

# An *Ex Ante* Evaluation of Indo-Pacific Economic Framework A General Equilibrium Analysis

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A general equilibrium framework (GTAP 10) and an environment energy variant of the general equilibrium model like the GTAP-E is used to analyse and read the possible economy-wide impacts of introducing the current administrative arrangement among the countries and also the future adoption of deeper integration policies among the 14 Indo-Pacific alliance members, namely the Indo-Pacific Economic Framework for Prosperity. The deeper integration policies go beyond the tariff and non-tariff liberalisation with freer movement of capital and skilled labour flows and concerted attempts made to promote input- and output-oriented innovations and technological progress in the region.

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The Indo-Pacific Economic Framework (IPEF) for Prosperity was launched in May 2022 by the American government with 13 initial partners (Experts briefings 2022).<sup>1</sup> These countries are, namely Australia, Brunei, India, Indonesia, Japan, South Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand, the United States (US), and Vietnam, which all together share 40% of world gross domestic product (GDP).<sup>2</sup> As per the fact sheet of the White House, the IPEF has four pillars: connected economy, resilient economy, clean economy, and fair economy, whereas the major focus would be on seven aspects, such as trade facilitation for small and medium entrepreneurs, standards for a digital economy and technology, supply chain resilience, decarbonisation and clean energy, infrastructure, worker's standards and other areas of shared interests. Goodman and Reinsch (2022) constructively suggest for well-engineered and managed region formation for the success of the US economic and strategic interests.<sup>3</sup> On the other, Yeon (2022) describes that at the time of turmoil and unrest in the world economy, countries should follow the principle of security interest rather than the sole focus on its own growth. The growing trade war and strategic interest rivalry between US and China warns and suggests for more security related interests rather than mere economic objectives.

The briefing further exhibits the intention of the grouping is to reassure the US remaining in the region. Hence, it is not a free trade agreement (FTA) as it will not involve trade negotiations and will not include market access for goods or services through traditional schedules, though we think that there may be commercial opportunity for New Zealand in the trade pillar through the negotiation

of rules on trade facilitation, on digital trade, and on regulatory cooperation among other things. Thus, the IPEF aims to strengthen economic partnership, particularly to support the US's strategic interest in the region. The IPEF includes India, the US and Fiji and excludes the countries from the Regional Comprehensive Economic Partnership (RCEP) region such as China, Cambodia, Lao PDR, and Myanmar. The IPEF counts all Association of Southeast Asian Nations (ASEAN) members except its three, namely Cambodia, Lao PDR, and Myanmar, and therefore deviates from the so-called ASEAN centrality.

India decided to opt out of the RCEP mainly due to growing trade imbalance with China. It is also interesting to note that US, India, and Fiji are members of IPEF and there are members of the RCEP as well (Diagram 1, p 18). Unlike the RCEP or CP-TPP, the IPEF is a comprehensive deal with much focus on trade facilitation, digital trade and regulatory cooperation than liberalisation. It is against this backdrop, the article intends to analyse and contrast the welfare gains of India with respect to IPEF formation based on the computable general equilibrium (CGE) models with the help of the Global Trade Analysis Project (GTAP) 10 database.

The IPEF participating countries share substantial resources as these countries account for around 40% of the world GDP, 32% of the world population, 25% of the world exports, and 30% of the world imports.<sup>4</sup>

The tariff profile of the major countries is indicated in Table 1 (p 18). The IPEF nations among themselves do not seem to have very high tariff rates. Thus, the major issue lies with the administrative arrangements as well as non-tariff barriers.

Further, non-tariff barriers, such as technical barriers to trade, phytosanitary measures and export-related measures dominate at a very high level in the IPEF region.<sup>5</sup> Also, as per the White House fact sheet, the US FDI in the region totalled more than \$969 billion in 2020, which had approximately doubled during the last decade.

