

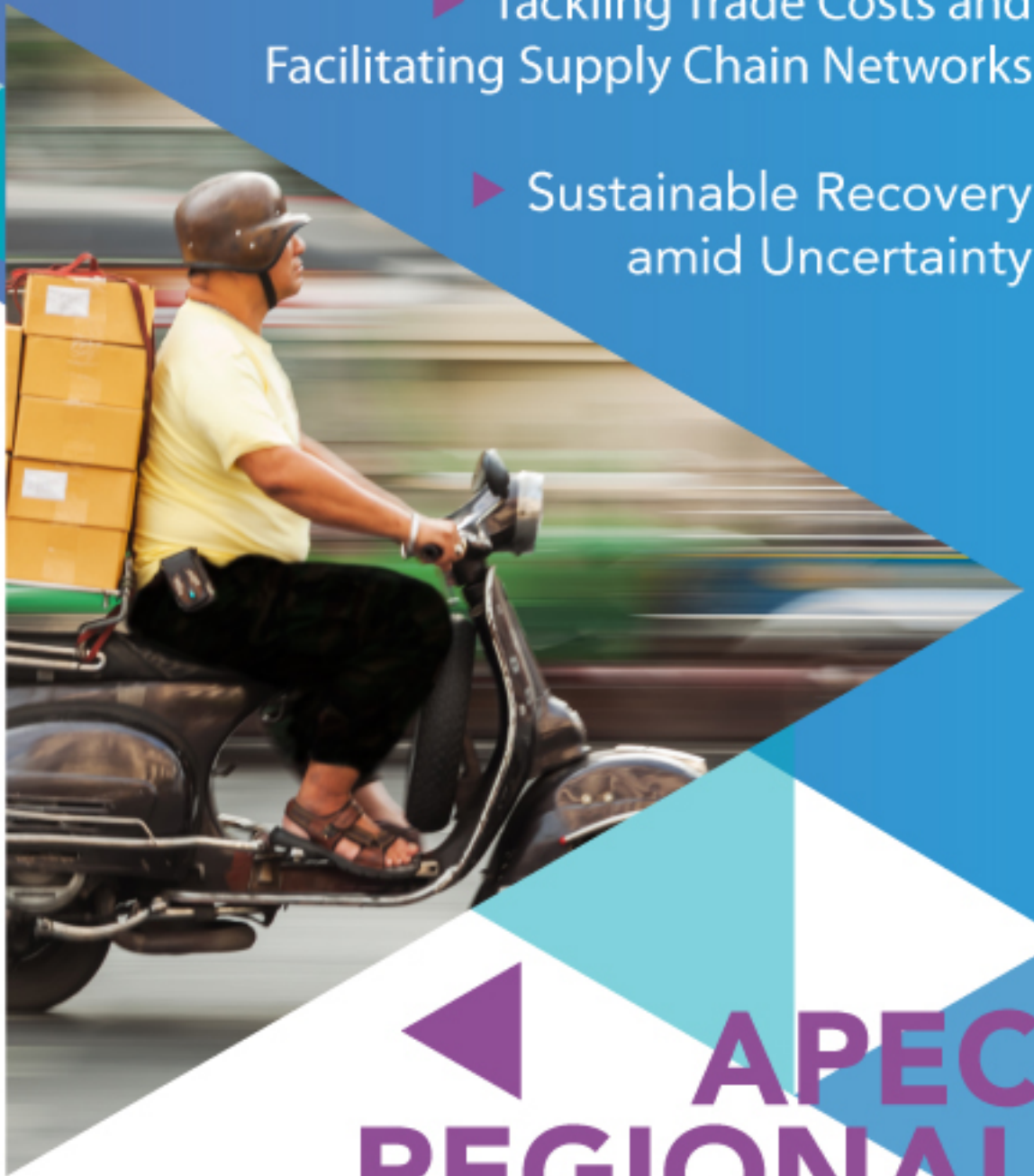


Asia-Pacific  
Economic Cooperation

Advancing Free Trade  
for Asia-Pacific Prosperity

▶ Tackling Trade Costs and  
Facilitating Supply Chain Networks

▶ Sustainable Recovery  
amid Uncertainty



# APEC REGIONAL TRENDS ANALYSIS

APEC Policy Support Unit  
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Prepared by:  
Asia-Pacific Economic Cooperation Policy Support Unit  
Asia-Pacific Economic Cooperation Secretariat  
35 Heng Mui Keng Terrace  
Singapore 119616  
Tel: (65) 6891-9600 | Fax: (65) 6891-9690  
Email: psugroup@apec.org Website: www.apec.org

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The views expressed in this paper are those of the authors and do not necessarily represent those of the APEC Member Economies.

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## KEY ABBREVIATIONS

APEC	Asia-Pacific Economic Cooperation
APA	Aotearoa Plan of Action
ARTA	APEC Regional Trends Analysis
FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
GDP	gross domestic product
GVC	global value chain
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
PPE	personal protective equipment
PSU	Policy Support Unit (APEC)
UNCTAD	United Nations Conference on Trade and Development
WHO	World Health Organization
WTO	World Trade Organization
y-o-y	year-on-year

## KEY MESSAGES

### I. Tackling Trade Costs and Facilitating Supply Chain Networks

- Between 2000 and 2018, average trade costs for the APEC economies declined by 8.5 percent, from 129 percent to 118 percent in ad valorem tariff equivalent terms. This could be credited in part to APEC's consistent trade facilitation efforts, including the first and second Trade Facilitation Action Plan (TFAP I and II) and the Supply Chain Connectivity Framework Action Plan (SCFAP).
- Trade costs in both the APEC economies and at the global level spiked in eventful years such as during the 2008–2009 global financial crisis and, to a lesser degree, the COVID-19 pandemic. Trade costs at the sectoral level are also expected to increase in 2020, given the supply chain disruptions caused by the COVID-19 pandemic. The APEC region, however, has shown a certain resiliency, with its trade costs increasing at lower rates than the global level during those periods of crisis.
- Trade costs for essential goods have fallen substantially over the last decade. Some of the APEC economies with the lowest trade cost levels in 2018 – Canada; China; Japan; Korea; Singapore; and the US – also have the highest centrality measures, suggesting that their relatively lower trade costs might have catalysed their central roles in the global trade networks for selected essential goods.
- The trade networks of a selected range of essential goods – chemicals, medicines, personal protective equipment (PPE) and medical equipment – expanded significantly from 2000 to 2018, facilitated by the emergence of trade hubs acting as key suppliers to a wider group of economies. The number of bilateral trade ties in these networks dropped slightly in 2020 but export performance remained strong for PPE. A fall in trade costs may lead to increased geographical concentration of production, clustering of business activities and fragmentation of the production process, thus enabling the emergence of several production hubs.
- The trade networks for certain essential goods display a high level of centralisation. These networks are highly concentrated, which could be efficient, but, at the same time, could also lead to supply chain risk and fragility. Importing a high proportion of those risky products could make an economy vulnerable to spillover effects from supply shocks, particularly from disruptions originating in hub economies.
- Managing inflation is crucial in ensuring a robust economic recovery; and disruptions to supply chain networks could have considerable impacts on inflation. Although such inflationary impacts could be temporary and short-lived, they may also be protracted if they raise production costs significantly.
- Economies need to take steps to reduce trade costs and improve the resiliency of supply chain networks, particularly for essential products that are important for economic recovery and stability. Avenues that APEC economies could pursue include: (1) investing in trade facilitation reforms and facilities to resolve supply bottlenecks; (2) focusing efforts on preventing supply chain disruptions to risky

and essential products; and (3) strengthening policy coordination and regional cooperation when adopting economic resiliency policies.

## II. Sustainable Recovery amid Uncertainty

- APEC GDP growth is expected to slow down to 3.2 percent in 2022 and 3.4 percent in 2023, following a 5.9 percent expansion in 2021.
- Economic recovery, which was already fragile to begin with, faltered toward the second half of 2021 with the emergence of the highly contagious Omicron variant. The resurgence of infections led to shortages of workers and production inputs, disrupting global supply chains and contributing to supply–demand imbalances that resulted in higher food and energy prices.
- APEC inflation averaged 3.0 percent in 2021, doubling from 1.5 percent in 2020. Inflation for Q1 2022 averaged higher at 4.5 percent compared to 1.8 percent in Q1 2021.
- Rising inflation, particularly of food prices, could push more people into extreme poverty. Higher inflation, interest rates and debt could slow down economic activity. Other risks remain, including a protracted war in Ukraine, the moderating of China’s economy; climate change, which, if left unmitigated, will continue to affect people’s health and livelihoods; and the ongoing pandemic, where the emergence of highly transmissible variants could send economies back into restart mode.
- Merchandise and commercial services trade recorded double-digit growth in 2021 from the contractionary levels in 2020. However, the World Trade Organization (WTO) and the International Monetary Fund (IMF) cut their trade forecasts for 2022 and 2023 to take into account the multiple challenges that could negatively impact trade relations and activity.
- Amid heightened uncertainty and rising risks from crisis upon crisis, APEC has remained committed to stay the course of sustainable and inclusive growth by implementing the Putrajaya Vision through the Aotearoa Plan of Action (APA).
- The APA is focused on implementing inclusive policies that equip people with the updated skills necessary to thrive amid rapid technological changes; advance gender equality and women’s economic empowerment; support MSMEs’ access to finance, global markets and global value chains; and further deepen APEC’s work on groups with untapped economic potential, including indigenous groups, people with disabilities and those living in remote and rural communities.
- APEC recognises that growth and prosperity need to be attained through environmentally sustainable approaches. APEC economies are expected to work toward achieving their environmental goals, including doubling renewable energy in the APEC energy mix by 2030, reducing aggregate energy intensity by 45

percent in 2035 and integrating the Bio-Circular-Green (BCG) model into the region's economic approaches.

- Food security also forms a vital part of APEC's sustainable growth agenda, which is timely amid rising food prices. The APEC Food Security Roadmap Towards 2030 leverages public-private partnership to bring about digital and innovative approaches to increase productivity and efficiency; minimise food loss and waste; mitigate and adapt to climate change; and reduce costs and facilitate food trade.
- Alongside the pursuit of medium- to long-term objectives, APEC is mindful that, in the immediate period, the priority remains focused on ensuring that the region's people are healthy so that economies can recover, reopen and rebuild. Central to this is the crucial role of trade facilitation to ensure the free and rapid flow of vaccines, therapeutics and related medical supplies across borders.
- The resumption of cross-border activity remains paramount, to strengthen the region's connectivity, while at the same time, re-energise travel and tourism to support economic growth.
- For APEC, the challenge remains to translate the Putrajaya 2040 vision of an 'open, dynamic, resilient and peaceful Asia-Pacific' into concrete actions and tangible benefits for all people.



# 1 TACKLING TRADE COSTS AND FACILITATING SUPPLY CHAIN NETWORKS<sup>1</sup>

Supply chains have been likened to the circulatory system, bringing goods where they are needed and allowing the global economy to thrive. Like the circulatory system, a good sign that supply chains are functioning well is when they are not the centre of attention. However, since the start of the COVID-19 pandemic, supply chains have been high on people's and policymakers' minds. Just as the coronavirus increased the likelihood of blood clots and cardiac arrhythmia, the pandemic created bottlenecks to supply chains as economic activities such as trade and investment came to a halt.

Two years into the pandemic, the world has begun to see a return to normalisation of business and social activities. However, questions remain on whether pandemic has permanently changed global trade and supply chains. Some observations suggest that global trade have been relatively resilient, while others imply that global supply chains are undergoing substantial reconfiguration to function with more resilience post-pandemic.

## 1.1 TRADE COSTS, TRADE NETWORKS AND COVID-19

Trade costs are an essential determinant of trade. With global trade now dominated by trade in intermediate goods, lower trade costs could facilitate global supply chain participation and growth.<sup>2</sup> High trade costs, on the other hand, represent damaging barriers to trade, as they raise the price of exports and imports and weaken business competitiveness.<sup>3</sup>

Reports from the World Trade Organization (WTO),<sup>4</sup> and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and World Bank,<sup>5</sup> suggest that global trade costs had declined between 2000 and 2018.<sup>6</sup> However, trade costs remain high, roughly equivalent to a 100 percent tariff, according to a 2021 World Bank study.<sup>7</sup> Another study, also in 2021, by the WTO, provides an estimated breakdown of such costs: (1) transport and travel cost (22–29%); (2) trade policy and regulatory differences (15–

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<sup>1</sup> Prepared by Akhmad Bayhaqi, Nguyen Thu Quynh and Emmanuel A. San Andres, APEC Policy Support Unit (PSU).

<sup>2</sup> In Q3 2021, intermediate goods accounted for 53 per cent of total trade (excluding fuels), a ratio that has remained steady over the last decade. See: World Trade Organization (WTO), "Information Note on Trade in Intermediate Goods: Third Quarter 2021" (WTO, 2021), [https://www.wto.org/english/res\\_e/statis\\_e/miwi\\_e/info\\_note\\_2021q3\\_e.pdf](https://www.wto.org/english/res_e/statis_e/miwi_e/info_note_2021q3_e.pdf)

<sup>3</sup> World Bank, "High Trade Costs: Causes and Remedies," in *Global Economic Prospects, June 2021* (World Bank, 2021), 103–28, [https://elibrary.worldbank.org/doi/10.1596/978-1-4648-1665-9\\_ch3](https://elibrary.worldbank.org/doi/10.1596/978-1-4648-1665-9_ch3)

<sup>4</sup> Data from: WTO, "WTO Trade Cost Index," accessed 15 April 2022, <http://tradedcosts.wto.org/>

<sup>5</sup> Data from: ESCAP, "ESCAP–World Bank Trade Cost Database," updated July 2021, <https://www.unescap.org/resources/escap-world-bank-trade-cost-database>

<sup>6</sup> The bilateral measure of trade costs featured in both databases are 'comprehensive' in the sense that they represent all costs associated with trading goods internationally versus those involved in trading goods domestically. The value of the index is in ad valorem equivalent form, e.g., the global average trade cost in 2020 is around 125 percent, which suggests that, on average, trading goods internationally will involve costs approximately 125 percent of the value of the goods when they are traded within domestic borders. See technical note at: ESCAP, "ESCAP–WB Trade Cost Database: Explanatory Note for Users," July 2017, <https://www.unescap.org/sites/default/d8files/Trade%20Cost%20Database%20-%20User%20note.pdf>

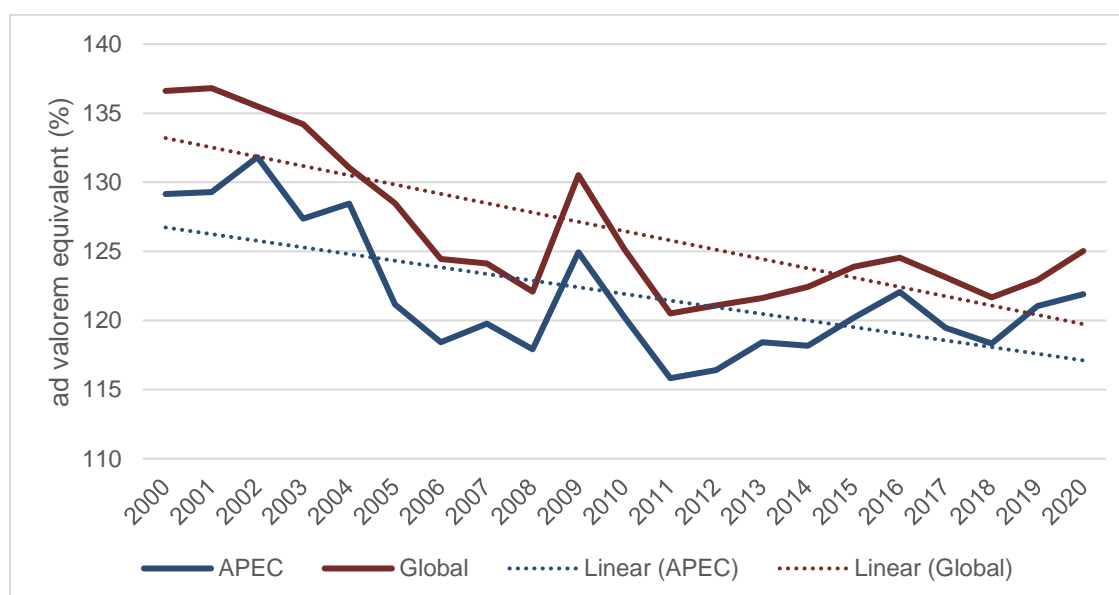
<sup>7</sup> World Bank, "High Trade Costs: Causes and Remedies."

