP) after the United States formally withdrew from that agreement in January 2017 (DFAT 2023a). This meant that the TPP could not be ratified as required for it to enter into force.

The remaining 11 Pacific Rim economies came together and negotiated the CPTPP. It incorporates many of the provisions of the TPP by reference to the original agreement, although it modifies others.

The CPTPP is a free trade agreement between Australia and 10 other countries: Canada and Mexico from North America; Chile and Peru from South America; New Zealand; and five east and south-east Asian countries (Brunei, Japan, Malaysia, Singapore and Vietnam) (figure 2.1).

Figure 2.1 – CPTPP membership^a



a. Excludes the UK, which is in the process of ratifying the agreement.

The agreement came into force for Australia, Canada, Japan, Mexico, New Zealand and Singapore on 30 December 2018. The agreement progressively came into force in the five remaining economies over the next five years, with Brunei being the last on 12 July 2023.

The agreement will, when fully implemented, eliminate 98% of tariffs within a trade zone that has a combined GDP of US\$12 trillion (11% of world GDP) and a population of over 500 million people (6% of world population), with two-way trade in excess of US\$8 trillion (14% of world trade) (World Bank 2023). Australian two-way trade with CPTPP members was A\$230 billion in 2021-22 (25% of Australian trade) (DFAT 2023b).

The United Kingdom has formally applied to join the CPTPP (Farrell and Ayres 2023). This was agreed to with the 11 existing members and the United Kingdom signed the Accession Protocol on 16 July 2023.⁵ The agreement will come into force for the United Kingdom once they and all the CPTPP members complete their

⁵ As it is yet to come into force, the United Kingdom is not included as a member of the CPTPP in this paper. Its ratification is examined in chapter 6.

respective ratification processes. If all members have not ratified by 16 October 2024, the Accession Protocol will enter into force after six CPTPP members and the United Kingdom ratify the Agreement.

The aim of the CPTPP is to reduce trade barriers and facilitate trade between member economies. It covers virtually all aspects of trade and investment. The Agreement features market-access commitments relating to trade in goods, services, investment, labour mobility and government procurement (box 2.1). The agreement also establishes clear rules that help create a consistent, transparent and fair environment to do business in CPTPP markets, with dedicated chapters covering key issues like technical barriers to trade, sanitary and phytosanitary measures, customs administration, transparency and state-owned enterprises.

Box 2.1 – What does the CPTPP cover?

The CPTPP is broad ranging and covers:

Trade in goods: Eliminates tariffs and reduces barriers for 98% of exports to CPTPP members.

Rules of origin and origin procedures: Businesses benefit from clear rules that determine which goods are considered originating and streamlined procedures that establish obligations for importers, exporters and producers. Companies can approach the customs administration in the market they are targeting to receive an advance ruling on the origin of their product.

Customs and trade facilitation: Members are working to keep customs procedures simple, effective, clear and predictable. This reduces processing times at the border and makes it easier to move goods.

Regulatory cooperation and conformity assessment: Helps reduce unnecessary regulatory requirements. It also includes measures that make it easier to do business in the Indo-Pacific.

Government procurement: Companies in member economies will receive the same treatment as domestic suppliers when bidding on government procurement opportunities in CPTPP members.

Trade in services and labour mobility: Increases predictability and eliminates many barriers encountered at the border, such as quotas and labour market tests, making it easier for business persons to travel for business or work temporarily in CPTPP member.

Investment: Provisions designed to increase certainty, stability and protection for investments and secure access to Indo-Pacific markets.

Intellectual property: Establishes a regional standard for intellectual property protection and enforcement in the Indo-Pacific, providing creators and innovators with a transparent and predictable framework for operating in CPTPP member.

Labour and the environment: Includes clear commitments to uphold CPTPP members' respective standards on labour and the environment and not to undermine them for commercial gain.

Inclusive trade: Advances an inclusive approach to trade with provisions to ensure the benefits of trade are more widely shared, including with under-represented groups such as women, SMEs and Indigenous peoples.

Source: Based on Government of Canada (2023).

2.2 Regional Comprehensive Economic Partnership (RCEP)

RCEP is a modern and comprehensive free trade agreement between Australia and 14 other Indo-Pacific economies (figure 2.2). It arose from negotiations between the members of the Association of Southeast Asian Nations (ASEAN) and their free trade agreement partners that commenced in November 2012.⁶ RCEP was signed on 15 November 2020 (DFAT 2023a).

Figure 2.2 – RCEP membership



The agreement came into force for Australia and nine other countries (Brunei, Cambodia, China, Japan, Laos, New Zealand, Singapore, Thailand and Vietnam) on 1 January 2022. Another four countries have since joined RCEP (Indonesia, Malaysia, Philippines and South Korea).

India withdrew from RCEP negotiations in November 2019. India is free to commence RCEP accession negotiations at any time.

There is a significant overlap in membership between RCEP and CPTPP. Seven economies – Australia, Brunei, Japan, Malaysia, New Zealand, Singapore and Vietnam – are signatories to both agreements.

RCEP is the world’s largest free trade agreement, with its members having a combined GDP of US\$29 trillion (29% of world GDP) and a population of 2.3 billion people (29% of world population), with two-way trade of US\$15 trillion (25% of world trade) (World Bank 2023). Australian two-way trade with RCEP members was just over \$600 billion in 2021-22 (67% of Australian trade) (DFAT 2023b).

The agreement seeks to broaden and deepen economic integration in the region, strengthen economic growth and equitable economic development and advance economic cooperation. It seeks to do this by establishing clear and mutually advantageous rules to facilitate trade and investment, including participation in regional and global supply chains. It also reinforces ASEAN’s regional leadership role.

⁶ ASEAN commenced in August 1967 and currently has 10 members: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

RCEP seeks to respond to the proliferation of bilateral trade agreements in the Asia-Pacific region in recent years by simplifying the region's trade architecture through harmonising the rules governing trade between members.

The agreement includes chapters on trade in goods, trade in services, investment, economic and technical cooperation and creates new rules for electronic commerce, intellectual property, government procurement, competition and small and medium sized enterprises (box 2.2).

Box 2.2 – What does RCEP cover?

RCEP seeks to broaden and deepen economic integration in the Asia-Pacific region, strengthen economic growth and equitable economic development and advance economic cooperation. It seeks to do this by establishing clear and mutually advantageous rules to facilitate trade and investment, including participation in regional and global supply chains.

RCEP is a modern trade agreement that it is broader than just trade. It contains 20 chapters that cover: trade in goods; rules of origin; customs procedures and trade facilitation; sanitary and phytosanitary measures; standards, technical regulations and conformity; trade remedies; trade in services; temporary movement of natural persons; investment; intellectual property; electronic commerce; competition; small and medium enterprises; economic and technical cooperation; government procurement; general provisions and exceptions; institutional provisions; and dispute settlement.

The primary focus of RCEP is to simplify the region's trade architecture by harmonising the rules governing trade that have evolved from the proliferation of bilateral trade agreements in the Asia-Pacific region. Trade liberalisation was central to these earlier agreements (particularly the five 'ASEAN Plus One' agreements). RCEP seeks to harmonise the rules.

In its inquiry into RCEP, the Australian Joint Standing Committee on Treaties concluded that:

RCEP is not a particularly ambitious trade agreement, and in terms of market access does not deliver much in the way of additional benefit for Australia. RCEP's significance, however, lies in the broad composition of its membership ... its reinforcement of ASEAN's regional leadership role, and its simplification and harmonisation of rules of origin and other trading standards which should facilitate growing supply-chain integration.

In particular, RCEP contains a single set of rules and procedures for Australian goods exporters to utilise RCEP's preferential tariff outcomes across the region, and increases opportunities for Australian business to access regional value chains.

Similar benefits apply to trade in services, investment, intellectual property and electronic commerce.

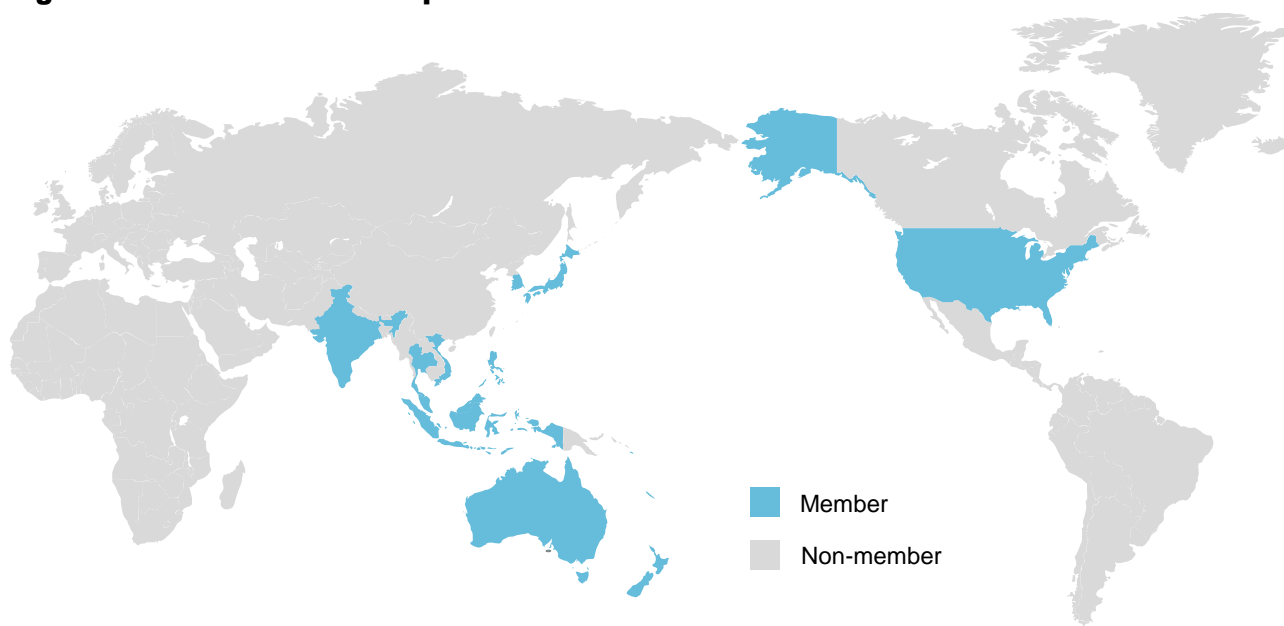
RCEP seeks to, among other things, provide a consistent set of rules for exporters and importers to access tariff preferences with other RCEP economies. It also allows producers in other RCEP countries to count Australian inputs towards qualification for tariff preferences when exporting to third countries within RCEP.

Source: Joint Standing Committee on Treaties (2021).

2.3 Indo-Pacific Economic Framework (IPEF)

Formal negotiations to form IPEF commenced on 23 May 2022 between the United States and 13 Indo-Pacific nations: Australia, Brunei, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Thailand and Vietnam. Fiji subsequently joined the negotiations in May 2023 (figure 2.3). The main differences in membership between IPEF and RCEP is that IPEF includes the United States and India but not China.

Figure 2.3 – IPEF membership



The 23 May 2022 Joint IPEF Statement outlines the aspirations that underpin the negotiations. The framework is seeking to:

... advance resilience, sustainability, inclusiveness, economic growth, fairness, and competitiveness for our economies. Through this initiative, we aim to contribute to cooperation, stability, prosperity, development, and peace within the region. (23 May 2022 Joint Statement)

It goes on acknowledging that:

... the economic policy interests in the region are intertwined, and deepening economic engagement among partners is crucial for continued growth, peace, and prosperity. (23 May 2022 Joint Statement)

It is hoped that IPEF will complement and build on existing regional architecture and support the global rules-based trading system.

The need for such an agreement arose out of the Covid-19 pandemic, which highlighted the importance of strengthening economic competitiveness and cooperation, securing critical supply chains, stimulating job growth and improving economic opportunities for vulnerable groups.

The economies negotiating IPEF have a combined GDP of roughly US\$40 trillion (40% of world GDP) and a population of over 2.5 billion people (32% of world population), with two-way trade in excess of US\$15 trillion (25% of world trade) (World Bank 2023). Australian two-way trade with IPEF members was almost A\$430 billion in 2021-22 (47% of Australian trade) (DFAT 2023b).

The framework is currently under negotiation and seeks to build cooperation and economic integration in the Indo-Pacific. It includes four core pillars that were formed at different times:

1. trade, including digital trade
2. supply chains
3. clean energy, decarbonisation and infrastructure
4. tax and anti-corruption (box 2.3).

Participation in all four pillars is not required to join IPEF.

Box 2.3 – What does IPEF cover?

The IPEF discussions are based on four pillars.

Trade: The aim is to build high-standard, inclusive, free and fair trade commitments and develop new and creative approaches in trade and technology policy that advance a broad set of objectives that fuels economic activity and investment, promotes sustainable and inclusive economic growth and benefits workers and consumers. The discussions also include cooperation in the digital economy.

Supply chains: The discussions seek to improve transparency, diversity, security and sustainability in member supply chains to make them more resilient and better integrated. The aim is to coordinate crisis response measures; expand cooperation to better prepare for and mitigate the effects of disruptions to better ensure business continuity; improve logistical efficiency and support; and ensure access to key raw and processed materials, semiconductors, critical minerals and clean energy technology.

Clean energy, decarbonization and infrastructure: In line with the goals of the Paris Agreement and efforts to support the livelihood of residents and workers, the discussions plan to accelerate the development and deployment of clean energy technologies to decarbonize member economies and build resilience to climate impacts. This involves deepening cooperation on technologies, on mobilizing finance, including concessional finance, and on seeking ways to improve competitiveness and enhance connectivity by supporting the development of sustainable and durable infrastructure and by providing technical assistance.

Tax and anti-corruption: The discussions seek to promote fair competition by enacting and enforcing effective and robust tax, anti-money laundering and anti-bribery regimes in line with existing multilateral obligations, standards and agreements to curb tax evasion and corruption in the Indo-Pacific region. The discussions involve sharing expertise and seeking ways to support capacity building necessary to advance accountable and transparent systems.

Source: DFAT (2022).

3. Overview of the modelling scenarios

Key points

- * All the scenarios in this paper are run using the PC Global model of the world economy.
- * The initial model database was updated to reflect two recent trade agreements (CPTPP and RCEP). The resulting database represents the starting point for all subsequent simulations in this paper.
- * A series of scenarios explore a range of possible trade policy scenarios that build on the existing international trading environment.
- * The comparative-static modelling results represent the impact of each scenario after the global economy has adjusted to the impacts of the policy changes being examined. The assumptions of fixed aggregate employment in each region and the assumption of international and domestic capital mobility give the results a distinct long-run flavour.
- * The assumption of international capital mobility means that the effects on national income (real Gross National Absorption) in each region may differ from national production (real GDP).

Two broad types of modelling simulations were undertaken.

- First, to update the model database to include two recent trade policy developments (section 3.1). The resulting updated model database represents the starting point for all the subsequent simulations presented in this paper.
- Second, a range of possible future trade policy scenarios that explore potential implications of possible developments in the international trading environment.

3.1 Updating of the model database

The starting database for the PC Global model is version 11 of the Global Trade Analysis Project (GTAP) database, which has a reference year of 2017 (Aguilar et al. 2022). GTAP is a global Computable General Equilibrium (CGE) model of the world's major economies. Adjustments were made to this database to, among other things, introduce bilateral capital income flows between regions (described in the appendix to this paper). The starting GTAP database pre-dated the implementation of the CPTPP and RCEP trade agreements that are currently operational.

To overcome this, the PC Global model database was updated to stylistically include these two trade agreements. This involved:

- each member of CPTPP removing all tariffs on goods imports from other CPTPP members and
- each member of RCEP removing all tariffs on goods imports from other RCEP members.⁷

This scenario does not involve members of CPTPP removing tariffs from those members of RCEP that are not members of CPTPP (and vice versa) (figure 3.1). So, for example, China, which is a member of RCEP but not of CPTPP, continues to levy tariffs on goods imports from Canada, which is a member of CPTPP but not RCEP.

Figure 3.1 – Overview of membership of CPTPP and RCEP

		CPTPP [11 members]	
		Members of both	Not members of both
RCEP [15 members]	Members of both	Australia (aus) Brunei (brn) Japan (jpn) Malaysia (mys) New Zealand (nzl) Singapore (sgp) Vietnam (vnm)	Cambodia (cam) China (chn) Indonesia (idn) Laos (lao) Myanmar (xse) Philippines (phl) South Korea (kor) Thailand (tha)
	Not members of both	Canada (can) Chile (chl) Mexico (mex) Peru (per)	

3.2 Trade policy scenarios modelled

This paper explores eight potential trade policy scenarios that build on the current global trading arrangements (table 3.1).

Each scenario involves the bilateral removal of all tariffs on goods trade in the model database for the economies concerned (between the joining economy(s) and all existing members of the agreement).

As PC Global is a comparative-static model, each trade-policy scenario represents a snapshot of the world economy after it has adjusted to the changes modelled. The modelling environment determines what adjustments occur and, hence, how the associated timeframe should be interpreted.

The chapters that follow discuss the results from each of these scenarios in turn (chapters 4 to 11). The concluding chapter draws together and summarises the results from these individual scenarios (chapter 12).

⁷ Goods in the PC Global database include all agricultural, mining and manufactured products (products 1 to 45). The definition of goods used in each simulation also includes, where relevant, tariffs levied on cross-border trade in electricity and gas distribution (products 46 and 47), which are typically classified as services.

Table 3.1 – Trade-policy scenarios modelled by the Commission^a

Chapter	Simulation	Specific policy changes modelled
Extension of RCEP		
4	What if India joins RCEP?	India eliminates all tariffs that it currently levies on goods imports from all RCEP members and that all RCEP members remove their tariffs on goods imports from India
5	What if South Asia joins RCEP?	Bangladesh, India, Pakistan and Sri Lanka eliminate all tariffs that they currently levy on goods imports from all RCEP members (and each other) and that all RCEP members remove their tariffs on goods imports from these four economies
Extension of CPTPP		
6	What if the United Kingdom ratifies the CPTPP?	The United Kingdom eliminates all tariffs that it currently levies on goods imports from all CPTPP members and that all CPTPP members remove their tariffs from goods imports from the UK
7	What if China joins the CPTPP?	China extends its RCEP commitments to goods imports from the four CPTPP members that are not part of RCEP (Canada, Chile, Mexico and Peru) and that these four CPTPP members remove their tariffs from goods imports from China
8	What if the United States joins the CPTPP?	The United States eliminates all tariffs that it currently levies on goods imports from all CPTPP members and that all CPTPP members remove their tariffs from goods imports from the US
9	What if CPTPP and RCEP were to combine?	All CPTPP members eliminate their tariffs on goods imports from RCEP members and all RCEP members remove their tariffs from goods imports from CPTPP members
Formation of IPEF		
10	What if IPEF is formed?	The 14 members of IPEF (Australia, Brunei, Fiji, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Thailand, United States and Vietnam) eliminate all tariffs on goods imports from IPEF members ^{a,b}
Unilateral action		
11	What if Australia removes all its tariffs unilaterally?	Australia unilaterally removes all its tariffs on goods imports

a. The results presented do not include the effects of Fiji's participation in IPEF, as Fiji forms part of the 'rest of Asia' region in the PC Global database, which includes many other economies that are not part of IPEF (such as Turkey, Israel, the United Arab Emirates, Afghanistan, Mongolia, Nepal and most economies in the Pacific Ocean). **b** Trade liberalisation is not currently part of IPEF (see chapter 2).

3.3 Modelling environment

Each scenario employs the same long-run modelling environment. It assumes that:

- aggregate employment, labour supply and population in each region remains fixed

- the owners of capital adjust their allocation between regions and industries in response to differences in relative rates of return
- the aggregate stock of capital owned by each region remains fixed.

The assumption of fixed aggregate employment means that changes in domestic economic activity translate into changes in real wages rather than in terms of changes in unemployment. This is characteristic of the long-run labour market assumption employed in many comparative-static CGE models. While aggregate employment is assumed to remain fixed within each region, employment at the industry level in that region varies in response to differences in wages growth compared to the growth in the prices of other primary factors of production (most notably the rental price of capital). All labour income is assumed to remain in the region in which it is generated (there is no international labour mobility or remittances).

International capital mobility means that the effects on national income (real GNP) in each region may differ from national production (real GDP). If the share of the capital stock in a region owned by residents of other economies increases, this entitles those owners (and the regions from which they come from) to a higher share of capital income produced in the region in which that production occurs.

The appendix to this paper provides additional information on the PC Global model, its database and the key elements of the modelling environment used.

3.4 Model results

The results are expressed in terms as percentage changes of the initial database variables. Most results are reported in real terms, that is in volume, in which case they represent the change in initial variable deflated with the relevant price deflator. For example, the change in the volume of exports is the change in the initial value of exports, net of any change in the price index of exports. Similarly, the change in real GNP represented the change in the value of Australian GNP in the initial database, net of any changes in the prices of its components (the weighted returns to labour, and of the returns to capital that Australians own, domestically and abroad).

Strictly speaking, the results are best interpreted as how different the structure of the economies and of global trade would be if the relevant tariffs were zero, rather than the levels that are recorded in the database.

Because the model is run in comparative static mode, results abstract from the passage of time. They cannot be interpreted as forecast, and represent only how variables are affected by the modelled shocks.