In view of the above, the remaining part of the article analyses *ex ante* welfare of the IPEF vis-à-vis other emerging

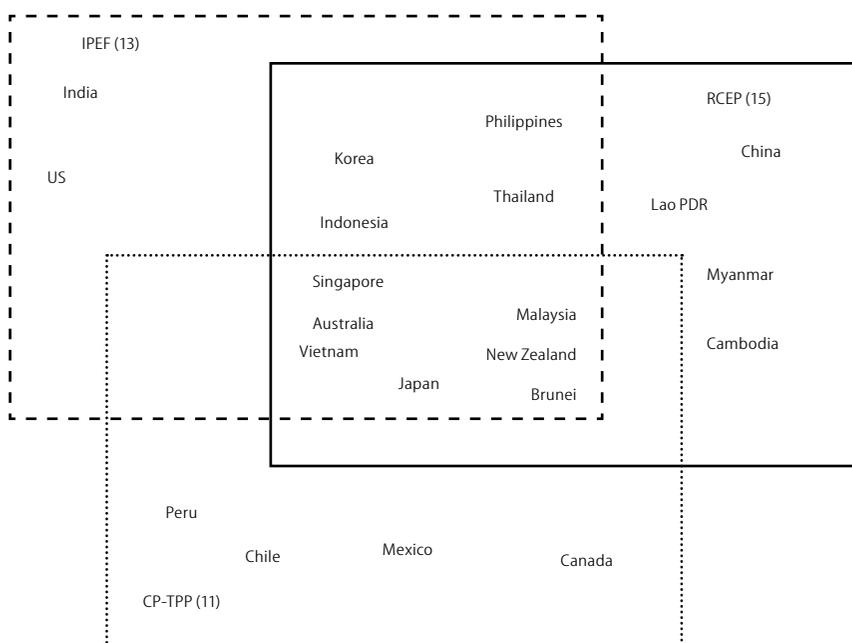
blocks, which includes two shocks. First is to study the impact of the present administrative arrangements on economy-wide variables, including welfare as defined and decomposed into various factors using general equilibrium models. Second is to study the impact of the formation of trade agreement among the IPEF nations at some future date and the resulting welfare changes due to the adoption of deep integration policies among member states. The next section focuses on the GTAP simulation results of India's alignment with different regions of the world followed by simulation scenarios in context of integrating with the IPEF region. The results are discussed subsequently. The concluding section incorporates the summary and policy suggestions. Apart from these simulation scenarios, the study intends to consider three simulation scenarios with respect to the IPEF region presented in the next section.

**Simulation Scenarios and Methodology**

There are five simulation scenarios considered in the article:

- (i) IPEF-14 liberalisation under administrative arrangement using GTAP-E.
- (ii) IPEF-14 liberalisation under administrative arrangement and trade and investment liberalisation without slacks and carbon taxation using GTAP-E.
- (iii) IPEF-14 region wise liberalisation under administrative arrangement using GTAP 10.
- (iv) IPEF-14 region-wise liberalisation with trade and investment flows, global value chains (GVCs), shipping technology using GTAP 10.
- (v) IPEF-14 region-wise liberalisation with trade and investment flows, global

**Diagram 1: Three Mega-regionals**



value chains (GVCs), shipping costs with trade facilitation and shipping technology using GTAP 10.

The article uses the GTAP 10<sup>6</sup> and GTAP-E models, which are computable general equilibrium models of the world economy. Economy-wide general equilibrium impact of tariff reduction induces the business to grow in the exporting country which in turn reduces the exports from the other countries. This reduces supply and further impacts the reduction in the factors of production. It verifies the role of Stolper–Samuelson theorem, which elaborates that a decline in price of the good reduces the returns of the factors of production used intensively but raises the return of the other factors. Because of cheaper imports, the domestic production also gets impacted which in turn affects investment savings and

GDP of the country. Terms of trade improve in the exporting country which levels up the welfare there. But for all this to happen, there is a need to know if the tariff is applied on final product or on intermediate product. If it is one the later, the cost of production comes down which raises the profit level. The impact depends on the fact if the prices are increasing or production or both. The GTAP model allows for all the liberalisations and exhibits one integrated model which allows for simulations across production, consumption, market equilibrium and traded sector economy-wide through elasticities. Non-linear deterministic simultaneous equations are solved to analyse the economy-wide impact of exogenous variables on endogenous variables. Closure allows to change the variables. The GTAP 10 database comprises