24%); (3) information and transaction cost (13–19%); (4) governance quality (11–14%); and (5) other (17–27%).<sup>8</sup>

## 1.2 OVERALL TRADE COSTS

By our estimates, average trade costs of the APEC economies between 2000 and 2018 have declined by nearly 8.5 percent, from more than 129 percent to around 118 percent in ad valorem tariff equivalent terms (Figure 1.1). This could be credited in part to APEC’s consistent trade facilitation efforts in the previous two decades, including the first and second Trade Facilitation Action Plan (TFAP I and II), and the Supply Chain Connectivity Framework Action Plan (SCFAP). These plans, implemented from 2001 through 2010 with topics covering customs and procedures, standards and conformance, business mobility, and electronic commerce, yielded significant trade cost reductions.<sup>9</sup> Reviews of the SCFAP also suggest that overall logistics performance and the border clearance environment have improved. The reviews also note reduced cost and time to import and export; increased connectivity; higher transparency; and better regulatory cooperation among APEC economies.<sup>10</sup>

**Figure 1.1 Trade costs (%): APEC and global**



Note: Based on the methodology described in Appendix B. Global average trade costs are represented by 42 economies: Brazil, Bulgaria, China, Croatia, the Czech Republic, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Korea, Malta, Mexico, Russia, Turkey, Romania, Poland, and Slovakia. Also included are the following high-income economies: Australia, Canada, Cyprus, the EU15 economies, Japan, Norway, Slovenia, Switzerland, and the US.

Source: UN Comtrade data; APEC Policy Support Unit (PSU) staff calculations.

<sup>8</sup> WTO, “WTO Trade Cost Index: Evolution, Incidence and Determinants” (Background note, WTO, 24 March 2021), [http://tradedcosts.wto.org/docs/Trade\\_Cost\\_Index\\_Background\\_Note\\_24-03-2021.pdf](http://tradedcosts.wto.org/docs/Trade_Cost_Index_Background_Note_24-03-2021.pdf)

<sup>9</sup> A. Bayhaqi et al., “Trade Facilitation in APEC: Progress and Impact” (Policy Brief 25, Singapore: APEC, January 2019), [https://www.apec.org/docs/default-source/Publications/2019/1/Policy-Brief-Trade-Facilitation-in-APEC-Progress-and-Impact/TFA-ESCAP-Policy-Brief\\_Final.pdf](https://www.apec.org/docs/default-source/Publications/2019/1/Policy-Brief-Trade-Facilitation-in-APEC-Progress-and-Impact/TFA-ESCAP-Policy-Brief_Final.pdf)

<sup>10</sup> A. Bayhaqi and L.G. Lai, “A Decade of Supply Chain Initiatives: Opportunities and Challenges in Post-COVID-19 Recovery” (Policy Brief 42, Singapore: APEC, January 2022), [https://www.apec.org/docs/default-source/publications/2022/1/a-decade-of-supply-chain-initiatives-opportunities-and-challenges-in-post-covid-19-recovery/222\\_psu\\_a-decade-of-supply-chain-initiatives.pdf?sfvrsn=4a241f9c\\_2](https://www.apec.org/docs/default-source/publications/2022/1/a-decade-of-supply-chain-initiatives-opportunities-and-challenges-in-post-covid-19-recovery/222_psu_a-decade-of-supply-chain-initiatives.pdf?sfvrsn=4a241f9c_2)

Trade cost levels in APEC tend to be lower compared to the global economy. However, the trendline is very similar for both, as shown in Figure 1.1. Our estimates show that global trade costs fell by almost 11 percent between 2000 and 2018, just slightly more than the 8.5 percent for APEC. Merchandise trade in APEC grew from 31 percent of total GDP in 2000 to 37 percent in 2018, a 20 percent increase in response to a decline of 8.5 percent in trade costs. As with APEC, global trade costs spiked in 2009 (+7 percent) and 2020 (+2 percent). In both years, the APEC region showed a degree of resiliency, with its trade costs increasing slower than the world as a whole.

### 1.3 SECTORAL TRADE COSTS

While overall trade costs in the APEC region decreased between 2000 and 2018, trends may vary at the sectoral level due to different trade policy measures applying to different products. Using the ESCAP–World Bank trade cost database, we compared trade costs in the manufacturing and agricultural sectors.<sup>11</sup>

We find trade costs in the agricultural sector to be consistently higher than in the manufacturing sector, indicating that agricultural products are facing more trade barriers (Figure 1.2). The starkly different trade cost levels between these two sectors can be explained in large part by the trade policies in different economies.<sup>12</sup> Findings from the literature highlight that trade barriers, both tariff and non-tariff, are much higher in agriculture than in manufacturing.<sup>13</sup>

Trends in trade costs for the two sectors are also illuminating. Between 2000 and 2010, trade costs fell faster in the manufacturing sector. In the immediate aftermath of the 1998 Asian financial crisis, trade costs for manufactured goods in APEC fell by more than 11 percent, higher than the 8 percent decrease for agricultural products. Notably, trade costs for manufactured goods tend to rise and fall with the trade costs for traded goods in aggregate, while agricultural products do not show this rhyme (Figure 1.2). Trade costs in the manufacturing sector also echo the shock from the 2009 financial crisis more clearly.

In the last decade, however, trade costs in both sectors have risen. Between 2011 and 2019, trade costs for agricultural goods expanded by 1.6 percent. Trade costs in manufacturing increased more markedly, by nearly 8.5 percent. The upward trend has become more defined in both sectors since 2018, in tandem with the increase in trade costs at the aggregate level. At the same time, since 2008, participation in GVCs has stagnated.<sup>14</sup> Although data unavailability hinders more definitive findings, trade costs at the sectoral level are expected to continue increasing in 2020 due to supply chain disruptions and bottlenecks caused by the COVID-19 pandemic.

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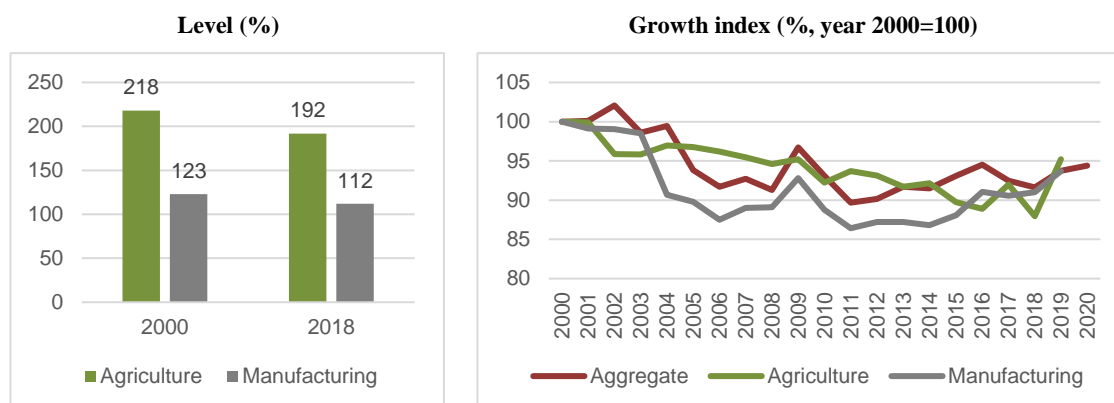
<sup>11</sup> The ESCAP–World Bank trade cost database is the most comprehensive in providing data by sector.

<sup>12</sup> See J.F. Arvis et al., “Trade Costs in the Developing World: 1995–2010” (ARTNeT Working Paper 121, Bangkok: ESCAP, December 2012).

<sup>13</sup> H.-L. Kee, A. Nicita and M. Olarreaga, “Estimating Trade Restrictiveness Indices,” *Economic Journal* 119 no. 534 (2009): 172–99.

<sup>14</sup> APEC, “APEC Regional Trends Analysis: Bolstering Supply Chains, Rebuilding Global Trade; Making Recovery Inclusive” (Singapore: APEC, May 2021),

[https://www.apec.org/docs/default-source/publications/2021/5/apec-regional-trends-analysis---may-2021/221\\_psu\\_arta\\_may\\_2021\\_final.pdf?sfvrsn=2d914ef5\\_1](https://www.apec.org/docs/default-source/publications/2021/5/apec-regional-trends-analysis---may-2021/221_psu_arta_may_2021_final.pdf?sfvrsn=2d914ef5_1)

**Figure 1.2 Level and growth of trade cost in APEC, by sector**

Note: For level, % is in ad valorem trade cost terms. Based on the methodology described in Appendix B. APEC data cover 20 economies.

Source: ESCAP–World Bank trade cost database; APEC PSU staff calculations.

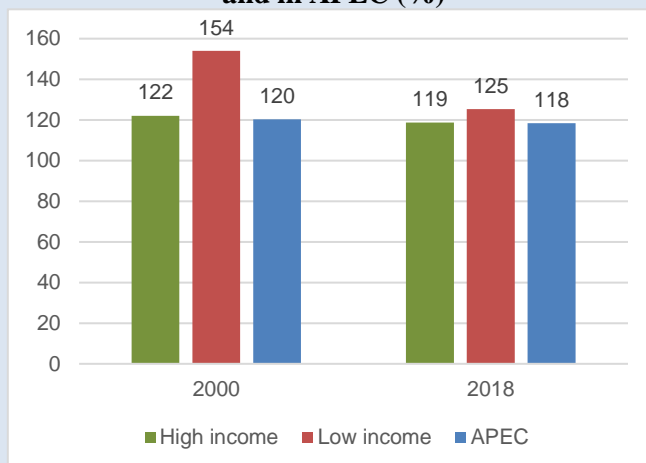
### Box 1.1 Global trade costs by income group

Trade cost levels differ for high- and low-income economies (Figure 1.3). In 2018, trade costs were 125 percent in ad valorem tariff equivalent terms for low-income economies and 119 percent for high-income economies. This was a steep reduction of 19 percent for lower-income economies from year 2000<sup>a</sup> compared to the 4 percent decrease for high-income economies.

According to the World Trade Organization (WTO), high- and low-income economies also differ in the components of their trade costs. Trade policy barriers are the most important component for low-income economies, while transport and travel together with information and transaction costs form the bulk of the trade costs between high-income economies.

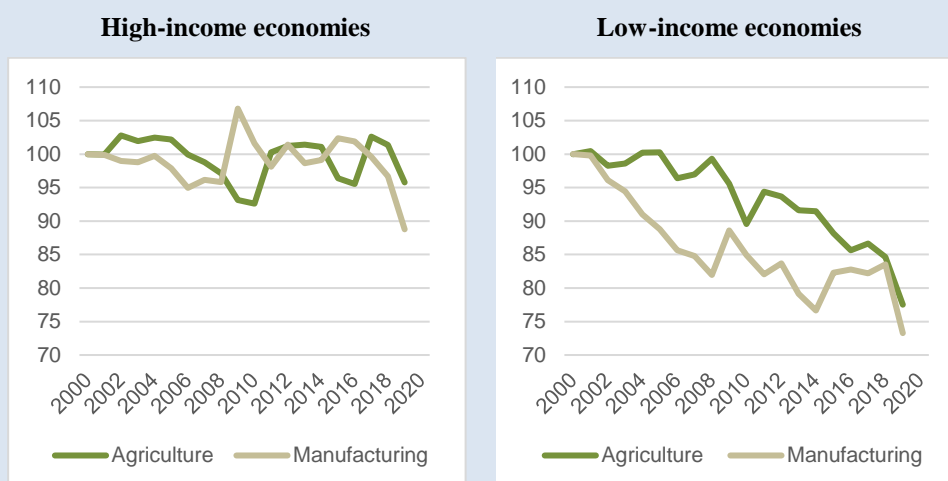
Trade costs are decreasing more drastically in lower-income economies, especially in the manufacturing sector (Figure 1.4). From 2000 to 2019, the ad valorem equivalent trade costs for manufactured goods in low-income economies had shrunk 27 percent. The decline during the same period in high-income economies was only 11 percent. The same trend is observed in the agricultural sector, where the rates of decrease in low-income economies and high-income economies are 22 percent and 4 percent, respectively. In both sectors, the gap in trade costs between the two income groups is dwindling.

**Figure 1.3 Trade costs by income group and in APEC (%)**



Note: % ad valorem equivalent trade cost. Based on the methodology described in Appendix B.  
 Source: UN Comtrade data; APEC PSU staff calculations.

**Figure 1.4 Global trade costs by sector and income group – growth index (% , year 2000=100)**



Note: Based on the methodology described in Appendix B.  
 Source: ESCAP–World Bank trade cost database; APEC PSU staff calculations.

Note:

<sup>a</sup> Following the classification of the WTO Trade Cost Index (<http://tradedcosts.wto.org/>), lower-income economies are those classified by the World Bank in year 2000 as low and middle income; high-income economies are those classified as high income. Lower-income economies are represented by Brazil, Bulgaria, China, Croatia, the Czech Republic, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Korea, Malta, Mexico, Russia, Turkey, Romania, Poland, and Slovakia. High-income economies are Australia, Canada, Cyprus, the EU15 economies, Japan, Norway, Slovenia, Switzerland, and the United States.