4. What if India joins RCEP?

Key points

- * India joining RCEP would represent a significant expansion in RCEP adding significantly to its output (as measured by GDP) and its population.
- * India has relatively high tariff rates in the model database. In most cases, these tariffs are appreciably higher than most other regions.
- * Consequently, Indian producers and consumers stand to benefit from appreciably cheaper imports as a result of India removing its tariffs.
- * Lower tariffs would increase trade flows between India and RCEP that would benefit both regions. These gains come at the expense of those economies that are not members of RCEP and give rise to some changes in the composition of Indian trade towards those goods that are now relatively cheaper.
- * The removal of tariffs on bilateral trade between India and RCEP leads to substantial growth in Indian output (real GDP). However, increased foreign investment in India, means that the growth in national income is smaller than for production.

4.1 Simulation background

The simulation involves India joining RCEP (chapter 3). This involves India removing its tariffs on goods imports from RCEP members and all RCEP members removing their tariffs on goods imports from India.

India's economic significance

India is the world's most populous country with 1.4 billion people (roughly 18% of the world's population) and an economy of US\$3.4 trillion (3.4% of world GDP) (World Bank 2023).

India joining RCEP would increase the GDP of RCEP by 12% and its population by 62%. This would represent a significant expansion in RCEP.

Indian trade

Roughly one-fifth of India's exports go to RCEP economies (21.1%) and one-third of India's imports come from the RCEP economies (35.4%) (table 4.1). Its main trading partners in the model database are the US, the European Union (EU), China and the two composite regions, Rest of Asia and Rest of Africa.

India has a diverse range of exports including business services, communications and manufactured exports including petroleum and chemical products. Its main imports include crude oil, metals, computer equipment and chemical products.

Table 4.1 – India’s goods trade with RCEP economies and the rest of the world (%)

Economy	Exports from India	Imports by India
Australia	1.84	3.49
Brunei	0.06	0.11
Cambodia	0.04	0.02
China	5.29	16.00
Indonesia	1.30	3.61
Japan	2.13	1.98
Laos	0.01	0.06
Malaysia	1.42	1.78
New Zealand	0.18	0.21
Philippines	0.53	0.21
Singapore	2.39	1.80
South Korea	1.83	3.43
Thailand	1.19	1.62
Vietnam	1.63	0.98
Rest of South-East Asia ^a	0.29	0.16
Rest of the World	79.86	64.53
Total	100.00	100.00

a. Includes Myanmar which is part of RCEP.

Source: PC Global model database.

Indian tariffs

India has relatively high average tariffs compared to the other regions in the PC Global model database (table 4.2).⁸ This reflects its limited participation in international free trade agreements. Apart from Bangladesh, Pakistan, Sri Lanka, Brazil and a couple of composite regions (Rest of America and Rest of Africa), India has the highest average tariff rate in the model database (5.78%), with an average tariff rate over twice that of China (2.15%).⁹

It is, therefore, unsurprising that India has higher average tariffs on imports from RCEP economies (4.96%) than RCEP does on Indian imports (2.63%) (table 4.2). This implies that, if India were to join RCEP, its domestic producers would face more competition from imports from RCEP economies than RCEP economies may face from Indian imports.

⁸ The tariff rates presented in this (and subsequent chapters) are average effective tariffs rates, which are calculated as imported duty divided by the cost, insurance and freight (CIF) value of imports for the set of goods traded internationally in PC Global. The duty and imports data are sourced from the GTAP version 11 database (appendix A). As a result, the tariff rates presented may differ from the statutory rates levied by product and region.

⁹ The average tariff rates in the model database are: 11.6% for Bangladesh, 10.2% for Pakistan, 9.6% for Sri Lanka, 8.6% for Brazil, 6.6% for Rest of America and 8.4% for Rest of Africa.

Table 4.2 – Average tariff rates on imports into India and into RCEP economies (%)^a

Exports from	Levied by			All countries
	India	RCEP	Rest of the World	
India	...	2.63	5.08	4.58
RCEP	4.96	...	4.41	2.35
Rest of the World	6.29	3.06	1.31	1.75
All countries	5.78	1.39	2.09	1.99

... Zero or less than ± 0.005 . **a.** Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

Indian tariffs vary substantially across RCEP member economies (table 4.3). Indian tariffs are highest in the model database for New Zealand, Australia and China (9.02%, 6.93% and 6.40%, respectively) and are appreciably higher than for most other RCEP members.

Only in a handful of RCEP economies, many of them developing economies, are RCEP tariffs on India higher than those levied by India.

Table 4.3 – Average tariff rates levied by and on India (%)^a

Economy	Levied by India	Levied on India
Australia	6.93	0.97
Brunei	...	0.04
Cambodia	4.12	4.69
China	6.40	3.55
Indonesia	4.34	2.21
Japan	3.55	0.44
Laos	0.50	3.39
Malaysia	2.52	1.96
New Zealand	9.02	2.82
Philippines	1.96	5.01
Singapore	1.48	...
South Korea	1.79	0.81
Thailand	3.06	3.68
Vietnam	3.76	6.11
Rest of South-East Asia ^b	0.59	1.45
Average (all countries)	5.78	4.58

... Zero or less than ± 0.005 . **a.** Import-weighted average tariff levied on goods imports. **b.** Includes Myanmar which is part of RCEP.

Source: PC Global model database.

4.2 Simulation results

India

The mutual removal of tariffs stimulates trade between India and RCEP members.

The elimination of India's relatively high level of tariffs will result in imported goods becoming appreciably cheaper in India. The price of imports falls by 1.86% (table 4.4).

Indian purchasers respond to this by switching their demand away from many Indian-made goods towards the now cheaper imported goods. This leads to growth in import demand and a reduction in domestic demand.

To pay for these increased imports, India needs to induce demand for its exports to restore balance in its external accounts. This requires Indian export prices to fall. Removing tariffs lowers the costs of inputs used in domestic production and encourages the expansion of domestic production and exports. As India runs a large current account deficit in the starting model database, India needs to increase its exports substantially. This requires a fall in export prices.

Table 4.4 – Aggregate impacts of India and RCEP removing import tariffs bilaterally (%)

	India	RCEP	Rest of the World	World
Real GDP	0.19	0.03	-0.01	...
Real GNP	0.05	0.01	...	...
Real GNA	-0.08	0.02	-0.01	...
Export volumes	6.48	0.08	0.11	0.12
Import volumes	4.04	0.19	0.06	0.12
Domestic demand	-0.19	0.01	-0.03	-0.02
Real wages ^a	0.58	0.04	0.01	0.02
Rate of return to capital	0.22	0.03	0.03	0.03
Capital used	0.41	0.05	-0.02	...
Export prices	-0.63	0.09	-0.04	...
Import prices (inc. tariffs)	-1.86	-0.02	-0.08	-0.06
Import prices (exc. tariffs)	0.06	0.02	-0.01	...
Terms of trade ^b	-0.69	0.07	-0.03	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

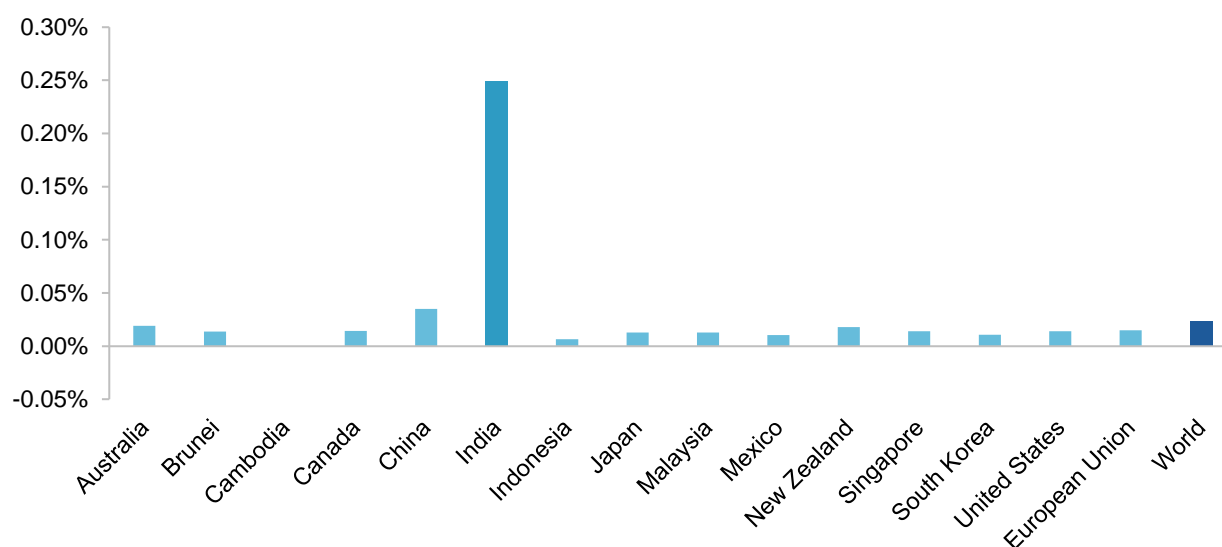
Source: Commission estimates using the PC Global model.

This increase in Indian output and exports requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for Indian workers (0.58%). The additional demand for capital in India drives up its rate of return relative to other economies (figure 4.1).

This relatively higher growth in the rate of return leads to India investing more of its own capital stock in India and to the increased use of foreign-owned capital in Indian production, leading to 0.41% additional capital used in Indian production. As Indian foreign investment abroad is small relative to its investment in India (93% of the Indian capital stock in the model database is owned by India), the bulk of the additional capital used in Indian production comes from abroad.

The resulting increase in Indian output leads to a 0.19% increase in Indian real GDP (Indian production).

The increased use of foreign capital means that foreign investors receive much of the increase in Indian production. This means that the 0.05% increase in Indian real GNP (real national income) is less than its increase in real GDP.

Figure 4.1 – Change in the rate of return on capital, selected economies

Source: Simulation results.

The purchasing power of this increase in real national income (real GNA) declines slightly (0.08%). This reflects the relatively larger falls in export prices relative to import prices (excluding tariffs) that are needed to restore external balance.

The long-run assumption that international capital is perfectly mobile is a relatively extreme assumption and, if it were to occur, would play out over many years. In the short- to medium-run, capital stocks are usually fixed or sticky across industries and economies. Sticky capital stocks would constrain the growth in Indian production (real GDP) as they would make it more difficult for industries to expand. They would also limit the inflow of foreign capital, thereby reducing the differences between national production and national income.¹⁰

Consequently, the long-run assumption of perfect international mobility of capital stocks can be seen as providing a lower bound on the impacts on Indian real national income.

The results for Indian national production and national income under this scenario are clearly sensitive to the extent of foreign capital inflows that occur in response to the bilateral removal of tariffs by India and RCEP. Given this, it would be worthwhile to carefully scrutinise the Indian trade and capital data in the database to ensure that they provide an accurate representation of the Indian economy before placing too much weight on the model results.

Existing RCEP members

RCEP collectively experiences increased real output and income from the bilateral removal of tariffs between India and RCEP, reflecting the complementarity between the economies of RCEP and India. However, the increase is quite small compared to India's gain (table 4.4).

The reduction in Indian tariffs causes an increase in trade between India and RCEP. There is also a slight shift in the composition of Indian trade away from services and towards those goods whose prices have fallen because of the lower tariffs.

¹⁰ While constraining quantity responses, sticky capital would imply larger changes in the rate of return.

The impacts of the bilateral removal of tariffs on individual RCEP member economies varies (table 4.5). Whether a member economy will be better or worse off depends on their trade viz-a-viz India. Economies that export goods that are complementary with India's imports benefit from the expansion of India's domestic production. Conversely, economies that compete with India in world markets reduce their production – as is the case for Cambodia and Indonesia. International capital mobility amplifies this negative effect as some capital from those economies that are adversely affected relocate to India where it can earn a higher rate of return, thereby further reducing output in economies that compete with India.

Rest of the world

The rest of the world incurs small losses when India joins RCEP (table 4.4). The reduction in Indian tariffs causes a slight shift in the focus of Indian trade away from non-RCEP economies such as the United States and the EU towards RCEP. Consequently, the increase in trade between India and RCEP members (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion).

World economy

The bilateral removal of tariffs between India and RCEP has little effect on the world economy (table 4.4). The main effects are slight increases in the volumes of international trade. While the Indian economy is large relative to most other economies, it is relatively small as a share of global economic activity and international trade (exports and imports) plays an important but modest role in the Indian economy.

Table 4.5 – Impacts of India and RCEP removing import tariffs bilaterally (%)^a

	AUS	BRN	CAM	CHN	IDN	IND	JPN	KOR	LAO	MYS	NZL	PHL	SGP	THA	VNM	XSE
Real GDP	0.05	-0.01	-0.02	0.05	-0.01	0.19	-0.02	-0.01	-0.01	...	...	0.05	-0.03	0.05	0.06	-0.04
Real GNP	...	...	...	0.01	...	0.05	-0.01	...	...	0.02	...	0.03	-0.01	0.02	0.03	-0.02
Real GNA	0.09	0.02	-0.05	0.04	0.04	-0.08	-0.01	-0.01	...	0.04	0.01	...	-0.01	...	0.02	-0.07
Output: primary	0.41	0.01	-0.02	0.01	0.05	-0.06	-0.01	0.01	...	0.12	0.19	-0.04	-0.02	0.01	0.12	-0.01
Output: manufacturing	-0.20	-0.18	...	0.02	-0.07	0.64	-0.02	...	-0.09	-0.04	-0.01	0.13	-0.10	0.10	-0.06	0.04
Output: services	0.03	-0.01	-0.03	0.05	-0.02	0.22	-0.02	-0.02	-0.01	-0.03	-0.01	0.02	-0.01	0.04	0.05	-0.04
Export volumes	0.10	-0.02	-0.01	0.23	0.07	6.48	-0.04	-0.02	-0.01	-0.02	0.03	0.22	-0.06	0.18	0.14	0.04
Import volumes	0.40	0.03	-0.05	0.41	0.30	4.04	-0.03	-0.04	-0.01	0.01	0.06	0.08	-0.04	0.16	0.12	-0.09
Domestic demand	0.04	-0.01	-0.02	0.02	-0.04	-0.19	-0.02	-0.01	-0.02	-0.02	...	0.03	-0.03	0.02	-0.07	-0.02
Real wages ^b	0.01	-0.01	0.04	0.04	-0.01	0.58	-0.02	-0.02	-0.01	0.02	...	0.06	-0.02	0.07	0.22	-0.02
Rate of return to capital	0.03	0.02	0.02	0.05	0.01	0.22	0.02	0.02	0.01	0.02	0.02	0.03	0.02	0.03	0.07	0.01
Capital used	0.12	-0.01	-0.06	0.08	-0.02	0.41	-0.04	-0.03	-0.03	-0.04	...	0.07	-0.06	0.07	0.08	-0.10
Export prices	0.38	0.06	-0.02	0.14	0.24	-0.63	0.02	...	0.01	0.05	0.10	-0.02	...	-0.02	0.02	-0.06
Import prices (inc tariffs)	-0.01	0.01	-0.01	-0.03	-0.02	-1.86	0.03	0.02	...	-0.05	0.04	-0.03	...	-0.06	-0.15	...
Import prices (exc tariffs)	...	0.01	0.02	0.01	0.04	0.06	0.04	0.03	0.01	0.03	0.04	0.05	...	0.02	0.03	0.06
Terms of trade ^c	0.38	0.05	-0.04	0.13	0.20	-0.69	-0.01	-0.03	...	0.02	0.03	-0.07	...	-0.04	-0.01	-0.12

... Zero or less than ± 0.005 . **a.** AUS: Australia. BRN: Brunei. CAM: Cambodia. CHN: China. IDN: Indonesia. IND: India. JPN: Japan. KOR: South Korea. LAO: Laos. MYS: Malaysia. NZL: New Zealand. PHL: Philippines. SGP: Singapore. THA: Thailand. VNM: Vietnam. XSE: Rest of South-East Asia. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

5. What if South Asia joins RCEP?

Key points

- * South Asia joining RCEP would represent a significant expansion in RCEP adding significantly to its output (as measured by GDP) and its population.
- * South Asian producers and consumers stand to benefit from appreciably cheaper import prices, as South Asia has higher tariffs than most members of RCEP.
- * Lower tariffs would increase trade flows between South Asia and RCEP for the benefit of both regions. These gains come at the expense of those economies that are not members of RCEP and give rise to some changes in the composition of South Asian trade towards those goods that are now relatively cheaper.
- * The bilateral removal of tariffs between South Asia and RCEP would lead to substantial growth in South Asian output (real GDP). However, increased foreign investment in South Asia, means that the growth in national income growth is smaller than for production.
- * South Asia joining may result in some losses for members of RCEP that compete with South Asia (such as Cambodia).

5.1 Simulation background

The simulation involves South Asia – Bangladesh, India, Pakistan and Sri Lanka – joining RCEP (chapter 3). The inclusion of Bangladesh, Pakistan and Sri Lanka extends the scenario modelled in the previous chapter in which India joins RCEP (chapter 4).

This scenario involves all four South Asian economies removing their tariffs on goods imports from RCEP members (and each other) and all RCEP members removing their tariffs on goods imports from these economies.

South Asia's economic significance

South Asia has a combined population of over 1.8 billion people (roughly 23% of the world's population) and an economy of US\$4.3 trillion (4.3% of world GDP) (World Bank 2023). The region is roughly 30% bigger than India alone (both in terms of population and economy).

South Asia joining RCEP would increase the GDP of RCEP by 15% and its population by 80%. This would represent a significant expansion in RCEP.

South Asian trade

Roughly one-fifth of South Asian exports go to RCEP economies (19%) and two-fifths of South Asia's imports come from the RCEP economies (41%) (table 5.1). Its main trading partners in the model database are the US, the Rest of Asia, the EU, the Rest of Africa and China.

Table 5.1 – South Asia's goods trade with RCEP economies and the rest of the world (%)^a

Economy	Exports from South Asia	Imports by South Asia
Australia	1.61	2.85
Brunei	0.02	0.10
Cambodia	0.04	0.01
China	6.12	21.23
Indonesia	1.24	3.94
Japan	2.04	2.44
Laos	0.01	0.05
Malaysia	1.47	1.94
New Zealand	0.15	0.18
Philippines	0.48	0.13
Singapore	1.13	1.56
South Korea	1.40	3.28
Thailand	1.07	1.79
Vietnam	1.70	1.10
Rest of South-East Asia ^a	0.33	0.16
Rest of the World	81.19	59.24
Total	100.00	100.00

a. Includes Myanmar which is part of RCEP.

Source: PC Global model database.

There are some differences across South Asian economies. Almost half of Bangladeshi exports are to the EU (47%) and just under a fifth to the United States (18%). The remaining three economies all proportionately have large trade shares with the EU, the United States and the Rest of Asia, although the relative importance of these three varies. Sri Lanka has the highest export share with the United States (27%), Pakistan with the EU (28%) and India with the Rest of Asia (21%). There is limited trade within South Asia (5% of South Asian exports go to South Asia).

South Asia has a diverse range of exports including business services, communications and manufactured exports including petroleum and chemical products. Its main imports include crude oil, metals, computer equipment and chemical products.

South Asian tariffs

Tariff rates in Bangladesh, Pakistan and Sri Lanka are appreciably higher than those in India (chapter 4). Average tariff rates on goods imports in the model database are 11.6% for Bangladesh, 10.2% for Pakistan and 9.6% for Sri Lanka compared to 5.8% for India.

This scenario involves removing higher tariffs (8% compared to 5.8%) across a broader and more diverse range of economies compared to the previous scenario (chapter 4).

South Asian tariffs rates on RCEP members are roughly three times higher than RCEP levies on imports from South Asia (table 5.2). This implies removing tariffs on bilateral trade will result in domestic producers in South Asia facing more competition from imports from RCEP economies than RCEP economies may face from South Asia's imports.

Table 5.2 – Average tariff rates on imports into South Asia and into RCEP economies (%)^a

Exports from	Levied by			All countries
	South Asia	RCEP	Rest of the World	
South Asia	7.98	2.71	4.83	4.58
RCEP	7.52	...	4.17	2.35
Rest of the World	6.47	3.06	1.25	1.73
All countries	6.94	1.39	1.99	1.99

... Zero or less than ± 0.005 . **a.** Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

South Asian tariffs vary substantially across RCEP member economies (table 5.3). Their tariffs are highest for New Zealand, Japan, China, Australia and Indonesia (22%, 11%, 9%, 7% and 6%, respectively) and are appreciably higher than for most other RCEP members.

Sri Lanka is the only South Asian economy in which RCEP tariffs are higher than those levied by the South Asian economies.

Table 5.3 – Average tariff rates levied by and on South Asia (%)^a

Economy	Levied by South Asia	Levied on South Asia
Australia	6.73	0.60
Brunei	...	0.01
Cambodia	4.90	3.64
China	8.69	3.00
Indonesia	6.00	2.02
Japan	10.81	0.51
Laos	0.50	2.16
Malaysia	4.74	1.79
New Zealand	22.18	1.54
Philippines	4.43	4.03
Singapore	4.55	...
South Korea	3.08	0.78
Thailand	5.99	2.97
Vietnam	3.76	5.61
Rest of South-East Asia	4.48	1.52
Average (all countries)	6.94	4.58

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

5.2 Simulation results

The modelling results point to the major impact of the bilateral removal of tariffs between South Asia and RCEP is the further opening up of the South Asian market to imports from RCEP member economies and the subsequent responses by South Asian producers and consumers. South Asia also gains from tariff-free access to RCEP's markets. The mutual removal of tariffs stimulates trade between South Asia and RCEP members.

