



**Asia-Pacific  
Economic Cooperation**

**Advancing** Free Trade  
for Asia-Pacific **Prosperity**

# **Economic Impact of Adopting Digital Trade Rules: Evidence from APEC Member Economies**

**APEC Committee on Trade and Investment**

March 2023





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Economic Cooperation**

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# Abstract

Digitalisation has transformed the way that goods and services are being supplied and procured both within economies and across the world, and digital trade is an integral component of the digital economy today. In 2017, Asia-Pacific Economic Cooperation (APEC) Leaders pledged to “work together to realise the potential of the internet and digital economy” and welcomed the adoption of the APEC Internet and Digital Economy Roadmap (AIDER).<sup>1</sup> AIDER builds on previous initiatives and sets a framework to guide APEC economies on key areas and actions needed to facilitate technological and policy exchanges among member economies and to promote innovative, inclusive and sustainable growth, as well as bridge digital divide in the region. The roadmap identifies 11 Key Focus Areas including on “Facilitation of E-commerce and Advancing Cooperation on Digital Trade”, “Enhancing trust and security in the use of ICTs” and “Promotion of Interoperability”.

As digitalisation changes the way that international trade is conducted, it is important to adopt trade rules to govern and support such trade. Increasingly, economies are including provisions aimed at enabling digital trade into trade agreements, and some economies, including APEC members, have entered agreements focused on strengthening digital collaboration. While there is broad recognition that growing digital trade could bring economic benefits to economies and the region, research on the effect of adopting digital trade rules, including e-commerce rules (hereafter referred to as “digital trade rules” or “digital trade provisions”), on economic growth has been more limited to-date. This study seeks to contribute to this body of research, including by taking a novel approach to estimate bilateral digital trade flows for APEC member economies and its largest trading partners.

The report is structured into three sections:

- **Section 1** defines digital trade and provides observations about the trends in digital trade flows over the last two decades in APEC economies. It explores the relationship between increased digital trade and economic growth for economies through an economic contribution model and systematic analysis.
- **Section 2** considers recent developments on digital trade rules in the APEC region and explores the potential impact of adopting such rules on digital trade flows and economic growth. It uses a “Digital Trade Openness Index” to approximate the extent of trade liberalisation and seeks to identify the digital trade provisions with the most observable effects on digital trade flows through a study of APEC economies.
- **Section 3** provides recommendations on how APEC policymakers can unlock the benefits of digital trade.

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<sup>1</sup> APEC (n.d.), Digital Economy Steering Group. Available at: <https://www.apec.org/groups/committee-on-trade-and-investment/digital-economy-steering-group>

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## Glossary of terms

AIDER	APEC Internet and Digital Economy Roadmap.
ASEAN	Association of Southeast Asian Nations.
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership – a Free Trade Agreement (FTA) between 11 economies: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Viet Nam.
Consumption-induced effects	Value of produced goods in all industries in the economy which are induced by additional spending by workers whose incomes increase as a result of contributing to the production of goods and services for exports.
Digital trade	Defined in Section 1.1 of the study.
Digital trade provisions (or digital trade rules)	Provisions in trade agreements, including FTAs and digital economy agreements concerning digital trade, including e-commerce.
Digitally ordered goods and services	Goods and services that are purchased but not necessarily delivered through digital means.
Digitally deliverable services	Services that can be delivered digitally (e.g., financial or administrative services) but not necessarily ordered via digital platforms or channels.
Direct effects	Change in output due to production activities undertaken by industries to produce the final goods and services exported
E-commerce	Sales or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders.
Parties	Economies that have signed an agreement, including a free trade agreement.
Factor	Input to production (e.g., financial capital, plant and equipment used in production, human capital, etc.).
Factor accumulation	Factor accumulation refers to an increase in factors used to produce goods and services in an economy, including financial capital, human capital, land and assets amongst other factors.
FTA	Free Trade Agreement.
GDP	Gross Domestic Product – the monetary or market value of all final goods and services produced and sold within the borders of a given economy in a given period of time.
Indirect effects	Change in output due to the production activities along the supply chain for the final goods and services exported.
RCEP	Regional Comprehensive Economic Partnership – an FTA between the ten member states of ASEAN and five FTA partners (Australia, China, Japan, New Zealand and Republic of Korea).
Value added	Value added reflects the value generated by producing goods and services and is measured as the value of output minus the value of intermediate consumption. It represents the income available for the contributions of labour and capital to the production process.

# Executive Summary

As digitalisation changes the way that international trade is conducted, policymakers are turning their attention to the impact it has on their economies and are recognising the need to reconsider and update the rules that govern international trade today. Increasingly, economies are including provisions aimed at strengthening digital trade in trade agreements and entering agreements focused on strengthening digital collaboration. These provisions cover various areas such as facilitating the free flow of data and provision of digital services across borders as well as protecting privacy and consumer rights in cross-border digital transactions. Policymakers and trade negotiators consider that such provisions support robust, interoperable frameworks and the flow of digital goods and services are beneficial to the growth of the digital economy in the region and overall economic development.

However, research on the effect of adopting digital trade rules on economic growth has been more limited to-date. This study seeks to contribute to this research, including by constructing a novel methodology to estimate bilateral digital trade flows for APEC member economies and their largest trading partners.<sup>2,3</sup> The aim is to support APEC policymakers in making evidence-based policy decisions when considering the design of future digital trade policies.

There is currently no generally accepted definition of digital trade – it has been interpreted broadly by some and narrowly by others. At its broadest, some policymakers consider digital trade to encompass (i) trade in goods and services such as goods sold over the Internet and e-commerce platforms and digital content such as software, books, music, films and apps as well as trade in digitally-enabled services including legal, financial, education and consultancy; (ii) electronic facilitation of trade, such as the acceptance of electronic trade documents and, possibly, the adoption of ‘regtech’ solutions as technology evolves; and (iii) the transmission of data across borders, both as a direct business activity and to support other business activities.

