

Incorporating the OECD-ICIO structure into the GTAP model

Expansion of CPTPP and Cross-Border Supply Chains

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Introduction

Acknowledgment

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Expansion of CPTPP in Progress

- Comprehensive and Progressive Agreement for Trans-Pacific Partnership ([CPTPP](#)) is a mega regional trade agreement (RTA) with high standards, entered into force in 2018
- CPTPP's 12 members ([CPT12](#)) have commenced the accession process: (Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, U.K., and Vietnam)
- with Costa Rica and Uruguay, and will commence in 2026 with U.A.E., Philippines, and Indonesia ([AP5](#)):
(9th Commission Meeting of the CPTPP, Nov.2025)
- What is the economic impact of AP5 joining CPTPP?
⇒ call for multi-country, economy-wide, quantitative model

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Cross-border Supply Chains in CPTPP

- CPTPP's rules are designed to facilitate production activities across borders by reducing tariffs and harmonizing standards among the member countries
- AP5's accession to CPTPP expands the pool of qualifying intermediate inputs via the rules of origin
- CPTPP also provides the member countries with a framework for supply chain resilience and diversification
- What is the impact on cross-border supply chains?
⇒ call for global coverage of trade, production, tariffs

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Our Approach to CPTPP Expansion

GTAP¹ framework, supplemented with MRIO and Gravity estimates

Methodological steps:

1. Represent the cross-border supply chains
 - Extend GTAP database with multi-regional input-output structure
 - Preserve the GTAP database's global coverage of production, trade, consumption, and protection (taxes, subsidies, etc.)
2. Identify the CPTPP's policy variables for simulation
 - Specify tariff changes (CPTPP, other RTAs, etc.)
 - Estimate structural gravity equations to obtain
 - non-tariff barriers (NTBs) estimates
 - agent-specific trade elasticities
3. Simulate the impact of AP5's accession to CPTPP
 - Set up GTAP model with agent-based import sourcing
 - Specify scenarios for the CPTPP expansion
 - Conduct comparative static simulations

¹<https://www.gtap.agecon.purdue.edu>

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Cross-border Supply Chains

Cross-Border Supply-Chains in MRIO

Supply Chains:

- Cross-border supply chains (SCs) describe international production linkages
- Trade in intermediate goods and services within cross-border SCs, accounts for approximately 65% of world trade

MRIO: multi-regional Input-Output (MRIO) tables to capture global supply-chains

- IDE-JETRO's International Input-Output Tables (1975, 2013)
- World Input-Output Database (Timmer et al. (2015))
- OECD's Inter-Country Input-Output tables (ICIO) (2025)

MRIO lacks crucial data to study CPTPP expansion (e.g. trade costs)

⇒ Extend GTAP database with ICIO structure

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Overview of ICIO Structure

Bilateral trade in goods and services **by economic agents**;
(firms, households, investment, government)
Country 1's bilateral trade by agent is shown in blue boxes.

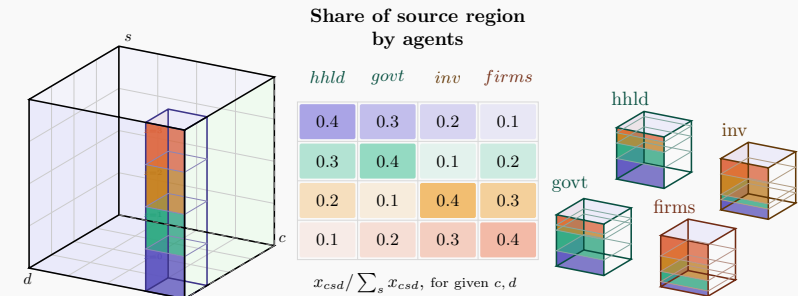
		Intermediate demand									Final demand				
		Country.1			Japan			ROW			Country.1	Japan	ROW	X	
		A	M	S	A	M	S	A	M	S	FD	FD	FD		
Intermediate inputs	Country.1	A	18,499	44,915	5,173	22	854	284	1,128	6,435	1,335	24,347	93	2,532	105,618
		M	20,158	75,230	31,035	128	3,925	3,358	3,120	33,194	20,367	37,030	5,720	51,800	285,066
		S	9,643	24,129	33,853	9	267	374	408	2,853	4,426	94,453	655	8,307	179,377
	Japan	A	3	11	3	8,996	53,798	16,904	257	491	182	3	30,080	400	111,128
		M	718	4,001	1,311	21,617	901,884	527,885	9,652	190,392	74,379	1,545	662,275	220,874	2,616,530
		S	329	1,051	797	22,715	492,865	1,397,128	5,519	51,929	83,951	576	3,379,354	85,444	5,521,660
	ROW	A	1,810	5,147	590	1,663	94,180	27,423	2,027,091	4,620,031	1,172,363	2,168	6,494	2,595,924	10,554,884
		M	10,096	57,819	17,787	3,206	115,334	76,864	1,273,123	14,792,197	8,421,111	17,235	178,552	14,694,595	39,657,919
		S	3,283	9,296	6,786	1,534	42,214	82,237	1,345,169	7,789,099	26,343,325	8,279	104,205	49,487,472	85,222,898
	VA		41,078	63,467	82,041	51,238	911,209	3,389,204	5,889,418	12,171,297	49,101,459				
X'		105,618	285,066	179,377	111,128	2,616,530	5,521,660	10,554,884	39,657,919	85,222,898					