## 1.4 TRADE COSTS FOR ESSENTIAL GOODS

The COVID-19 pandemic has left unprecedented impacts on trade of goods and services. To improve the measurement and analysis of trade in critical products and support the policy efforts of economies as they work to combat COVID-19, there have been multiple discussions to harmonise the classification of essential goods in different economies.<sup>15</sup> Despite the urgency and importance of reducing trade barriers and addressing supply chain disruptions for goods critical during the pandemic, creating a single unified definition of essential goods remains a challenging task. The most popular classification so far is provided jointly by the World Customs Organization (WCO) and the World Health Organization (WHO). The classification is, however, specifically concerned with medical supplies, priority medicines, vaccines and related equipment.<sup>16</sup>

In May 2020, the APEC Ministers Responsible for Trade agreed to ‘facilitate the flow of essential goods and services to fight the pandemic including medicines, medical supplies and equipment, agriculture and food products and other supplies across borders’.<sup>17</sup> Echoing this broad definition of essential goods, we identify products other than vaccines and medical products as being essential and thus requiring policy attention. For this analysis, therefore, we adopt a more comprehensive definition and list of essential goods, as proposed in the report ‘Non-Tariff Measures (NTMs) on Essential Goods during COVID-19 in the APEC Region’ under the APEC Committee on Trade and Investment. (see Appendix A).<sup>18</sup>

The results show that trade costs for essential goods have fallen substantially in the last decade, both in APEC and at the global level (Figure 1.5). In 2010, ad valorem equivalent trade costs for essential goods were 143 percent for APEC, and 152 percent at the global level. By 2019, the trade-cost gap between the global level and APEC for essential goods had greatly shrunk, posting a difference of less than 1 percentage point. Over the decade, trade costs for essential goods at the global level had declined more than 10 percent, two times faster than for the APEC region (5 percent).

Trade costs for essential goods also vary among APEC economies (Figure 1.6). Some of the APEC economies with the lowest trade costs for essential goods in 2018 – Canada; China; Japan; Korea; Singapore; and the United States – were also consistently among the economies with the highest centrality measures (Table 1.1). This suggests that their relatively lower trade costs served as catalysts for their hub roles in the global trade network for the selected essential goods.

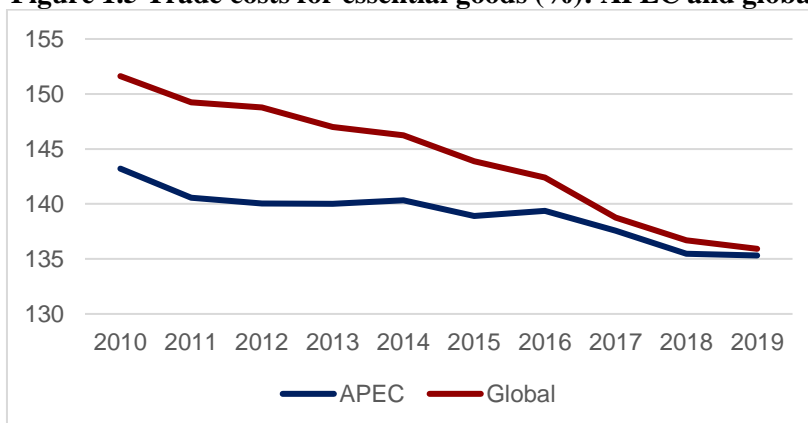
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<sup>15</sup> WTO, “Improving Trade Data for Products Essential To Fight COVID-19: A Possible Way Forward” (Information note, WTO, 1 July 2021), [https://www.wto.org/english/tratop\\_e/covid19\\_e/trade\\_data\\_report\\_e.pdf](https://www.wto.org/english/tratop_e/covid19_e/trade_data_report_e.pdf)

<sup>16</sup> World Customs Organization (WCO), “The HS 2022 Version of the COVID-19 Reference Lists for Medical Supplies, Priority Medicines, Vaccines and Related Equipment,” 15 February 2022, <http://www.wcoomd.org/en/media/newsroom/2022/february/the-hs-2022-version-of-the-covid19-reference-lists.aspx>

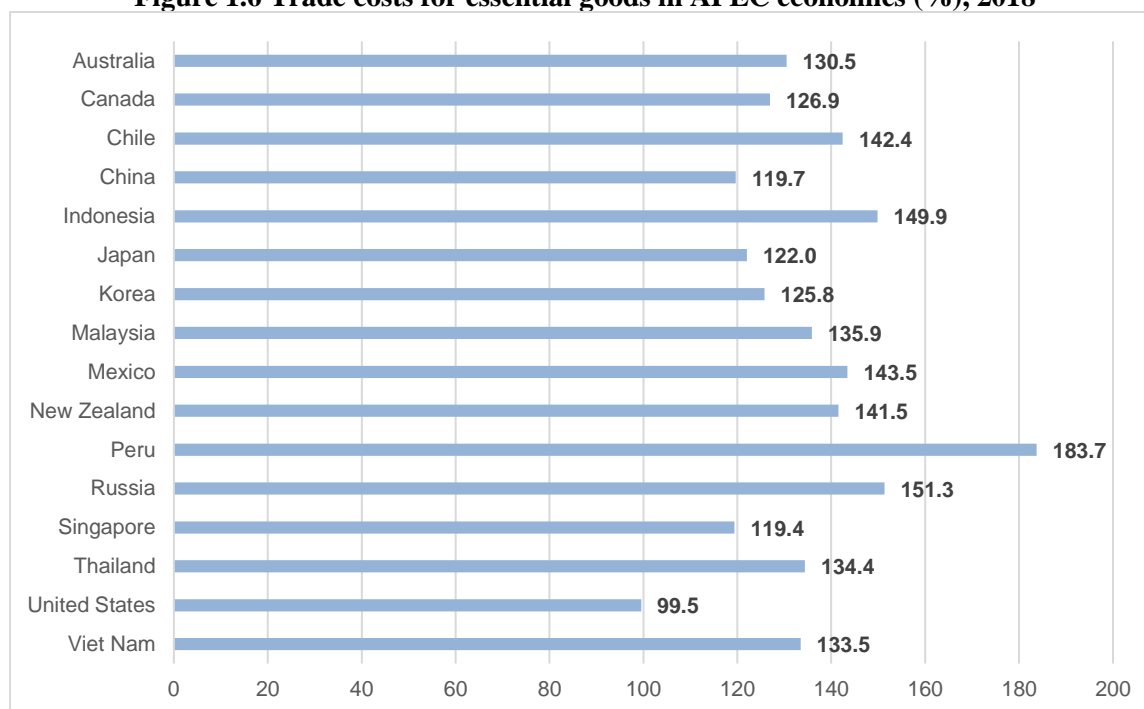
<sup>17</sup> APEC, “Statement on COVID-19 by APEC Ministers for Trade,” 5 May 2020, [https://www.apec.org/meeting-papers/sectoral-ministerial-meetings/trade/2020\\_trade](https://www.apec.org/meeting-papers/sectoral-ministerial-meetings/trade/2020_trade)

<sup>18</sup> APEC, “Non-tariff Measures (NTMs) on Essential Goods during COVID-19 in the APEC Region” (Singapore: APEC, 2021), [https://www.apec.org/docs/default-source/publications/2021/4/non-tariff-measures-on-essential-goods-during-covid-19-in-the-apec-region/221\\_cti-ntms-on-essential-goods-during-covid-19.pdf?sfvrsn=afa67fb1\\_1](https://www.apec.org/docs/default-source/publications/2021/4/non-tariff-measures-on-essential-goods-during-covid-19-in-the-apec-region/221_cti-ntms-on-essential-goods-during-covid-19.pdf?sfvrsn=afa67fb1_1)

**Figure 1.5 Trade costs for essential goods (%): APEC and global**

Note: % ad valorem trade cost. Based on the methodology described in Appendix B. To improve data coverage, Ireland, Luxembourg and Malta are excluded from the 42 economies used to represent global trade costs. APEC data cover 16 economies. Missing values for China; Japan; and Thailand in 2019 are replaced with their last available observations in 2018.

Source: UN Comtrade (export data); UNIDO Statistics Portal (output data, manufacturing only); APEC PSU staff calculations.

**Figure 1.6 Trade costs for essential goods in APEC economies (%), 2018**

Note: % ad valorem trade cost. Based on the methodology described in Appendix B.

Source: UN Comtrade data; APEC PSU staff calculations.

## 1.5 TRADE NETWORKS, CENTRALISATION AND RISK

Global trade is conducted through a network of value chains. This network is characterised by business, influence and information relationships among different parties such as traders, logistics operators, infrastructure providers and trade regulators. Trade networks involve not only the flows of goods and services but also flows of information and business relations reflecting numerous micro-decisions and considerations among the actors involved in the network. As such, supply chain relations may transfer knowledge, productivity and skills as well as encourage spillovers benefiting domestic firms, with positive impacts for the poor and other marginalised groups.<sup>19</sup>

Network analysis allows us to identify key players that hold a central or hub position in the system. A node (i.e., an economy in this case) with high degree centrality is considered to have maintained extensive contacts and access with other network actors. Central nodes occupy structural hub positions that serve as a channel or ‘bridge’ for large volumes of exchange with other nodes.<sup>20</sup> Based on the essential goods classification for chemicals, medicines, personal protective equipment (PPE) and medical equipment, we calculate three centrality measures: degree centrality, closeness centrality and betweenness centrality.

Degree centrality measures the strength of a connection from a node to other nodes (how connected a node is); closeness centrality shows the relative ease with which a particular node can be reached by other nodes (closeness to connected nodes) and betweenness centrality describes the importance of a node in bridging or brokering trade relations with other nodes. If a node is an airport, then degree centrality is the number of direct flights from and to a given airport, closeness centrality is the number of transit flights to other airports, and betweenness centrality is the number of shortest transit flights through the airport.

Table 1.1 shows the 15 economies (out of more than 200) with the highest rank globally based on the average of the three centrality measures.

Ten economies consistently appear among the top 15 in the four categories of essential goods: Canada; China; France; Germany; India; Korea; the Netherlands; Spain; the United Kingdom; and the United States. While all economies in the list have significant share of trade in the respective goods, the ranking considers the centrality of each economy as the key factor.

For example, in the category of medical supplies, Germany has the highest share of trade in terms of value (12%), higher than the US (9%), the Netherlands (4%), France (5%); and the United Kingdom (3%). But Germany ranks only fifth on the centrality list. The US is ranked first as it has the highest score on betweenness centrality for medical supplies, with 1,515 shortest paths that go through the economy, in comparison with 798 for Germany. This shows that while Germany is trading more medical supplies, the US has more

<sup>19</sup> World Bank, “World Development Report 2020: Trading for Development in the Age of Global Value Chains” (Washington, DC: World Bank, 2020), <https://www.worldbank.org/en/publication/wdr2020>

<sup>20</sup> L. De Benedictis and L. Tajoli, “Comparative Advantage and Centrality in the World Network of Trade and Value Added: An Analysis of the Italian Position,” *Rivista di Politica Economica* 105, no. 7/9 (2016): 187–22 <https://www.econbiz.de/Record/comparative-advantage-and-centrality-in-the-world-network-of-trade-and-value-added-an-analysis-of-the-italian-position-benedictis-luca/10012041538>



connections with trading partners and occupies a more central (hub) role in the medical supplies trade.

**Table 1.1 Economies with highest average centrality scores, 2020**

	Chemicals	Medical supplies	PPE	Medical equipment
1	US	US	France	Germany
2	China	Netherlands	China	France
3	United Kingdom	France	US	US
4	India	United Kingdom	Spain	Netherlands
5	France	Germany	United Kingdom	Canada
6	Germany	Canada	Germany	United Kingdom
7	Netherlands	Korea	Thailand	Korea
8	Canada	China	Netherlands	Singapore
9	Korea	India	Canada	Belgium
10	Belgium	Singapore	Korea	China
11	Spain	Spain	Austria	India
12	Turkey	Indonesia	United Arab Emirates	Poland
13	Austria	Belgium	India	Japan
14	Singapore	Thailand	Poland	Spain
15	Indonesia	Austria	Italy	Thailand

PPE=personal protective equipment.

Note: APEC economies are highlighted in green.

Source: CEPII, “BACI: International Trade Database at the Product-Level: 2022 Version” data; APEC PSU staff estimates.

For PPE, China has the highest trade share, reaching almost 59 percent, higher than France (1.5 percent). However, France ranks the highest in terms of betweenness centrality and closeness centrality: 2,040 shortest trade paths go through France and it only takes 240 transit steps to reach all other nodes or economies.

For medical equipment, Germany has the highest trade share at 15 percent while also ranking first in terms of the highest average on the three centrality measures.

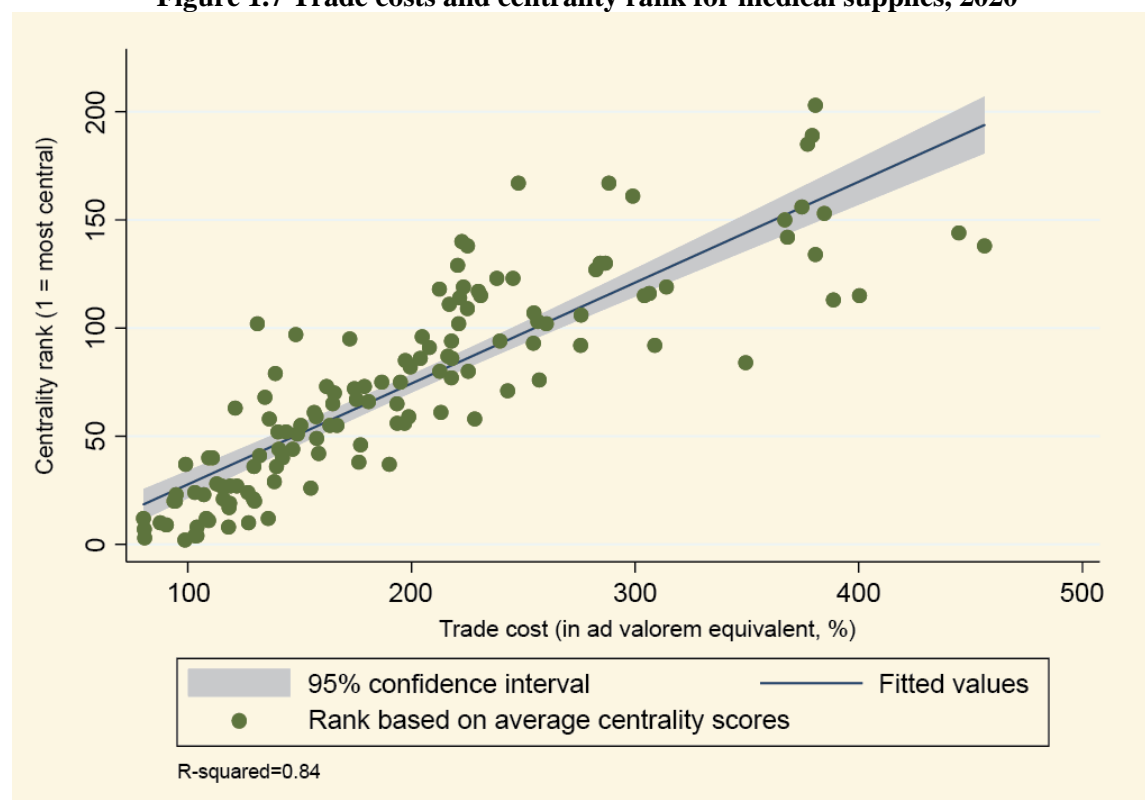
In the case of chemicals, China has the highest trade share (15 percent) and is the economy which has the highest out-degree centrality, that is, it is the economy that has the highest number of importers for chemicals.