To support the estimation of digital trade flows, international organisations, including the Organisation for Economic Co-operation and Development (OECD), World Trade Organization (WTO), the International Monetary Fund (IMF), and the United Nations Conference on Trade and Development (UNCTAD) have led efforts to define digital trade as “all trade that is digitally ordered and/or digitally delivered.”<sup>4</sup> Aligning with this definition, this study relies on two components to approximate digital trade trends in APEC economies. Component 1 covers goods and services which are digitally ordered but not necessarily deliverable through digital means. Component 2 covers services that are digitally deliverable but not necessarily digitally ordered.

The research has uncovered nine key insights relevant to policymakers in the APEC region:

- I. **APEC intra-regional digital trade in 2018 was around USD 1.68 trillion, which is approximately 20% of APEC intra-regional trade.** APEC intra-regional digital trade comprised mainly (67%) digitally ordered goods and services (e.g., cross-border e-commerce), with digitally deliverable services (e.g., financial and insurance services) being a relatively

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<sup>2</sup> APEC's 21 member economies are Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; The Philippines; The Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; Viet Nam.

<sup>3</sup> For the analysis within this study, two estimates of APEC digital trade flows were developed based on guidelines established in the OECD-WTO-IMF Handbook. The first estimate (i.e., Component 1) covers goods and services which are digitally ordered but not necessarily deliverable through digital means. The second estimate (i.e., Component 2) covers services that are digitally deliverable but not necessarily digitally ordered. This includes services such as financial services and telecommunications services. Together, Components 1 and 2 provide a view of digital trade flows in APEC.

<sup>4</sup> An updated version of the Handbook (Version 2) is expected to be published by early 2023, jointly produced by the OECD, WTO, IMF, and UNCTAD. OECD, WTO and IMF (2019). Handbook on Measuring Digital Trade: Version 1. Available at: <https://www.oecd.org/sdd/its/Handbook-on-Measuring-Digital-Trade-Version-1.pdf>

smaller (33%) but growing component. The two largest APEC economies—China and the United States—accounted for more than 46% of APEC intra-regional digital trade.

- II. **Digital trade volumes grew faster than that of conventional trade among APEC economies in the pre-pandemic period, demonstrating the increasing importance of digital trade.** Between 2000 and 2018, intra-APEC trade of digitally deliverable services grew by a compound annual growth rate (CAGR) of 7.8%, outpacing overall intra-APEC trade in commercial services which grew at 6.3% CAGR over the same period. Trade for digitally ordered goods and services grew in a similar direction for years in which data was available, growing at 31.6% CAGR between 2016 and 2018. The share of digital trade as a proportion of conventional trade is likely to have further increased in recent years, as the COVID-19 pandemic accelerated the pace of digital adoption globally. For digitally deliverable services trade in particular, the share of digital trade within overall trade in commercial services grew from 25.5% in 2000 to 32.9% in 2018.
- III. **In 2018, APEC intra-regional digital trade contributed USD 2.1 trillion to economies in the APEC region, approximately 4.1% of regional GDP.**<sup>5</sup> Around USD 690 billion of the economic contribution was from the direct effects of production activities undertaken by industries to produce the goods and services that were exported; Over USD 790 billion was attributed to the indirect effects from the production activities of industries along their supply chain; and approximately USD 650 billion was attributed to the consumption induced effects from workers in those industries that increased their spending as their incomes rose. This economic activity supported more than 60 million jobs in the APEC region.
- IV. **Digital trade contributes to economic growth for APEC economies by attracting increased investment, facilitating greater market access and competition, and enabling productivity improvements.** Digital trade drives economic growth through similar channels to conventional trade, but has stronger effects – increasing factor accumulation and productivity, through providing access to larger export markets, enabling exporters to learn from overseas customers and foreign competition, gaining access to foreign intermediate inputs and partners, and increased competitive pressures for domestic industries. Digital trade encourages further factor accumulation as it creates new goods and services to be traded, further increases market access, and lowers informational and cost barriers for both buyers and sellers to encourage greater participation in trade. Digital trade also increases productivity by helping to increase the value-added of goods and services produced in various industries through the use of technology, by knowledge diffusion across participants of digital trade, and by promoting innovation and efficient business practices through greater competitive pressure.
- V. **The prevalence of digital trade provisions between trade pairs<sup>6</sup> in the APEC region increased significantly since 2000, but as of 2021 there was still scope to further increase coverage between APEC economies.** Based on the Digital Trade Openness Index (DTOI) that was created to approximate the coverage of digital trade provisions in APEC, coverage of key digital trade provisions between APEC economies has increased significantly over the past two decades. Despite this progress, 121 out of 210 trade pairs in APEC are still not covered by any of the 13 digital trade provisions in the DTOI in 2021, suggesting that more progress could be made to strengthen APEC's digital trade infrastructure.

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<sup>5</sup> Cross-border e-commerce market sizes (used to size digitally ordered trade) were not available for Brunei Darussalam; Chile; Malaysia, New Zealand; Papua New Guinea; Peru; Viet Nam, creating an underestimate for digitally ordered exports from other APEC economies to the above economies. Data for digitally deliverable services exports was also not available for Papua New Guinea.

<sup>6</sup> The DTOI is constructed based on the coverage of digital trade provisions between two trading economies (otherwise known as a trade pair).