**Table 1: Tariff Profile of Major IPEF Countries**

Tariff Rate among IPEF 10	IPEF 10 to IPEF 10	Japan Exporting to IPEF 10	IPEF 10 Exporting to Japan	US Export to IPEF 10	IPEF 10 Export to US	India Exports to IPEF 10	IPEF to India	India Exporting to Japan	Japan Exporting to India	India to US	US to India
Agriculture and allied activities	5.98	8.04	12.8	25.84	1.47	16.4021	60.62	2.27	32.61	0.312	26.14
Coal	0.02	0.34	0	0.0018	0	0.0825	3.38	0	0	0	3.404
Oil	0.003	0.0002	0	0.0006	0	0	0.033	0	0	0	0.0022
Gas	0.099	0	0	0	0	0	5.03	0	0	0	0
Oil and petroleum	0.6521	1.42	0.8828	0.49	0.024	0.647	4.5856	0	0	0	4.85
Electricity	0	0	0	0	0	0.1172	0	0	0	0	0
Energy-intensive industry	0.89	2.95	0.366	1.54	0.8	1.7419	6.82	0.32	7.0085	0.51	8.1627
Industry	0.966	4.76	0.409	1.33	2.51	4.61	5.68	0.5199	7.725	3.955	7.1374
Average	1.076263	2.188775	1.807225	3.6503	0.6005	2.950088	10.76858	0.388738	5.917938	0.597125	6.212038

Source: Authors' own simulations via GTAP-E.

141 countries, 65 sectors and five factors of production.

Further, the Perdue University has revamped the GTAP model into GTAP-E,<sup>7</sup> which incorporates energy and environmental modelling (Burniaux and Truong 2002).<sup>8</sup> The central feature of the GTAP-E model is to analyse the impact of alternative climate change policies along with other factors like trade, industry, liberal capital flows and human capital formation on economic variables and carbon emissions among others.

Model allows for inter-fuel and inter-factor substitution in the production structure of firms and in the consumption behaviour of private households and the government sector. Apart from standard macroeconomic results, the GTAP-E captures the effects arising from changes in energy-environmental policy strategies, both in terms of economic and environmental indicators.

The model is specifically designed to be used in the context of greenhouse gases (GHG) mitigation policies which also includes modified treatment of energy demand energy-capital and inter-fuel

substitution, carbon dioxide accounting, taxation and emission trading, the major prospective feature of the GTAP-E in existing debate on climate change is illustrated by some illustrative simulations of the implementation of the Kyoto Protocol. The model estimates the sector-wise energy-wise demand on macroeconomic conditions and predictions.

## Results and Discussion

The results of simulation scenarios 1 and 2 are presented in Table 2. The simulations are performed using GTAP-E which accounts for environmental factors. As per the priorities of the IPEF agreement, the first simulation scenario accounts for administrative arrangement while the second scenario considers IPEF-14 liberalisation under administrative arrangement and trade and investment liberalisation without slacks<sup>9</sup> and carbon taxation using GTAP-E. The IPEF region is subdivided into ASEAN-7 which includes ASEAN-10 minus Cambodia, Laos, and Myanmar and the OKNZKOF in the table denotes rest of QUAD, Australia, us, Japan, South Korea, New Zealand, and Fiji. Here, India is taken

separately. The results of the first simulation scenario reveal positive gains for all the three. India seems to have welfare gains of \$63.39 billion, while ASEAN-7 gains by \$85.89 billion and other nations of IPEF by \$720.76 billion. In terms of VGDP, ASEAN seems to lose, while India and other countries of IPEF have gains but along with that there would be negative trade balance of all the three.

In scenario 2, which considers IPEF-14 liberalisation under administrative arrangement and trade and investment liberalisation without slacks shows huge gains for all the regions of the IPEF. In this case the gains are there for ASEAN-7, India and other nations of IPEF in terms of equivalent variation and value of GDP. There are gains for all the nations of the region in all the scenarios but the gains seem to be more with the future trade agreement among the IPEF nations. The IPEF-14 nations are impacted differentially with QUAD members gaining the most followed by ASEAN-7 under the trade agreement and adoption of deeper integration policies among the IPEF nations.

Also Figures 1 to 5 (p 20) reveal the welfare decomposition in all the five scenarios. Technical efficiency seems to dominate in all the five simulation scenarios in the case of the IPEF nations.

To summarise the same, we use the general equilibrium models to analyse and simulate the impact of present dispensation under the IPEF-14 focusing on four areas of cooperation, namely connectivity, including physical and digital connectivity, raising labour and environmental standards and following norms of fair trade, energy and climate security,