The above suggests that while the trade share of an economy contributes to its centrality in the global trade network (having large trade volumes will allow more possible trade relations with other economies), the strategic hub position of an economy is also affected by the overall topology of the network structure. In the case of PPE, France holds a dominant position not only due to its strong manufacturing and trade performance, but also because of its brokerage position and its closeness to other economies: France is an important supplier of raw materials for PPE while also a major PPE supplier within Europe.<sup>21</sup>

<sup>21</sup> C. Park et al. “Global Shortage of Personal Protective Equipment amid COVID-19: Supply Chains, Bottlenecks, and Policy Implications” (ADB, April 2020), <https://doi.org/10.22617/brf200128-2>

Hub economies play an important role in the trade network because they act as central nodes that facilitate exchange with other economies. There is a strong link between trade costs and the degree of centrality: economies with low trade costs tend to occupy a hub position (Figure 1.7). This is because the factors that reduce trade costs – such as low trade barriers, trade facilitation policies, and efficient trade institutions – are also conducive to the development of trade hubs.

**Figure 1.7 Trade costs and centrality rank for medical supplies, 2020**



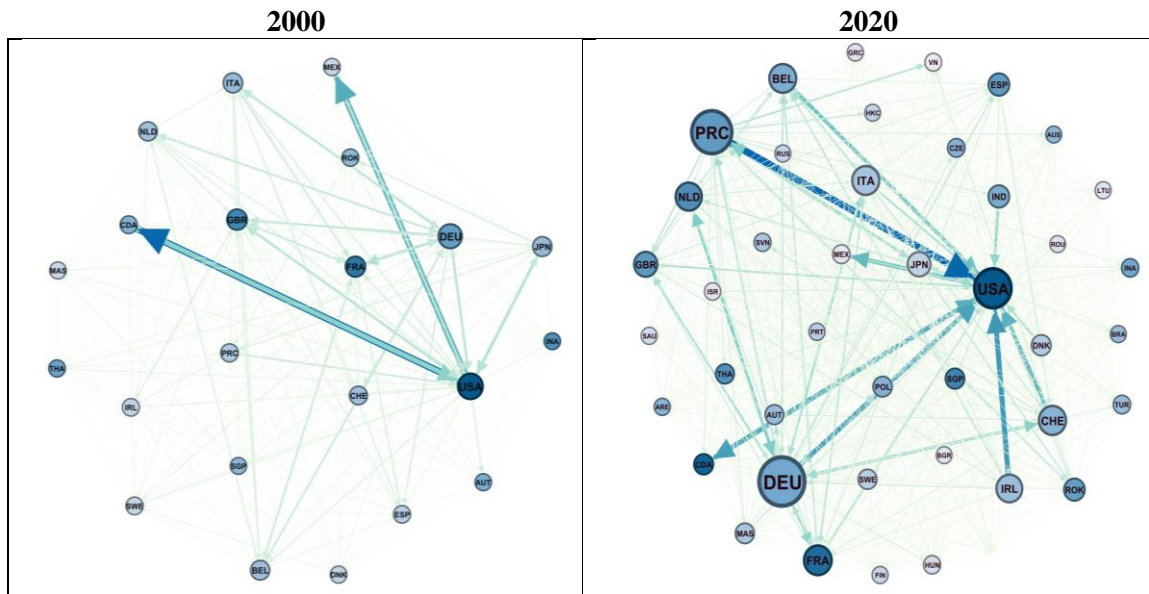
Source: UN Comtrade data; CEPII-BACI data; APEC PSU staff calculations.

The structure of trade networks for the four groups of commodities also provides interesting insights as the trade networks for these commodities have significantly increased their density between 2000 and 2020 (see Appendix C for quantitative results). The evolution of trade networks for medical supplies and PPE is illustrated in Figure 1.8 and Figure 1.9, respectively.

For medical supplies, a vast difference in trade networks between 2000 and 2020 is observed (Figure 1.8). Not only did total trade values increase (bigger node sizes), but new trade hubs (darker shades) also developed particularly in the APEC region. The chart also illustrates the difference between trade value and trade centrality: in 2020, Germany traded the most, but the US is clearly the more central hub for trade in medical supplies. Moreover, the 2020 chart shows the development of three regional hubs: China; Germany; and the US. Note that in Figures 1.8 and 1.9, the distance between economies is not based on geographical distance from one another, but rather captures ‘neighbourhoods’ or clusters

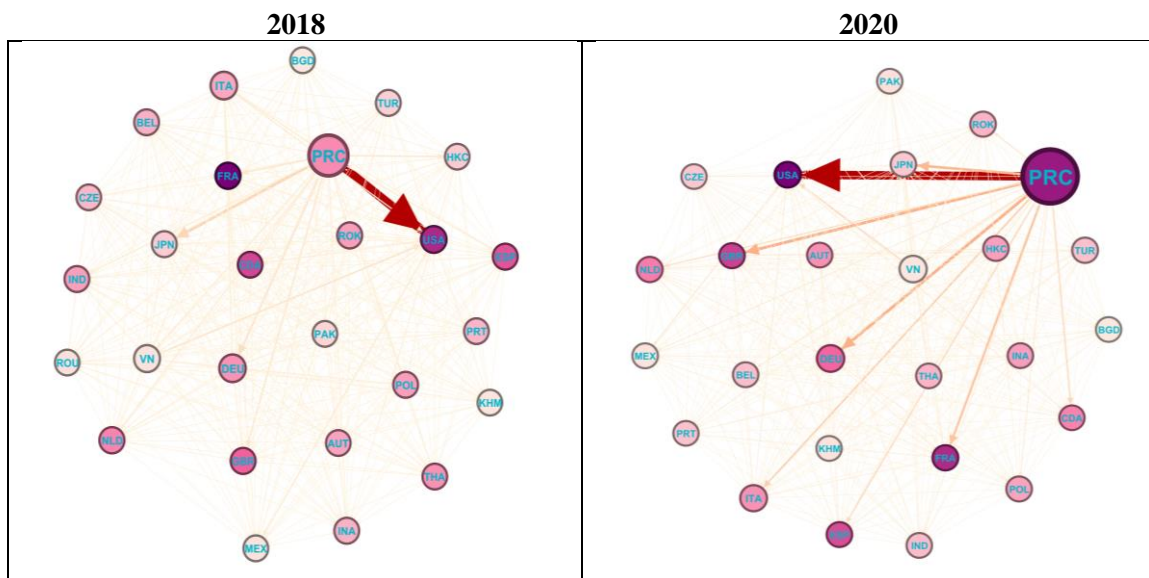
of closely linked economies, and contrasts them with other groups of economies with which they are less connected.<sup>22</sup>

**Figure 1.8 Evolution of trade networks for medical supplies**



Note: (1) Node sizes reflect total export values: bigger nodes represent large exporting economies; node shades reflect (betweenness) centrality: darker nodes represent more central/hub economies; edges (the lines between the nodes) reflect bilateral export values: darker and thicker edges represent higher export values. Source: CEPII-BACI data; APEC PSU staff calculations.

**Figure 1.9 Evolution of trade networks for PPE**



Note: (1) Node sizes reflect total export values: bigger nodes represent large exporting economies; (2) node shades reflect (betweenness) centrality: darker nodes represent more central/hub economies; (3) edges reflect bilateral export values: darker and thicker edges represent higher export values. Source: CEPII-BACI data; APEC PSU staff calculations.

<sup>22</sup> APEC, “Evaluation of Value Chain Connectedness in the APEC Region” (Singapore: APEC, 2014), [https://www.apec.org/docs/default-source/publications/2014/10/evaluation-of-value-chain-connectedness-in-the-apec-region/vc-connectedness-final-report-october2014-clean.pdf?sfvrsn=8d2c511e\\_1](https://www.apec.org/docs/default-source/publications/2014/10/evaluation-of-value-chain-connectedness-in-the-apec-region/vc-connectedness-final-report-october2014-clean.pdf?sfvrsn=8d2c511e_1)

The impact of COVID-19 on trade networks can be seen in the case of PPEs (Figure 1.9). In 2018, China was the largest trader of PPEs in the world (i.e., largest node size) but the hub for PPE trade was still France (darkest shade). However, in 2020, not only did China trade more in PPE, but it also joined France as a hub in the global PPE trade along with the US. In contrast with medical supplies, there is no clear indication of emerging regional hubs in the PPE trade network.

A more technical analysis is presented in Appendix C, but, in summary, the number of bilateral trades increased significantly from 2000 to 2018 and dropped slightly in 2020; and this expansion had been facilitated by the emergence of trade hubs. It is possible that a fall in the cost of trade leads to increased geographical concentration of production, clustering of business activities and fragmentation of the production process.<sup>23</sup> These probably happened as firms exploit the economies of scale to gain global competitiveness.

A high level of centralisation means that goods are being sent to a relatively small number of locations that function as hubs. Korniyenko et al. identify a global list of ‘100 risky import products’ based on the three components of product fragility: presence of central players, tendency to cluster, and low international substitutability.<sup>24</sup> The trade networks for these products are also very concentrated, which can be efficient, but it also means that shocks emanating from these hubs could be more easily transmitted through the supply chain.<sup>25</sup> Two of the top 10 risky import products are also essential goods: ‘Antisera & oth. blood fractions & modified immunological prods.’ and ‘Instruments & appls. used in medical/surgical/veterinary sciences’.

## 1.6 SUPPLY CHAIN FOR STRONGER ECONOMIC RECOVERY

The year 2022 has been marked with anxieties regarding high inflation. As economies start to relax their COVID-19 measures, an economic rebound is happening in developed and emerging economies on the back of strong pick-up in consumer and industrial demand. However, inflation is picking up too, and could be a signal of several imbalances in the economy such as firm profiteering, a tightening labour market, excess liquidity and supply-side disruptions. Trade tensions could also raise inflation by reducing supplies and disrupting trade of commodities.

While inflation from strong demand due to recovery is somewhat expected, the concern is over inflation originating from supply bottlenecks and logistics disruptions, leading to exorbitant increases in shipping costs and prolonged delivery times.<sup>26</sup> While the inflationary impacts of supply chain disruption are often regarded as temporary and short-lived, the effects could be protracted if they raise production costs significantly.<sup>27</sup> For

<sup>23</sup> C. Vidya, K. Prabheesh and S. Sirowa, “Is Trade Integration Leading to Regionalization? Evidence from Cross-Country Network Analysis,” *Journal of Economic Integration* 35, no. 1 (2020): 10–38, <https://doi.org/10.11130/jei.2020.35.1.10>

<sup>24</sup> Y. Korniyenko, M. Pinat and B. Dew, “Assessing the Fragility of Global Trade: The Impact of Localized Supply Shocks Using Network Analysis” (Working Papers 17(30), IMF, 2017), <https://doi.org/10.5089/9781475578515.001>

<sup>25</sup> Korniyenko, Pinat and Dew, “Assessing the Fragility of Global Trade.”

<sup>26</sup> J.C. Williams, “Reading the Recovery” (speech, via videoconference, Council of Foreign Relations, 14 January 2022), <https://www.newyorkfed.org/newsevents/speeches/2022/wil220114>

<sup>27</sup> S. Tenreyro, “International Trade, Global Supply Chains and Monetary Policy” (speech, Centre for Economic Policy Research seminar, 25 October 2021), <https://www.bankofengland.co.uk/speech/2021/october/silvana-tenreyro-speech-at-the-centre-for-economic-policy-research>; P.R. Lane, “Bottlenecks and Monetary Policy,” ECB Blog, 10 February 2022, <https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog220210~1590dd90d6.en.html>

example, a supply chain disruption may force a company to use other suppliers, incurring higher costs, thus increasing their cost of goods sold. Shipping delays could also cause containers to be stuck in ports or at warehouses, creating a bullwhip effect<sup>28</sup> leading to higher inventory costs. According to Sheffi, the bullwhip effect during the 2008 global financial crisis impacted economies domestically as well as globally; US retail sales declined by 12 percent, inventories went down by 15 percent, and manufacturers' sales declined almost 30 percent bringing imports down to over 30 percent.<sup>29</sup>

According to the European Central Bank (ECB), three elements of globalisation seem to be inversely related to the persistent component of inflation: trade integration, informational globalisation and global value chain (GVC) participation.<sup>30</sup> The deepening and expansion of globalisation in the last few decades allowed many economies to benefit from lower prices due to the ability of firms to outsource their production to various geographical locations supported by lower trade barriers and enabling trade facilitation policies. Digitalisation-driven integration also reduced search costs, increased competition,<sup>31</sup> and reduced logistics or supply chain costs.<sup>32</sup> Finally, GVC participation contributes to lower inflation by acting as a channel for wage moderation and rising productivity.<sup>33</sup>

Unfortunately, the reverse is also true as supply chain networks could transmit supply shocks and price increases along their chains. The impact could be amplified if supply chain participants create buffers in the existing lean production networks, causing bottlenecks.<sup>34</sup> The inflationary impact of the bottlenecks may be temporary, but if the bottlenecks are not resolved quickly, this may trigger an upward shift in wage growth and inflation expectations.<sup>35</sup> The expansion of GVCs could build up a network through which wage and price pressures spread from within borders through direct channels such as price pressures for imported inputs.<sup>36</sup>

An International Monetary Fund (IMF) working paper by Carriere-Swallow et al. released in 2022 analysed the impact of shocks to global shipping costs on domestic prices and found that increases in shipping costs are followed by significant increases in import prices,

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<sup>28</sup> A characteristic of supply chains known as the 'bullwhip effect' makes it even more challenging to maintain a stable and efficient supply chain across different suppliers. Procter & Gamble (P&G) coined the term in the 1990s to describe the variance amplification phenomenon between the company and its suppliers: even a simple change in customer demand can have severe consequences on inventories, disrupting normal supply chain operations. See: X. Wang and S.M. Disney, "The Bullwhip Effect: Progress, Trends and Directions," *European Journal of Operational Research* 250, no. 3(2016): 691–701. <https://doi.org/10.1016/j.ejor.2015.07.022>

<sup>29</sup> Y. Sheffi, "Prepare for the Bullwhip's Sting," *MIT Sloan Management Review*, 13 January 2022, <https://sloanreview.mit.edu/article/prepare-for-the-bullwhips-sting/>

<sup>30</sup> M.G. Attanasi and M. Balatti, "Globalisation and Its Implications for Inflation in Advanced Economies," *ECB Economic Bulletin*, no. 4/2021(2021), [https://www.ecb.europa.eu/pub/economic-bulletin/articles/2021/html/ecb.ebart202104\\_01~ae13f7fe4c.en.html](https://www.ecb.europa.eu/pub/economic-bulletin/articles/2021/html/ecb.ebart202104_01~ae13f7fe4c.en.html)

<sup>31</sup> B. Csonto et al., "Is Digitalization Driving Domestic Inflation" (Working Paper 19(271). IMF, 2019), <https://doi.org/10.5089/9781513519944.001>; <https://www.elibrary.imf.org/view/journals/001/2019/271/article-A001-en.xml>

<sup>32</sup> K. LaBotz, "The Best Supply Chain Recipe for Winning with Inflation," Flexis, 13 January 2022, <https://blog.flexis.com/the-best-supply-chain-recipe-for-winning-with-inflation>

<sup>33</sup> D. Andrews, P. Gal and W. Witheridge, "A Genie in the Bottle: Inflation, Globalisation, and Competition," VoxEU, 11 May 2018, <https://voxeu.org/article/inflation-globalisation-and-competition>

<sup>34</sup> D. Rees and P. Rungcharoenkitkul, "Bottlenecks: Causes and Macroeconomic Implications," *BIS Bulletin*, no. 48 (11 November 2021), <https://www.bis.org/publ/bisbull48.htm>

<sup>35</sup> Rees and Rungcharoenkitkul, "Bottlenecks."