- VI. **Overall, the increased coverage of digital trade provisions in the APEC region had an observable effect of increasing digital trade flows.**<sup>7</sup> The analysis found that flows of digitally deliverable services increased by 2.3% for every additional digital trade provision that came into force between two trading partners on aggregate. This translates into digital trade provisions coming into force between 2000 and 2018 adding around USD 40.1 billion or 2.9% to digitally delivered trade flows in 2018. While the aggregate level analysis did not find a significant relationship between the coverage of digital trade provisions and the flow of digitally ordered trade, the provision-level analysis revealed an impact (see insight VII).
- VII. **The adoption of specific digital trade provisions was found to increase the flows of digitally ordered and digitally deliverable trade by between 11% and 44% in successive years.** Individual provisions that demonstrated a positive significant impact on digital trade flows, either digitally ordered or digitally deliverable, could increase the flows of digital trade by between 11% and 44% in successive years after adoption. A provision coming into force could increase digital trade flows in the subsequent one to two years and, for digitally deliverable trade, up to three years. For instance, taking the digital trade value for digitally deliverable services between a hypothetical trade pair as USD 100 million in 2015, an e-invoicing provision that comes into force in 2015 could potentially create an additional USD 40 million in trade value between 2016 and 2018. In 2019, the direct impact of the provision will taper off, but future growth would ride on the higher trade flows created by the adoption of the provision.
- VIII. **Robust implementation of digital trade provisions backed by capacity building efforts is critical to achieving benefits of digital trade.** The analysis reinforces that beyond concluding digital trade provisions, it is also critical for economies to focus on creating capacity for the implementation of digital trade provisions. It finds that making a digital trade provision legally binding<sup>8</sup>—which generally signifies a stronger commitment towards implementation—presently does not have an observable effect on digital trade flows, suggesting that administrations may only be entering into legally binding provisions when already confident that they have the capacity to implement them. To this end, ensuring that authorities have the capacity to implement the provisions, as well as ensuring consumers and businesses can adapt, is critical to achieving the benefits of digital trade.
- IX. **There is scope for APEC economies to improve data on digital trade flows.** There is currently a lack of data to accurately size digital trade flows, including in the APEC region. Digital trade covers a broad range of goods traded over internet and e-commerce platforms as well as digital content, the electronic facilitation of trade, and the transmission of data across borders. However, existing data on digital trade are not captured along these lines. As such, analysis relies on estimates based on breakdowns available within conventional trade statistics, as well as other data, e.g., on e-commerce. Improving the accuracy of digital trade flow data will be important for monitoring the effectiveness of digital trade provisions and other initiatives to support digital trade growth (see recommendations below).

Based on the above insights, a review of regional best practices and ongoing developments in APEC, seven recommendations under three policy pillars were identified for policymakers in APEC to harness the benefits of digital trade. The seven recommendations are consistent with the key focus areas under the APEC Internet and Digital Economy Roadmap (AIDER).

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<sup>7</sup> The analysis excluded Papua New Guinea due as data was not available for both components used to estimate digital trade and included digital trade flows with India and the EU to reflect the full benefit that digital trade provisions could have on digital exports from the APEC region.

<sup>8</sup>The categorisation between binding and non-binding commitments follows the typology developed by Abbot and Snidal, where binding commitments (or hard law) refers to legally binding obligations that are precise, whereas non-binding commitments (or soft law) are legal arrangements that are 'weakened along one or more of the dimensions of obligation, precision, and delegation'.

## Pillar 1: Support coverage and implementation of digital trade provisions

- (i) **Increase coverage of digital trade provisions between APEC member economies.** While the coverage of key digital trade provisions between APEC economies has increased significantly over the past two decades, there is further scope to strengthen APEC's digital trade infrastructure. This could be done through the participation of more economies in multilateral, regional or bilateral digital economy agreements, trade agreements with digital trade provision, or through the development of APEC guidelines or frameworks setting out principles for key issues covered under the DTOI.
- (ii) **Support implementation of provisions that encourage cross-border data flows.** Past research has demonstrated the importance of strong data flows as an enabler of digital trade; however, the provision-level analysis did not find a strong relationship between the adoption of provisions and digital trade flows. This suggests that the current formulation of provisions that prohibit data localisation or encourage cross-border data flows may not be having the intended effect. While this lack of effect could be attributed to trade pairs with such provisions in-force also having a strong level of mutual trust in each other's data protection regimes that precede the conclusion of such provisions; but could also reflect the presence of carve-outs in trade agreements specific to clauses governing data flows. To encourage more trade pairs to work towards enabling data flows and improve the effectiveness of such provisions, policymakers could explore how to strengthen the language of such provisions alongside capacity building measures to ready more economies to be well-placed to support data flows so as to encourage digital trade. To help make a case for implementation, policymakers could also consider conducting market research to better understand the impact of data localisation requirements or cross-border data flow restrictions on firms.
- (iii) **Promote interoperability as a core principle in the development of digital trade infrastructure.** The research found that provisions aimed at reducing the transaction costs for businesses at both the domestic and cross-border levels, such as provisions related to e-invoicing, domestic e-transactions frameworks, and e-authentication, largely have positive relationships with digital trade flows. This suggests that the development of interoperable standards in the advancement of digital trade infrastructure would have a positive impact on digital trade flows, and offers a lesson around the value of interoperability as a core principle for pursuing digital trade policy.

## Pillar 2: Support stakeholder confidence in digital trade environment

- (iv) **Focus on provisions to build consumer trust to improve participation of individual consumers and MSMEs in digital trade.** The findings suggest that provisions perceived to strengthen consumer protection and privacy protection for individual users and MSMEs (sometimes operating as individuals) encourage greater use of e-commerce platforms, which could increase participation in digital trade. To strengthen confidence amongst users and increase participation in digital trade among individual consumers and MSMEs, APEC policymakers could consider making consumer trust provisions an integral part of trade agreements and explore broader initiatives to build frameworks or principles to strengthen consumer trust at the bilateral, regional and multilateral level, including building on discussions towards developing an APEC Regional Consumer Protection Framework.
- (v) **Focus on cybersecurity collaboration to strengthen digital trade infrastructure in APEC.** The analysis found a significant positive relationship between the adoption of cybersecurity

provisions and flows of digitally deliverable services such as financial and business services. Given the cross-border nature of cyber threats and the role that collaboration in cybersecurity could play in driving increased confidence in digital trade, it is critical for governments to work together to develop effective responses and protections. The APEC Framework for Securing the Digital Economy provides a set of non-binding principles and recommendations to inform member economies as they develop policy and regulatory frameworks to secure their digital economies. The ASEAN-Singapore Cybersecurity Centre of Excellence (ASCCE) potentially provides a model for cybersecurity cooperation and sharing of best practices.