Note: Figures are in million U.S.\$\$. The world economy is represented by 3 regions and 3 sectors. Exports from Country.1 are in light-gray shaded blocks, and imports are in dark-gray. ROW: rest of the world, A: agriculture, M: manufacturing, S: services, VA: value-added, X: output, FD: final demands (household, investment, government).
Source: Author's calculation based on OECD (2018).

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Illustration: Import Sourcing by Agents

Bilateral trade data cube:
Goods&Services (c), Source country (s), Destination country (d): X_{csd}
Add economic agents (g): X_{cgsgd}



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GTAP and MRIO

Cross-border supply chains/MRIO in GTAP model

- Walmsley et al. (2014), Carrico (2017), Walmsley and Minor (2018)
- Itakura and Oyamada (2015) for "classic" GTAP model
- GTAP-MRIO (gtapv7-mrio.tab, 2020)
 - $VXSB_{csd} \rightarrow VFOB_{csd} \rightarrow VMAC_{cgsd} \rightarrow VMAB_{cgsd}$

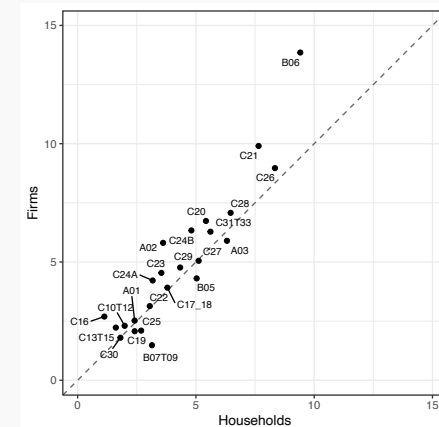
Our approach:

- based on the latest GTAP model (v7) and database (v12)
- $VXAB_{cgsd} \rightarrow VXAF_{cgsd} \rightarrow VMAC_{cgsd} \rightarrow VMAB_{cgsd}$
- estimate agent-specific trade elasticity

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Agent-Specific Trade Elasticity

- Trade elasticities are higher for firms than for households
- Elasticities vary considerably across goods sectors



Note: Sector codes are based on OECD ICIO

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CGE Simulation

Scenario: CPTPP17

Computable General Equilibrium (CGE) simulation with CPTPP expansion scenario:

For this scenario, a simulation experiment is set up as follows;

- AP5 joins CPT12 to form an extended CPTPP (CPTPP17)
- Tariff elimination among CPTPP17 members
- Reduction of NTBs in goods and services trade among CPTPP17 based on the gravity estimates
- Agent-specific trade elasticities applied to SBA model

Scenario is simulated with the sourcing-by-agent (SBA) model and the standard GTAP model (GT7) by using the GEMPACK software (Horridge et al., 2018)

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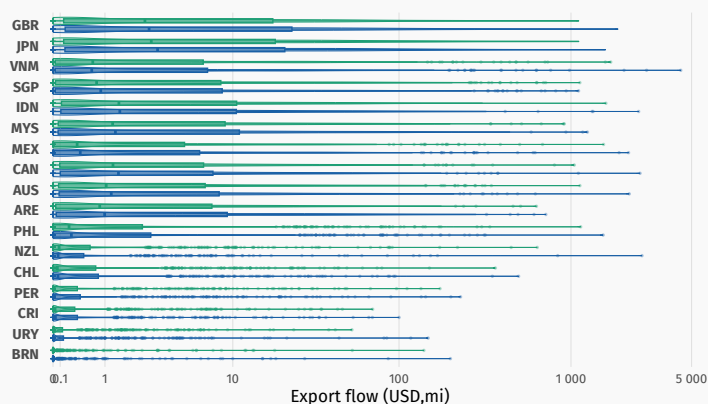
Impact on Bilateral Trade: Distribution by Source Country

Changes in CPTPP17's export volume, $X_{c, sd \in CPTPP17}$

(million US\$, constant 2023 price)