<sup>36</sup> R. Auer, C. Borio and A. Filardo, "Global Value Chains and the Increasingly Global Nature of Inflation," VoxEU, 28 April 2017, <https://voxeu.org/article/global-value-chains-and-increasingly-global-nature-inflation>

producer price inflation, headline and core inflation, as well as inflation expectations.<sup>37</sup> A more detailed analysis by the United Nations Conference on Trade and Development (UNCTAD) in 2021 concludes that a 243 percent increase in container freight rates induced an 11.4 percent increase in import price levels for computer products.<sup>38</sup>

Celasun argues that supply constraints and bottlenecks may have slowed the pace of economic recovery and created significant inflationary pressures in 2021; around half of the rise in manufacturing producer price inflation could be avoided if supply bottlenecks can be handled adequately.<sup>39</sup>

## 1.7 CONCLUSION

The COVID-19 pandemic has had far-reaching economic consequences. At the early stages, as pandemic control policies disrupted shipping, international travel and domestic production, global trade collapsed by almost 16 percent.<sup>40</sup> Almost two years on, despite a rapid economic rebound in the goods sector, recovery in sectors such as tourism and travel remain weak.<sup>41</sup>

Supply chain networks are important for global production and are essential for economic recovery. These networks allow firms to connect with the suppliers that offer the most competitive price and thus best enable them to compete globally. This had led to more GVCs and the multiplying of trade connections among economies. Indeed, most goods have experienced greater expansion of trade networks, including those considered to be essential goods.

The expansion of GVCs brings another dimension of the trade network, in which certain economies are more ‘central’ than others, and have the role as ‘hubs’ in the supply chain network. While this can bring efficiency gains, the centralisation of a network for a particular product can also lead to supply chain risk and fragility. Moreover, having a high proportion of risky products in the import basket may indicate that an economy is particularly vulnerable to spillover effects from supply shocks, particularly from disruptions in hub economies.<sup>42</sup>

Managing inflation is crucial in ensuring a robust economic recovery, and disruptions to supply chain networks can have considerable impacts on inflation. Economies need to take steps to reduce trade costs and improve the resiliency of supply chain networks, particularly for the essential products that are important for economic recovery and stability. Trade costs also determine the competitiveness of firms in the global market, and policies that facilitate supply chains can help firms to join and move up value chains.

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<sup>37</sup> Y. Carriere-Swallow et al., “Shipping Costs and Inflation” (Working Paper 22(061), IMF, 2022), [https://www.imf.org/en/Publications/WP/Issues/2022/03/25/Shipping-Costs-and-Inflation-515144?utm\\_medium=email&utm\\_source=govdelivery](https://www.imf.org/en/Publications/WP/Issues/2022/03/25/Shipping-Costs-and-Inflation-515144?utm_medium=email&utm_source=govdelivery)

<sup>38</sup> UNCTAD, “Review of Maritime Transport 2021” (New York: UN, 2021), <https://unctad.org/webflyer/review-maritime-transport-2021>

<sup>39</sup> O. Celasun et al., “Supply Bottlenecks: Where, Why, How Much, and What Next?” (Working Paper 2022(031), IMF, 2022), <https://www.imf.org/en/Publications/WP/Issues/2022/02/15/Supply-Bottlenecks-Where-Why-How-Much-and-What-Next-513188>

<sup>40</sup> World Bank, “High Trade Costs: Causes and Remedies.”

<sup>41</sup> APEC, “APEC Regional Trends Analysis: APECs Climate Change Challenge; Toward a Resilient Recovery: Policies Matter” (Singapore: APEC, November 2021).

<sup>42</sup> Korniyenko, Pinat and Dew, “Assessing the Fragility of Global Trade.”

Moreover, complex GVCs may fail to develop if trade costs are too high.<sup>43</sup> APEC economies can pursue several avenues to reduce trade costs and ensure a resilient economic recovery.

**Invest in trade facilitation reforms and facilities to resolve supply bottlenecks.** Policy reform to lower trade costs may involve continuing to work on implementing the trade facilitation measures in the WTO Trade Facilitation Agreement; further streamlining trade processes and clearance requirements; providing improved access to transport infrastructure; and facilitating vibrant domestic logistics providers.<sup>44</sup> Escaith suggests that the global benefits will be higher when trade facilitation investments go to key GVC traders due to their high centrality in the trade network.<sup>45</sup> Governments can tackle supply bottlenecks through regulatory measures such as facilitating the licensing of logistics workers, improving timeliness of customs inspection, and optimising the use of logistics facilities.<sup>46</sup>

**Focus efforts on preventing supply chain disruptions to risky and essential products.** Around 40 percent of supply shocks in 2020-2021 were caused by shutdowns meant to control the COVID-19 pandemic.<sup>47</sup> While the shutdowns were temporary, their impacts were protracted and did not resolve after the shutdowns were lifted. In dealing with certain risky essential products, economies relying on a small pool of suppliers for their imports may consider supporting supplier diversification; ensuring a trusted, rules-based trading environment; and creating a responsive regulatory environment.<sup>48</sup> It becomes particularly important for governments to help firms diversify their portfolio of suppliers when disruptions happen. Governments should also ensure that firms do not face unnecessary regulatory constraints when it comes to planning for and responding to disruptions.<sup>49</sup>

**Strengthen policy coordination and regional cooperation when adopting economic resiliency policies.** Policies that aim to increase economic resilience by re-shoring production, promoting self-sufficiency and unwinding trade integration can yield the opposite effect. This is because risk reduction measures and resilience policies in one economy will create spillovers in other economies. Without policy coordination and regional cooperation, such policies are likely to be less than optimal. Ensuring transparency and predictability of trade policies will facilitate coordination and cooperation as these will help traders minimise costs and anticipate negative spillovers from sudden policy changes.<sup>50</sup>

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<sup>43</sup> H. Escaith, “Accumulated Trade Costs and Their Impact on the Development of Domestic and International Value Chains,” in *Global Value Chain Development Report 2017: Measuring and Analyzing the Impact of GVCs on Economic Development* (World Bank, IDE-JETRO, UIBE and WTO, 2017), Ch. 4.

<sup>44</sup> World Bank, “High Trade Costs: Causes and Remedies.”

<sup>45</sup> Escaith, “Accumulated Trade Costs and Their Impact on the Development of Domestic and International Value Chains.”

<sup>46</sup> Celasun et al., “Supply Bottlenecks: Where, Why, How Much, and What Next?”

<sup>47</sup> Celasun et al., “Supply Bottlenecks: Where, Why, How Much, and What Next?”

<sup>48</sup> Productivity Commission, “Vulnerable Supply Chains, Study Report: Executive Summary and Findings” (Commonwealth of Australia, July 2021), <https://www.pc.gov.au/inquiries/completed/supply-chains/report/supply-chains-overview.pdf>

<sup>49</sup> Productivity Commission, “Vulnerable Supply Chains, Study Report” (Commonwealth of Australia, July 2021), <https://www.pc.gov.au/inquiries/completed/supply-chains/report/supply-chains.pdf>

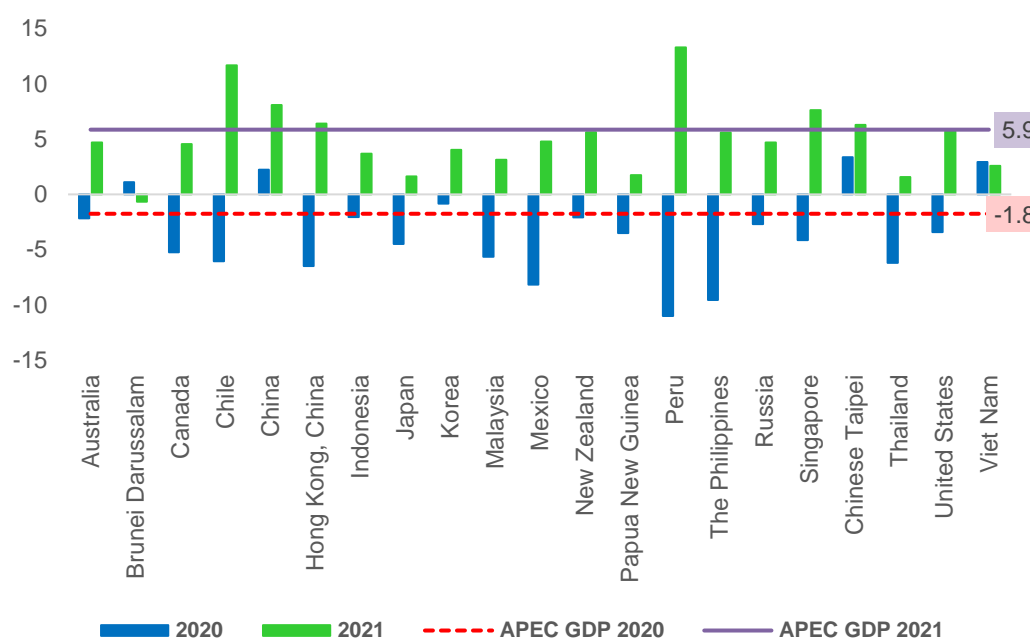
<sup>50</sup> WTO, “Part D: The Role of International Cooperation in Building Economic Resilience,” in *World Trade Report 2021: Economic Resilience and Trade* (WTO, 2021), 122–74, [https://www.wto.org/english/res\\_e/booksp\\_e/wtr21\\_e/05\\_wtr21\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/wtr21_e/05_wtr21_e.pdf)

## 2 SUSTAINABLE RECOVERY AMID UNCERTAINTY<sup>51</sup>

### 2.1 APEC GDP GROWTH

Following an economic contraction in 2020 due to the pandemic, the APEC region rebounded, achieving 5.9 percent growth in 2021 (Figure 2.1), reflecting stronger economic activity as borders and businesses reopen while vaccine uptake increased. However, the emergence of the more contagious Omicron variant toward the second half of 2021 prompted the re-imposition of movement restrictions and area lockdowns in some economies, slowing down economic activity. Overall, household consumption and investments reversed to positive territory even as government spending went up anew, with the outlay largely focused on supporting lives and livelihoods as well as managing the pandemic (Figure 2.2).

Figure 2.1 Real GDP growth (%), 2020 and 2021



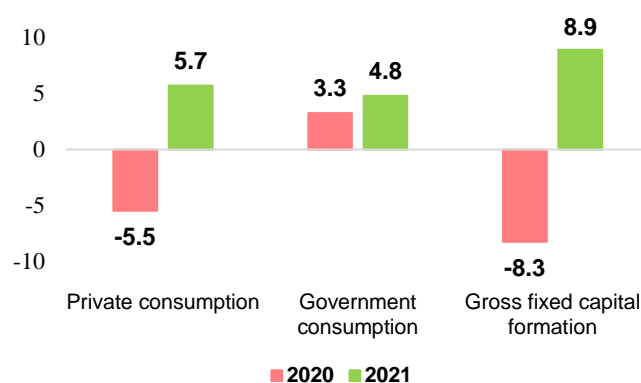
Note: 2021 GDP for Brunei Darussalam is preliminary.

Source: Member-economy sources; International Monetary Fund (IMF) World Economic Outlook (April 2022); APEC Policy Support Unit (PSU) staff calculations.

<sup>51</sup> Prepared by Rhea Crisologo Hernando, APEC Policy Support Unit (PSU). This chapter includes all data and information available as of 5 May 2022.



**Figure 2.2 Growth in consumption and investments (%), 2020 and 2021**



Note: Data on consumption and investments are not available for China and Papua New Guinea.

Source: Member-economy sources; APEC PSU staff calculations.

## 2.2 INFLATION AND MONETARY POLICY

Pent-up demand and accumulated savings supported household spending, which in turn contributed partly to higher prices. The other half of the story of rising inflation comes from supply-side shocks due to stricter health protocols, mobility restrictions and re-imposition of local lockdowns to curb the spread of the Omicron variant, affecting major manufacturing hubs and shipping ports. Worker shortages, insufficient production inputs, longer delivery times as well as higher storage and shipping costs combined with strong pick-up in demand resulted in a surge in inflation.

The upward trend in global inflation is likewise reflected in APEC's inflation, which averaged 3.0 percent in 2021, double the average inflation in 2020 at 1.5 percent (Figure 2.3).

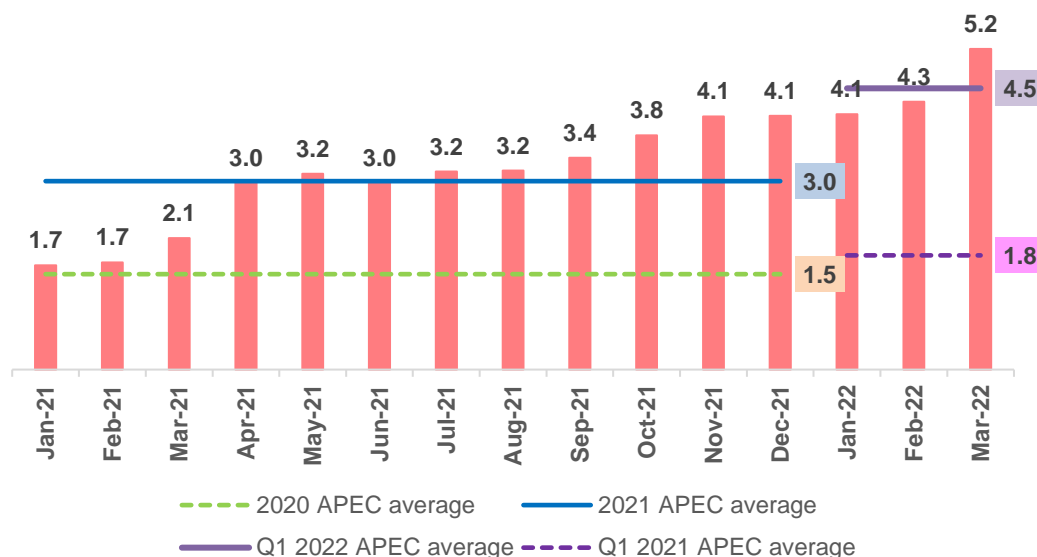
Inflation is expected to remain elevated for longer due to worsening supply disruptions from the war in Ukraine. So far, APEC's inflation has sharply increased, averaging 4.5 percent for the period January–March 2022 compared to 1.8 percent in Q1 2021. Rising inflation, particularly of food prices, could push more people into extreme poverty, and this significantly diminished standard of living could last well beyond the end of the conflict (See Box 2.1).

In response to persistently higher inflation, monetary authorities in the APEC region signalled their readiness to deploy tools at their disposal to rein in inflation. As of 5 May 2022, 10 of the 18 APEC economies that use interest rates as their main monetary policy lever decided to raise their benchmark rates from the end-2021 level.