### Pillar 3: Support digital trade participation through capacity building and monitoring

- (vi) **Pursue programs that support consumers, businesses, and policymakers to more actively participate in contributing to a vibrant digital trade environment.** The analysis finds that beyond the crafting of trade agreements and the implementation of digital trade provisions, it is critical to focus on creating capacity for the implementation of digital trade provisions. As such, knowledge and digital skills gaps in the consumer population, businesses and public service must be addressed to harness the full benefits of digital trade. This could include (i) programs to equip the general population with adequate digital skills to access digital platforms and participate in e-commerce confidently and safely; (ii) programs to encourage the adoption of digital technologies and innovation amongst businesses, particularly MSMEs, and allow them to participate more actively in cross-border digital trade; and (iii) programs to guide public officers in shaping a robust regulatory environment that will encourage digital trade participation and implement commitments under digital trade provisions effectively.
- (vii) **Pursue initiatives to track the implementation of digital trade provisions, to support development of targeted capacity building initiatives.** The findings of the analysis highlight the need for robust implementation of digital trade provisions to support digital trade flows, backed by regional capacity building efforts for economies to ready themselves for the digital economy. To ensure that digital trade provisions in-force between APEC economies continue to be useful to enabling digital trade growth in the region, it is important for economies to work together to gather robust data on the implementation of these provisions. Importantly, insights from such data about implementation gaps would help support the development of targeted capacity building initiatives in APEC, particularly for government officials.

## 1. *What is digital trade and why is it important for APEC economies?*

This section discusses digital trade trends in APEC economies, and its potential impact on economic growth. The key insights are summarised as follows:

- **APEC intra-regional digital trade in 2018 was around USD 1.68 trillion, which is approximately 20% of APEC intra-regional trade.** APEC intra-regional digital trade comprised mainly (67%) digitally ordered goods and services (e.g., cross-border e-commerce), with digitally deliverable services (e.g., financial and insurance services) being a relatively smaller (33%) but growing component. The two largest APEC economies—China and the United States—accounted for more than 46% of APEC intra-regional digital trade.
- **Digital trade volumes grew faster than that of conventional trade among APEC economies in the pre-pandemic period, demonstrating the increasing importance of digital trade.** Between 2000 and 2018, intra-APEC trade of digitally deliverable services grew by a compound annual growth rate (CAGR) of 7.8%, outpacing overall intra-APEC trade in commercial services which grew at 6.3% CAGR over the same period. Trade for digitally ordered goods and services grew in a similar direction for years in which data was available, growing at 31.6% CAGR between 2016 and 2018. The share of digital trade as a proportion of conventional trade is likely to have further increased in recent years, as the COVID-19 pandemic accelerated the pace of digital adoption globally. For digitally deliverable services trade in particular, the share of digital trade within overall trade in commercial services grew from 25.5% in 2000 to 32.9% in 2018.
- **In 2018, APEC intra-regional digital trade contributed USD 2.1 trillion to economies in the APEC region, approximately 4.1% of regional GDP.**<sup>9</sup> Around USD 690 billion of the economic contribution was from the direct effects of production activities undertaken by industries to produce the goods and services that were exported; Over USD 790 billion was attributed to the indirect effects from the production activities of industries along their supply chain; and approximately USD 650 billion was attributed to the consumption induced effects from workers in those industries that increased their spending as their incomes rose. This economic activity supported more than 60 million jobs in the APEC region.
- **Digital trade contributes to economic growth for APEC economies by attracting increased investment, facilitating greater market access and competition, and enabling productivity improvements.** Digital trade drives economic growth through similar channels to conventional trade, but has stronger effects – increasing factor accumulation and productivity, through providing access to larger export markets, enabling exporters to learn from overseas customers and foreign competition, gaining access to foreign intermediate inputs and partners, and increased competitive pressures for domestic industries. Digital trade encourages further factor accumulation as it creates new goods and services to be traded, further increases market access, and lowers informational and cost barriers for both buyers and sellers to encourage greater participation in trade. Digital trade also increases productivity by helping to increase the value-added of goods and services produced in various industries through the use of technology,

<sup>9</sup> Cross-border e-commerce market sizes (used to size digitally ordered trade) were not available for Brunei Darussalam; Chile; Malaysia, New Zealand; Papua New Guinea; Peru; Viet Nam, creating an underestimate for digitally ordered exports from other APEC economies to the above economies. Data for digitally deliverable services exports was also not available for Papua New Guinea.

by knowledge diffusion across participants of digital trade, and by promoting innovation and efficient business practices through greater competitive pressure.

- **There is scope for APEC economies to improve data on digital trade flows.** There is currently a lack of data to accurately size digital trade flows, including in the APEC region. Digital trade covers a broad range of goods traded over internet and e-commerce platforms as well as digital content, the electronic facilitation of trade, and the transmission of data across borders. However, existing data on digital trade are not captured along these lines. As such, analysis relies on estimates based on breakdowns available within conventional trade statistics, as well as other data, e.g., on e-commerce. Improving the accuracy of digital trade flow data will be important for monitoring the effectiveness of digital trade provisions and other initiatives to support digital trade growth.