**Table 2: Simulation Scenarios 1 and 2**

Countries	Scenario 1				Scenario 2			
	EV (million \$)	VGDP	Trade Balance	gco2tb	EV	VGDP	Trade Balance	gco2tb
EU27	-97286.11	5.92	464149.09	-0.73	-27520.72	7.89	119280.2	-0.34
EEFSU	5196.87	6.95	56157.85	0.02	-2307.41	7.91	20573.06	-0.16
RoA1	-12897.43	6.54	83470.8	0.46	-4870.88	7.95	23830.4	-0.62
EEx	3210.53	6.89	108036.3	-0.67	-2117.51	7.9	44921.75	-0.36
ASEAN7	85890.63	8.78	-85375.52	3.64	124923.2	15.77	-9685.51	-1.46
CHN	-64644.98	5.98	345539.19	0.15	-24460.04	7.92	116350.38	-0.2
OQNZKOFI	720756	11.49	-1071615.75	3.24	963642.7	14.75	-327015.81	-3.39
IND	63389.57	10.06	-77249.41	3.44	82292.16	13.02	-14691.15	-2.93
ROW	-31039.51	6.76	176887.42	-0.29	-8944.58	8.1	26435.53	-0.36

VGDP rates are reported with respect to base 10. For example: 14.86 means growth rate of 4.86.

Source: Authors' own simulations via GTAP-E.

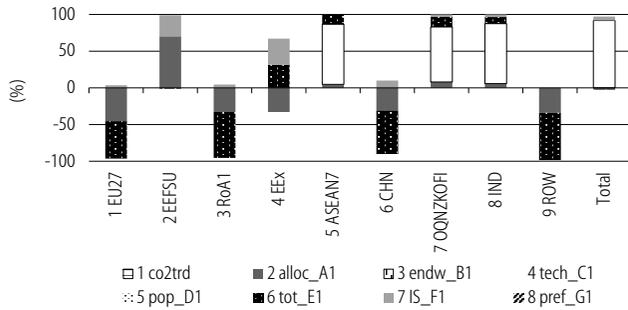
**Table 3: Simulation Scenarios 3, 4, and 5**

	Scenario 3			Scenario 4			Countries	Scenario 5		
	EV (million \$)	VGDP	Trade Balance	EV	VGDP	Trade Balance		EV	VGDP	Trade Balance
EastAsia	-89973.29	5.73	396364.34	-29495.11	7.71	152875.7	India	101999.94	-16878.36	13.14
SEAsia	-785.97	6.77	1422.41	-246.83	7.91	389.83	IPEF	1352968.6	-444594.4	14.95
SouthAsia	-3657.59	5.44	7320.3	-1368.26	7.39	-1362.12	OCEANIA	-207.1	-712	7.78
India	82935.22	10.69	-77914.76	99144.83	13.24	-16744.29	East Asia	-30570.64	157210.58	7.68
ASEAN7	110949.9	9.82	-85023.42	137208.22	14.93	-12624.42	South East Asia	-258.47	390.79	7.93
RQUNZKOFI	1037959	13.52	-1210777	1194077.38	14.97	-421521.28	South Asia	-1509.22	-1274.97	7.35
NAmerica	-31986	5.71	95761.89	-9502.36	7.71	24439.62	NAmerica	-8327.87	25749.12	7.67
LatinAmer	-31279.7	4.55	117808.09	-10342.61	7.21	29970.97	Latin America	-9331	30571.15	7.24
EU_28	-127686.3	5.12	522383.09	-35994.32	7.65	156220.97	EU_28	-38792.66	159053.42	7.61
MENA	-23668.92	5.8	99535.33	-3481.98	7.92	38633.4	MENA	1087.33	39844.51	8.1
SSA	-9766.43	5.5	37277.52	-2027.68	7.73	8895.68	SSA	-666.2	8809.45	7.89
RestofWorld	-16393.97	5.74	95842.18	-2415.24	7.88	40825.9	ROW	1117.32	41830.64	8.01

VGDP rates are reported with respect to base 10. For example: 14.86 means growth rate of 4.86.

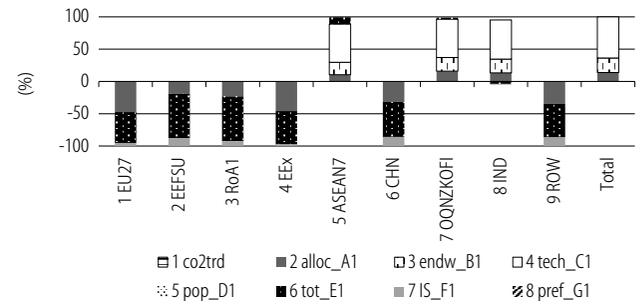
Source: Authors' own simulations via GTAP-E.