South Asia

South Asia's initially relatively high level of tariffs implies that bilateral removal of tariffs will result in many imported goods becoming appreciably cheaper in South Asia.

In response to the subsequent fall in import prices, South Asian purchasers switch their demand away from many South Asian-made goods towards the now cheaper imported goods. This leads to growth in import demand and a reduction in domestic demand (table 5.4).

To pay for these increased imports, South Asia needs to induce demand for its exports to restore balance in its external accounts. This requires South Asian export prices to fall. Removing tariffs lowers the costs of inputs used in domestic production and encourages the expansion of domestic production and exports. As South Asia runs a large current account surplus in the starting model database, South Asia needs to increase its exports substantially. This requires a fall in export prices.

Table 5.4 – Aggregate impacts of South Asia and RCEP removing import tariffs bilaterally (%)

	South Asia	RCEP	Rest of the World	World
Real GDP	0.57	0.04	-0.01	0.01
Real GNP	0.22	0.01	...	0.01
Real GNA	-0.07	0.04	0.01	0.01
Export volumes	9.99	0.14	-0.01	0.22
Import volumes	12.34	0.28	0.03	0.22
Domestic demand	-0.14	0.01	-0.02	-0.02
Real wages ^a	1.29	0.05	...	0.05
Rate of return to capital	0.57	0.05	0.04	0.07
Capital used	1.01	0.06	-0.04	...
Export prices	-1.13	0.15	0.03	...
Import prices (inc tariffs)	-3.28	...	-0.01	-0.13
Import prices (exc tariffs)	0.01	0.05	...	...
Terms of trade ^b	-1.17	0.11	0.03	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

This increase in South Asian output and exports requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for South Asian workers (1.29%). The additional demand for capital in South Asia drives up its rate of return relative to other economies (figure 5.1).

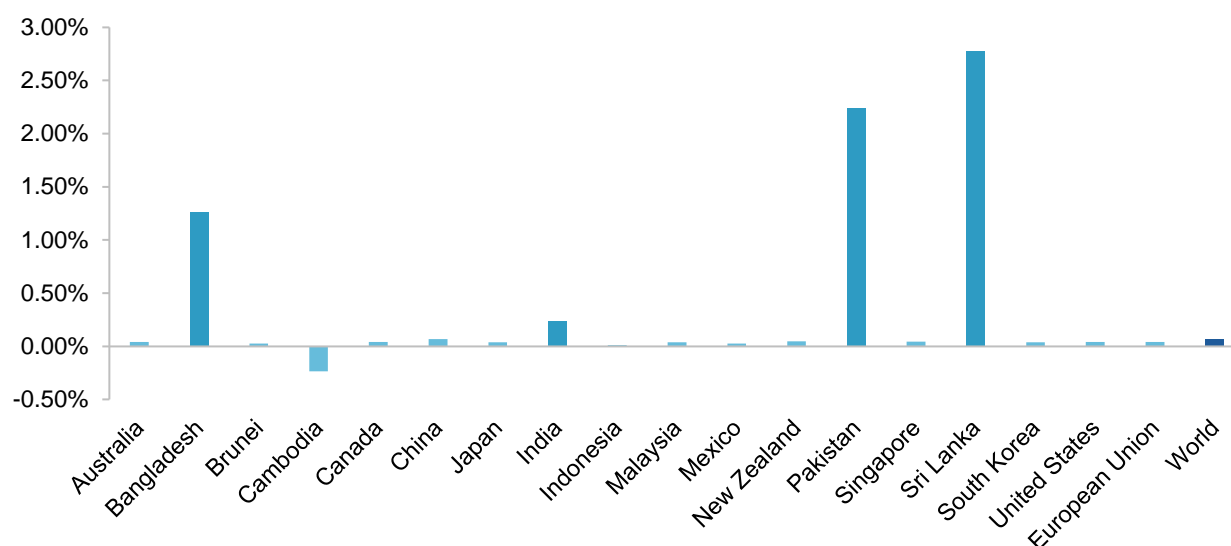
This relatively higher growth in the rate of return leads to South Asia investing more of its capital stock in South Asia and to the increased use of foreign-owned capital in South Asian production leads to 1.01% additional capital used in South Asian production. As South Asian foreign investment abroad is relatively small relative to its investment in South Asia, the bulk of the additional capital used in South Asian production comes from abroad.

The resulting increase in South Asian output leads to a 0.57% increase South Asian real GDP (South Asian production).

The increased use of foreign capital means that foreign investors receive much of the increase in South Asian production. This means that the 0.22% increase in South Asian real GNP (real national income) is less than its increase in real GDP.

The purchasing power of this increase in real national income (real GNA) declines slightly (0.07%). This reflects the relatively larger falls in export prices relative to import prices that are needed to restore external balance.

Figure 5.1 – Change in the rate of return on capital, selected economies



Source: Simulation results.

The long-run assumption that international capital is perfectly mobile is a relatively extreme assumption and, if it were to occur, would play out over many years. In the short- to medium-run, capital stocks are usually fixed or sticky across industries and economies. Sticky capital stocks would constrain the growth in South Asian production (real GDP) as they would make it more difficult for industries to expand. They would also limit the inflow of foreign capital, thereby reducing the differences between national production and national income.¹¹

Consequently, the long-run assumption on the perfect international mobility of capital stocks can be seen as providing a lower bound on the impacts on South Asian real national income.

The results for South Asian national production and national income under this scenario are clearly sensitive to the extent of foreign capital inflows that occur in response to bilateral removal of tariffs between South Asia and RCEP. Given this, it would be worthwhile to carefully scrutinise the South Asian trade and capital data in the database to ensure that they provide an accurate representation of the South Asian economies before placing too much weight on the model results.

¹¹ While constraining quantity responses, sticky capital would imply larger changes in the rate of return.

Reflecting their high initial tariff rates, Sri Lanka and Pakistan have the largest increases in real output (3.36% and 2.71%, respectively) within South Asia (table 5.5). The three additional economies all grow by more than India does. They particularly benefit from cheaper imports from China (including machinery and equipment). Cheaper imported inputs lead to lower production costs in these economies and enable them to increase their exports (mainly to the EU, the United States and the rest of Asia), Sri Lanka also materially benefits from the freeing up of bilateral trade with India. Bangladesh experiences relatively greater import competition, with the largest increase in import volumes. Bangladesh is also relatively more labour intensive and its increase in the use of capital is less. While still much larger than the increase in India, the growth in real output in Bangladesh is smaller than Sri Lanka and Pakistan despite having higher tariffs.

Existing RCEP members

RCEP collectively experiences increased real output and income from the removal of tariffs on bilateral trade with South Asia (table 5.4). This reflects the complementarity between the economies of RCEP and South Asia.

The reduction in tariffs causes an increase in trade between South Asian and RCEP. There is also a slight shift in the composition of South Asian trade away from services and towards those goods whose prices have fallen because their tariffs are reduced.

The impacts of the bilateral removal of tariffs on individual RCEP member economies varies (table 5.5). Whether a member economy will be better or worse off depends on their specific trade relations with South Asia. Economies that export goods that complement South Asian production also benefit from the resulting increase in output. Australian, for example, benefits from increased exports of wheat and other agricultural products. Conversely, economies that compete with South Asia in world markets reduce their production – as is the case for Cambodia. This is because South Asia's products become more competitive in world markets. International mobility of capital intensifies this negative effect as some of the capital from these affected economies reallocates to the South Asian economies in response to the higher rates of return in the South Asian economies, thereby further reducing output in economies that compete with South Asia.

Rest of the world

The rest of the world incurs small losses from the bilateral removal of tariffs between South Asia and RCEP (table 5.4). The reduction in tariffs cause a slight shift in the focus of South Asian trade away from non-RCEP economies such as the United States and the EU towards RCEP. Consequently, the increase in trade between South Asia and RCEP members (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion).

World economy

The bilateral removal of tariffs between South Asia and RCEP has little effect on the world economy (table 5.4). The main effects are slight increases in the volumes of international trade. While the South Asian economy is large relative to most other economies, it is relatively small as a share of global economic activity and international trade (exports and imports) plays an important but modest role in the South Asian economy.

Table 5.5 – Impacts of South Asia and RCEP removing import tariffs bilaterally (%)^a

	AUS	BGD	BRN	CAM	CHN	IDN	IND	JPN	KOR	LAO	MYS	NZL	PAK	PHL
Real GDP	0.05	0.81	-0.02	-0.39	0.07	-0.03	0.19	-0.02	-0.01	-0.03	...	0.02	2.71	0.05
Real GNP	...	0.47	...	-0.13	0.02	...	0.05	...	...	...	0.03	0.01	1.18	0.04
Real GNA	0.09	-0.15	0.02	-0.44	0.06	0.06	-0.08	0.01	...	-0.02	0.09	0.06	-0.13	...
Output: primary	0.41	-0.71	...	0.05	0.02	0.09	-0.03	-0.04	0.01	...	0.22	0.64	1.75	-0.07
Output: manufacturing	-0.18	1.57	-0.17	-0.53	0.02	-0.15	0.64	0.03	0.01	-0.25	-0.04	0.04	2.40	0.14
Output: services	0.03	-0.07	-0.02	-0.28	0.06	-0.04	0.21	-0.03	-0.02	-0.03	-0.06	-0.02	2.81	0.01
Export volumes	0.10	27.52	-0.04	-0.49	0.31	0.06	6.50	0.03	...	-0.07	-0.03	0.06	26.01	0.27
Import volumes	0.42	15.74	0.02	-0.71	0.55	0.42	4.06	0.05	...	-0.09	0.05	0.26	9.86	0.10
Domestic demand	0.04	-1.63	-0.02	-0.25	0.02	-0.06	-0.20	-0.01	-0.01	-0.05	-0.03	0.03	1.35	0.01
Real wage ^b	0.01	3.10	-0.03	-0.34	0.05	-0.04	0.57	-0.01	-0.02	-0.03	...	...	4.06	0.07
Rate of return to capital	0.04	1.23	0.03	-0.09	0.07	0.01	0.23	0.04	0.04	...	0.04	0.04	1.40	0.05
Capital used	0.11	1.03	-0.03	-0.87	0.10	-0.06	0.40	-0.04	-0.03	-0.07	-0.06	0.03	3.85	0.05
Export prices	0.42	-3.60	0.09	-0.20	0.21	0.39	-0.61	0.09	0.04	0.06	0.14	0.30	-3.08	0.01
Import prices (inc tariffs)	...	-9.14	0.05	0.03	-0.02	...	-1.84	0.05	0.05	0.06	-0.03	0.05	-6.65	-0.03
Import prices (exc tariffs)	0.02	0.02	0.05	0.08	0.03	0.08	0.08	0.06	0.06	0.08	0.07	0.09	0.11	0.09
Terms of trade ^c	0.40	-3.61	0.04	-0.28	0.18	0.32	-0.69	0.03	-0.02	-0.02	0.07	0.22	-3.18	-0.08

(continued next page)

Table 5.5 – Impacts of South Asia and RCEP removing import tariffs bilaterally (%)^a

	SGP	SRI	THA	VNM	XSE
Real GDP	0.02	3.36	0.16	0.06	-0.10
Real GNP	0.02	1.63	0.07	0.04	-0.03
Real GNA	0.05	0.69	0.09	-0.03	-0.11
Output: primary	0.09	-0.84	0.01	0.15	0.03
Output: manufacturing	0.19	3.82	0.29	-0.03	-0.12
Output: services	...	3.40	0.08	0.06	-0.10
Export volumes	0.08	18.79	0.43	0.17	-0.10
Import volumes	0.11	11.59	0.49	0.12	-0.25
Domestic demand	0.02	0.92	0.08	-0.05	-0.06
Real wage ^b	0.04	2.37	0.06	0.08	0.02
Rate of return to capital	0.02	4.55	0.16	0.20	-0.10
Capital used	0.03	3.90	0.22	0.07	-0.22
Export price	0.06	-2.67	0.08	0.02	-0.03
Import price (inc tariffs)	0.02	-7.99	-0.05	-0.13	0.05
Import price (exc tariffs)	0.02	-0.06	0.05	0.07	0.13
Terms of Trade ^c	0.03	-2.62	0.03	-0.05	-0.16

... Zero or less than ± 0.005 . **a.** AUS: Australia. BGD: Bangladesh. BRN: Brunei. CAM: Cambodia. CHN: China. IDN: Indonesia. IND: India. JPN: Japan. KOR: South Korea. LAO: Laos. MYS: Malaysia. NZL: New Zealand. PAK: Pakistan. PHL: Philippines. SGP: Singapore. SRI: Sri Lanka. THA: Thailand. VNM: Vietnam. XSE: Rest of South-East Asia. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

6. What if the United Kingdom ratifies the CPTPP?

Key points

- * The United Kingdom ratifying the CPTPP would represent a material expansion in the CPTPP adding significantly to its output (as measured by GDP) and its population.
- * UK producers and consumers stand to benefit from slightly cheaper import prices arising from the removal of tariffs on imports from CPTPP economies.
- * The United Kingdom joining is beneficial for both the United Kingdom and the CPTPP.
- * Lowering tariffs increases trade flows between the United Kingdom and CPTPP for the benefit of both regions.
- * Malaysia and Vietnam, which have markedly higher tariffs on imports from the UK, gain more than other CPTPP members.

6.1 Simulation background

The United Kingdom has formally signed the CPTPP, but the UK Parliament has yet to ratify it. This means that the United Kingdom has yet to commence meeting its commitments to, among other things, liberalise its trade with CPTPP members.

The simulation involves the United Kingdom ratifying the CPTPP (chapter 3). It involves the United Kingdom removing its tariffs on imports of goods from CPTPP members and all CPTPP members removing their tariffs on goods imports from the UK.

The economic significance of the UK

The United Kingdom is the world's sixth largest economy, with real GDP of over US\$3 trillion (roughly 3% of the world's GDP) and a population 67 million people (0.8% of world population) (World Bank 2023).

The United Kingdom joining would increase the GDP of the CPTPP by 27% and its population by 13%. This would represent a material expansion in the CPTPP.

It should be borne in mind that the United Kingdom already has pre-existing trade agreements, mostly bilaterally, with several CPTPP members: Australia, Canada, Chile, Japan, Mexico, New Zealand, Singapore and Vietnam. The United Kingdom also has trade agreements with many other economies, including Cameroon, Egypt, Ghana, Norway, Israel, Jordan, Morocco, Serbia, South Korea, Switzerland and Turkey.

UK trade

Reflecting its geographic position, the United Kingdom has limited goods trade with CPTPP members. Roughly one-tenth of the UK's goods exports and imports are with CPTPP economies (table 6.1). Its main trading partners in the model database are the EU, the US, China, the Rest of Europe and the Rest of Asia. These five economies account for four-fifths of all UK goods trade (81%).

The United Kingdom has a diverse range of exports. Its main exports include business services, financial services, motor vehicles and parts, transport equipment and computer, electronic and optical products. Its main imports are generally similar but also include food and accommodation (tourism) and other metals.

The story for international trade in goods is similar (table 6.1). Within the CPTPP, the UK's trade shares are higher with Japan and many English speaking economies (particularly Canada, Australia and Singapore).

Table 6.1 – UK's goods trade with CPTPP economies and the rest of the world (%)

Economy	Exports from the United Kingdom	Imports by the United Kingdom
Australia	1.49	0.75
Brunei	0.02	0.00
Canada	1.45	2.22
Chile	0.18	0.12
Japan	1.79	1.96
Malaysia	0.42	0.37
Mexico	0.48	0.29
New Zealand	0.27	0.17
Peru	0.06	0.13
Singapore	1.35	0.21
Vietnam	0.18	0.98
Rest of the World	92.32	92.78
Total	100.00	100.00

Source: PC Global model database.

UK tariffs

UK tariffs on imports from CPTPP economies (2.00%) are broadly comparable to those that the CPTPP levies on UK imports (1.40%) (table 6.2). This would imply that UK ratification of the CPTPP would result in, on average, similar reductions in import price in the United Kingdom and CPTPP economies.

Table 6.2 – Average tariff rates on imports into United Kingdom and CPTPP economies (%)^a

Exports from	Levied by			All countries
	United Kingdom	CPTPP	Rest of the World	
UK	...	1.40	1.73	1.71
CPTPP	2.00	...	1.36	1.17
Rest of the World	0.91	0.81	2.49	2.16
All countries	0.99	0.70	2.28	1.99

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

It is worth noting that, while they are all low, the UK's tariffs on CPTPP economies are slightly higher than those levied by non-CPTPP economies. This raises the possibility that the CPTPP will distort UK trade away from the rest of the world towards CPTPP economies.

There is some variation in UK tariffs across CPTPP economies (table 6.3). Reflecting pre-existing trade agreements with these economies, the United Kingdom has relatively low average tariff rates on imports from Australia, Canada, Chile, Mexico, Peru and Singapore. In contrast, average tariff rates levied on imports from Brunei, New Zealand and Vietnam are higher.

CPTPP economies levy broadly similar tariffs on imports from the United Kingdom compared to those that the United Kingdom levies on them (table 6.3). Vietnam, Malaysia and New Zealand are exceptions, with higher tariffs than those levied by the United Kingdom and Japan, Chile and Singapore, which are lower.

Table 6.3 – Average tariff rates levied by and on the United Kingdom (%)^a

Economy	Levied by the United Kingdom	Levied on the United Kingdom
Australia	1.40	1.61
Brunei	1.08	0.27
Canada	0.74	0.79
Chile	2.23	0.07
Japan	3.36	1.01
Malaysia	2.38	6.78
Mexico	0.23	0.67
New Zealand	4.17	3.62
Peru	0.13	0.77
Singapore	2.02	0.02
Vietnam	2.83	6.10
Average (all countries)	0.99	0.70

a. Import-weighted average tariff levied on bilateral goods imports.

Source: PC Global model database.

6.2 Simulation results

UK

While the United Kingdom gains from the bilateral removal of tariffs with CPTPP economies, the effects are small reflecting limited bilateral goods trade and low initial tariff rates.

The United Kingdom gains from CPTPP members reducing their tariffs on UK imports (table 6.4). The reciprocal lowering of tariffs lowers the price of UK imports in CPTPP member economies relative to local production and imports from non-CPTPP economies. This leads to an increase in UK exports of 0.31%.

Table 6.4 – Aggregate impacts of United Kingdom and CPTPP removing import tariffs bilaterally (%)

	United Kingdom	CPTPP	Rest of the World	World
Real GDP	0.03	0.01	...	...
Real GNP	0.01	...	...	...
Real GNA	0.02	0.01	...	...
Export volumes	0.31	0.08	...	0.01
Import volumes	0.25	0.09	...	0.01
Domestic demand	...	0.01	...	...
Real wages ^a	0.08	0.02	...	...
Rate of return to capital	0.01	...	...	...
Capital used	0.08	0.02	...	...
Export prices	0.03	0.02	...	...
Import prices (inc tariffs)	-0.12	-0.02	-0.01	-0.01
Import prices (exc tariffs)	...	...	...	...
Terms of trade ^b	0.03	0.02	...	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

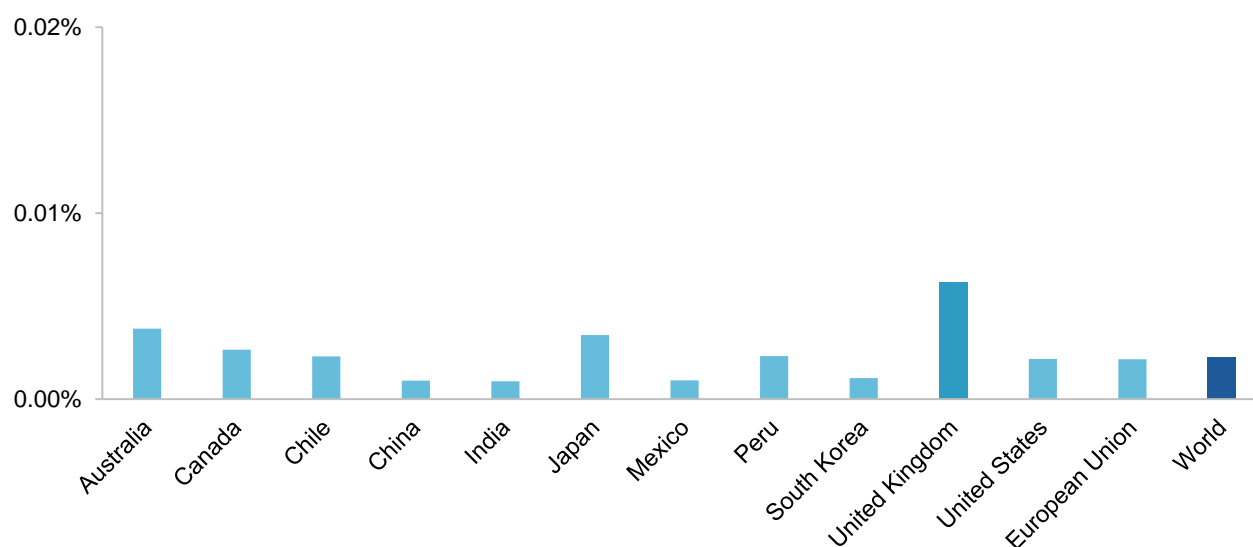
Source: Commission estimates using the PC Global model.

UK consumers and producers likewise benefit from cheaper imports from CPTPP members. UK imports increase by 0.25%. These cheaper imports lower the costs of inputs used in domestic production, for the benefit of UK consumers (including other producers) and UK exporters.