## 1.1 What is digital trade?

The adoption of digital technology has transformed the scope, speed and scale of cross-border trade and led to the adoption of new business models that give rise to more complex international trade transactions. Digital technologies have changed the way that goods and services are being supplied and procured, blurring distinctions between goods and services and modes of delivery and introducing new combinations of goods and services.<sup>10</sup> Increasingly, policymakers are referring to digitally-enabled trade or “digital trade” as a critical component of the digital economy. In 2017, APEC Leaders pledged to “work together to realise the potential of the internet and digital economy” and welcomed the adoption of the APEC Internet and Digital Economy Roadmap (AIDER).<sup>11</sup> AIDER builds on previous initiatives and sets a framework to guide APEC economies on key areas and actions needed to facilitate technological and policy exchanges among member economies and to promote innovative, inclusive and sustainable growth, as well as bridge digital divide in the region. The roadmap identifies 11 key focus areas including on “Facilitation of E-commerce and Advancing Cooperation on Digital Trade”, “Enhancing trust and security in the use of ICTs” and “Promotion of Interoperability”. More recently, Leaders’ in 2022 committed to continuing to advance digital tools to facilitate economic activities and recognised “*the power of digital transformation in facilitating and reducing barriers to trade and unlocking exponential growth, including through nurturing the interoperability of digital systems and tools across the region*”.

Despite the increased focus on digital trade, there is no generally accepted definition of digital trade – it has been interpreted broadly by some and narrowly by others. At its broadest, some policymakers consider digital trade to encompass (i) trade in goods and services such as goods sold over the Internet and e-commerce platforms and digital content such as software, books, music, films and apps as well as trade in digitally-enabled services including legal, financial, education and consultancy; (ii) electronic facilitation of trade, such as the acceptance of electronic trade documents and, possibly, the adoption of ‘regtech’ solutions as technology evolves; and (iii) the transmission of data across borders, both as a direct business activity and to support other business activities.

To support government authorities to develop estimates of digital trade flows, the Organisation for Economic Co-operation and Development (OECD), World Trade Organization (WTO), the International Monetary Fund (IMF), and the United Nations Conference on Trade and Development (UNCTAD) have been leading work on defining the different components of cross-border digital trade. The OECD-WTO-IMF Handbook on Measuring Digital Trade (Version 1) released in 2020 defines digital trade as all trade

<sup>10</sup> OECD (n.d.), The impact of digitalisation on trade. Available at: <https://www.oecd.org/trade/topics/digital-trade/#:~:text=The%20digital%20transformation%20has%20reduced,of%20businesses%20and%20consumers%20globally>

<sup>11</sup> APEC (n.d.), Digital Economy Steering Group. Available at: <https://www.apec.org/groups/committee-on-trade-and-investment/digital-economy-steering-group>

that is digitally ordered and/or digitally delivered.<sup>12</sup> A key issue with estimating digital trade flows is that economies currently collect data on who they are trading with and what goods and services are being traded, but the definition of digital trade cuts across these lines to consider how goods and services are being purchased and delivered. Governments and global bodies are in the early stages of developing standardised reporting mechanisms that could form the basis of digital trade accounts, with data potentially collected through channels such as business or household surveys and customs statistics. In the meantime, existing trade statistics need to be used to create a proxy that can reflect digital trade trends.

As such, in alignment with the definition established in the OECD-WTO-IMF Handbook, this study relies on two components to estimate digital trade using existing trade statistics, as such statistics are readily available and consistent over a number of years. Component 1 covers goods and services which are digitally ordered but not necessarily delivered through digital means. Examples of such transactions are purchasing a wallet through an e-commerce platform, or booking a hotel stay abroad via an online portal. It also covers digital content such as music, games or mobile applications ordered via digital platform intermediaries. Component 2 covers services that are digitally deliverable but not necessarily digitally ordered. This includes services such as financial services and telecommunications services. Exhibit 1 shows how these components cover different aspects of digital trade.<sup>13</sup>

#### EXHIBIT 1

### Our methodology to estimate digital trade flows covers the digitally ordered and digitally delivered components of digital trade

		Type of product (What)	
		Goods	Services
Nature (How)	Digitally ordered 	<b>C1</b> <b>Component 1:</b> Trade in digitally ordered goods and services (i.e., cross-border e-commerce including purchasing a wallet or booking a hotel stay abroad via an online portal)	
	Digitally ordered and delivered 	<b>C1</b> <b>Component 1:</b> Trade in digital content (i.e., music, games or mobile apps purchased on digital platforms)	<b>C2</b> <b>Component 2:</b> Trade in digitally deliverable services (e.g., financial services and telecommunications services) <sup>1</sup>
	Digitally Delivered 	Note: Based on definitions in the OECD-WTO-IMF handbook, only services can be digitally delivered. <sup>2</sup> However, this study makes an exception to include digital content (digitally delivered goods) under Component 1	

#### Notes:

1. This includes publishing, audio-visual, and broadcasting activities; telecommunications services; IT and other information services; financial and insurance activities; professional, scientific, and technical activities; and administrative and support services.

2. OECD-WTO-IMF (2019).

Source: Literature review and Access Partnership analysis

Due to limitations in the availability of data, Component 1 was sized for only 2016 to 2018, while Component 2 was sized from 2000 to 2018. For trade in digitally ordered goods and services, there is insufficient data to derive the proportion of goods and services traded through digital platforms between

<sup>12</sup> An updated version of the Handbook (Version 2) is expected to be published by early 2023, jointly produced by the OECD, WTO, IMF, and UNCTAD. OECD, WTO and IMF (2019). Handbook on Measuring Digital Trade: Version 1. Available at: <https://www.oecd.org/sdd/its/Handbook-on-Measuring-Digital-Trade-Version-1.pdf>

<sup>13</sup> Some goods and services can be both digitally ordered and digitally delivered, e.g., music and streaming downloads, and can thus be classified under Component 1 and Component 2. Due to the lack of information around the degree of overlap, these two components should not be summed together to provide an overall approximation of digital trade flows.