**Figure 1: Welfare Decomposition (Scenario 1)**

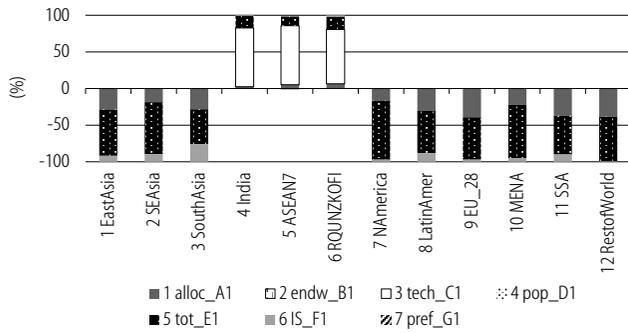


Source: Prepared by authors using simulation results from GTAP E.

**Figure 2: Welfare Decomposition (Scenario 2)**

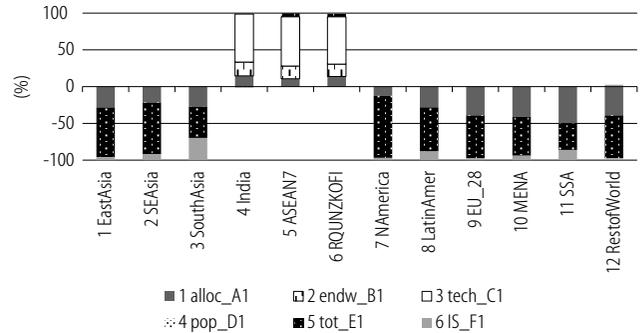


**Figure 3: Welfare Decomposition (Scenario 3)**

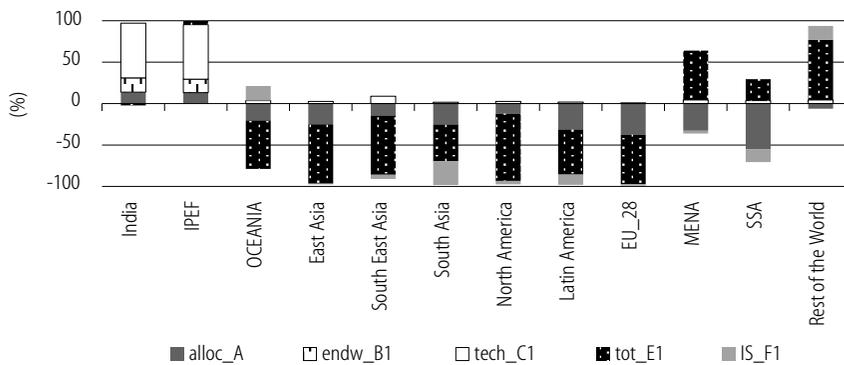


Source: Prepared by authors using simulation results from GTAP 10

**Figure 4: Welfare Decomposition (Scenario 4)**



**Figure 5: Trade Facilitation (Scenario 5)**



Source: Prepared by authors using simulation results from GTAP-10

and enhancing gvc's to stem supply chain disruptions. It seems that the us, Japan, South Korea, Australia, New Zealand, and Fiji would gain the most in terms of welfare and vGDP growth followed by India and then ASEAN-7 nations in terms of vGDP growth. This serial order changes as and when IPEF 14 becomes a trade agreement where in there is free flow of goods, services, and capital and skilled labour flows across nation's. ASEAN-7 jumps to the second position in terms of vGDP growth and welfare while India would be a laggard when IPEF would allow tariff liberalisation along with free movement of factor flows across nation's.

The welfare levels are any figure between \$63 billion to \$99 billion for India under two simulation scenarios of no trade agreement and one when IPEF 14 transforms into a trade agreement. Similarly, ASEAN welfare levels reach \$126 billion with, nearly 5% growth under trade agreement scenario. It is the QUAD nation's, South Korea and New Zealand which reap the maximum benefit under both scenarios, no and with trade agreement with welfare reaching beyond \$1,100 billion with nearly, 4.50% growth in the member states with trade agreement and free flow of labour and capital. A carbon taxation of 6% along with

trade liberalisation can take care of the carbon emissions and partly address the climate change in the us-led IPEF 14 nations. Fiji is the 14th nation apart from ASEAN-7 nation's along with the QUAD, New Zealand and South Korea.