In its 14 April 2022 meeting, the Monetary Authority of Singapore tightened anew its monetary policy stance by raising slightly the rate of appreciation of the exchange rate policy band and re-centring the mid-point of the band at the prevailing level of the S\$NEER. This followed a pre-emptive meeting on 25 January 2022 when the Monetary Authority of Singapore increased slightly the rate of appreciation of the S\$NEER policy band.

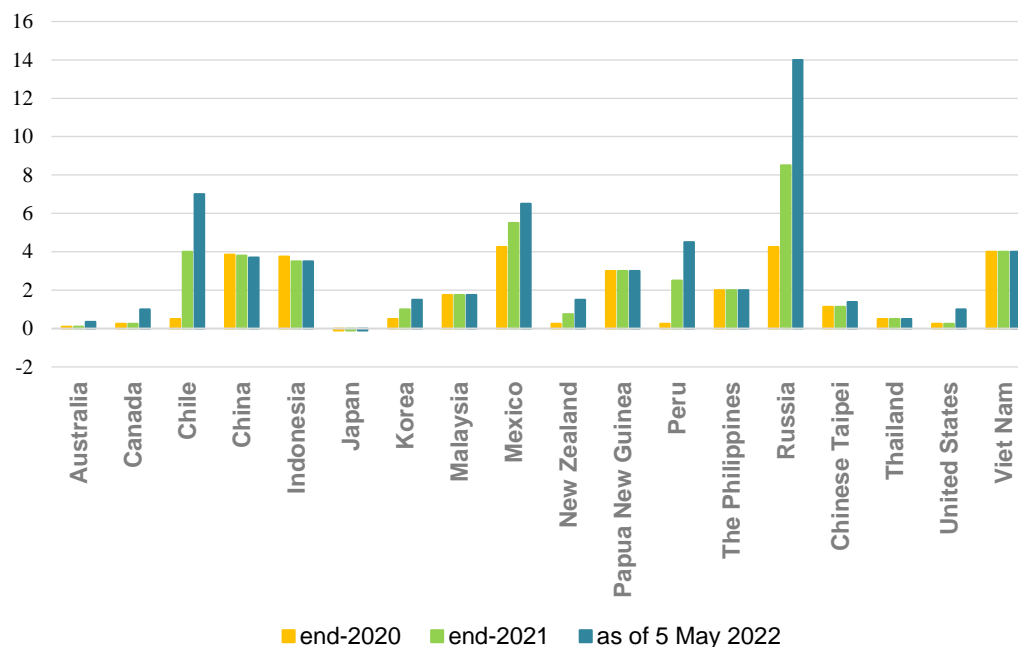
On the other hand, the US Federal Open Market Committee (FOMC), in its 3–4 May 2022 meeting, raised the target range for the federal funds rate by 0.5 percent. At the same time, the US FOMC signalled a gradual withdrawal of quantitative easing measures with a reduction in its purchases of Treasury securities as well as agency debt and agency mortgage-backed securities starting on 1 June 2022.

**Figure 2.3 Inflation rate (%), 2020 and 2021**



Source: Member-economy sources; APEC PSU staff calculations.

**Figure 2.4 Monetary policy rate (%), end-2020, end-2021 and as of 5 May 2022**



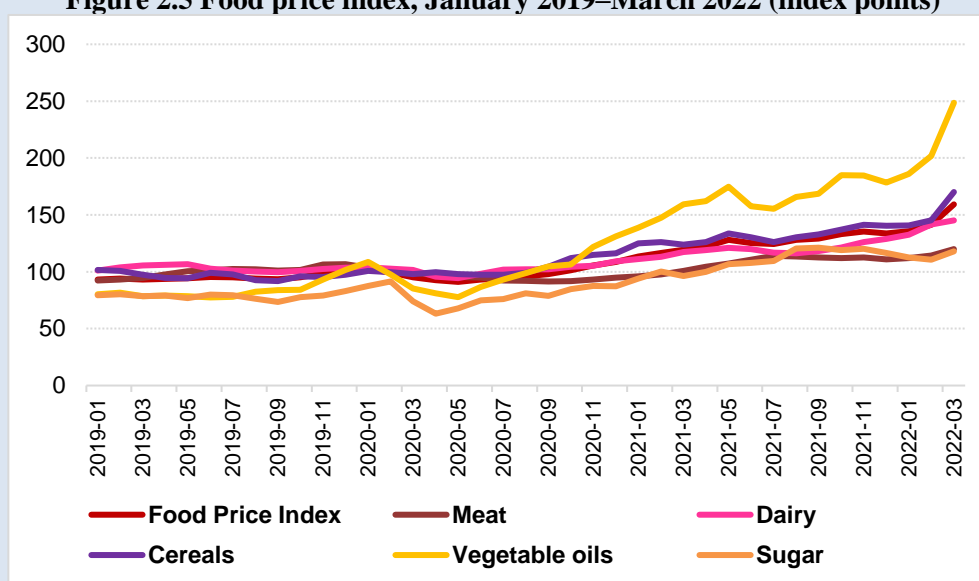
Note: The monetary policy framework in Brunei Darussalam is based on a currency board system, with the Brunei dollar anchored to the Singapore dollar at par. Hong Kong, China maintains a currency board system pegged against the US dollar. For Singapore, monetary policy is conducted through the trade-weighted exchange rate, which is allowed to fluctuate within a policy band. The operating targets for the S\$NEER are expressed in the level, slope and width of the policy band which determine the direction of monetary policy.

### Box 2.1 The consequences of conflicts: Inflation and poverty

An estimated 100 million more people have become poor in 2020 because of the COVID-19 pandemic. Climate change is seen to push around 68 to 132 million more people into poverty by 2030.<sup>a</sup> Aggravating these factors are inflation and conflicts, which could result in around 75 to 95 million more people living in extreme poverty in 2022 alone.<sup>b</sup>

Data from the Food and Agriculture Organization of the United Nations (FAO) show that, after years of generally benign changes in food prices, the average FAO food price index (FPI) jumped by 12.6 percent in March 2022 from the previous month's level, to 159.3 index points (Figure 2.5).

Figure 2.5 Food price index, January 2019–March 2022 (index points)



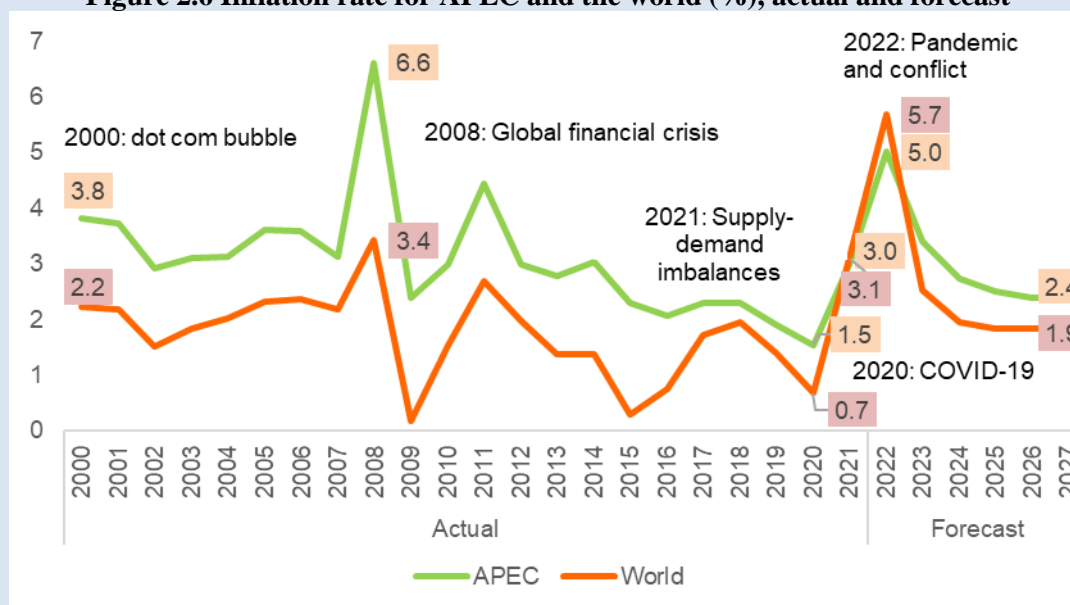
Source: Food and Agriculture Organization of the United Nations (FAO).

Vegetable oils rose sharply, by 23.2 percent, during the same period due to higher sunflower, palm, soy and rapeseed oil prices. In particular, price quotations for sunflower seed oil went up considerably as international markets factored in uncertainty in export supply amid the ongoing conflict in Ukraine. The price index for cereals also increased by 17.1 percent in March 2022 as world prices of wheat and coarse grains went up due to supply disruptions from the conflict; Russia and Ukraine together account for 30 percent of global wheat supply, and a smaller proportion of corn production.

Rising food prices, exacerbated by armed conflict that disrupts production and limits food supply, affect everyone around the world. However, poor households are likely to suffer significantly because they typically spend around two-thirds of their income on food. An increase in food prices could translate into more people living in poverty. A recent study by the World Bank shows that a 1 percent increase in food prices could mean almost 10 million additional poor while a 3–5 percent increase could push 15–18 million more people into extreme poverty.<sup>c</sup>

A further rise in inflation is expected in 2022, averaging 5.0 percent in the APEC region and 5.7 percent globally. Supply-side bottlenecks from the ongoing pandemic coupled with production disruptions due to the armed conflict are expected to generate broad-based inflationary pressures that will lead to higher inflation this year. This compares with the 6.6 percent inflation rate in APEC recorded at the height of the global financial crisis (Figure 2.6). The upward price pressures from supply-side disruptions are expected to linger until 2023 before tapering to 2.4 percent and 1.9 percent for APEC and the world, respectively, in the medium term, barring any shocks.

**Figure 2.6 Inflation rate for APEC and the world (%), actual and forecast**



Source: Member-economy sources; IMF World Economic Outlook (April 2022); APEC PSU staff calculations.

Aside from rising inflation, other ways that conflicts contribute to poverty are through loss of property such as house and land; forced displacement leading to loss of employment, income and living standards; loss of access to social services such as education and health; and loss of social networks and financial linkages, including access to credit and assets.

A recent report by the World Bank reveals that people living in an economy under chronic fragility and conflict is 10 times more likely to be poor than those who have not faced conflict or fragility in the past 20 years. In fact, the poverty rates for economies in conflict situations have been stuck at over 40 percent in the past 10 years, while those that have overcome these situations have seen their poverty rates reduced by more than half.<sup>d</sup> Another study shows that conflicts are strongly associated with diminished education and living standards, and that most conflict-ridden economies and regions would have poverty rates that are 5–10 percentage points lower without conflict.<sup>e</sup>

These findings are corroborated by earlier, economy-specific studies. In Rwanda, the destruction of a house during the 1990–1996 period due to violence resulted in a 62 percent reduction in average incomes and a significantly lower probability of escaping poverty.<sup>f</sup> Evidence from Burundi suggests that exposure to violence could have long-lasting negative impacts. i.e., households exposed to war saw their welfare diminished as opposed to those who did not experience violence, with the difference between the two groups predicted to remain significant for at least 12 years post-conflict.<sup>g</sup>

Those exposed to violence and conflicts suffer significantly even beyond the end of the conflict. In today's more integrated and connected world, the negative impacts of conflicts are more widespread and immediate. And, the aftermath of conflicts, particularly significant setbacks to human capital development in terms of education, nutrition, health and social development, has proven that there are no winners in war.

Source:

<sup>a</sup> World Bank, "Poverty: Overview," updated 26 April 2022, <https://www.worldbank.org/en/topic/poverty/overview#1>

<sup>b</sup> D.G. Mahler et al., "Pandemic, Prices, and Poverty," World Bank Blogs, 13 April 2022, <https://blogs.worldbank.org/opendata/pandemic-prices-and-poverty>

<sup>c</sup> Mahler et al., "Pandemic, Prices, and Poverty."

<sup>d</sup> P. Corral et al., "Fragility and Conflict: On the Front Lines of the Fight against Poverty" (Washington, DC: World Bank, 2020).

<sup>e</sup> H. Mueller and Chanon Techasunthornwat, "Conflict and Poverty" (Policy Research Working Paper 9455, World Bank, 2020).

<sup>f</sup> P. Justino and P. Verwimp, "Poverty Dynamics, Violent Conflict and Convergence in Rwanda" (Research Working Paper 4, Brighton: MICROCON, 2008).

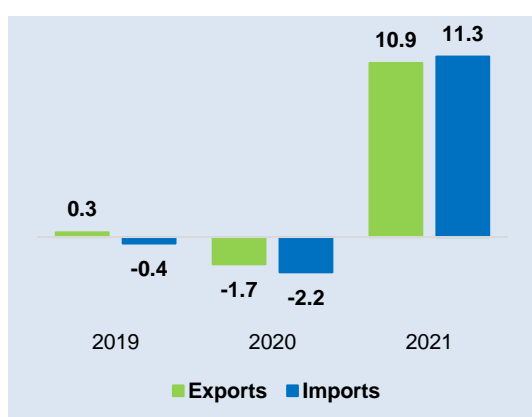
<sup>g</sup> M. Mercier, R.L. Ngenzebuke and P. Verwimp, "Violence Exposure and Welfare over Time: Evidence from the Burundi Civil War," (Working Papers 198 updated, Households in Conflict Network, 2016).

## 2.3 TRADE PERFORMANCE

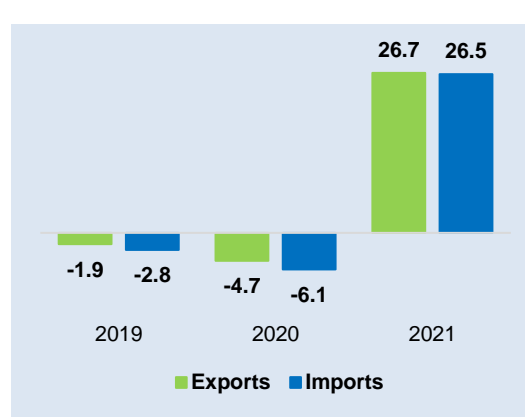
Trade activity in the APEC region accelerated in 2021, growing by double digits from pre-pandemic levels. The volume of merchandise trade grew by 10.9 percent for exports and 11.3 percent for imports in 2021 compared to the level in 2020 (Figure 2.7). Similarly, the value of merchandise exports and imports showed a significant turnaround in 2021, expanding by almost 27 percent from the year-ago level (Figure 2.8).

The strong performance of trade-in-goods, both in APEC and the rest of the world, reflected the surge in demand and in part, higher commodity prices, particularly energy. Trade increased across all economic sectors, except transport and telecommunications equipment where a global shortage in semiconductors held back growth.

**Figure 2.7 Growth in the volume of merchandise trade (y-o-y, %)**



**Figure 2.8 Growth in the value of merchandise trade (y-o-y, %)**



Source: World Trade Organization (WTO); APEC PSU staff calculations.