2000 and 2015. Estimates for digitally ordered goods and services (Component 1) traded between APEC economies from 2016 to 2018 were derived based on the value of transactions made on e-commerce platforms. Trade in digitally deliverable services amongst APEC economies was derived based on past trade data (Papua New Guinea is excluded due to lack of data).

APEC intra-regional digital trade in 2018 was around USD 1.68 trillion (Exhibit 2), which is approximately 20% of APEC intra-regional trade. APEC intra-regional digital trade comprised mainly (67%) digitally ordered goods and services (e.g., cross-border e-commerce), with digitally deliverable services (e.g., financial and insurance services) being a relatively smaller (33%) but growing component. The two largest APEC economies—China and the United States—accounted for more than 46% of APEC intra-regional digital trade. These estimates do not provide the absolute value of all digital trade flows in a given year as they do not encompass all aspects of digital trade; but are instead useful proxies based on currently available data to show overall trends in digital trade flows.

Digitally ordered trade for APEC economies (excluding economies for which consistent data was not available) grew at a compound annual growth rate (CAGR) of 31.6% between 2016 and 2018 (Exhibit 2), moving in the same direction as digitally deliverable trade but at a much faster pace. The strong growth in digitally ordered trade also appears to continue globally post-2018, based on other studies examining the aggregate online retail sales and share of e-commerce that is cross-border. UNCTAD calculations indicate a CAGR of 17.9% for overall online retail sales for seven major economies<sup>14</sup> from 2018 to 2021, supported by increased e-commerce penetration even as the COVID-19 pandemic ravaged global supply chains, with the growth of cross-border e-commerce outpacing that of domestic e-commerce.<sup>15</sup>

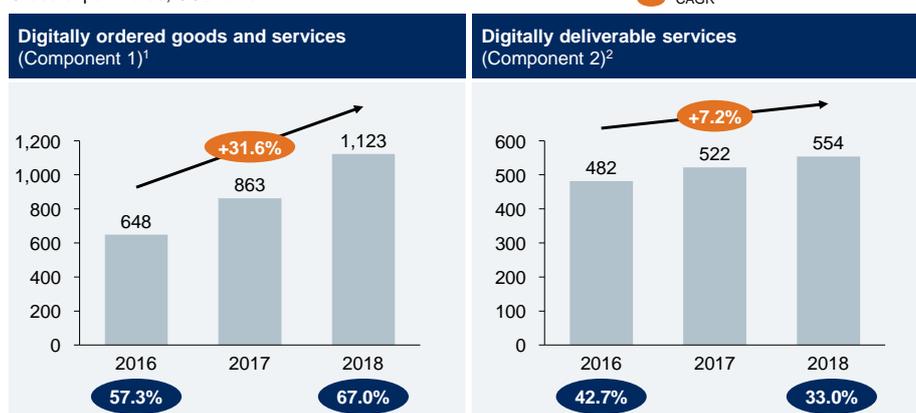
## EXHIBIT 2

### APEC intra-regional digital trade in 2018 was around USD 1.68 trillion, with digitally ordered trade being the larger and faster growing component

#### Digitally ordered trade (Component 1) and digitally deliverable services trade (Component 2) between APEC economies, 2016 to 2018

Gross export value, USD billion

● Share of APEC intra-regional digital trade  
● CAGR



Notes:

- Digitally ordered trade: Cross-border e-commerce statistics in economies are used to estimate trade in digitally ordered goods and services as well as trade in digital content. This includes bilateral trade between APEC economies excluding

<sup>14</sup> These seven economies (Australia; Canada; People's Republic of China; Republic of Korea; Singapore; United Kingdom, United States of America.) provide official statistics. UNCTAD (2022), "COVID-19 boost to e-commerce sustained into 2021, new UNCTAD figures show". Available at: <https://unctad.org/news/covid-19-boost-e-commerce-sustained-2021-new-unctad-figures-show>

<sup>15</sup> Sources include Forrester (2017), *Cross-Border eCommerce Will Reach \$727 Billion By 2022*. Available at: <https://www.forrester.com/press-newsroom/cross-border-e-commerce-will-reach-627-billion-by-2022/>; and DHL (2015), *The 21<sup>st</sup> Century Spice Trade: A Guide to the Cross-Border E-commerce Opportunity*. Available at: <http://www.iberglobal.com/files/2017/dhl-cross-border-e-commerce.pdf>

Brunei Darussalam; Chile; Malaysia, New Zealand; Papua New Guinea; Peru; Viet Nam as data is not available for these economies.

- Digitally deliverable trade: This is defined as digitally deliverable services, which includes publishing, audio-visual, and broadcasting activities (ISIC 58 to 60); telecommunications services (ISIC 61); IT and other information services; (ISIC 62 to 63); financial and insurance activities (ISIC 64 to 66); professional, scientific, and technical activities (ISIC 69-75); and administrative and support services (ISIC 77 to 82). Trade data includes all bilateral digital trade between APEC economies (excluding Papua New Guinea due to lack of data).