**Conclusions**

The article attempts to analyse IPEF at present and its possible future dispensation in terms of structural variables defining the member nations, including vGDP, welfare, carbon emissions, among others with the help of the general equilibrium models like GTAP-E and GTAP 10. The results reveal that deeper integration policies following the formation of a trade agreement among 14 IPEF countries will bring maximum gains to the IPEF countries. The GTAP 10 simulation results also consider gvc's enhancing value added of nations into account as one deeper integration policy. Also background simulations show that industry would see maximum sectoral growth, followed by services and domestic investments if the IPEF adopts deeper integration programmes going beyond tariff and non-tariff liberalisation and inducting policies of freer movement of skilled labour and capital with natural resource

and land productivity enhancing policies and make concerted attempts to enhance value-added processes in the region through seamless connectivity of gvcs. Here, we compare the welfare gains in terms of main four pillars of IPEF and the scenario of possible future dispensation of the formation of a trade agreement among IPEF nations adopting deeper integration policies. The latter has salubrious impact on IPEF nations with QUAD members along with New Zealand, South Korea, and Fiji gaining the most followed by the ASEAN-7 nations and Indians being a laggard in the future alignment process. India though like other IPEF members gains while being part of a future trade agreement rather than the present alignment based on four pillars of digital and physical connectivity, energy and climate security, harmonisation of labour and environmental standards and trade facilitation. It seems from the simulations that carbon taxation with deeper integration policies can negate the carbon emissions growth rate and at the same time promote welfare and GDP growth in the IPEF region.

## NOTES

- 1 Fiji joined soon after.
- 2 <https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/23/fact-sheet-in-asia-president-biden-and-a-dozen-indo-pacific-partners-launch-the-indo-pacific-economic-framework-for-prosperity/>.
- 3 For example, Cossa et al (2022) argued that there is further need to incorporate National Security Strategy (NSS) along with all security objective.
- 4 Calculated based on the WDI, the World Bank.
- 5 Refer the WITS database.
- 6 See Naman and Mathur (2021).
- 7 See Antimiani et al (2012).
- 8 This was also revised by McDougall and Golub (2007).
- 9 Slacks introduce partial equilibrium analysis in the general equilibrium models. Say if price slacks are introduced it means that prices are exogenous with market clearing assumption while quantities become endogenous. If trade slacks are introduced it means that the shocks do not impact the market for tradables while the price of tradable becomes endogenous. Our administrative simulation scenario introduces trade slacks in the general equilibrium models.

## REFERENCES

- Antimiani, A, V Costantini, C Martini, A, Palma and M C Tommasino (2012): "The GTAP-E: Model Description and Improvements," *The Dynamics of Environmental and Economic Systems*, Springer, Dordrecht, pp 3–24.
- Burniaux, Jean-Marc and Truong, P Truong (2022): "GTAP-E: An Energy-Environmental Version of the GTAP Model," GTAP Technical

Papers, Paper 18, <http://docs.lib.purdue.edu/gtapt/18>.

- McDougall, Robert and Alla Golub (2007): "GTAP-E: A Revised Energy-Environmental Version of the GTAP Model," GTAP Research Memoranda 2959, Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University.
- Cossa, R A and B Glosserman (2022): "Ukraine Seizes the Headlines amid Mounting Concerns about China," *Comparative Connections: A Triannual E-Journal on East Asian Bilateral Relations*, Vol 24, No 1.
- Dalpino, C (2022): "Regional Powers Cast Long Shadows: Asean Grapples with New Dynamics," *Comparative Connections: A Triannual E-Journal on East Asian Bilateral Relations*, Vol 24, No 1.
- Goodman, M P and W Reinsch (2022): "Filling in the Indo-Pacific," <https://www.jstor.org/stable/pdf/resrep39408.pdf>.
- Mathur, S and N Agarwal (2021): "Evaluation of India's Proposed Regional Trade Agreements with Major Economies Using General Equilibrium Analysis," *Handbook of Research on the Empirical Aspects of Strategic Trade Negotiations and Management*, IGI Global, pp 211–34.
- Oxford Analytica (2022): "Biden Unveils Indo-Pacific Economic Framework in Tokyo," *Emerald Expert Briefings*, (oxan-es), <https://www.emerald.com/insight/content/doi/10.1108/OXAN-ES270431/full/html>.
- Petri, P A and M G Plummer (2013): "ASEAN Centrality and the ASEAN-US Economic Relationship," *East-West Center Policy Studies*, Forthcoming.
- Yeon, W (2022): "The Future of Global Supply Chains: Opportunities and Challenges," KIEP Research Paper, KIEP Opinions, No 233.

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