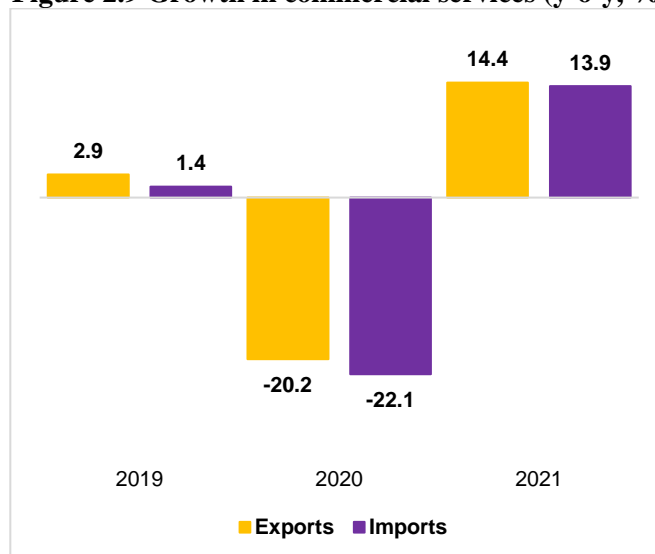
**Table 2.1 Value and growth in merchandise trade, 2020 and 2021**

	Value (in billion USD)		Growth (y-o-y, in %)	
	2020	2021	2020	2021
<b>Merchandise Exports</b>				
World	17645	22284	-7.2	26.3
APEC	8966	11364	-4.7	26.7
Rest of the World (ROW)	8679	10919	-9.6	25.8
<b>Merchandise Imports</b>				
World	17872	22519	-7.5	26.0
APEC	9055	11457	-6.1	26.5
ROW	8817	11062	-8.9	25.5
<b>APEC's Share of the World (%)</b>				
Merchandise Exports	50.8	51.0		
Merchandise Imports	50.7	50.9		

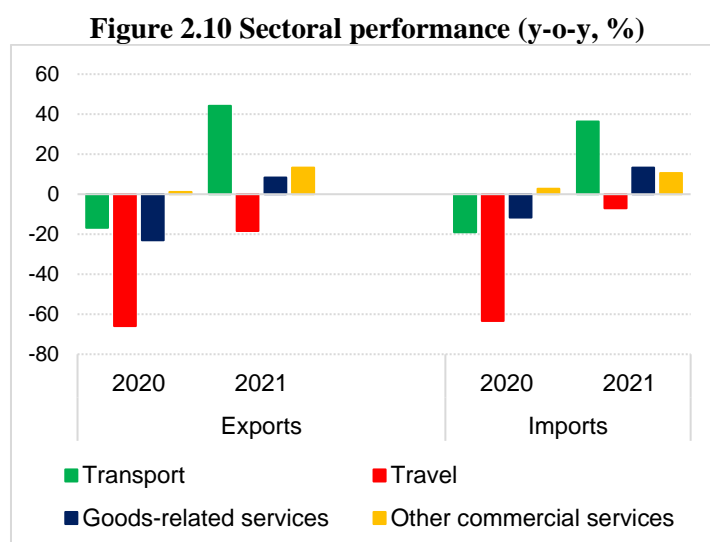
Source: WTO.

The value of APEC merchandise exports and imports in 2021 reached over USD 11 trillion, representing 51 percent of total world trade (Table 2.1). While global trade rose substantially in 2021, merchandise trade growth in the APEC region outpaced the rest of the world.

Commercial services also reverted to positive territory in 2021, with exports and imports growing by 14.4 percent and 13.9 percent, respectively, from the deep contraction in 2020 and above 2019 pre-pandemic levels (Figure 2.9). Growth was propelled by strong consumer demand and the record-high expansion in transport services, in turn due largely to higher shipping costs as disruptions hit global supply chains. Goods-related and other commercial services also contributed double-digit growth in 2021. However, travel services continue to be a drag, although substantially less contractionary in 2021 compared to the 65 percent plunge seen in 2020 (Figure 2.10).

**Figure 2.9 Growth in commercial services (y-o-y, %)**

Source: WTO.



Source: WTO.

Comparisons with the rest of the world reveal that commercial services in the APEC region grew at a relatively weaker pace (Table 2.2). This could be due to several factors, including the re-imposition of lockdowns and border controls in the second half of 2021 in some APEC economies amid increased caseloads from the Omicron variant.

**Table 2.2 Value and growth in commercial services, 2020 and 2021**

	Value (in billion USD)		Growth (y-o-y, in %)	
	2020	2021	2020	2021
<b>Commercial Services Exports</b>				
World	5086	5942	-18.0	16.8
APEC	1860	2127	-20.2	14.4
Rest of the World (ROW)	3227	3815	-16.6	18.2
<b>Merchandise Imports</b>				
World	4807	5479	-19.0	14.0
APEC	1803	2054	-22.1	13.9
ROW	3004	3425	-17.0	14.0
<b>APEC's Share of the World (%)</b>				
Merchandise Exports	36.6	35.8		
Merchandise Imports	37.5	37.5		

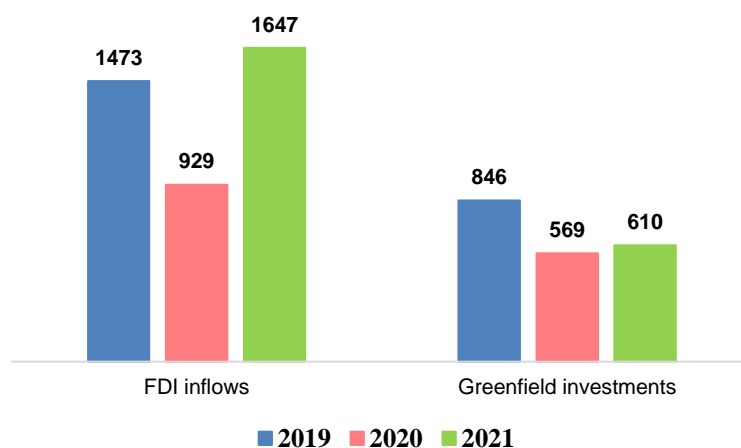
Source: WTO.

## 2.4 INVESTMENT TRENDS

Preliminary data on global foreign direct investment (FDI) show that it recovered strongly in 2021 to USD 1.6 trillion, equivalent to a 77.3 percent increase from the exceptionally low level in 2020 and higher by 11.8 percent compared to the 2019 level (Figure 2.11). However, recovery is uneven, with year-on-year growth in developed economies at 199 percent but only at 30 percent among developing economies, even as the least developed economies recorded a modest growth of 19 percent.

Crucially, the value of announced greenfield investments has not returned to its pre-pandemic levels; it is still around 30 percent lower than the 2019 level. Investor confidence in industry and global value chains (GVCs) has also remained weak, with new projects in GVC-intensive industries declining further.

**Figure 2.11 Global FDI and greenfield investments (USD billion), 2019, 2020 and 2021**



Note: Figures are preliminary.

Source: United Nations Conference on Trade and Development (UNCTAD) Investment Trends Monitor (January 2022).

## 2.5 TRADE AND INVESTMENT MEASURES

A recent report on trade and trade-related measures reveal that trade-facilitating measures have outnumbered trade-restrictive measures since the start of US–China trade tensions in mid-2018 (Figure 2.12). In aggregate, APEC economies implemented 80 measures that facilitated trade, dominated by the termination of anti-dumping investigations and reduction/elimination of export duties and import tariffs (Table 2.3). Measures that restrict trade were also deployed, mostly on initiation/resumption of anti-dumping investigations.<sup>52</sup>

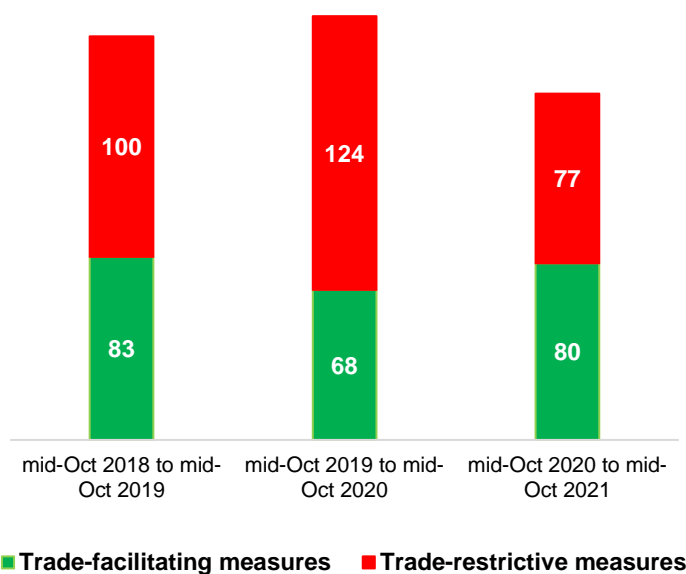
For the period mid-May 2021 to end-September 2021, there were only eight investment policy measures implemented by five APEC economies who are also G20 members.<sup>53</sup> These measures focused on foreign exchange reserve requirements, reclassification of certain foreign investments and national security.<sup>54</sup>

<sup>52</sup> For a complete and detailed listing of trade and trade-related measures implemented during the period mid-October 2020 to mid-October 2021, see Annex 1: [https://www.apec.org/docs/default-source/publications/2022/4/apec-regional-trends-analysis-may-2022/annex-1\\_trade-and-trade-related-measures\\_-mid-oct-2020-to-mid-oct-2021.docx?sfvrsn=d8d9e930\\_2](https://www.apec.org/docs/default-source/publications/2022/4/apec-regional-trends-analysis-may-2022/annex-1_trade-and-trade-related-measures_-mid-oct-2020-to-mid-oct-2021.docx?sfvrsn=d8d9e930_2)

<sup>53</sup> Australia; Canada; China; Indonesia; Japan; Korea; Mexico; Russia; and the United States.

<sup>54</sup> For a complete and detailed listing of investment measures implemented during the period mid-May 2021 to end-September 2021, see Annex 2: [https://www.apec.org/docs/default-source/publications/2022/4/apec-regional-trends-analysis-may-2022/annex-2\\_investment-measures\\_-mid-may-2021-to-end-sep-2021.docx?sfvrsn=5355b4f0\\_2](https://www.apec.org/docs/default-source/publications/2022/4/apec-regional-trends-analysis-may-2022/annex-2_investment-measures_-mid-may-2021-to-end-sep-2021.docx?sfvrsn=5355b4f0_2)



**Figure 2.12 Trade and trade-related measures in APEC (actual number), 2018–2021**

Source: WTO, “Overview of Developments in the International Trading Environment, Annual Report by the Director General,” various years.

**Table 2.3 Trade and trade-related measures in APEC, mid-October 2020 to mid-October 2021**

	Number of Measures
<b>Trade-restrictive measures</b>	
Initiation/Resumption of anti-dumping investigation	44
Initiation/Imposition of countervailing investigation/duties	13
Initiation/Imposition of safeguard investigation/measures	2
Increase/Imposition of import tariffs, export duties, levy rates and taxes	5
Reduction/Elimination of tax rebates	0
Imposition of export/import requirements, quotas, bans and other restrictions	13
<b>Sub-total: Trade-restrictive measures</b>	<b>77</b>
<b>Trade-facilitating measures</b>	
Termination/Suspension of anti-dumping investigation/duties	37
Termination of countervailing investigation/duties	7
Termination of safeguard investigation/duties	8
Reduction/elimination of export duties/import tariffs and taxes	23
Elimination of import/export ban, quotas, relaxation of requirements and other restrictions	5
<b>Sub-total: Trade-facilitating measures</b>	<b>80</b>
<b>Total: Trade and trade-related measures</b>	<b>157</b>

Source: WTO, “Overview of Developments in the International Trading Environment, Annual Report by the Director General,” 22 November 2021.

## 2.6 NEAR-TERM OUTLOOK, RISKS AND OPPORTUNITIES

Economic recovery, which was already fragile to begin with, faltered toward the second half of 2021 with the emergence of the highly contagious Omicron variant. The resurgence of infections prompted some economies to re-impose area lockdowns and movement restrictions, affecting major manufacturing hubs, congesting shipping lanes and ports, and leading to shortages of both workers and production inputs. Global supply chains were significantly disrupted, generating supply–demand imbalances and inflationary pressures that led to higher food and energy prices.

Addressing the negative impact of the pandemic on lives and livelihoods, while at the same time containing inflation, has been made more difficult by the war in Ukraine. Supply conditions have turned for the worse, particularly hitting fuel and food products such as sunflower oil, wheat, corn and barley. Along with sharply rising inflation levels, the conflict and the associated economic sanctions are expected to adversely affect trade and financial linkages.

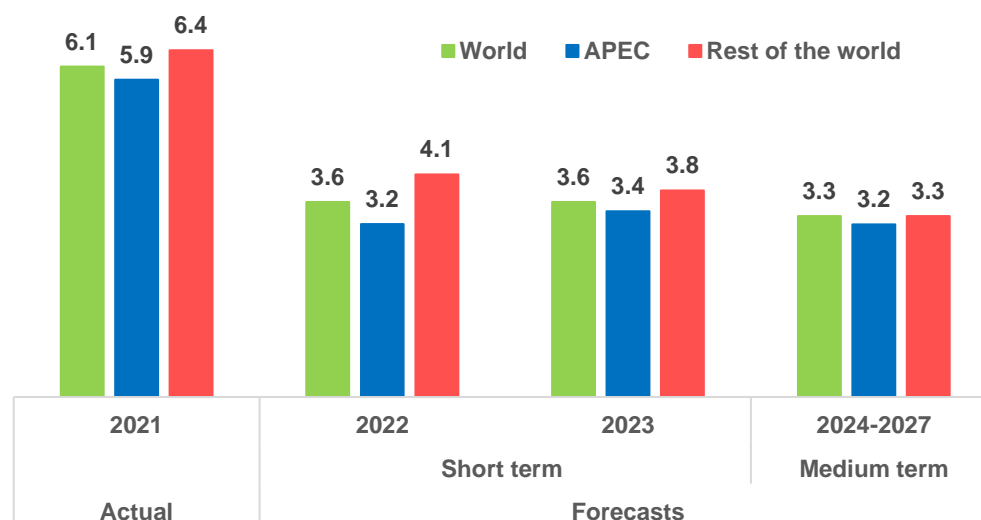
Higher interest rates to rein in inflation could also trigger a flight to quality in relation to capital flows, leading to increased financial market volatility and currency depreciations that could particularly impact emerging-market and developing economies. Moreover, higher government debt from the massive spending amid the pandemic means a narrowing fiscal space; and a withdrawal of fiscal support measures such as cash transfers and wide-ranging subsidies could push more people into poverty, raising the risk of social unrest.

Other risks could emanate from a moderating of China’s economy, which could weigh on the growth of its trade and investment partners. Climate change, if left unmitigated, will continue to affect people’s health and livelihoods, with significant ramifications on environmental and economic sustainability.

Moreover, the ongoing pandemic remains a threat to economic recovery and stability. The COVID-19 virus continues to mutate; the emergence of highly transmissible variants could compel another round of border control measures or local lockdowns that could send economies back into restart mode.