Source: Access Partnership analysis, Euromonitor, OECD-WTO Trade in Value-Added (TiVA) database (2021 revision), UNCTAD

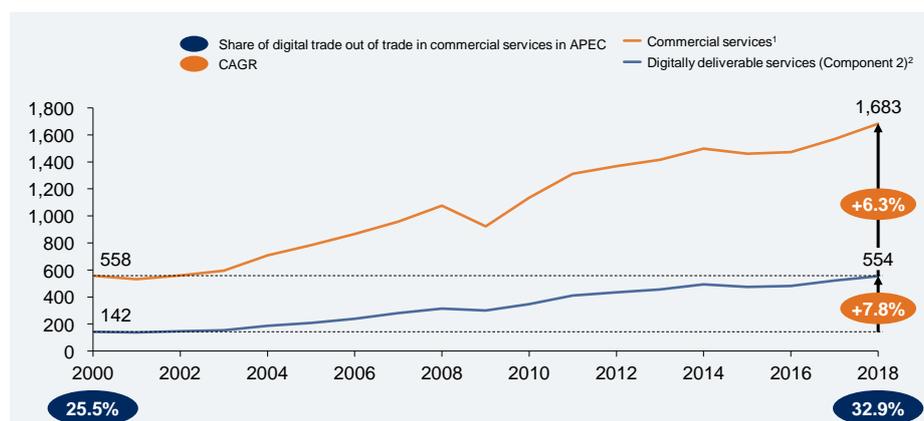
The value of digitally deliverable services traded between APEC economies increased by 7.8% per annum on average between 2000 and 2018 (Exhibit 3). This outpaces the growth in overall commercial services – including services likely to be traded digitally as well as non-digitally.<sup>16</sup> Trade in digitally deliverable services quadrupled from around USD 140 billion to more than USD 550 billion between 2000 and 2018. This translates into a growing share of digital trade within overall trade in commercial services, from 25.5% in 2000 to 32.9% in 2018, demonstrating the increasing importance of digital trade.

### EXHIBIT 3

#### Between 2000 and 2018, digital trade volumes grew faster than that of conventional trade within APEC, demonstrating its increasing importance

##### Digitally deliverable services trade (Component 2) and overall commercial services trade between APEC economies

Gross export value, USD billion



#### Notes:

- Commercial services include distributive trade, transport, accommodation, and food services (ISIC 45 to 56); real estate services (ISIC 68), and digitally deliverable services as defined below. Trade data includes all bilateral digital trade within APEC economies (excluding Papua New Guinea due to lack of data).
- Digitally deliverable services include publishing, audio-visual, and broadcasting activities (ISIC 58 to 60); telecommunications services (ISIC 61); IT and other information services; (ISIC 62 to 63); financial and insurance activities (ISIC 64 to 66); professional, scientific, and technical activities (ISIC 69-75); and administrative and support services (ISIC 77 to 82). Trade data includes all bilateral digital trade within APEC economies (excluding Papua New Guinea due to lack of data).

Source: Access Partnership analysis, OECD-WTO Trade in Value-Added (TiVA) database (2021 revision)

### 1.2 Why is digital trade important to APEC economies?

International trade has historically been a strong driver of economic growth and much research has been conducted on the links between trade liberalisation and economic growth. However, despite

<sup>16</sup> Commercial services include distributive trade, transport, accommodation, and food services (ISIC 45 to 56); real estate services (ISIC 68), and digitally deliverable services, which include publishing, audio-visual, and broadcasting activities (ISIC 58 to 60); telecommunications services (ISIC 61); IT and other information services; (ISIC 62 to 63); financial and insurance activities (ISIC 64 to 66); professional, scientific, and technical activities (ISIC 69-75); and administrative and support services (ISIC 77 to 82).

increasing global attention on digital trade flows, research on the impact of digital trade openness on economic growth is more limited. This study seeks to contribute to policymakers' understanding of this impact.

This report finds that digital trade can strengthen the channels through which international trade impacts economic growth. Digital trade encourages further factor accumulation as it creates new goods and services to be traded, further increases market access, and lowers informational and cost barriers for both buyers and sellers to encourage greater participation in trade. Digital trade also increases productivity by helping to increase the value-added of goods and services produced in various industries through the use of technology, knowledge diffusion across digital trade participants, and by promoting innovation and more efficient business practices through greater competitive pressure. The subsequent discussion is structured as follows:

- Section 1.2.1. discusses the economic contribution of digital trade to the APEC region.
- Section 1.2.2. draws on past academic and grey literature to outline the specific channels of effect through which international trade leads to economic growth.
- Section 1.2.3. discusses how the digital ordering and delivery of goods and services has changed production and transaction processes, and maps out how this affects the channels through which international trade impacts economic growth

### **1.2.1 The economic contribution of digital trade in the APEC region**

Increased digital trade flows comprises increased external demand for an economy's digitally ordered and delivered goods and services that is met by increased domestic production of those goods and services. As such, increased digital trade contributes to an economy through the increased production activity that it induces across all industries in an economy (See Appendix I).

In 2018, APEC intra-regional digital trade was worth almost USD 1.7 trillion, estimated to have contributed around USD 2.1 trillion (or 4.1%) of value added to regional GDP and supported more than 60 million jobs.<sup>17</sup> This economic contribution was generated from the production activity of exporting industries and industries along their supply chain (Table 1):

- Around USD 690 billion of value added from the direct effects of production activities undertaken by industries to produce the goods and services that were exported.
- More than USD 790 billion of value added from the indirect effects from the production activities of industries along their supply chain. For example, for a given increase in output for Financial Services, inputs from other industries such as Administrative and Support Services may be required, as well as from Financial Services itself. Multiple rounds of induced outputs arising from demand of these inputs, otherwise known as industrial support effects, are also included in the indirect effects.
- Around USD 650 billion of value added from the consumption induced effects from workers in those industries that increased their spending as their incomes rose.

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<sup>17</sup> Cross-border e-commerce market sizes (used to size digitally ordered trade) were not available for Brunei Darussalam; Chile; Malaysia, New Zealand; Papua New Guinea; Peru; Viet Nam, creating an underestimate for digitally ordered exports from other APEC economies to the above economies. Data for digitally deliverable services exports was also not available for Papua New Guinea.