This resulting increase in UK output and exports requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for UK workers (0.08%). The additional demand for capital in UK marginally drives up its rate of return relative to other economies (figure 6.1).

This relatively higher growth in the rate of return leads to the United Kingdom investing more of its capital stock in the United Kingdom and to increased use of foreign-owned capital in UK production, leading to 0.08% additional capital being used in UK production. The bulk of the additional capital used comes from abroad.

The resulting increase in UK output leads to a 0.03% increase in UK real GDP (UK production).

Figure 6.1 – Change in the rate of return on capital, selected economies

Source: Simulation results.

The increased use of foreign capital means that foreign investors receive much of the increase in UK production. This means that the 0.01% increase in UK real GNP (real national income) is less than its increase in real GDP.

The improvement in the terms of trade increase the purchasing power of the increase in UK national income (0.02%).

Existing CPTPP members

The CPTPP collectively gains from removing tariffs on bilateral trade with the United Kingdom (table 6.4). This reflects a degree of complementarity between the economies of CPTPP and the UK. Most member economies also experience small gains (table 6.5).

While average UK tariff rates are broadly comparable to those levied by CPTPP members, some CPTPP economies, particularly Malaysia and Vietnam, have higher tariff rates on bilateral goods trade than the United Kingdom does (table 6.3). Consequently, removing their tariffs on goods imports from the United Kingdom leads to relatively larger reductions in the cost of imports in these economies. This leads to larger switches away from local production (and from all other economies) towards the now cheaper imports from the United Kingdom (and, ultimately, to larger GDP gains). It should be emphasised that realising these benefits does not require the United Kingdom to ratify the CPTPP, as these economies are free to remove their own tariffs unilaterally (including on imports from non-CPTPP economies which would produce wider benefits).

Rest of the world

There is no discernible impact on the rest of the world from the removal of bilateral tariffs on goods trade between the United Kingdom and CPTPP members (table 6.4). This reflects the small share of global trade affected under this scenario.

World economy

The removal of bilateral tariffs under this scenario has little effect on the world economy (table 6.4).

Table 6.5 – Impacts of the United Kingdom and CPTPP removing import tariffs bilaterally (%)^a

	AUS	BRN	CAN	CHL	JPN	MEX	MYS	NZL	PER	SGP	UK	VNM
Real GDP	0.01	...	...	...	0.01	...	0.13	0.05	...	0.01	0.03	0.05
Real GNP	...	...	...	...	...	...	0.06	0.02	...	...	0.01	0.03
Real GNA	...	...	0.01	0.01	0.01	...	0.06	0.03	...	0.01	0.02	0.11
Output: primary	...	...	0.06	0.06	-0.09	...	0.03	0.10	...	...	0.17	-0.09
Output: manufacturing	0.07	0.07	0.02	0.01	0.04	-0.01	0.15	0.07	...	0.03	0.25	0.01
Output: services	0.01	0.01	...	...	...	...	0.10	0.04	...	...	...	0.02
Export volumes	0.05	0.02	0.04	0.01	0.08	...	0.21	0.17	...	0.02	0.31	0.09
Import volumes	0.06	0.01	0.05	0.04	0.08	...	0.21	0.17	...	0.02	0.25	0.16
Domestic demand	0.01	...	...	0.01	0.01	-0.01	0.08	0.03	...	0.01	...	-0.04
Real wages ^b	0.02	0.01	0.01	...	0.01	...	0.17	0.06	...	0.01	0.08	0.15
Rate of return to capital	...	0.01	...	...	...	...	0.01	0.01	...	...	0.01	0.06
Capital used	0.02	0.01	0.01	...	0.01	-0.01	0.21	0.10	...	0.02	0.08	0.11
Export prices	0.01	...	0.02	0.03	0.03	...	...	0.02	...	0.01	0.03	0.07
Import prices (inc tariffs)	-0.03	...	-0.01	...	-0.02	...	-0.09	-0.09	...	...	-0.12	-0.03
Import prices (exc tariffs)	...	...	...	...	...	...	...	...	...	...	...	...
Terms of trade ^c	0.01	...	0.02	0.03	0.03	...	-0.01	0.02	...	0.01	0.03	0.07

... Zero or less than ± 0.005 . **a.** AUS: Australia. BRN: Brunei. CAN: Canada. CHL: Chile. JPN: Japan. MEX: Mexico. MYS: Malaysia. NZL: New Zealand. PER: Peru. SGP: Singapore. UK: United Kingdom. VNM: Vietnam. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

7. What if China joins the CPTPP?

Key points

- * China joining the CPTPP would represent a significant expansion in the CPTPP adding significantly to its output (as measured by GDP) and its population.
- * China gains from the bilateral removal of tariffs between China and CPTPP members. Its producers and consumers benefit from cheaper imports and removal of tariffs on its exports by CPTPP economies. The resulting increase in Chinese production and real GDP benefits Chinese workers through higher real wages.
- * CPTPP member economies collectively also gain from the bilateral removal of tariffs on trade between China and CPTPP member economies.
- * However, the impacts on individual CPTPP member economies differ depending on their initial level of tariffs on trade with China and whether they are also a member of RCEP or not. The seven CPTPP economies that are also members of RCEP – Australia, Brunei, Japan, Malaysia, New Zealand, Singapore and Vietnam – already have removed their tariffs on bilateral trade with China and gain little under this scenario. The two CPTPP economies that are not members of RCEP – Mexico and Canada – gain the most because they have tariffs on trade with China.
- * In part reflecting its relatively high tariffs on Chinese imports, Mexico benefits the most from removing its tariffs on Chinese imports. Given that the United States -Mexico-Canada Agreement provides Mexican producers with preferential access to the lucrative US market, cheaper Chinese inputs lowers the cost of Mexican production and results in increased Mexican exports to the US.

7.1 Simulation background

The simulation involves China joining CPTPP (chapter 3). It involves China eliminating its tariffs on goods imports from CPTPP members and all CPTPP members removing their tariffs on goods imported from China.

China is already a member of RCEP. Consequently, the seven CPTPP economies that are also members of RCEP already have preferential access to the Chinese market.

Given the high degree of overlap in membership between RCEP and CPTPP, this scenario involves the removal of tariffs on bilateral trade between China and the four CPTPP members that are not members of RCEP – Canada, Chile, Mexico and Peru.

The economic significance of China

China accounts for 18% of the world's economy, with real GDP of US\$18 trillion and a population of 1.4 billion people (18% of world population) (World Bank 2023).

China's accession would increase GDP of the CPTPP by roughly 160% and its population by 275%. This would represent a significant expansion in the CPTPP.

Chinese trade

One-fifth of Chinese trade in the model database is with CPTPP economies (22% of its exports and 30% of its imports) (table 7.1). Its main trading partners are the US, EU, Japan and South Korea. These four economies account for half of all Chinese trade. Japan is China's main trading partner within CPTPP.

Table 7.1 – China's goods trade with CPTPP economies and the rest of the world (%)

Economy	Exports from China	Imports by China
Australia	2.44	5.50
Brunei	0.04	0.02
Canada	1.43	1.19
Chile	0.66	1.19
Japan	8.51	12.61
Malaysia	2.01	3.05
Mexico	1.63	0.69
New Zealand	0.26	0.51
Peru	0.32	0.72
Singapore	1.54	1.96
Vietnam	3.56	2.46
Rest of the World	77.60	70.11
Total	100.00	100.00

Source: PC Global model database.

Manufactured goods account for the bulk of Chinese exports. Computers and electrical equipment, electrical equipment, other machinery and equipment and textiles account for 60% of Chinese exports. Its main imports are computers and electronic equipment, chemical products and a range of raw materials or less elaborately transformed manufactured goods (such as oil, metals and mineral products).

Chinese and CPTPP tariffs

Chinese tariffs on imports from CPTPP economies (0.23%) are slightly lower than those the CPTPP levies on Chinese imports (table 7.2). These low tariffs would mean that Chinese joining the CPTPP would result in only modest reductions in import prices across the Chinese and CPTPP member economies.

Table 7.2 – Average tariff rates on imports into China and into CPTPP economies (%)^a

Exports from	Levied by			
	China	CPTPP	Rest of the World	All countries
China	...	0.62	4.37	3.51
CPTPP	0.23	...	1.78	1.17
Rest of the World	3.05	0.89	1.90	1.88
All countries	2.15	0.70	2.24	1.99

... Zero or less than ± 0.005 . **a.** Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

China's tariffs on CPTPP members are mainly limited to Canada and Mexico (table 7.3), both of which have a preferential trade agreement with the US.¹²

Mexico and Canada have similar, although slightly higher, tariffs on Chinese imports (4.40% and 4.00%, respectively). While higher than those that China levies on them, Peru and Chile have much lower tariffs on Chinese imports (1.46% and 0.24%, respectively).

There are minimal tariffs on trade between China and most other CPTPP economies, reflecting their membership of RCEP.

Table 7.3 – Average tariff rates levied by and on China (%)^a

Exports from	Levied by China	Levied on China
Australia	...	...
Brunei	...	...
Canada	4.03	3.96
Chile	0.03	0.24
Japan	...	...
Malaysia	...	...
Mexico	3.73	4.44
New Zealand	...	...
Peru	0.08	1.46
Singapore	...	...
Vietnam	...	...
Average (all countries)	2.15	3.51

... Zero or less than ± 0.005 . **a.** Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

¹² China has high tariffs in the model database with many non-CPTPP member economies (including the EU, UK, US, Sri Lanka, India and Pakistan).

7.2 Simulation results

The major impacts under this scenario arise from the interaction between the effects of:

- removing tariffs on bilateral trade between China and the four members of the CPTPP that are not members of RCEP – Mexico, Canada, Chile and Peru
- the preferential trading arrangements that exist under the US-Mexico-Canada Agreement.¹³

China

The modelling indicates that the effects on the Chinese economy are small but positive (table 7.4).

These gains come from multiple sources.

First, China gains from removing its tariffs on imports from CPTPP member economies. This lowers the price of imports from CPTPP economies relative to the price of domestic Chinese production and imports from non-CPTPP economies, whose price remain unchanged. Chinese consumers (including producers that use imported inputs in their production) increase their demand for imports from CPTPP economies at the expense of domestic production and imports from other economies. Chinese demand for imports increases by 0.40% (table 7.4).

Table 7.4 – Aggregate impacts of China and CPTPP removing import tariffs bilaterally (%)

	China	CPTPP	Rest of the World	World
Real GDP	0.05	0.04	-0.01	...
Real GNP	0.01	0.02	...	...
Real GNA	0.03	0.01	...	...
Export volumes	0.24	0.12	-0.01	0.04
Import volumes	0.40	0.09	...	0.04
Domestic demand	0.02	...	-0.01	-0.01
Real wages ^a	0.06	0.07	...	0.01
Rate of return to capital	0.04	0.03	0.02	0.02
Capital used	0.08	0.05	-0.01	...
Export prices	0.09	-0.03	-0.01	-0.01
Import prices (inc tariffs)	-0.10	-0.15	-0.02	-0.04
Import prices (exc tariffs)	-0.02	-0.01	-0.01	-0.01
Terms of trade ^b	0.11	-0.02	...	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

Cheaper imports also benefit Chinese producers that use imported goods as inputs into their own production (including firms that produce services) and enables them to produce their output at a lower cost. Lower production costs benefit Chinese consumers of the goods and services that these firms produce and increase the competitiveness of Chinese firms that export.

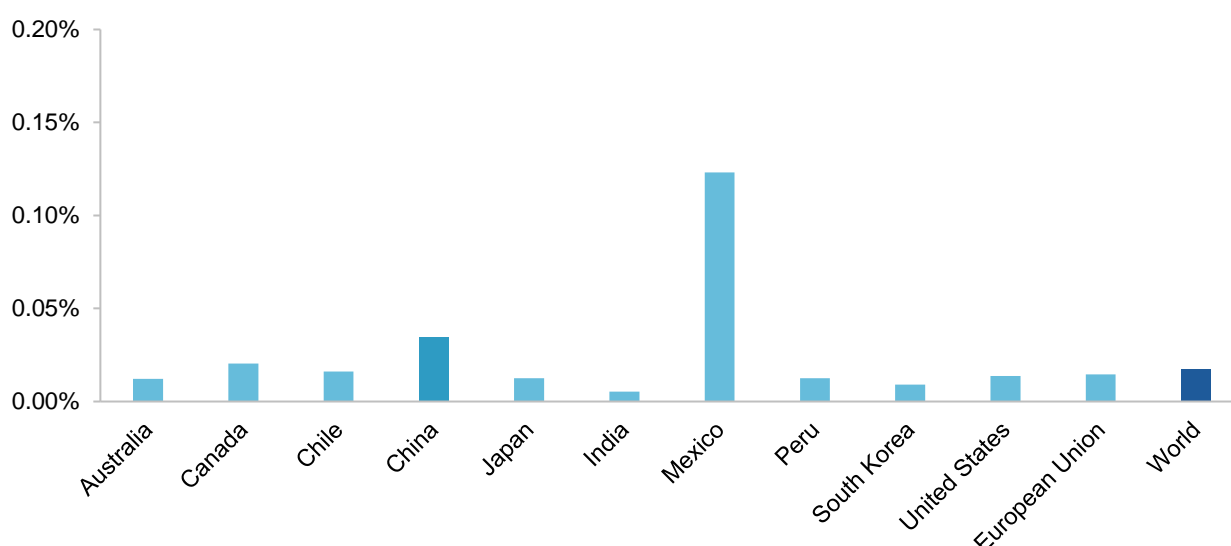
¹³ The US-Mexico-Canada Agreement (USMCA) replaced the previous North American Free Trade Agreement (NAFTA) between Canada, Mexico and the United States in September 2018.

Second, Chinese exporters also gain from CPTPP members removing their tariffs on Chinese exports, particularly Canada, Mexico and Peru.¹⁴ This lowers the cost of Chinese exports in these markets. Foreign consumers shift their demand away from domestic production (and from imports of other economies) to the now relatively cheaper Chinese imports. Chinese exports increase by 0.24% (table 7.4).

Chinese production increases to meet the higher world demand for its exports and enables China to supply the increase in export volumes. The requirement for external balance enables Chinese producers to receive slightly higher prices for their exports (as opposed to the prices paid by Mexican and Peruvian consumers which fall).

This additional production requires the use of additional labour, capital and intermediate inputs. As aggregate employment in the model is fixed, the increase in the demand for labour translates into higher real wages for Chinese workers (0.06%). The additional demand for capital in China drives up its rate of return relative to other economies (figure 7.1). (The reason for the large increase for Mexico is discussed below.)

Figure 7.1 – Change in the rate of return on capital, selected economies



Source: Simulation results.

The higher rate of return leads to Chinese investors investing more of their capital stock in China and to the use of more foreign-owned capital in Chinese production (leading to 0.08% additional capital use in Chinese production). Much of this additional capital comes from abroad.

Increased Chinese production leads to a 0.05% increase in Chinese real GDP.

The increased use of foreign capital means that foreign investors receive much of the increase in Chinese production. This means that the 0.01% increase in Chinese real GNP (real national income) is less than its increase in real GDP.

The favourable impact on the Chinese terms of trade increases the purchasing power of this increase in national income, giving rise to a 0.03% increase in real GNA.

¹⁴ While it is one of the four CPTPP economies that is not a member of RCEP, Chilean tariffs on Chinese imports in the model database are negligible.

Existing CPTPP members

As a group, CPTPP members gain from removing their tariffs on Chinese imports and from China removing its tariffs on their exports.

While broadly comparable, CPTPP tariffs on Chinese imports are slightly higher in the model database than Chinese tariffs are on CPTPP exports (table 7.2).

Removing tariffs on Chinese imports lowers the cost of Chinese imports in CPTPP economies. This leads to a switch away from local production to the now cheaper imports from China. The lower cost imports benefits consumers and producers in CPTPP economies.

CPTPP exporters also gain from more favourable access to the massive Chinese market.

This increases real output and income for the CPTPP collectively (table 7.4). This reflects the complementarity between the economies of CPTPP and China.

The reduction in bilateral tariffs causes an increase in trade between China and CPTPP members. There is also a slight shift in the composition of this trade towards those goods whose price has fallen because of the reduction in tariffs and away from services. For example, as CPTPP members remove their tariffs, Chinese exports of motor vehicles and parts, other manufacturing, textiles and wearing apparel increase.

These aggregate impacts mask wide variation across CPTPP economies (table 7.5). These impacts depend on the initial level of tariffs on bilateral trade with China and whether the economy has preferential access to the lucrative US market or not.

The US-Mexico-Canada Agreement gives Canadian and Mexican exporters preferential access to the large US market compared to exporters from other CPTPP economies. Partly because of this, there is a high degree of enmeshment between these three economies.

The Mexican economy is particularly enmeshed with that of the US, which is by far its largest export market (accounting for 78% of its exports in the model database). Mexico is also a substantial importer from China (accounting for just under 10% of total imports) and, along with India, Thailand and Indonesia, has high tariffs on Chinese imports relative to other economies (table 7.3).

Collectively, these factors mean that removing tariffs will result in larger beneficial impacts on the Mexican economy than for other CPTPP members. As well as benefiting Mexican consumers, cheaper Chinese imported inputs benefit Mexican producers, especially those that sell into the US market. Mexican exports increase significantly (1.69%) and, to enable this to occur, Mexican output (real GDP increases by 0.33%). This also benefits Mexican workers (real wages increase by 0.46%). The strong increase in Mexican output leads to a relatively large increase in the rate of return to capital used in Mexican production (figure 7.1) and this attracts additional capital into Mexican production (much of which is foreign owned). Some of this increase in Mexican production comes at the expense of the US, given that Mexico has preferential access under the US-Mexico-Canada Agreement.

Canada also gains from the removal of tariffs, but not to the same extent as Mexico (0.10% growth in real GDP). It exports less to the United States than Mexico (65% of Canadian goods exports), it imports proportionately less from China than Mexico and has lower initial tariffs on Chinese goods imports than Mexico (4% compared to 4.4%). The result is that the Canadian economy is somewhat less enmeshed with that of the United States than Mexico.

Lowering tariffs between China, Canada, Mexico, Chile and Peru has a small but adverse impact on trade between China and the seven CPTPP members that are also members of RCEP (Australia, Brunei, Japan,

Malaysia, New Zealand, Singapore and Vietnam). Exports from these seven economies fall. Consequently, production in these seven economies also fall.

Rest of the world

The rest of the world remains mostly unaffected in terms of real GDP and GNP when China joins CPTPP (table 7.4). The reduction in tariffs between China and CPTPP members causes a slight shift in the focus of trade away from non-CPTPP economies such as the EU towards the expanded CPTPP. Consequently, the increase in trade between China and CPTPP members (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion).

World economy

The removal of tariffs between China and CPTPP member economies has a negligible effect on the world economy (table 7.4). The main effects are slight increases in the volumes of international trade. In part, this reflects the relatively low level of tariffs between China and CPTPP members in the model database.

Table 7.5 – Impacts of China and CPTPP removing import tariffs bilaterally (%)^a

	AUS	BRN	CAN	CHL	CHN	JPN	MEX	MYS	NZL	PER	SGP	VNM
Real GDP	-0.01	-0.01	0.10	...	0.05	-0.02	0.33	-0.03	-0.01	...	-0.01	-0.06
Real GNP	...	...	0.03	...	0.01	-0.01	0.16	-0.01	-0.01	0.01	...	-0.02
Real GNA	...	...	0.06	-0.01	0.03	-0.01	0.11	-0.03	-0.01	-0.01	...	-0.17
Output: primary	...	-0.01	0.59	0.03	-0.01	0.02	0.08	-0.02	...	0.11	-0.01	0.10
Output: manufacturing	-0.01	-0.03	0.42	0.01	0.03	-0.04	0.83	-0.05	-0.02	-0.07	-0.04	-0.02
Output: services	-0.01	-0.01	0.01	...	0.05	-0.02	0.22	-0.03	-0.01	0.01	...	-0.04
Export volumes	-0.01	-0.02	0.66	0.06	0.24	-0.08	1.69	-0.05	-0.02	0.49	-0.04	-0.10
Import volumes	-0.01	-0.01	0.66	0.04	0.40	-0.07	1.42	-0.08	-0.02	0.52	-0.01	-0.21
Domestic demand	...	-0.01	0.04	-0.01	0.02	-0.02	0.08	-0.03	-0.01	-0.08	-0.01	0.03
Real wages ^b	-0.01	-0.01	0.20	0.01	0.06	-0.02	0.46	-0.03	-0.01	0.03	-0.01	-0.16
Rate of return to capital	0.02	0.01	0.03	0.02	0.04	0.02	0.08	0.02	0.02	0.02	0.02	-0.06
Capital used	-0.01	-0.02	0.20	...	0.08	-0.04	0.44	-0.07	-0.03	-0.02	-0.01	-0.16
Export prices	-0.01	...	0.09	-0.02	0.09	-0.02	-0.14	-0.02	-0.02	-0.10	-0.01	-0.10
Import prices (inc tariffs)	-0.01	-0.01	-0.37	-0.06	-0.10	...	-0.57	...	-0.01	-0.31	-0.01	0.01
Import prices (exc tariffs)	-0.01	-0.01	-0.04	-0.01	-0.02	...	-0.03	...	-0.01	-0.01	-0.01	0.01
Terms of Trade ^c	-0.01	0.01	0.13	-0.01	0.11	-0.02	-0.11	-0.02	-0.01	-0.09	...	-0.11

... Zero or less than ± 0.005 . **a.** AUS: Australia. BRN: Brunei. CAN: Canada. CHL: Chile. CHN: China. JPN: Japan. MEX: Mexico. MYS: Malaysia. NZL: New Zealand. PER: Peru. SGP: Singapore. VNM: Vietnam. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

8. What if the United States joins the CPTPP?

Key points

- * The United States joining the CPTPP would represent a significant expansion of CPTPP adding significantly to its output (as measured by GDP) and its population.
- * US producers and consumers stand to benefit from somewhat cheaper import prices arising from the removal of tariffs on imports from CPTPP economies.
- * The United States joining is beneficial for both the United State and the CPTPP. Reflecting relative differences in the size of their economies, CPTPP economies stand to gain more from the United States joining than does the US.
- * Lower tariffs increase trade flows between the United States and CPTPP for the benefit of both regions. These gains come, to some extent, at the expense of those economies that are not members of CPTPP and give rise to some changes in the composition of US trade towards those goods that are now relatively cheaper.
- * The United States joining may result in some losses for members of CPTPP that compete with the United States in certain key export markets (such as Australian wheat and cattle exports).