Factoring in rising risks and substantial uncertainty led to the downgrade of GDP projections for the near and medium term. The APEC region is expected to slow down considerably, with GDP growth of 3.2 percent in 2022 and 3.4 percent in 2023. The GDP forecast for 2022 represents a full percentage point reduction from the earlier forecast in the February 2022 APEC Regional Trends Analysis (ARTA), while the 2023 forecast has been revised downwards by 0.4 percentage point (Figure 2.13).

The APEC region is seen to grow at a weaker pace in the short-term period compared to the rest of the world, albeit following the same declining trend. The medium-term horizon paints the same slower growth for APEC and the global economy as uncertainty abounds.

**Figure 2.13 GDP growth (actual, 2021) and projections (2022–2027) (%)**

Source: Member-economy sources; IMF World Economic Outlook (April 2022); APEC PSU staff calculations.

Reflecting the gloomy economic prospects, the WTO cut its forecast for growth in the volume of world merchandise trade to 3.0 percent in 2022 (from 4.7 percent); while projecting a 3.4 percent growth in 2023.<sup>55</sup> The IMF also reduced its forecasts for growth in the volume of world trade in goods and services to 5.0 percent in 2022 (from 6.7 percent) and 4.4 percent in 2023 (from 4.5 percent).<sup>56</sup>

## 2.7 CONCLUSION: MOVING TOWARD SUSTAINABLE RECOVERY IN APEC

At the onset of the pandemic in 2020, APEC acted swiftly, drawing on its strength as a multilateral economic and trade forum to ensure that the region boosts its resilience to pandemics, shocks, crises and other emergencies by fostering sustainable and inclusive growth. This strategy, interlinked with trade and investment, and innovation and digitalisation, is an integral economic driver under the Putrajaya Vision 2040 adopted by all 21 APEC member economies.

Since then, the APEC region has confronted crisis upon crisis so that it remains important to stay the course of sustainable and inclusive growth by implementing the Putrajaya Vision through the Aotearoa Plan of Action (APA).<sup>57</sup> The APA sets out individual and collective actions with corresponding progress evaluation metrics to guide the APEC region toward achieving the APEC vision of ‘an open, dynamic, resilient and peaceful Asia-Pacific community by 2040, for the prosperity of all people and future generations’.

Pandemic-related restrictions have given rise to losses and opportunities. The closure of businesses and borders as consumers hunkered down has resulted in job and income losses,

<sup>55</sup> See: WTO, Press Release 902, 12 April 2022, [https://www.wto.org/english/news\\_e/pres22\\_e/pr902\\_e.htm](https://www.wto.org/english/news_e/pres22_e/pr902_e.htm)

<sup>56</sup> IMF, “World Economic Outlook: War Sets Back the Global Recovery,” (Washington, DC: IMF, April 2022).

<sup>57</sup> The full Aotearoa Plan of Action can be accessed at: <http://aotearoaplanofaction.apec.org/index.html>

particularly affecting micro, small and medium enterprises (MSMEs) and women who are likely to have customer-facing jobs as well as disadvantaged groups, including those in the informal sector who do not have health and unemployment insurance. Moreover, scarring effects are likely to affect human capital development due to setbacks in education, skills training and health.

Parallel to these losses are the opportunities that have sprouted, mainly through digitalisation. However, the shift to digitalisation requires digital skills to be able to participate in a fast-changing, technologically powered economy.

APEC is cognisant that, to take advantage of these opportunities and bring palpable benefits to all would necessitate implementing inclusive policies; advancing gender equality and women's economic empowerment; supporting MSMEs' access to finance, global markets and GVCs; and further deepening its work on other groups with untapped economic potential, including indigenous groups, people with disabilities and those living in remote and rural communities.

A key component of inclusive policies is accelerating human resource development by equipping people in the region with the updated skills and knowledge to be able to thrive in a world characterised by rapid technological change. Toward this end, the region is poised to implement APEC's Education Strategy and the APEC Framework on Human Resources Development in the Digital Age. Complementing these efforts is APEC's commitment to improve data collection and analysis of skills vis-à-vis the labour market. This is geared toward better assessment of mismatches to be able to bridge gaps between skills and available employment. At the same time, APEC is building on its existing work on mutual recognition of qualifications to deepen and widen its coverage, contributing to a smoother cross-border movement of people and skills.

It is also notable that APEC recognises that growth and prosperity need to be attained through environmentally sustainable approaches. APEC economies are expected to implement environment-related policies consistent with their international obligations and meeting APEC goals. Some of these important environment goals are to accelerate progress toward doubling the share of renewable energy in the APEC energy mix by 2030 (from 2010 levels), including in power generation; and to deliver a plan to reduce aggregate energy intensity by 45 percent by 2035 (from 2005 levels).

Related to this, the region is also committed to advancing the APEC sustainability agenda by developing and exchanging best practice policies that address all environmental challenges, including climate change; promoting economic policies that lead to concrete action to meet the goals of multilateral environmental agreements; and integrating the Bio-Circular-Green (BCG) model into the region's economic approaches to complement global efforts.<sup>58</sup>

Food security forms a vital part of APEC's sustainable growth agenda. This is timely amid rising food prices as supply shocks continue to exert inflationary pressures, aggravated by conflicts that limit food production. The APEC Food Security Roadmap Towards 2030 leverages public-private partnership to bring about digitalised and innovative economies that contribute to achieving food security in the region. Specifically, the strategy leans on

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<sup>58</sup> APEC 2022 Thailand, "Balance in All Aspects", <https://www.apec2022.go.th/balance-in-all-aspects>

digital and innovative approaches to increase productivity and efficiency; minimise food loss and waste; mitigate and adapt to climate change; and reduce costs and facilitate food trade.

Alongside the pursuit of sustainable approaches toward recovery, APEC is mindful that, in the immediate period, the priority remains on ensuring that the region's people are healthy so that economies can recover, reopen and rebuild. Central to this is the crucial role of trade facilitation to ensure the free and rapid flow of vaccines, therapeutics and related medical supplies across borders. In view of this, member economies are encouraged to uphold the Declaration on Facilitating the Movement of Essential Goods, the Statement on COVID-19 Vaccine Supply Chains and the Statement on Services to Support the Movement of Essential Goods.

Moreover, the resumption of cross-border activity remains paramount, to strengthen the region's connectivity, while at the same time, re-energise travel and tourism to support economic growth. This is the goal of the establishment of the Safe Passage Taskforce, a voluntary, non-binding group within APEC, specifically to coordinate members' efforts to come up with practical solutions to enable safe and seamless travel to resume while also remaining vigilant against the spread of COVID-19.

Amid intensified uncertainty brought about by the multiple challenges of high inflation, high interest rates and high debt, the negative repercussions of which could spill over into the medium term, APEC is steadfast on its goal of sustainable and inclusive economic growth. The challenge is to translate these aspirations and roadmaps into concrete actions and tangible benefits for all people living in the region.

## APPENDIX

### Appendix A. Classification of essential goods

Type	HS2017 2-digit and/or 4-digit codes	Examples of products
<b>Food*</b>	Chapters 01-22 (all)	Fruit and vegetables, dairy products, meat, fish, beverages, cereals, nuts, sugars, oils and fats, coffee, food preparations
<b>Agricultural products</b>	Chapters 23, 31 (all) 3501, 4416, 4819, 7309, 7611, 8701	Food industry residues, animal fodder, fertilisers Casein, casks, barrels, vats, metal tanks, tractors, food packaging
<b>Chemicals</b>	2501 2801, 2804, 2806, 2811, 2815, 2827, 2828 2833 2835, 2836, 2837, 2839, 2843, 2844, 2847, 2853, 2905, 2907, 2911, 2915, 2916, 2918, 2920, 2921, 2922, 2923, 2924, 2925, 2932, 2933, 2934, 2935, 2936, 2937, 2939, 2940, 2941, 2942, 3808	Salt/sodium chloride Chlorine, medical oxygen, inorganic acids Provitamins, antibiotics, phenol-alcohols, hormones, sugar salts Hand sanitiser (alcohol-based)
<b>Medicines and medical supplies</b>	3001, 3002, 3003, 3004, 3005, 3006 3401, 3402, 3403 3701, 3702, 3802, 3821, 3822, 3906, 3907, 3914, 3917, 3918, 3919, 3920, 3921, 3922, 3923, 3926 4001, 4009, 4015, 4803, 4818, 5503, 5601, 5602, 5603, 5607	Pharmaceutical products, vaccines, COVID-19 test kits, antiseptic, wadding, gauze, plasters Soap, handwashes, lubricants X-ray plates, swabs, hazardous waste disposal bags, plastic face shields & gloves Rubber gloves & protective garments Paper facemasks, disposable paper hospital gowns, paper shoe covers, wadding, cables
<b>Personal protective equipment (PPE)</b>	5806, 5903, 5906, 5911 6113, 6115, 6116, 6210, 6216, 6217 6307, 6401, 6402, 6505, 6506 9004, 9020	Plastic/laminated and rubber textile fabrics, gloves covered with plastics/rubber, protective garments for surgical/medical use Facemasks, disposable hairnets, waterproof rubber shoes Protective goggles, gasmasks with filters

\* Most food products are not included in our calculations of trade costs for essential goods because the UNIDO output dataset only covers the manufacturing sector (ISIC rev. 3 section D).  
Source: APEC, “Non-tariff Measures (NTMs) on Essential Goods during COVID-19 in the APEC Region” (Singapore: APEC, 2021), [https://www.apec.org/docs/default-source/publications/2021/4/non-tariff-measures-on-essential-goods-during-covid-19-in-the-apec-region/221\\_cti-ntms-on-essential-goods-during-covid-19.pdf?sfvrsn=afa67fb1\\_1](https://www.apec.org/docs/default-source/publications/2021/4/non-tariff-measures-on-essential-goods-during-covid-19-in-the-apec-region/221_cti-ntms-on-essential-goods-during-covid-19.pdf?sfvrsn=afa67fb1_1)

## Appendix B. Measuring trade costs

Trade costs are calculated using the following formula:<sup>59</sup>

$$\tau_{ij} = \left( \frac{t_{ij}t_{ji}}{t_{ii}t_{jj}} \right)^{\frac{1}{2}} - 1 = \left( \frac{x_{ii}x_{jj}}{x_{ij}x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} - 1$$

Where:

- $\tau_{ij}$  denotes trade costs between economy  $i$  and economy  $j$ ;
- $t_{ij}$  denotes international trade costs from economy  $i$  to economy  $j$ ;
- $t_{ji}$  denotes international trade costs from economy  $j$  to economy  $i$ ;
- $t_{ii}$  denotes intranational trade costs of economy  $i$ ;
- $t_{jj}$  denotes intranational trade costs of economy  $j$ ;
- $x_{ij}$  denotes international trade flows from economy  $i$  to economy  $j$ ;
- $x_{ji}$  denotes international trade flows from economy  $j$  to economy  $i$ ;
- $x_{ii}$  denotes intranational trade of economy  $i$ ;
- $x_{jj}$  denotes intranational trade of economy  $j$ ;
- $\sigma$  denotes elasticity of substitution (set at  $\sigma = 8$ ).

The calculations in this paper use export data. Group aggregates are calculated as simple averages of bilateral trade costs.

Bilateral trade costs are expressed as a tariff equivalent measure. In general, several choices of data will affect the results of the calculation. Using GDP data will tend to yield higher values compared with using statistics on gross outputs, as GDP data contain services components. Different estimates of ‘elasticity of substitution’ will also affect the results.

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<sup>59</sup> D. Jacks, C.M. Meissner, and D. Novy, “Trade Booms, Trade Busts, and Trade Costs,” *Journal of International Economics* 83, no. 2 (2011): 185–201; Y. Duval and C. Utoktham, “Intraregional Trade Costs in Asia: A Primer,” *Asia-Pacific Development Journal* 18, no. 2 (2011): 1–23.

### Appendix C. Properties of trade networks, selected essential goods

	2000	2018	2020
<b>Medical equipment</b>			
Nodes	222	227	226
Arcs	13,755	20,757	19,261
Density	0.28	0.40	0.38
Import (in-degree) centralisation	0.50	0.54	0.54
Export (out-degree) centralisation	0.68	0.56	0.59
Trade value (USD thousands)	570,119,168	1,680,690,304	1,537,981,824
<b>PPE</b>			
Nodes	222	226	226
Arcs	10,192	15,544	15,228
Density	0.21	0.31	0.30
Import (in-degree) centralisation	0.46	0.53	0.55
Export (out-degree) centralisation	0.68	0.62	0.63
Trade value (USD thousands)	45,116,756	130,621,400	194,875,376
<b>Medical supplies</b>			
Nodes	222	226	226
Arcs	14,004	20,296	18,994
Density	0.29	0.40	0.37
Import (in-degree) centralisation	0.46	0.50	0.54
Export (out-degree) centralisation	0.66	0.57	0.58
Trade value (USD thousands)	275,041,696	1,039,849,088	1,101,964,800
<b>Chemicals</b>			
Nodes	222	227	226
Arcs	9,109	12,262	11,859
Density	0.19	0.24	0.23
Import (in-degree) centralisation	0.36	0.44	0.46
Export (out-degree) centralisation	0.69	0.65	0.65
Trade value (USD thousands)	146,504,640	394,189,184	378,793,024

PPE=personal protective equipment

Note: Nodes refer to number of economies in a network. Arcs refer to number of bilateral trade ties between economies (nodes). Degree centralisation shows the level of distribution for centrality scores: a network that is highly centralised will have a maximum score equal to 1, in which one node has the maximum possible score and the other nodes register the lowest possible scores (T.U. Grund, “Nwcommands: Network Analysis in Stata” (manuscript, 28 July 2015), <https://nwcommands.wordpress.com/tutorials-and-slides/>).

Source: CEPII-BACI data; APEC PSU staff estimates.

The data show that trade networks have significantly increased their density from 2000 to 2018 with the number of arcs (bilateral trade ties) reaching as high as 20,757 for medical equipment. Trade density dropped slightly in 2020, but export trade performance was still strong for PPE due to the pandemic.

Degree centralisation, which shows the level of distribution for centrality scores, that is, the extent to which the ties are concentrated in particular economies, can further enrich our



understanding.<sup>60</sup> While export centralisation is generally lower in 2018 and 2020, import centralisation has increased. Import centralisation scores show the number of incoming trade flows from trading partners. Thus, over the past two decades, the increase in import centralisation, combined with decreasing export centralisation, indicates the growing importance of hubs in the trade network that act as key suppliers to a wider group of economies.

The network indicators suggest that higher trade density (and thus complexity) is a necessary requirement to support the high level of trade and production for these essential goods. The increase in trade density may also have been facilitated by decreasing trade costs in the last few decades. For example, for medical supplies and PPE, trade values in 2020 have multiplied more than four times from the year 2000; and, at the same time, their trade density has increased 1.3–1.4 times.

From 2018 to 2020, only PPE shows a large increase of trade values, at almost 50 percent. Medical supplies show a slight increase (8 percent) while the largest drop happened in medical equipment (9 percent). In general, trade density measures for all categories of essential goods dropped in 2020 from 2018, albeit slightly.

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<sup>60</sup> T.U. Grund, “Nwcommands: Network Analysis in Stata” (manuscript, 28 July 2015), <https://nwcommands.wordpress.com/tutorials-and-slides/>