Each box: 697 flow values (41 sectors x 17 CPTPP importers) • sorted by GT7 median

Model  GT7  SBA

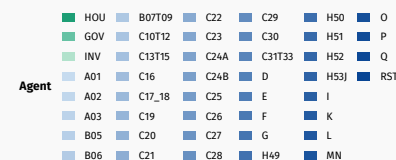
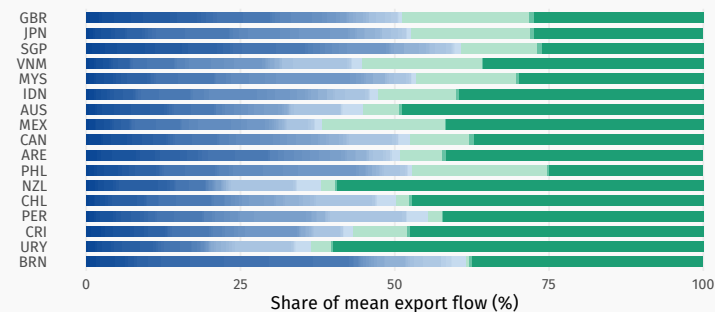


Violin = density shape • Box = IQR • median • $\log(1+x)$ x-axis scale

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Impact on Bilateral Trade: Contribution by Agent

100% stacked • mean over all sectors • destinations



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Summary & Way Forward

Summary

- AP5's accession to CPTPP would generate **significant trade gains** for both goods and services among member countries
- **Firms respond more strongly** to trade-cost reductions, amplifying the impact on cross-border supply chains
- Incorporating **agent-based import sourcing** into the CGE model reveals distributional effects across economic agents that aggregate models would miss

Way Forward

- Incorporate more detailed MRIO data and bilateral trade data for cross-border supply chains
- Improve gravity estimates of NTBs and agent-specific elasticities
- Apply to other CPTPP extension scenarios; e.g. CPTPP-ASEAN, CPTPP-EU, CPTPP-MERCOSUR ...

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Selected References i

- Carrico, Caitlyn (2017), "An Enhanced Analytical Framework for Evaluating the Effects of Trade Costs along Global Value Chains," *Journal of Global Economic Analysis*, 2(2), 43–111, <https://www.gtap.agecon.purdue.edu/resources/jgea/ojs/index.php/jgea/article/view/43>.
- Horridge, Mark J., Michael Jerie, Dean Mustakinov, and Florian Schiffmann (2018), *GEMPACK manual*, GEMPCK Software.
- IDE-JETRO (1975), *ASEAN International Input-Output Tables*, IDE-JETRO, Chiba.
- (2013), *International Input-Output Tables*, IDE-JETRO, Chiba.
- Itakura, Ken (2019), "Evaluating the Impact of the US–China Trade War," *Asian Economic Policy Review*, 15(1).
- Itakura, Ken and Kazuhiko Oyamada (2015), "Extending GTAP Data Base and A CGE Model with Global Input-Output Linkage," in "Globalization and Development: Leading Issues in Development with Globalization," , Shigeru Otsubo, ed., Routledge, chap. 12, 344–363.

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Selected References ii

- Organization for Economic Co-operation and Development (2025), *Inter-Country Input-Output Tables*, OECD, Paris, <http://oe.cd/icio>.
- Timmer, Marcel P., Erik Dietzenbacher, Bart Los, Robert Stehrer, and Gaaitzen J. de Vries (2015), "An Illustrated User Guide to the World Input – Output Database: the Case of Global Automotive Production," *Review of International Economics*, 23, 575–605.
- Walmsley, Terrie and Peter Minor (2018), "Estimated Impacts of US Sections 232 and 301 Trade Actions on the US and Global Economies: A Supply Chain Prospective 2018-2030," *ImpactEcon Report*, 1–73.
- Walmsley, Terrie, Thomas W. Hertel, and David Hummels (2014), "Developing a GTAP-Based Multi-Region, Input-Output Framework for Supply Chain Analysis," in "Asia and Global Production Networks: Implications for Trade, Incomes and Economic Vulnerability," , Benno Ferrarini and David Hummels, eds., Asian Development Bank and Edward Elgar, Cheltenham, chap. 2, 16–80.

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Learning Resources

To learn more about GTAP and GEMPACK

- GTAP University (GTAP-U)
<https://www.gtap.agecon.purdue.edu/events/gtap-u/index.aspx>
- GEMPACK-based CGE Training Courses
<https://www.copsmodels.com/courses.htm>
Practical CGE Course, 14-18 September 2026, Nagoya City University.
For the first time in Japan!

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