8.1 Simulation background

The simulation involves the United States joining CPTPP (chapter 3). This involves the United States eliminating its tariffs on goods imports from CPTPP members, and all CPTPP members removing their tariffs on goods imports from the US.

The economic significance of the US

The United States is the world's largest economy with real GDP of over US\$25 trillion (roughly 25% of the world's GDP) and a population 330 million people (4% of world population) (World Bank 2023). The US's joining would increase the GDP of the CPTPP by 220% and its population by 65%. This would represent a significant expansion in the CPTPP.

It should be borne in mind that the United States already has pre-existing free trade agreements, mostly bilaterally, with many CPTPP members: Australia, Canada, Chile, Mexico, Peru, and Singapore. It also has a free trade agreement in critical minerals with Japan, which is also a member of CPTPP. Consequently, the United States already has relatively low tariffs already with these economies. It also has free trade agreements with many other economies including Bahrain, Guatemala, Israel, Morocco and South Korea.

US trade

Roughly two-fifths of the US's exports go to CPTPP economies (40%) and one-third of the US's imports come from the CPTPP economies (34%) (table 8.1). Its main trading partners in the model database are the EU, China, Canada, Mexico and Japan. These five economies account for three-fifths of all US trade.

The United States has a diverse range of exports including computers and electrical equipment, business services, chemical products, motor vehicles and parts and machinery and equipment. Many of its exports are elaborately transformed manufactured goods. Its main imports are generally similar but include both manufactures nec and electrical equipment.

Table 8.1 – US's goods trade with CPTPP economies and the rest of the world (%)

Economy	Exports from the United States	Imports by the United States
Australia	1.86	0.55
Brunei	0.01	0.00
Canada	14.97	11.61
Chile	0.75	0.45
Japan	5.51	5.12
Malaysia	0.69	0.88
Mexico	12.57	12.29
New Zealand	0.24	0.21
Peru	0.48	0.32
Singapore	2.85	0.84
Vietnam	0.47	1.83
Rest of the World	59.60	65.89
Total	100.00	100.00

Source: PC Global model database.

US tariffs

US tariffs on imports from CPTPP economies (0.8%) are comparable to those that the CPTPP levies on US imports (table 8.2). This would imply that the United States joining the CPTPP would result in, on average, similar import price reductions in the United States as in the CPTPP.

Table 8.2 – Average tariff rates on imports into the United States and into CPTPP economies (%)^a

Exports from	Levied by			
	United States	CPTPP	Rest of the World	All countries
United State	0	0.80	4.17	2.59
CPTPP	0.80	1.55	3.25	2.22
Rest of the World	1.98	1.80	2.52	2.38
All countries	1.54	1.49	2.72	2.37

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

There is significant variation in US tariffs across CPTPP economies (table 8.3). Reflecting pre-existing free trade agreements with these economies, Australia, Canada, Chile, Mexico, Peru and Singapore have relatively low average tariff rates. In contrast, average tariff rates levied on imports from Brunei, New Zealand and Vietnam are appreciably higher.

Table 8.3 – Average tariff rates levied by and on the United States (%)^a

Economy	Levied by the United States	Levied on the United States
Australia	0.44	0.40
Brunei	3.70	0.42
Canada	0.10	0.30
Chile	0.21	0.01
Japan	1.55	2.31
Malaysia	1.09	2.43
New Zealand	3.58	2.55
Mexico	0.28	0.04
Peru	0.20	0.06
Singapore	0.25	...
Vietnam	6.65	4.03
Average (all countries)	1.54	2.59

... Zero or less than ± 0.005 . a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

8.2 Simulation results

The modelling results point to the major impact of US accession to CPTPP being the stimulation of trade between the United States and CPTPP members arising from the reciprocal removal of tariffs.

US

The United States gains from CPTPP members reducing their tariffs on US imports (table 8.4), which, for some economies, are substantial (table 8.3). The reciprocal lowering of tariffs lowers the price of imports from the United States in CPTPP member economies relative to local production and imports from non-CPTPP economies. This leads to an increase in US exports of 0.88%.

The US consumers and producers likewise benefit from cheaper imports from CPTPP members. US imports increase by 0.62%. These cheaper imports lower the costs of inputs used in domestic production, for the benefit of US consumers (including other producers) and US exporters.

Table 8.4 – Aggregate impacts of the United States and CPTPP removing import tariffs bilaterally (%)

	United States	CPTPP	Rest of the World	World
Real GDP	0.03	0.07	...	0.01
Real GNP	0.01	0.05	...	0.01
Real GNA	0.01	0.07	...	0.01
Export volumes	0.88	0.35	0.03	0.11
Import volumes	0.62	0.53	0.03	0.11
Domestic demand	0.01	-0.03	-0.01	-0.01
Real wages ^a	0.06	0.14	0.01	0.02
Rate of return to capital	0.02	0.04	0.01	0.02
Capital used	0.08	0.07	-0.01	...
Export prices	0.06	0.14	...	0.02
Import prices (inc tariffs)	-0.28	-0.18	-0.03	-0.05
Import prices (exc tariffs)	0.03	0.02	0.02	0.02
Terms of trade ^b	0.04	0.09	-0.02	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

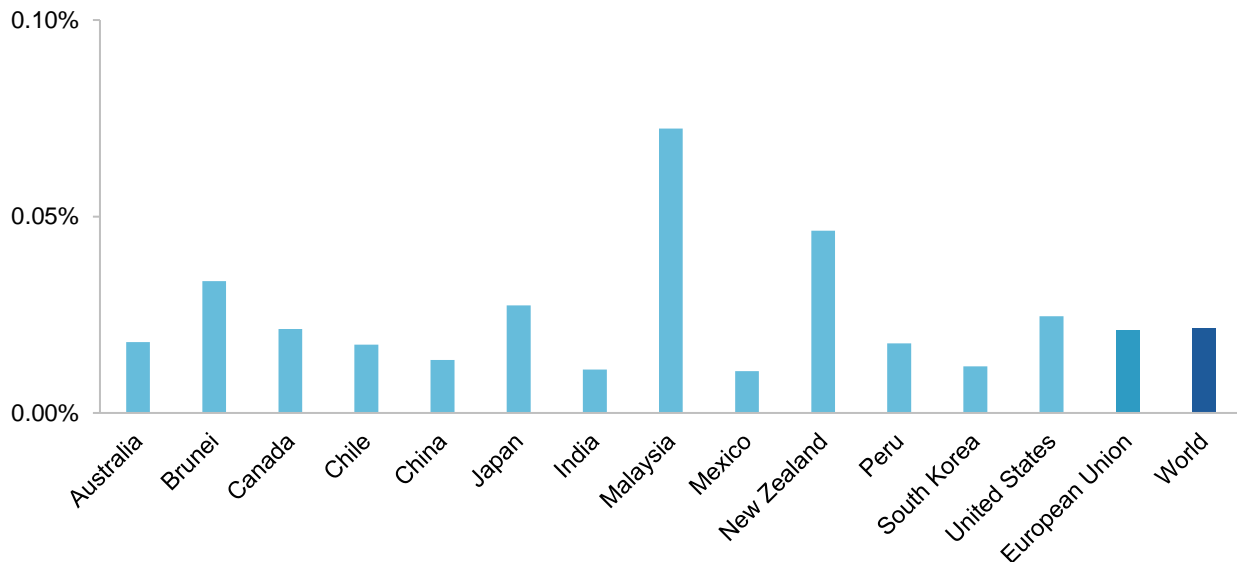
Source: Commission estimates using the PC Global model.

This resulting increase in US output and exports requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for US workers (0.06%). The additional demand for capital in the United States drives up its rate of return relative to other economies (figure 8.1).

This relatively higher growth in the rate of return leads to the United States investing more of its capital stock in the United States and to increased use of foreign-owned capital in US production, leading to 0.08% additional capital in US production. The bulk of the additional capital used comes from abroad.

The resulting increase in US output leads to a 0.03% increase US real GDP (US production).

The increased use of foreign capital means that foreign investors receive much of the increase in US production. This means that the 0.01% increase in US real GNP (real national income) is less than its increase in real GDP. The negligible impact on the US terms of trade has no discernible impact on the purchasing power of this increase in real national income (real GNA).

Figure 8.1 – Change in the rate of return on capital, selected economies

Source: Simulation results.

Existing CPTPP members

While average US tariff rates are comparable to those levied by CPTPP members, some CPTPP economies have relatively higher tariff rates than the United States (table 8.3). Consequently, the United States joining CPTPP will reduce the cost of US imports in these countries. This leads to a switch away from their local production to the now cheaper imports from the US.

Lower cost imports benefit consumers and producers in these CPTPP economies.

Exporters in these economies also gain from more favourable access to the massive US market.

CPTPP collectively experiences increased real output and income from the United States joining CPTPP (table 8.4). This reflects the complementarity between the economies of CPTPP and the US.

The reduction in bilateral tariffs causes an increase in trade between the United States and CPTPP members. There is also a slight shift in the composition of this trade towards those goods whose price has fallen because of the reduction in tariffs and away from services. For example, as CPTPP members remove their tariffs, US exports of primary products (such as wheat and cattle) increase.

The impacts that the United States joining CPTPP has on individual CPTPP member economies varies (table 8.5). Whether a member economy will be better or worse off depends on their specific trade relations with the US. Those economies that complement the US economy (such as those supplying inputs used by the US) benefit from the United States joining. However, economies that compete with the United States in the world market may be worse off. Australia, for example, is detrimentally affected by the increased competitiveness of US wheat and cattle exports within CPTPP. This detrimental impact is small. Moreover, some CPTPP may also be adversely affected by an outflow of capital to the United States that occurs in response to the increase in the US rate of return.

Rest of the world

The rest of the world remains mostly unaffected in terms of real GDP and real GNP and real wages and rate of return improve slightly (table 8.4). The reduction in tariffs between the United States and CPTPP members

causes a slight shift in the focus of trade away from non-CPTPP economies such as the EU and China towards the expanded CPTPP. Consequently, the increase in trade between the United States and CPTPP members (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion).

World economy

The United States joining the CPTPP has little effect on the world economy (table 8.4). The main effects are slight increases in the volumes of international trade. While the US economy is large relative to most other economies, it is relatively small as a share of global economic activity and international trade (exports and imports) plays an important but modest role in the US economy.

Table 8.5 – Impacts of the United States and CPTPP removing import tariffs bilaterally (%)^a

	AUS	BRN	CAN	CHL	JPN	MEX	MYS	NZL	PER	SGP	US	VNM
Real GDP	-0.02	0.02	0.01	-0.03	0.10	0.35	-0.03	0.10	-0.01	...	0.03	0.83
Real GNP	...	...	0.02	-0.01	0.07	0.15	-0.01	0.04	...	...	0.01	0.35
Real GNA	-0.04	0.01	-0.02	-0.03	0.08	0.19	-0.03	0.15	-0.01	...	0.01	2.17
Output: primary	-0.05	-0.02	-0.53	-0.15	-3.07	0.01	-0.24	0.53	0.01	-0.03	0.55	-1.89
Output: manufacturing	-0.19	0.53	-0.06	-0.10	0.16	0.43	0.13	0.06	-0.05	-0.05	0.21	-0.01
Output: services	0.01	0.02	0.02	-0.02	0.05	0.23	-0.01	0.09	-0.01	0.01	0.01	0.36
Export volumes	-0.07	0.08	0.07	-0.09	0.69	0.59	0.15	0.29	-0.03	-0.03	0.88	1.19
Import volumes	-0.20	0.10	-0.05	-0.14	0.67	0.65	0.12	0.62	-0.04	...	0.62	2.73
Domestic demand	-0.01	0.02	-0.06	-0.05	-0.01	0.19	-0.01	0.08	-0.02	-0.01	0.01	-0.81
Real wage ^b	-0.02	0.06	0.04	-0.01	0.13	0.43	-0.01	0.06	-0.01	-0.01	0.06	2.60
Rate of return to capital	0.01	0.03	0.02	0.02	0.02	0.04	0.01	0.03	0.01	0.02	0.02	1.21
Capital used	-0.04	0.03	-0.03	-0.05	0.07	0.57	-0.04	0.20	-0.02	0.01	0.08	1.89
Export prices	-0.14	0.03	-0.14	-0.07	0.10	0.05	...	0.36	-0.01	0.03	0.06	1.40
Import prices (inc tariffs)	-0.01	...	-0.15	0.02	-0.43	-0.20	0.03	-0.19	...	0.02	-0.28	-0.22
Import tariffs (exc tariffs)	0.03	0.01	0.04	0.02	0.02	0.02	0.05	-0.01	0.01	0.02	0.03	-0.01
Terms of trade ^c	-0.17	0.03	-0.18	-0.09	0.08	0.03	-0.05	0.38	-0.02	...	0.04	1.41

... Zero or less+ than ± 0.005 . **a.** AUS: Australia. BRN: Brunei. CAN: Canada. CHL: Chile. JPN: Japan. MEX: Mexico. MYS: Malaysia. NZL: New Zealand. PER: Peru. SGP: Singapore. US: United States. VNM: Vietnam. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

9. What if CPTPP and RCEP were to combine?

Key points

- * Combining CPTPP and RCEP would represent a significant expansion in both agreements adding significantly to their output (as measured by GDP) and their population.
- * The removal of tariffs benefits CPTPP and RCEP producers and consumers through cheaper import prices.
- * Joining the two trade agreements is beneficial for both CPTPP and RCEP member economies. The main beneficiaries are Mexico, Thailand, Vietnam and Canada.
- * Most members of CPTPP and RCEP benefit, to varying degrees, from extending the coverage of global free trade by combining the two agreements. A small number of economies, such as Cambodia, are made slightly worse off.

9.1 Simulation background

The simulation involves combining the CPTPP and RCEP trade agreements (chapter 3). It involves the four members of the CPTPP that are not members of RCEP (Canada, Chile, Mexico and Peru) and the eight members of RCEP that are not members of CPTPP (Cambodia, China, Indonesia, Laos, Myanmar, Philippines, South Korea and Thailand) removing their tariffs on goods imports from each other. When coupled with the seven economies that are already members of both CPTPP and RCEP (Australia, Brunei, Japan, Malaysia, New Zealand, Singapore and Vietnam), the combined free trade arrangements cover 19 economies. This scenario builds on China joining CPTPP (chapter 7).

The economic significance of the combined agreement

RCEP is significantly larger than CPTPP, accounting for 150% more real GDP (\$29 billion compared to \$12 billion) and 350% more people (2.3 billion compared to 515 million) (World Bank 2023).

The seven joint members of CPTPP and RCEP have a combined real GDP of US\$7 trillion (7% of the world's GDP) and a population of 294 million people (4% of world population).

The members of the combined CPTPP and RCEP free trade agreement (hereafter referred to as the members) have a real GDP of US\$34 trillion (roughly 33% of the world's GDP) and a population 2.5 billion people (32% of world population).

Combined trade

Roughly three-fifths of exports and imports of member economies are with other members (60% and 61%, respectively) (table 9.1). The main trading partners in the model database for the combined region are China, the EU, the US, Canada, Mexico and Japan. These six economies account for over half of all CPTPP and RCEP trade.

The members export a diverse range of products including computers and electrical equipment, motor vehicles and parts, chemical products, machinery and equipment and business services. Many of their exports are elaborately transformed manufactured goods. Their main imports are generally similar but include crude oil.

Table 9.1 –Goods trade between CPTPP and RCEP economies and the rest of the world (%)

Economy	Exports from CPTPP and RCEP	Imports by CPTPP and RCEP
Australia	2.09	2.41
Brunei	0.03	0.08
Cambodia	0.26	0.13
Canada	6.46	5.90
Chile	0.42	0.52
China	21.80	23.44
Indonesia	1.58	2.04
Japan	5.78	6.14
Laos	0.10	0.04
Malaysia	1.81	2.09
Mexico	6.24	6.47
New Zealand	0.40	0.37
Peru	0.25	0.29
Philippines	1.12	0.71
Singapore	2.17	1.71
South Korea	4.16	4.31
Thailand	2.00	2.33
Vietnam	2.59	2.13
Rest of the World	40.74	38.88
Total	100.00	100.00

Source: PC Global model database.

Member tariffs

Import tariffs levied by the members (1.55%) are comparable to those levied by the rest of the world (2.21%) (table 9.2). Reflecting their membership of CPTPP and/or RCEP, member tariffs on each other are lower (1.20%). This points to small tariff reductions under the combined agreement.

Table 9.2 – Average tariff rates on CPTPP and RCEP economies (%)^a

Exports from	Levied by		
	Combined CPTPP and RCEP	Rest of the World	All countries
Combined CPTPP and RCEP	1.20	2.33	1.94
Rest of the World	1.70	2.16	2.02
All countries	1.55	2.21	1.99

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

There is limited average tariff variation across member economies (table 9.3). Cambodia is an exception, with higher average tariff rates than for other members.

Table 9.3 – Average tariff rates levied on CPTPP and RCEP imports (%)^a

Exports from	Imports to the combined CPTPP and RCEP
Australia	0.82
Brunei	0.02
Cambodia	5.71
Canada	0.31
Chile	0.48
China	1.49
Indonesia	2.21
Japan	0.69
Laos	0.17
Malaysia	0.41
Mexico	0.32
Myanmar	0.30
New Zealand	0.87
Peru	1.38
Philippines	0.66
Singapore	0.13
South Korea	0.16
Thailand	0.45
Vietnam	3.11
Average (all countries)	1.55

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

9.2 Simulation results

Agreement members

The members collectively gain from removing their tariffs on imports with each other (table 9.4).

Removing the tariffs lowers the cost of imports from other members relative to domestic production and imports from non-member economies. This benefits consumers in the member economies (including other producers). This leads to a 0.22% increase in imports by the members.

Removing tariffs also benefits exports from members to other member economies by reducing the cost of their products relative to production in the destination region and exports from non-member economies. This leads to a 0.14% increase in exports from combined agreement members (table 9.4). The requirement for external balance results in a marginal increase in export prices (0.02%).

Table 9.4 – Aggregate impacts of CPTPP and RCEP members removing import tariffs bilaterally (%)

	Combined CPTPP and RCEP	Rest of the World	World
Real GDP	0.05	-0.02	...
Real GNP	0.02	-0.01	...
Real GNA	0.02	-0.01	...
Export volumes	0.14	-0.06	0.06
Import volumes	0.22	-0.05	0.06
Domestic demand	0.01	-0.02	-0.01
Real wages ^a	0.08	-0.03	0.01
Rate of return to capital	0.04	0.03	0.03
Capital used	0.07	-0.04	...
Export prices	0.02	-0.03	-0.01
Import prices (inc tariffs)	-0.13	-0.01	-0.05
Import prices (exc tariffs)	...	-0.01	-0.01
Terms of trade ^b	0.03	-0.01	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

The resulting increases in member output and exports requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for workers in member economies (0.08%). The additional demand for capital in member economies drives up their rates of return relative to other economies (figure 9.1).

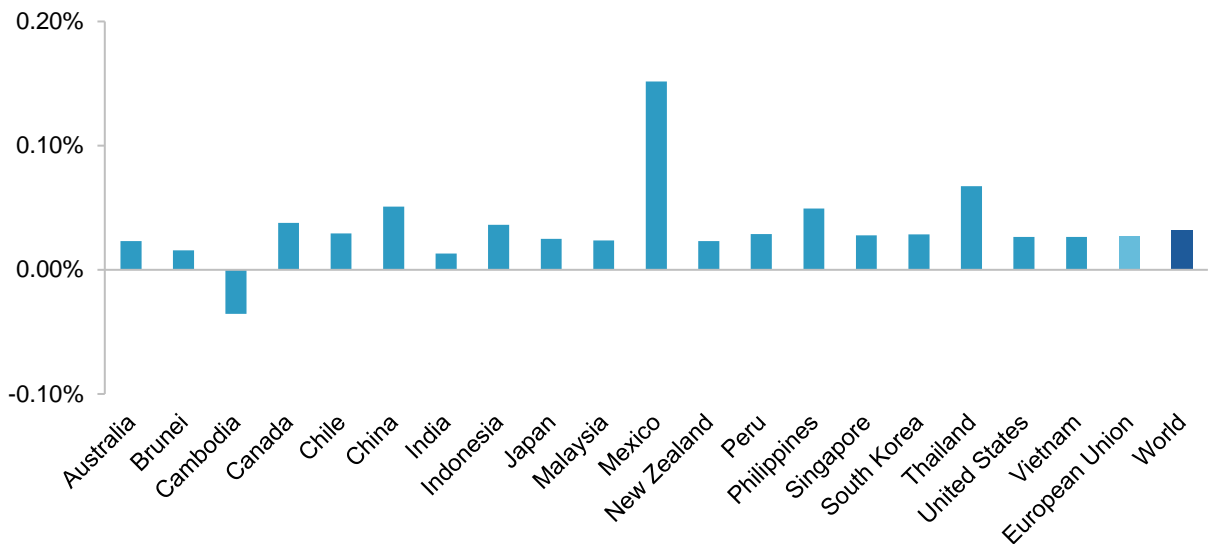
Relatively higher growth in the rates of return lead to members investing more of their capital stock in member economies and to the increased use of foreign-owned capital in their production, leading to 0.07% additional capital use in member economies. The bulk of the additional capital used comes from abroad.

The resulting increase in member output leads to a 0.05% increase in their real GDP (production).

This increase in the use of foreign capital means that foreign investors receive much of the increase in member production. This means that the 0.02% increase in member real GNP (real national income) is less than its increase in real GDP.

The main beneficiaries from combining the two trade agreements are those economies that are members of RCEP but not of CPTPP – Mexico, Thailand, Vietnam and Canada (table 9.5). These economies have higher tariffs than the other economies that are not members of both agreements.

Figure 9.1 – Change in the rate of return on capital, selected economies



Source: Simulation results.

The modelling indicates that the removal of tariffs points to a small number of members being made slightly worse off – mostly the American members of CPTPP (other than Canada) as well as Singapore and Brunei. These American economies tend to compete more with those RCEP economies that are not members of CPTPP and, as a result, are less complementary and benefit less from the increase in trade.

Rest of the world

The removal of tariffs on bilateral trade between members has an adverse effect on trade with non-members, whose exports and imports decline by 0.06% and 0.05%, respectively (table 9.4). The reduction in tariffs causes a shift in trade away from non-members such as the EU and the US. Consequently, the increase in trade within the combined CPTPP and RCEP region (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion).

World economy

The removal of tariffs on bilateral trade between the member of CPTPP and RCEP has little effect on the world economy (table 9.4). The main effects are slight increases in the volumes of international trade (exports and imports).

Table 9.5 – Impacts of CPTPP and RCEP members removing import tariffs bilaterally (%)^a

	AUS	BRN	CAM	CAN	CHL	CHN	IDN	JPN	KOR	LAO	MEX	MYS
Real GDP	-0.01	-0.02	-0.13	0.12	0.02	0.04	0.01	-0.02	0.01	-0.01	0.52	-0.04
Real GNP	...	...	-0.04	0.03	0.01	0.01	...	-0.01	0.01	...	0.25	-0.01
Real GNA	...	...	-0.14	0.08	0.01	0.03	0.01	-0.01	0.03	-0.01	0.18	-0.03
Output: primary	-0.01	-0.01	0.02	0.93	0.07	-0.02	-0.04	0.03	-0.11	-0.01	0.19	-0.03
Output: manufacturing	-0.03	-0.02	-0.12	0.40	0.02	0.02	0.06	-0.06	0.03	-0.14	1.23	-0.05
Output: services	-0.01	-0.02	-0.06	0.01	0.01	0.04	...	-0.02	0.01	...	0.36	-0.03
Export volumes	-0.02	-0.03	-0.12	0.71	0.09	0.23	0.10	-0.11	0.04	-0.03	2.46	-0.06
Import volumes	-0.03	-0.01	-0.20	0.75	0.11	0.37	0.13	-0.08	0.10	-0.03	2.00	-0.08
Domestic demand	-0.01	-0.01	-0.05	0.05	...	0.01	...	-0.03	0.01	-0.02	0.16	-0.03
Rate of return to capital	-0.01	-0.01	-0.10	0.23	0.02	0.06	0.03	-0.02	0.04	-0.01	0.70	-0.03
Real wages ^b	0.02	0.02	-0.01	0.03	0.03	0.05	0.04	0.03	0.03	0.02	0.12	0.03
Capital used	-0.02	-0.02	-0.29	0.22	0.03	0.07	0.01	-0.05	...	-0.02	0.69	-0.08
Export prices	-0.02	0.01	-0.06	0.14	0.01	0.08	0.03	-0.02	0.05	0.02	-0.22	-0.02
Import prices (inc tariffs)	...	...	-0.01	-0.42	-0.09	-0.09	-0.02	0.01	-0.03	0.02	-0.84	0.01
Import prices (exc tariffs)	...	...	0.02	-0.05	-0.01	-0.01	0.01	0.01	...	0.02	-0.03	0.01
Terms of trade ^c	-0.01	0.01	-0.09	0.19	0.02	0.09	0.02	-0.03	0.04	...	-0.19	-0.02

(continued next page)

Table 9.5 – Impacts of CPTPP and RCEP members removing import tariffs bilaterally (%)^a

	NZL	PER	PHL	SGP	THA	VNM
Real GDP	-0.02	0.01	0.07	-0.01	0.20	0.20
Real GNP	-0.01	0.01	0.03	...	0.08	0.08
Real GNA	-0.02	...	0.01	...	0.10	0.10
Output: primary	-0.06	0.17	-0.11	-0.01	-0.07	-0.07
Output: manufacturing	-0.03	-0.09	0.14	-0.04	0.45	0.45
Output: services	-0.02	0.03	0.05	0.01	0.13	0.13
Export volumes	-0.04	0.60	0.28	-0.04	0.54	0.54
Import volumes	-0.05	0.68	0.14	...	0.61	0.61
Domestic demand	-0.02	-0.09	0.03	-0.01	0.18	0.18
Real wages ^b	-0.02	0.04	0.09	-0.01	0.20	0.20
Rate of return to capital	0.02	0.03	0.05	0.03	0.06	0.06
Capital used	-0.04	0.01	0.11	-0.01	0.31	0.31
Export prices	-0.04	-0.08	-0.03	...	0.04	0.04
Import prices (inc tariffs)	-0.01	-0.38	-0.08	-0.01	-0.10	-0.10
Import prices (exc tariffs)	-0.01	-0.01	0.02	-0.01	...	...
Terms of trade ^c	-0.03	-0.07	-0.04	0.01	0.04	0.04

... Zero or less+ than ± 0.005 . **a.** AUS: Australia. BRN: Brunei. CAM: Cambodia. CAN: Canada. CHL: Chile. CHN: China. IDN: Indonesia. JPN: Japan. KOR: South Korea. LAO: Laos. MEX: Mexico. MYS: Malaysia. NZL: New Zealand. PER: Peru. PHL: Philippines. SGP: Singapore. THA: Thailand. VNM: Vietnam. **b.** Deflated by the GDP deflator. **c.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

10. What if IPEF included tariff reductions?

Key points

- * Economies negotiating IPEF account for a sizable share of global economic activity and population.
- * If IPEF were broadened to include the removal of tariffs, it would benefit IPEF producers and consumers through cheaper import prices.
- * Lower tariffs increase trade flows between IPEF members. These gains come at the expense of those economies that are not members of IPEF and give rise to some changes in the composition of IPEF trade towards those goods that are now relatively cheaper.
- * IPEF members are collectively better off from the removal of their tariffs on bilateral trade (real GDP, real GNP and real GNA). These gains benefit workers and capital owners alike.
- * IPEF members with high tariffs – Thailand, Vietnam, Philippines, Malaysia, Indonesia and India in particular - stand to gain significantly more from the bilateral removal of tariffs than do other IPEF members.

10.1 Simulation background

As noted in chapter 2, IPEF involves members implementing any of the following four pillars: trade, including digital trade; supply chains; clean energy, decarbonisation and infrastructure; and/or tax and anti-corruption. The simulation goes beyond this to assess ‘what if’ IPEF was broadened to include the removal of tariffs on bilateral trade between those economies that are currently negotiating the IPEF (chapter 3). It involves 13 economies – Australia, Brunei, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Thailand, United States and Vietnam – eliminating their tariffs on goods imports from fellow IPEF members.¹⁵ The main difference between IPEF and RCEP is that IPEF includes the United States and India but not China.

¹⁵ The simulation does not include the removal of tariffs on bilateral trade with Fiji, as Fiji forms part of the broader Rest of Asia region in the PC Global model that also includes economies that are not part of IPEF.

The economic significance of IPEF

IPEF members collectively account for 40% of world GDP (US\$40 trillion) and 32% of world population (2.6 billion people) (World Bank 2023). IPEF members account for over half of global goods and services trade (54% of exports and 57% of imports).

IPEF trade

One-third of goods exports from IPEF member economies go to other IPEF economies (35%) and IPEF members account for a similar share of goods imports (31%) (table 10.1). Overall, 10% of all world trade in goods subject to tariffs is between IPEF members. The main trading partners of IPEF in the model database are China and the EU. Many IPEF members also have significant exports to the US.

The main exports from IPEF economies are a diverse range of manufactured goods, particularly computers and related products, motor vehicles and parts, chemical products and machinery and equipment. Many of these exports are elaborately transformed manufactured goods. Other important exports include business services and accommodation, food and service activities (tourism). IPEF's main imports are generally similar but also include crude oil.

Table 10.1 – IPEF's trade with IPEF economies and the rest of the world (%)

Economy	Exports from IPEF	Imports by IPEF
Australia	2.10	2.40
Brunei	0.00	0.10
India	2.40	1.70
Indonesia	1.60	2.00
Japan	5.80	6.10
Malaysia	1.80	2.10
New Zealand	0.40	0.40
Philippines	1.10	0.70
Singapore	2.20	1.70
South Korea	4.20	4.30
Thailand	2.00	2.30
US	8.70	4.90
Vietnam	2.60	2.10
Rest of the World	65.10	69.20
Total	100.00	100.00

Source: PC Global model database.

IPEF tariffs

Although there are no explicit market access negotiations under IPEF, we explore the possible impacts of improving market access among IPEF members.

Many IPEF members already have pre-existing free trade agreements with each other, most notably those that are members of ASEAN, CPTPP and RCEP (chapter 2).¹⁶ Consequently, many IPEF members already have relatively low bilateral tariffs.

¹⁶ The 10 members of ASEAN are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

This means that IPEF members have, on average, lower tariffs on imports from other IPEF economies (1.20%) than on imports from the rest of the world (1.70%) (table 10.2). IPEF members also tend to have lower tariffs than the rest of the world (1.55% compared to 2.21%, respectively).

There is substantial variation in tariffs across IPEF member economies (table 10.3). In large part, this variation reflects the effects of pre-existing free trade agreements between member economies. The US, which has fewer free trade agreements with member economies, has the second highest average tariff rate (after Vietnam).

Table 10.2 – Average tariff rates on imports into IPEF economies (%)^a

Exports from	Levied by		
	IPEF	Rest of the World	All countries
IPEF	1.20	2.33	1.94
Rest of the World	1.70	2.16	2.02
All countries	1.55	2.21	1.99

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

Table 10.3 – Average IPEF tariff rates on imports from IPEF economies (%)^a

Imports from	IPEF
Australia	0.82
Brunei	0.02
India	2.21
Indonesia	1.65
Japan	0.69
Malaysia	0.41
New Zealand	0.87
Philippines	0.66
Singapore	0.13
South Korea	0.16
Thailand	0.45
US	2.79
Vietnam	3.11
Average (all countries)	1.55

a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

10.2 Simulation results

IPEF members

IPEF members collectively gain from removing their tariffs on imports from other IPEF members (table 10.4).

Removing tariffs lowers the cost of imports from other IPEF members relative to domestic production and imports from non-IPEF economies. This benefits consumers in IPEF economies (including other producers). This leads to an increase in imports by IPEF members of 1.03%.

Removing tariffs also benefits exports from IPEF economies to other IPEF members by reducing the cost of these products relative to production in the destination region and exports from non-IPEF member economies. This leads to a 1.08% increase in exports from IPEF member economies (table 10.4). The requirement for external balance means that export prices increase by 0.15%.

Production in IPEF economies increase to enable this increase in export volumes. This additional output requires the use of additional labour and capital. As aggregate employment is fixed in the model, the increase in the demand for labour translates into higher real wages for IPEF workers (0.16%). The additional demand for capital in IPEF economies drives up the rates of return in IPEF economies (0.08%) relative to other economies (figure 10.1).

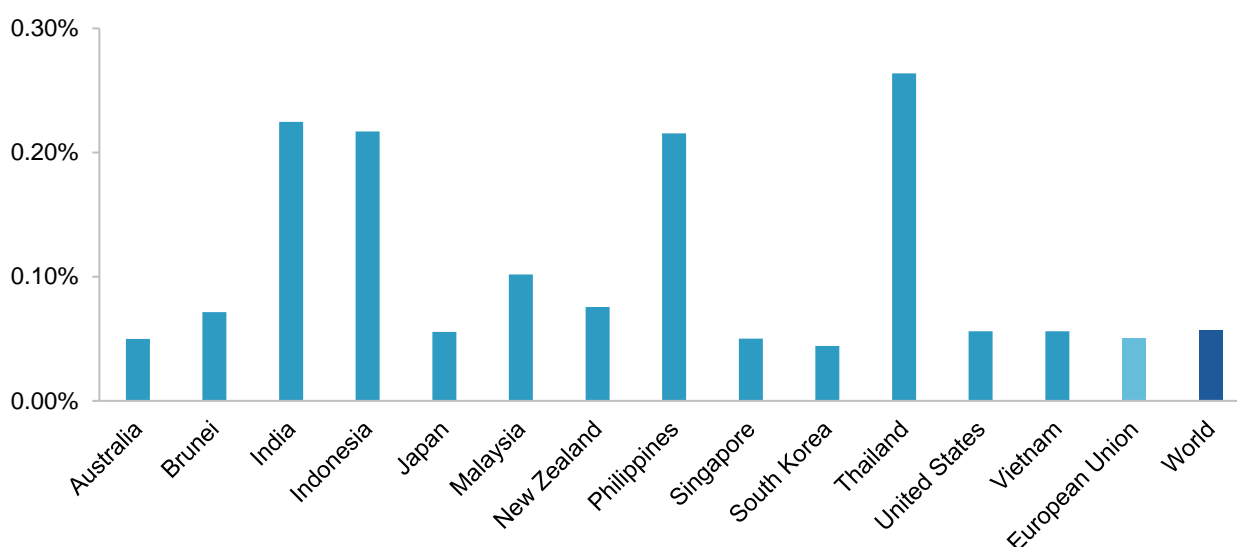
Table 10.4 – Aggregate impacts of IPEF members removing import tariffs bilaterally (%)

	IPEF	Rest of the World	World
Real GDP	0.08	-0.05	0.01
Real GNP	0.03	-0.01	0.01
Real GNA	0.05	-0.02	0.01
Export volumes	1.08	-0.15	0.22
Import volumes	1.03	-0.13	0.22
Domestic demand	-0.01	-0.04	-0.03
Real wages ^a	0.16	-0.06	0.04
Rate of return to capital	0.08	0.04	0.06
Capital used	0.15	-0.09	...
Export prices	0.15	-0.02	0.02
Import prices (inc tariffs)	-0.39	0.02	-0.11
Import prices (exc tariffs)	0.03	0.02	0.02
Terms of trade ^b	0.13	-0.05	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

Figure 10.1 – Change in the rate of return on capital, selected economies



Source: Simulation results.

This relatively higher growth in the rate of return leads to IPEF investing more of its capital stock in IPEF member economies and to increased use of foreign-owned capital in IPEF production, leading to 0.15% additional capital being used in IPEF production. The bulk of the additional capital used comes from abroad.

The resulting increase in IPEF output leads to a 0.08% increase IPEF real GDP (IPEF production).

The increased use of foreign capital means that foreign investors receive much of the increase in IPEF production. This means that the 0.03% increase in IPEF real GNP (real national income) is less than its increase in real GDP. The increase in the terms of trade enhances the purchasing power of this increase in national income (0.05%).

Most IPEF members gain from the bilateral removing of tariffs (table 10.5).

Those economies that gain the most – Thailand, Vietnam, Philippines, Malaysia, Indonesia and India – have higher initial tariff rates.

The removal of tariffs has little impact on Singapore and South Korea. This is not surprising given that Singapore has no tariffs in the model database to remove (including on trade with non-IPEF members).

Rest of the world

The removal of tariffs on bilateral trade between IPEF members has an adverse effect on trade with non-members, whose exports and imports decline by 0.15% and 0.13%, respectively (table 10.4). The reduction in tariffs causes a shift in trade away from non-IPEF economies such as the EU and China towards IPEF. Consequently, the increase in trade within IPEF (trade creation) partly comes at the expense of trade with the rest of the world (trade diversion). The decline in trade in the rest of the world results in a 0.05% decline in real GDP in the rest of the world.

World economy

The removal of IPEF tariffs on bilateral trade has little effect on the world economy (table 10.4). The main effects are slight increases in the volumes of international trade. While IPEF is relatively large compared to most other economies, it is relatively small as a share of global economic activity and international trade (exports and imports).

Table 10.5 – Impacts of IPEF members removing import tariffs bilaterally (%)^a

	AUS	BRN	IDN	IND	JPN	KOR	MYS	NZL	PHL	SGP	THA	US	VNM
Real GDP	0.03	0.03	0.17	0.15	0.09	-0.01	0.36	0.10	0.40	-0.05	0.87	0.05	0.81
Real GNP	...	...	0.02	0.04	0.06	0.01	0.17	0.04	0.19	-0.01	0.35	0.02	0.36
Real GNA	0.04	0.06	0.13	-0.01	0.08	-0.01	0.23	0.14	0.16	-0.01	0.05	0.04	1.91
Output: primary	0.34	0.01	-0.22	-0.23	-3.04	-0.33	0.12	0.48	-0.26	-0.02	-0.44	0.79	-1.51
Output: manufacturing	-0.54	0.13	0.40	0.59	0.13	-0.02	0.38	-0.01	0.74	-0.34	1.69	0.34	0.01
Output: services	0.06	0.03	0.10	0.12	0.04	...	0.24	0.09	0.28	0.02	0.78	0.01	0.42
Export volumes	-0.03	0.04	1.14	4.24	0.66	0.02	0.63	0.30	1.83	-0.20	2.61	1.39	1.31
Import volumes	0.12	0.16	1.69	2.82	0.69	-0.01	0.73	0.61	1.22	-0.11	2.25	1.10	2.62
Domestic demand	0.03	0.03	...	-0.11	-0.03	-0.02	0.16	0.07	0.16	-0.06	0.56	0.01	-0.75
Real wages ^b	-0.03	0.04	0.29	0.49	0.12	0.03	0.46	0.05	0.48	-0.05	1.25	0.09	2.50
Rate of return to capital	0.04	0.06	0.20	0.19	0.05	0.04	0.06	0.06	0.14	0.04	0.17	0.05	1.17
Capital used	0.07	0.04	0.29	0.31	0.05	-0.04	0.56	0.18	0.62	-0.09	1.29	0.12	1.80
Export prices	0.18	0.13	0.62	-0.21	0.12	0.01	0.07	0.36	...	0.05	-0.45	0.23	1.18
Import prices (inc tariffs)	-0.03	-0.01	-0.20	-1.39	-0.41	-0.02	-0.29	-0.17	-0.40	0.06	-1.10	-0.38	-0.40
Import prices (exc tariffs)	0.02	...	0.02	0.05	0.04	0.06	0.01	0.03	0.05	0.06	0.06	...	-0.02
Terms of trade ^c	0.16	0.12	0.60	-0.27	0.08	-0.05	0.06	0.33	-0.06	-0.01	-0.51	0.22	1.21

... Zero or less than ± 0.005 . a. AUS: Australia. BRN: Brunei. IDN: Indonesia. IND: India. JPN: Japan. KOR: South Korea. MYS: Malaysia. NZL: New Zealand.

PHL: Philippines. SGP: Singapore. THA: Thailand. US: United States. VNM: Vietnam. b. Deflated by the GDP deflator. c. Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

11. What if Australia removes all its tariffs unilaterally?

Key points

- * Australia has relatively low tariffs on imported goods.
- * These tariffs raise minimal revenue for the Australian Government (less than 1%).
- * Unilaterally removing these tariffs benefits Australian consumers and producers by reducing the cost of imports.
- * The unilateral removal of these tariffs increases Australian real GDP by 0.07%.
- * Achieving these gains does not depend on reciprocal action by other economies.

11.1 Simulation background

The simulation involves Australia unilaterally removing its remaining tariffs (chapter 3). This scenario provides a benchmark against which the impacts of the scenarios canvassed in chapters 4 to 10 on the Australian economy can be assessed. This scenario does not assume that Australia's trading partners reciprocate.

Unlike the other scenarios explored in this paper, the impacts in this scenario depend solely on the actions of Australia and not on the actions of other countries.

Australian tariffs

Australia has relatively low tariff rates on imports. In large part, this reflects the fact that Australia is a party to many free trade agreements, some of which are examined in this paper (chapter 2).

Consequently, the average Australian tariff rate in the model database (0.4%) is lower than that levied by the rest of the world (2%) (table 11.1). Reflecting the numerous trade agreements to which Australia is signatory to, the rest of the world has lower tariffs on Australian exports (0.7%) than it does on exports from other economies (2%).

Table 11.1 – Average tariff rates on imports into Australia and the rest of the world (%)^a

Exports from	Levied by		
	Australia	Rest of the World	All countries
Australia	0.00	0.73	0.73
Rest of the World	0.43	2.04	2.02
All countries	0.43	2.02	1.99

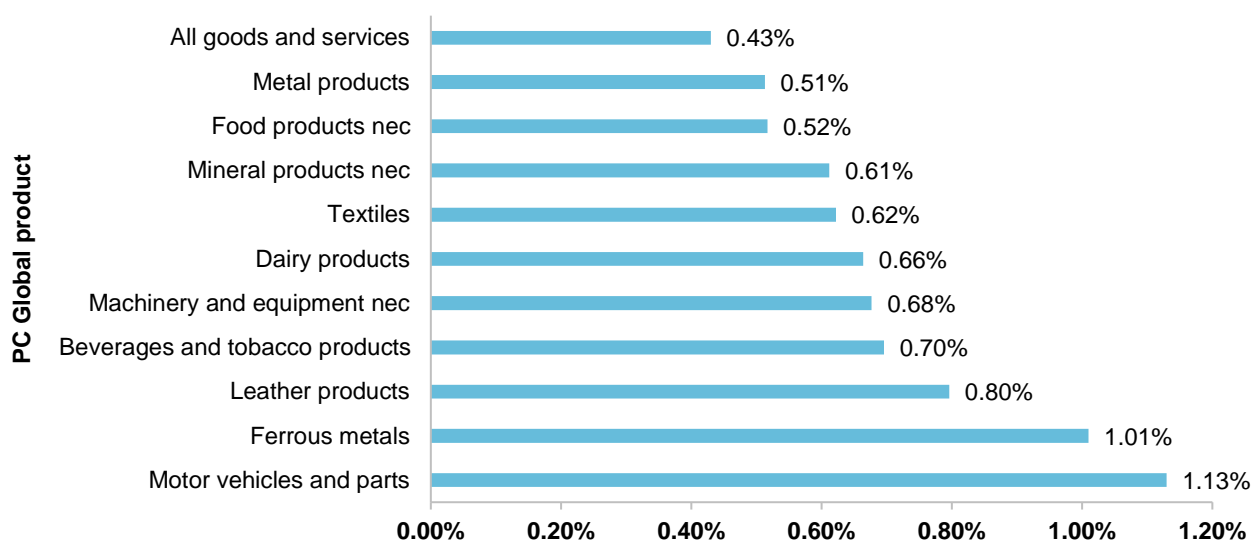
a. Import-weighted average tariff levied on goods imports.

Source: PC Global model database.

This low average tariff rate for Australia masks wide variation across goods (figure 11.1). Tariffs tend to be higher on manufactured goods, particularly motor vehicles and parts (1.13%), ferrous metals (1.01%) and a range of metal and related products. Other products with higher tariff rates include leather products (0.80%), dairy products (0.66%) and textiles (0.62%).

Collectively, Australian tariffs raise just under US\$1 billion in revenue (0.5% of government revenue in the PC Global model database).¹⁷ This revenue comes from narrow range of products (PC 2022).

Figure 11.1 – Average tariff rates on Australian imports (%)



Source: PC Global model database.

11.2 Simulation results

The modelling results point to beneficial effects of Australia unilaterally removing tariffs on its imports.

¹⁷ This figure excludes tariffs that are levied as ‘excise duty-equivalents’ on imports of tobacco and some alcohol products, which are generally excluded from Australian free trade agreements.

Australia

The removal of all remaining tariffs lowers the price of imports in Australia. Cheaper imports lead to Australian consumers (including firms that use imported inputs) switching away from domestically produced goods and imports from other economies whose prices remain unchanged. This leads to a 0.24% increase in the demand for imports (table 11.2).

The requirement for external balance requires an offsetting increase in Australian exports, which requires a fall in Australian export prices. Australian exports increase by 0.32% and export prices fall by 0.08%.

The increase in exports requires Australian output to increase. This additional production requires more labour and capital. As the labour supply is fixed, the increased demand for labour leads to an increase in real wages in Australia (0.13%). The increased demand for capital leads to an increase in the rate of return. The 0.01% increase in the rate of return is small, as Australia as a small country in terms of global capital markets and can easily access the additional capital required overseas. The resulting capital inflow include some repatriation of Australian-owned capital in other economies with the remainder being foreign owned. This leads to a 0.16% increase in capital used in Australian production.

Increased Australian production leads to a 0.07% increase in real GDP.

Increased foreign investment in Australia entitles foreign investors to an increased share of the capital income generated in Australia. The resulting increase in capital outflows leads to no change in national income (real GNA).

Unilaterally removing tariffs would produce additional benefits to those presented here. In addition to reducing the cost of imports, removing tariffs would also eliminate the associated compliance and administration costs for the benefit of businesses and Australian taxpayers. The Commission found these additional costs amount to \$0.59 to \$1.57 per dollar of revenue raised (PC 2022).

Table 11.2 – Aggregate impacts of Australia removing import tariffs unilaterally (%)

	Australia	All countries
Real GDP	0.07	...
Real GNP	...	...
Real GNA	-0.01	...
Export volumes	0.32	...
Import volumes	0.24	...
Domestic demand	0.04	...
Real wages ^a	0.13	...
Rate of return to capital	0.01	...
Capital used	0.16	...
Export prices	-0.08	...
Import prices(inc tariffs)	-0.33	...
Import prices (exc tariffs)	...	...
Terms of trade ^b	-0.08	...

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates using the PC Global model.

World economy

Australia unilaterally removing its tariffs has no discernible impact on the world economy (table 11.2).

This highlights that the rationale for unilaterally removing all remaining tariffs is because it benefits the Australian economy.

12. Results summary

Key points

- * Expanding the country coverage of trade agreements increases production in the joining countries and the members of existing trade agreement as a group. These gains primarily come at the expense of those countries that are outside the trade agreement. Expanding trade agreements has little impact on the world economy. The magnitudes of the gain are larger where the joining country(s) have higher tariff rates.
- * Individual members of an existing trade agreements can gain or lose from new members joining. Whether a member gains or not depends on, in large part, whether the economies of the joining countries complement or compete with the economy of the member country.
- * Trade agreements increase trade between member countries. These increases generally come at the expense of trade with non-member countries.
- * The bilateral removal of tariffs produces larger effects on real national production (GDP) than on real national income (GNP) because additional foreign capital is needed to produce the additional output that is generated and the returns to these factors flow out of the economy in which production occurs. Changes in the terms of trade can increase or decrease the purchasing power of any change in real national income (GNA).
- * Australia gains under most of the trade scenarios assessed. Where Australia is worse off, it is because the acceding country is a competitor in many of Australia's key agricultural export markets (such as wheat). Regardless, the effects on the Australian economy, whether positive or negative, are generally small. Australia unilaterally removing its remaining tariffs would produce larger economic gains than any of the scenarios examined in this paper.
- * Freeing up international trade in goods is an important part of modern trade agreements. However, these agreements are much broader than just trade in goods and these impacts of the remainder of these agreements, which have not been modelled here, need to be considered to assess whether agreements are beneficial or not.

This chapter summarises the results from the trade scenarios assessed in chapters 4 to 10. It also includes the unilateral action by Australia scenario (chapter 11) to provide a benchmark against which to assess the impacts on Australia.

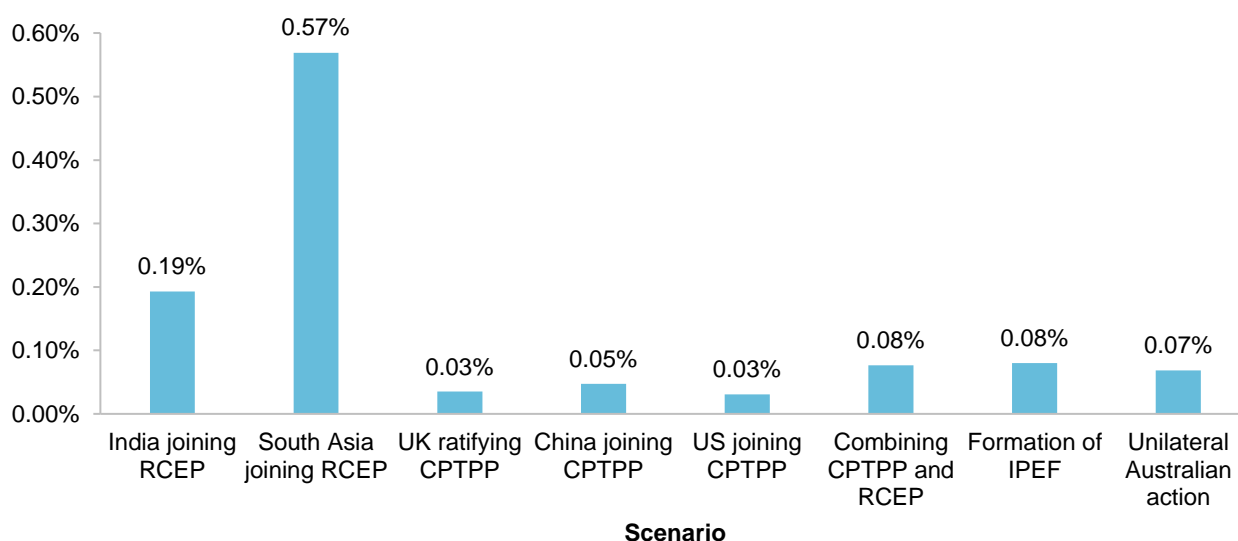
12.1 Impacts on the joining economies

Each of the first five scenarios examined involved a single economy joining an existing free trade agreement or, in the case of the South Asia scenario, a small number of economies joining (chapters 4 to 8).

Each of these joining economies benefits from increased national production by joining the trade agreements examined (figure 12.1). India and South Asia benefit from joining RCEP, while the United Kingdom benefits from ratifying CPTPP and China and the United States both benefit from joining CPTPP. South Asia and India gain more from joining RCEP than do the other joining economies in their respective scenarios because they have higher initial tariffs.¹⁸

As discussed below, Australia also benefits from increased production by removing its tariffs unilaterally (figure 12.1).

Figure 12.1 – Impact on real GDP for the joining economies^a



a. Combining CPTPP and RCEP is the effect of Canada, Chile, Mexico and Peru joining RCEP and Cambodia, China, Indonesia Laos, Myanmar, South Korea and Thailand joining the CPTPP.

Source: Commission estimates based on PC Global simulation results (chapters 4 to 11).

Other economies also materially benefit from the trade scenarios (chapters 4 to 10). In all but one case, the nation that has the highest increase in real GDP is not necessarily the economy joining the trade agreement. India is the one exception, as it is the primary beneficiary from joining RCEP. Malaysia has the largest increase in real GDP from the United Kingdom ratifying CPTPP. Mexico and Vietnam, respectively, gain the most from China and the United States joining CPTPP. The gains to Mexico and Vietnam are appreciably larger than those experienced by the joining economy.

The modelling points to Mexico benefiting the most in terms of increased national production from China joining CPTPP (chapter 7). At face value, this may appear puzzling, but it reflects a confluence of factors. Mexico has relatively high tariffs on Chinese imports. Hence, Mexico removing its tariffs on Chinese imports leads to relatively large falls in import prices for Mexico. Mexico also has substantial imports from China that benefit from these price reductions. By virtue of being a party to the US-Mexico-Canada Agreement, Mexico (along with Canada) has preferential access to the lucrative US market compared to other economies. This,

¹⁸ Pakistan and Sri Lanka have higher average tariff rates than India (9.3% and 8.3% compared to 4.9%, respectively).

coupled with the size and wealth of the US market, means that the United States is by far the largest export market for Mexican producers. Mexico removing its tariffs lowers the cost of imported inputs into Mexican production. This reduces production costs in Mexico and increases Mexican exports into the US.

While many of these factors also apply to Canada, the positive impact on the Canadian economy is smaller than for Mexico owing to the relatively smaller magnitudes involved.

12.2 Impacts on the world economy

All the scenarios modelled have little to no discernible effect on world GDP (table 12.1).

The reason for this is that the scenarios primarily involve a redistribution of economic activity towards the joining economy and the members of the trade agreement (at least collectively) and away from non-member economies. This applies to both trade (imports and exports) as well as a redistribution of the global capital stock across economies (appendix A). Much of the trade creation that occurs at the level of individual economies is at the expense of trade diverted away from non-member economies.

Table 12.1 – Macroeconomic impacts on the world economy (%)

	India joins RCEP	South Asia joins RCEP	United Kingdom ratifies CPTPP	China joins CPTPP	US joins CPTPP	Combined CPTPP and RCEP	Formation of IPEF	Unilateral action by Australia
Real GDP	...	0.01	...	...	0.01	...	0.01	...
Real GNP	...	0.01	...	...	0.01	...	0.01	...
Real GNA	...	0.01	...	...	0.01	...	0.01	...
Export demand	0.12	0.22	0.01	0.04	0.11	0.06	0.22	...
Import demand	0.12	0.22	0.01	0.04	0.11	0.06	0.22	...

... Zero or less than ± 0.05 .

Source: Commission estimates based on PC Global simulation results (chapters 4 to 11).

All scenarios result in some increase in global trade, with the formation of IPEF involving the largest increase. Lowering tariffs reduces the cost of imports and leads to a switch away from domestically produced goods and exports from other economies where export prices remain unchanged. The resulting increase in trade comes at the expense of locally produced goods. Hence, the growth in international trade is higher than the resulting growth in global production (real GDP). The combining of CPTPP and RCEP and South Asia joining RCEP also have relatively large impacts on world trade and the United Kingdom joining the CPTPP has the smallest impact. IPEF has a bigger trade impact than combining of CPTPP and RCEP, as most of the economies that are members of only one of these agreements (other than China) are relatively small compared to the US. Hence, the United States joining IPEF has a greater impact on world trade.

The small impact of each of these scenarios on the global economy is unsurprising. Most scenarios involve a single economy joining an existing agreement. Each of these economies by themselves is small relative to world GDP, even the US, China and India. The scenarios involve these economies bilaterally removing their tariffs with the existing members of the agreement examined. These tariffs are seldom large, which limits the gain. The absence of tariffs on trade between existing members means that the gains come from the interactions with the joining economy. The small tariffs reduce the magnitude of the gains to existing members. Existing members may gain or lose depending on whether they complement the joining economy or compete with it.

The small impact on global GDP is because the global stock of capital is held fixed.

The production and income effects for individual economies frequently differ owing to the use of foreign-owned capital, which entitles foreign investors to a share of the capital income that is created from that production. This is not the case globally, as the capital income transfers net out across economies, with the result that global production and global income are the same.

12.3 Impacts on Australia

Australian tariffs in the starting database are relatively low and confined to those economies that are not members of CPTPP or RCEP. This includes South Africa, Pakistan, UK, EU, Taiwan, Sri Lanka, Brazil and India. Australian tariffs are mainly levied on imports of motor vehicles and parts, ferrous metals, leather products, dairy products and a range of other manufactured goods.

The scenarios modelled involve few of these economies joining a trade agreement to which Australia is a signatory. Most scenarios involve a single country (such as India and the UK), or a small number of countries, joining (such as Bangladesh, India, Pakistan and Sri Lanka). Even the formation of IPEF (chapter 11), which involves the most economies, involves few economies joining with which Australia does not already have an existing free trade agreement with.

Consequently, Australia benefits from limited tariff reductions under each scenario. Hence, the fall in import prices in each scenario is modest.

The main gains will come from the reciprocal cuts in foreign tariffs levied on Australian exports. However, while generally higher than those levied by Australia, these tariffs are also relatively low.

This points to limited potential gains for Australia under each of the scenarios considered.

The modelling results bear this out.

All the scenarios modelled have relatively minor implications for the Australian economy (table 12.2).

Australia gains more in terms of increased production (real GDP) by removing its own tariffs (chapter 11) than it does from any of the scenarios examined (chapters 4 to 1). Unlike the other scenarios examined, unilaterally removing the remaining Australian tariffs does not depend on reciprocal action by any other economy. These gains depend solely on the actions of Australia. Given the small amount of revenue that these tariffs collect, unilaterally removing these tariffs is likely to deliver a net benefit to the Australian economy, particularly when the associated compliance and administration costs that would be saved are included.

As Australia has relatively high tariffs on imports from India and India on Australian imports, Australian production increases from India joining RCEP (chapter 4). The removal of tariffs with India leads to increased Australian exports of primary products and to an increase in imports of manufactured goods. This highlights the complementary nature between the two economies.

Table 12.2 – Macroeconomic impacts for Australia (%)

	India joins RCEP	South Asia joins RCEP	United Kingdom ratifies CPTPP	China joins CPTPP	US joins CPTPP	Combined CPTPP and RCEP	Formation of IPEF	Unilateral action by Australia
Real GDP	0.05	0.05	0.01	-0.01	-0.02	-0.01	0.03	0.07
Real GNP	...	...	...	...	...	...	...	...
Real GNA	0.09	0.09	...	...	-0.04	...	0.04	-0.01
Output: primary	0.41	0.41	...	...	-0.05	-0.01	0.34	0.14
Output: manufacturing	-0.20	-0.18	0.07	-0.01	-0.19	-0.03	-0.54	0.07
Output: services	0.03	0.03	0.01	-0.01	0.01	-0.01	0.06	0.07
Export volumes	0.10	0.10	0.05	-0.01	-0.07	-0.02	-0.03	0.32
Import volumes	0.40	0.42	0.06	-0.01	-0.20	-0.03	0.12	0.24
Domestic demand	0.04	0.04	0.01	...	-0.01	-0.01	0.03	0.04
Real wages ^a	0.01	0.01	0.02	-0.01	-0.02	-0.01	-0.03	0.13
Rate of return to capital	0.03	0.04	...	0.02	0.01	0.02	0.04	0.01
Capital used	0.12	0.11	0.02	-0.01	-0.04	-0.02	0.07	0.16
Export prices	0.38	0.42	0.01	-0.01	-0.14	-0.02	0.18	-0.08
Import prices (inc tariffs)	-0.01	...	-0.03	-0.01	-0.01	...	-0.03	-0.33
Import prices (exc tariffs)	...	0.02	...	-0.01	0.03	...	0.02	...
Terms of trade ^b	0.38	0.40	0.01	-0.01	-0.17	-0.01	0.16	-0.08

... Zero or less than ± 0.005 . **a.** Deflated by the GDP deflator. **b.** Defined using import prices excluding tariffs.

Source: Commission estimates based on PC Global simulation results (chapters 4 to 11).

The results for Australia from South Asia joining RCEP (chapter 5) are similar to those from India joining RCEP (chapter 4). This reflects the fact that most trade between Australia and South Asia is between Australia and India rather than with the three other economies included in this scenario (Bangladesh, Pakistan and Sri Lanka). The inclusion of these three economies adds little benefit to Australian trade and the Australian economy compared to India joining RCEP.

Australian production also increases from the formation of IPEF (chapter 10) and from the United Kingdom ratifying the CPTPP (chapter 6). Again, this result reflects Australia having relatively higher tariffs on imports from the United Kingdom than on most other economies in the database. The removal of these tariffs increases Australian trade and, with it, Australian production.

China joining the CPTPP (chapter 7) has a negligible impact on the Australian economy. This is because, as China is already a member of RCEP, there is no bilateral reduction in tariffs on trade between China and Australia in this scenario. Hence, China joining has little impact on Australia. The Australian results contrast with those for Mexico and Canada (and China), which are the main beneficiaries from bilateral tariff reductions with China.

Australian production declines marginally from the United States joining the CPTPP (chapter 8). This reflects the adverse trade effects that arise from the United States being a competitor to Australia in supplying certain primary products internationally (such as beef and wheat). This outweighs the gains to Australia from the bilateral lowering of tariffs between other CPTPP members and on trade with the US, which are higher than the Australian average.

Australian production also declines marginally from combining CPTPP and RCEP (chapter 9). This reflects the adverse trade effects that flow from Australia having generally lower tariffs than those economies that are members of just one of these agreements.

Half of the scenarios involve an improvement in Australia's terms of trade (table 12.2). The resulting increase in export prices relative to import prices increases the purchasing power of the change in national income in all but two scenarios and means that the increase in real GNA than real GNP. Only in the case of the United States joining the CPTPP, is the decline in Australian real GNP smaller than the decline in real GNA. In the other case, the effects of China joining the CPTPP on Australian national income and expenditure are the same.

Reflecting the modest impacts on Australian production (real GDP), all scenarios have a negligible impact on Australian real wages growth.

12.4 Limitations of the modelling

The modelling presented here will overstate the gains from liberalising goods trade through trade agreement as the agreements:

- do not liberalise all trade in goods (Australia, for example, does not include tobacco in its trade agreements)
- the agreed tariff reductions are often phased and may not end in the tariff being removed
- there may be other non-tariff barriers that may restrict trade in certain goods (such as export prohibitions).

Having modelled only the effects of removing tariffs means that many of the larger benefits from the agreements under consideration have not been accounted for. Freeing up trade in services and investment may deliver significant gains.

The modelling clearly demonstrates the important role that international capital flows can play in determining the effects of each scenario on the wellbeing of residents in each economy.¹⁹

- However, data on the ownership of international capital stocks is, at best, patchy. PC Global utilises data from the IMF, but this data is far from complete or consistent.
- Improving data on international capital ownership will improve estimates of the effects on income (GNP) and welfare (GNA).
- Additional international work is required to fill this information void.

12.5 Scope for further work

Significant scope exists to develop this work further:

- by comprehensively analysing the actual commitments made in each trade agreement (as the Productivity Commission did in its report on *Bilateral and Regional Trading Agreements* (PC 2010))
- by going beyond tariffs to examine the effects of commitments made in the areas of international trade in services and foreign investment, including their interaction with domestic policies
- to develop the trade and assistance data in the GTAP and PC Global databases (such as adding non-tariff barriers and verifying the veracity of the data).

¹⁹ Welfare measures such as real net national income should ideally be expressed on a per capita basis to account for any changes in population that occurs. As the population is fixed in each of the scenarios modelled in this paper using PC Global, the percentage changes in per capita welfare measures are identical to those presented in this paper.

A. Overview of the PC Global model and database

PC Global is a multi-country computable general equilibrium model of the world economy (PC 2017a). It was developed as a streamlined and more transparent version of the GTAP model. The design of PC Global starts with the minimum number of equations required to solve the general equilibrium problem (Zhang 2013). Therefore, PC Global has fewer equations than the GTAP model and fewer indicator variables, such as those that aggregate quantity and price variables to national and industry levels.²⁰ Despite these simplifications, PC Global contains the same behavioural assumptions as the GTAP model, and additional assumptions about how capital is allocated across the world.

The version of PC Global used in this study is an updated version of that used for the 2017 *Rising Protectionism: Challenges, Threats and Opportunities for Australia* paper (PC 2017b). The original model is documented in PC(2017a).

This appendix focuses on the changes made to the model and database since 2017.

The appendix also discusses the modelling of bilateral capital and capital income flows that do not form part of the original GTAP model, as this is important for understanding the differences between the two of the welfare measures present in this paper – real national income (real GNP) and the purchasing power of national income (real GNA).

A.1 PC Global model

Substitution between occupations

The version of PC Global used for the 2017 study had two types of labour (skilled and unskilled) that were used in fixed proportions.

The GTAP version 11 database includes five types of labour:

- two skilled (professionals and technical)
- three unskilled (agricultural, clerical, and other unskilled).

To accommodate the additional types of labour in the latest GTAP database, occupational substitution was introduced into the production core of PC Global to allow producers to switch between occupations based on changes in relative wages. The CES substitution parameter was set to 2 for all industries in all regions.

²⁰ PC Global consists of approximately 150 equations, of which 35 are core equations. In contrast, GTAP consists of approximately 300 equations.

Inclusion of natural resources

Natural resources are included as a separate primary factor of production. In the previous version of PC Global, income from the use of natural resources was part of the income received by the owners of land. Natural resources are fixed at the industry level in each region.

International relocation of capital stock

An important feature of PC Global (both the current and 2017 version) is that it includes bilateral capital stock, capital income and investment data and mechanisms for their relocation across regions. These features represent material enhancements to the original GTAP model and database. The introduction of foreign capital stock makes the model consistent with foreign investment flows, implied by the imbalances in trade accounts.

Capital stock, capital income and investment data in PC Global has three dimensions:

- the region in which the capital stock is used (the destination for the investment and the region that produces the capital income)
- the industry in which it is used (the industry in which the investment occurs and the industry that produces the capital income)
- the region that owns the capital stock (that owns the investment and the region that receives the capital income).

The short-run closure (which has not been used in this study) fixes the domestic and foreign capital stock in each region but allows them to reallocate across industries to equalise rates of return within that region.

The long-run closure for PC Global (which has been used in this study) allows the capital stocks in the model database to move between regions and industries to equate changes in the rate of return to capital. This is implemented by assuming that the total capital stock owned by each region is fixed (exogenous) and allowing the stock of capital used in each region to vary.

When a policy change raises a region's rate of return above the average for the owning region, capital will move until its rate of return falls back to the average. This means that the stock of capital used in each regional industry may increase (decrease) depending on whether its rate of return is higher (lower) than the average rate of return for the owning region.

Capital mobility means that the share of the capital stock in any regional industry that is owned by domestic residents (the share owned by residents of other regions) may increase (decrease) or decrease (increase) in any simulation depending on differences in the rates of return across regions and industries.

Changes in capital-stock ownership shares affect the flow of the capital income that regional industries produce. An increase in the foreign-ownership share will increase the share of capital income that flows to non-residents. Net capital income flows (inflows less outflows) account for the difference between real production (real GDP) and real national income (real GNP) in PC Global.

Regional investment responds to changes in the rental price of capital.

The introduction of international capital mobility in this way allows a comparative-static model such as PC Global to capture some dynamic features of capital reallocation across countries, which could provide additional insights into the possible responses of capital owners to a policy change.

It should also be noted that the term 'long-run' in comparative-static framework refers only to the adjustment process. This is because the long-run involves factor prices and the rates of return to be equalised across industries and regions. As the supply of labour in each region and the capital stock owned by each region is

still fixed, the simulation results do not imply any growth effects. They show only what will happen if a given set of factors are allowed to be fully adjusted to a policy change.

A.2 PC Global database

Basic structure

The PC Global database used for this study covers 35 regions and 65 sectors (section A.3). This is an increase from the 25 regions and 57 sectors used in the 2017 study. The 10 additional regions reflect:

- regions of interest for this study (such as Brunei, Cambodia, Chile, Laos, Pakistan, Peru, Sri Lanka and Vietnam)
- the fact that the United Kingdom (which is also a region of interest) has left the EU
- the introduction of a composite region covering the remaining regions in south-east Asia.

The reference year for the model database is 2017. While this may be somewhat dated, it pre-dates the disruptions to global production and trade caused by the worldwide outbreak of Covid-19 and maybe more representative of the global economy in a normal year.

The trade and assistance data in the PC Global database comes from the GTAP version 11 database. The Australian duty data was adjusted to ensure that the implied tariff rates reflected the pattern reported in ABS 2016-17 Input-Output Tables (ABS 2019). The cost, insurance and freight (CIF) value of imports was adjusted to maintain the basic value of Australian imports.

Regional data

For each of these 35 regions, the database consists of four components:

- i. national input-output tables
- ii. bilateral trade matrices
- iii. a bilateral capital stock matrix at the industry level
- iv. an investment matrix at the national level.

(i) National input–output tables

The input-output, world trade, factor income and tax data are taken from the GTAP version 11 database (Aguiar et al. 2022).

The structure of input-output tables for a representative region (Australia) and the world as an aggregate are shown in figure A.1. The first column of the table shows the costs of production by industry and the first row shows the sales of the products to all users. In equilibrium, the costs of production are equal to the sales of the goods produced.

(ii) Bilateral trade matrices

Each region's input-output tables are linked with each other by four bilateral trade matrices of exports and imports, valued at four different prices:

- i. domestic basic prices for exports
- ii. free-on-board (FOB) prices for exports
- iii. cost-insurance-freight (CIF) prices for imports
- iv. domestic basic prices for imports, which include import tariffs.

Figure A.1 – Database structure: Input-output tables^{a,b}**A representative region: Australia (US\$ million)**

	Industry use	Investment	Government consumption	Household consumption	Exports	Total
Domestic inputs	1,145,673	240,690	244,450	611,382	324,497	2,566,693
Imported inputs	163,489	49,370	4,185	82,085		299,130
Taxes on domestic products	10,526	21,985	0	28,565	-72	61,003
Taxes on imported products	3,432	1,303	0	13,822		18,557
Primary factor income	1,142,316					1,142,316
Primary factor taxes	55,524					55,524
Other product taxes	45,732					45,732
Total	2,566,693	313,347	248,636	735,855	324,425	4,188,955

Aggregation of all regional economies (US\$ million)

	Industry use	Investment	Government consumption	Household consumption	Exports	Total
Domestic inputs	67,393,905	17,453,653	13,137,384	39,950,785	20,908,163	158,843,891
Imported inputs	13,858,067	2,695,588	265,997	4,611,916		21,431,567
Taxes on domestic products	1,505,654	439,104	236,802	1,786,784	129,080	4,097,424
Taxes on imported products	565,532	150,574	16,900	648,601		1,381,607
Primary factor income	66,734,122					66,734,122
Primary factor taxes	6,751,656					6,751,656
Other product taxes	2,034,956					2,034,956
Total	158,843,892	20,738,919	13,657,083	46,998,086	21,037,243	261,275,223

Source: GTAP version 11 database.

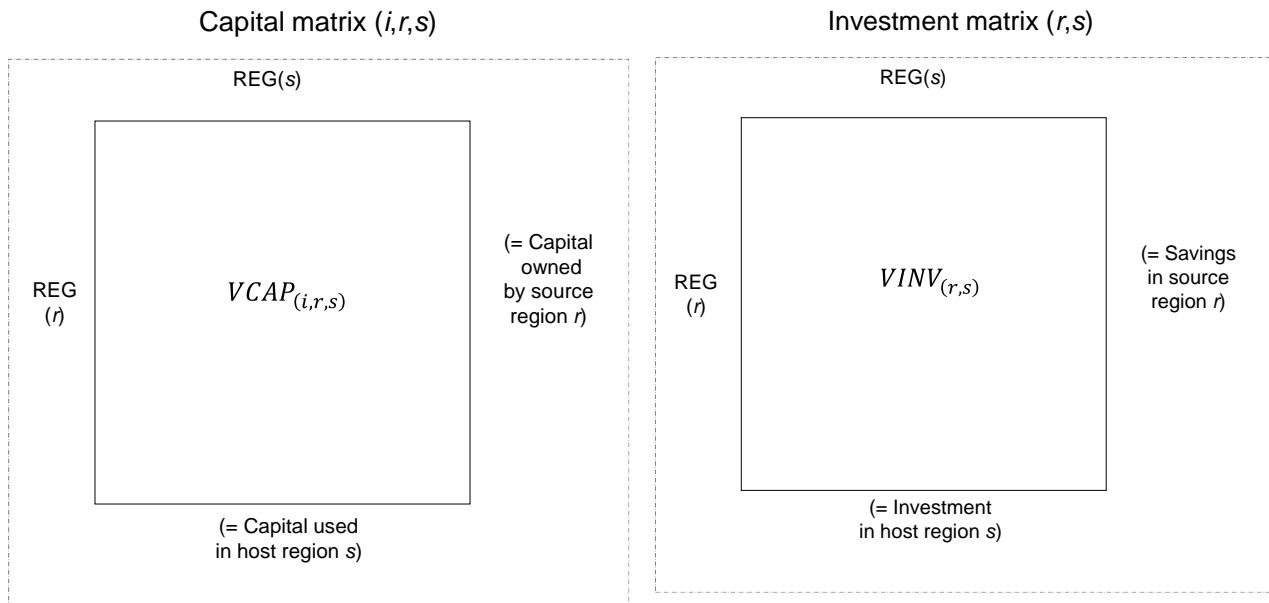
(iii) Bilateral capital and investment matrixes

As discussed, the bilateral capital stock and investment matrixes are an important extension of the original capital stock and investment data in the GTAP database. The structures of capital and investment matrixes are illustrated in figure A.2.

Unlike the GTAP model in which each region owns the capital it uses, this model introduces foreign capital ownership and extends the capital stock data from a vector to a three-dimensional matrix with bilateral capital stock ownership at the industry level ($VCap_{(i,r,s)}$). It can be seen in figure A.2 that firms in an industry of each region can source capital from their own regions *and* from any other region in the world. This is introduced by adding an additional CES substitution nest into industry production in which industry's demand for capital depends on the relative rental price of capital compared to other regions. This extension allows an analysis of the type of service trade liberalisation that involves foreign commercial presence with bilateral foreign capital investment in service sectors. It also means that the effects of changes in the trading environment on the allocation of capital can be analysed.

Figure A.2 shows the capital stock matrix in the source-destination region dimension. For a given industry, the column total, or the sum of the matrix over the source regions (r), gives the capital stock used in each destination region (s). Conversely, the row total, or the sum of the matrix over destination regions (s), gives the capital stock owned by each source region (r).

Figure A.2 – Database structure: Bilateral capital and investment



Source: Compiled from data from GTAP version 11 database, IMF (2023a, 2023b).

To be consistent with the capital stock data, investment data also need to be extended from its single vector in the standard GTAP database to a two--dimensional matrix ($VInv_{(r,s)}$). Its structure, as shown in figure A.2, is a source-destination region matrix. This is a matrix of bilateral investment across the world. As total investment in the world must be equal to total savings in equilibrium, this matrix also gives bilateral saving flows, or global investments of regional savings. The column sums of the matrix over source regions (r) should be equal to total investment in the destination regions, consistent with the total investment values in the regional input-output tables. The row sums over the destination regions (s) give the total savings by each source region (r) , derived from the input-output tables. Moreover, a region's total investment (column sum), net of its total saving (row sum), gives the value of net foreign investment inflow required by this region in equilibrium.

A.3 Macro closure and solution

There are 52 equations in the core system. In the first 51 equations, 45 are used to define 45 endogenous variables as functions of other variables. In this group, the number of equations is equal to the number of the endogenous variables defined. The remaining six equations specify six general-equilibrium conditions to determine the values of the remaining six undefined endogenous variables. In this group, therefore, the numbers of equations and the undefined endogenous variables are also equal.

The equations form a closed system with equal numbers of endogenous variables and equations. It implies that a unique solution can be found for the values of all undefined endogenous variables. The general-equilibrium values of all remaining endogenous variables can be calculated by their associated equations. According to Walras law, however, one endogenous variable in the system must be redundant because it can be derived from the other variables. The value of this variable can be fixed and used as a numeraire to allow the values of other variables to be measured against. The undefined variables of factor prices are suitable candidates for the numeraire. If a factor price is chosen as numeraire, the market clearing equation for this price needs to be removed from the system to ensure equality between endogenous variables and equations. Alternatively, a global price index can be introduced to replace the single factor price as a new numeraire. The numeraire used in this study is the world average price of capital goods.

In the basic closure implied by the core equation system, all tax rates, household saving rates are set as exogenous. In the external accounts, the net foreign investment inflow is determined by the investment of savings across regions. As the capital account balance is offset by the current account balance in the balance of payments, this closure allows the current account balance to be balanced by terms of trade adjustment. Changes in terms of trade reflect the changes in the prices of exports and imports between countries, which can be traced back, fundamentally, to the changes in the prices of the factors used in each trading region.

In the closure, the regional endowments of capital, labour occupations, land and natural resources are all given. In response to a policy change, labour from each occupation can be reallocated across industries with each region. Capital stock owned by each region can be reallocated across regions until its rates of return from all regions are equalised. This feature of international capital mobility can be used to capture some long-run effects of policy changes in a comparative static framework.

A.4 Other variables and macro indicators

Additional variables can be added outside the core equation system to facilitate the verification and the presentation of model's simulation results. Introducing or removing any of these variables should have no impact on the model results.

Three macro indicators are calculated in the model to capture the economy-wide effects of a policy change: real gross domestic product (GDP), real gross national product (GNP) and real gross national absorption (GNA). The first is a measure of production of national income, the second is a measure of distribution of national income and the third is a measure of consumption of national income. Real GNP is an indicator of real income that accrues to a region, while real GNA is an indicator of real expenditure. In nominal terms, a country's GNA is equal to its GNP, because expenditure and income must be equal in equilibrium. In real terms, however, they are unlikely to be equal. This is because they are deflated by different price indices. Real GNP uses a price index derived from the costs of production of national income, while real GNA uses a price index derived from the spending of this income (that is, the goods and services that national income is used to purchase). These also include the capital goods for investment. The incorporation of bilateral capital and investment data in the PC Global model allows for a more accurate measure of the changes in the prices of capital goods for investment and the changes in the transfer of capital income between countries and regions. As a measure of real expenditure, real GNA captures the change in the purchasing power of a country's national income. It is, therefore, suitable to be used as an indicator for national welfare.

A.5 Industries and regions in the PC Global database

Table A.3 – Industries in the PC Global database^{a,b}

Number	Industry	Number	Industry
1	Paddy rice	34	Basic pharmaceutical products
2	Wheat	35	Rubber and plastic products
3	Cereal grains nec	36	Mineral products nec
4	Vegetables, fruit, nuts	37	Ferrous metals
5	Oil seeds	38	Metals nec
6	Sugar cane, sugar beet	39	Metal products
7	Plant-based fibres	40	Computer, electronic and optical products
8	Crops nec	41	Electrical equipment
9	Bovine cattle, sheep and goats, horses	42	Machinery and equipment nec
10	Animal products nec	43	Motor vehicles and parts
11	Raw milk	44	Transport equipment nec
12	Wool, silk-worm cocoons	45	Manufactures nec
13	Forestry	46	Electricity
14	Fishing	47	Gas manufacture, distribution
15	Coal	48	Water
16	Oil	49	Construction
17	Gas	50	Trade
18	Other extraction	51	Accommodation, food and service activities
19	Bovine meat products	52	Transport nec
20	Meat products nec	53	Water transport
21	Vegetable oils and fats	54	Air transport
22	Dairy products	55	Warehousing and support activities
23	Processed rice	56	Communication
24	Sugar	57	Financial services nec
25	Food products nec	58	Insurance
26	Beverages and tobacco products	59	Real estate activities
27	Textiles	60	Business services nec
28	Wearing apparel	61	Recreational and other services
29	Leather products	62	Public administration and defence
30	Wood products	63	Education
31	Paper products, publishing	64	Human health and social work activities
32	Petroleum, coal products	65	Dwellings
33	Chemical products		

a. Industries 1 to 14 form the agricultural sector, 15 to 18 the mining sector, 19 to 45 the manufacturing sector and 46 to 65 the services sector. **b.** nec: not elsewhere classified.

Table A.4 – Countries and regions in the PC Global database

Number	Region	Number	Region
1	Australia (AUS)	19	India (IND)
2	New Zealand (NZL)	20	Pakistan (PAK)
3	China (CHN)	21	Sri Lanka (SRI)
4	Hong Kong (HKG)	22	Rest of Asia and Oceania (ROA)
5	Japan (JPN)	23	Canada (CAN)
6	South Korea (KOR)	24	United States of America (US)
7	Taiwan (TWN)	25	Mexico (MEX)
8	Brunei (BRN)	26	Brazil (BRA)
9	Cambodia (CAM)	27	Chile (CHL)
10	Indonesia (IDN)	28	Peru (PER)
11	Laos (LAO)	29	Rest of America (ROM)
12	Malaysia (MYS)	30	European Union (EU)
13	Philippines (PHL)	31	United Kingdom (UK)
14	Singapore (SGP)	32	Russian Federation (RUS)
15	Thailand (THA)	33	Rest of Europe (ROE)
16	Vietnam (VNM)	34	South Africa (ZAF)
17	Rest of South-East Asia (XSE)	35	Rest of Africa (ROF)
18	Bangladesh (BGD)		

Table A.5 – Capital stock data in the PC Global database (US\$ million)

Number	Country/Region	Total capital used	Total capital owned	Own capital used
1	Australia	6,243,250	5,544,806	3,708,388
2	New Zealand	687,460	588,061	409,565
3	China	73,188,454	73,819,702	66,314,184
4	Hong Kong	1,669,583	2,084,939	667,833
5	Japan	21,989,692	25,293,404	16,231,539
6	South Korea	7,258,282	7,579,835	6,080,557
7	Taiwan	2,216,354	3,484,851	1,418,054
8	Brunei	77,944	65,783	62,355
9	Cambodia	55,821	47,673	38,302
10	Indonesia	6,591,904	6,283,566	5,930,253
11	Laos	56,757	47,902	45,405
12	Malaysia	1,105,000	1,115,176	680,979
13	Philippines	1,149,231	1,114,087	935,199
14	Singapore	1,607,608	1,947,080	643,043
15	Thailand	2,041,617	2,012,551	1,526,821
16	Vietnam	576,799	486,807	461,439
17	Rest of South-East Asia	150,815	139,719	110,647
18	Bangladesh	991,776	964,889	923,184
19	India	10,821,295	10,421,952	9,780,310
20	Pakistan	591,523	488,874	459,048
21	Sri Lanka	338,348	291,057	277,788
22	Rest of Asia and Oceania	15,869,773	15,582,905	13,204,013
23	Canada	8,288,347	9,043,639	4,911,929
24	US	66,214,275	60,621,831	37,968,288
25	Mexico	4,567,778	4,068,165	3,423,778
26	Brazil	11,082,922	10,475,751	9,560,087
27	Chile	997,412	960,784	583,182
28	Peru	671,223	597,861	464,164
29	Rest of America	8,615,111	7,518,469	6,343,037
30	EU	77,950,718	79,911,527	54,592,397
31	UK	12,785,634	12,952,749	8,310,662
32	Russian Federation	7,672,601	8,012,292	6,610,666
33	Rest of Europe	7,851,993	8,837,987	4,986,861
34	South Africa	1,469,845	1,529,699	957,372
35	Rest of Africa	7,714,758	7,225,531	6,606,760
	World	371,161,904	371,161,904	275,228,089

Abbreviations

ABS	Australian Bureau of Statistics
ASEAN	Association of Southeast Asian Nations
CES	Constant elasticity of substitution
CIF	Cost, insurance and freight
CGE	Computable general equilibrium
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
EABER	East Asian Bureau of Economic Research
GDP	Gross domestic product
GNA	Gross national absorption
GNP	Gross national product
GTAP	Global Trade Analysis Project
IMF	International Monetary Fund
IPEF	Indo-Pacific Economic Framework
NAFTA	North American Free Trade Agreement
PC	Productivity Commission
RCEP	Regional Comprehensive Economic Partnership
UK	United Kingdom
US	United States
USMCA	US-Mexico-Canada Agreement

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