**Table 1: Breakdown of economic contribution**

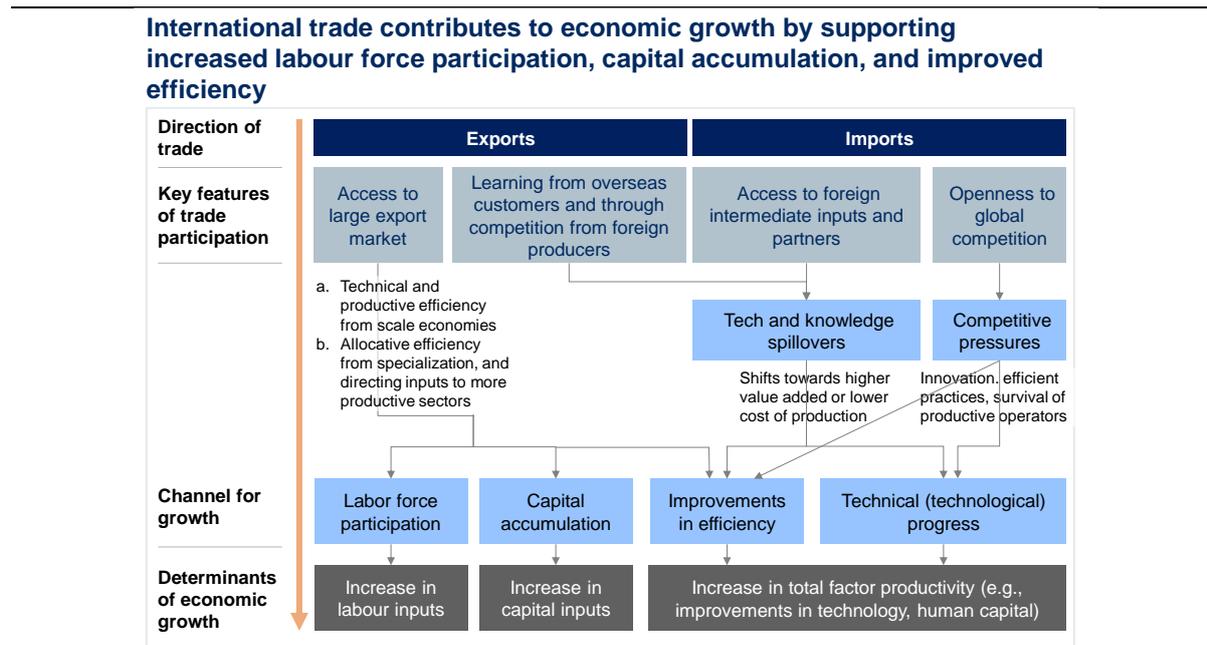
	Gross Output (USD billions)	Value Added (USD billions)	Jobs Created (millions of Full-Time Equivalents or FTEs)
Direct effects	1,680	690	21.0
Indirect effects	2,160	790	24.1
Consumption induced effects	1,400	650	15.6
<b>Total</b>	<b>5,240</b>	<b>2,130</b>	<b>60.7</b>

Beyond quantitative measures of economic contribution, the channels through which digital trade impacts economic performance are also relevant to helping policymakers understanding the merits of pursuing digital trade growth as a policy priority. The following sections discuss these channels.

### 1.2.2 Understanding the impact of international trade on economic growth

There is substantial literature on the correlation between higher trade volumes and better economic performance. Since the late 1980s, studying the impact of higher trade openness and volumes on economic outcomes has been a key focus area for applied economists, producing significant volumes of theoretical and empirical literature on this topic. Studies that rely on trade intensity measures (e.g., export plus import to GDP ratio, export to GDP ratio) have revealed evidence on the positive impact of trade on economic growth (Alcala and Ciccone, 2002; Krueger and Berg, 2003; Dollar and Kraay, 2004; Lee, 2004; Chang, 2009; Busse and Koniger, 2012).<sup>18</sup> Contemporary trade theories integrated in endogenous growth models (Romer, 1990; Krugman, 2001; Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1990; Matsuyama, 1992) imply that trade is beneficial to economic growth. The large body of research has also outlined the key features of international trade for an economy, and the channels through which participation in international trade impact the determinants of economic growth, namely labour inputs, capital inputs, and productivity (Exhibit 4).

**EXHIBIT 4**



<sup>18</sup> There are some critics who dispute these findings on methodological ground (Rodrik, 1996; Rodriguez and Rodrik, 1999).

- (i) Access to large export market leads to factor accumulation and increased productivity through efficiency improvements

The expansion of export demand is a core mechanism through which trade impacts economic growth. The simple absorption of exports by other economies fosters the expansion of an economy's exporting industries. Through trade, businesses can access more foreign customers which can absorb more goods and services produced. Businesses have an incentive for greater labour inputs and capital accumulation (collectively, factor accumulation)<sup>19</sup>, to in turn provide the raw inputs and production capabilities to achieve greater levels of output and sales.

Besides a direct impact on output quantity, access to a large export market also encourages further specialisation in goods and services in which an economy is competitive.<sup>20</sup> The increased interconnectivity of global value chains<sup>21</sup> has further enabled this by enabling greater levels of specialisation by different economies at each part of the value chain.<sup>22</sup> By participating in global value chains and focusing on specific activities within the value chain, firms within an economy can leverage economies of scale through higher levels of production, to improve productive efficiency through lowering unit costs as workers become better at their sub-divided roles, or as firms benefit from buying in bulk or get better terms on financing and better transportation networks.<sup>23</sup> As these efficiencies proliferate through an economy's firms, increased cost competitiveness can secure even greater market share, export demand and therefore factor accumulation<sup>24</sup> to create a virtuous cycle of export-driven growth and productivity increases.

- (ii) Exposure to foreign buyers and competitors alongside access to foreign intermediate inputs and partners, lead to technology and knowledge spillovers for productivity increases

A second pathway through which increased participation in international trade and higher trade flow volumes can lead to economic growth is through the diffusion of knowledge and technology that can lead to productivity increases (Grossman and Helpman, 1991).<sup>25</sup> Such spillovers can come through both export and import activity enabled by participation in international trade.

Exporters increase productivity by learning from overseas customers and through exposure to competition from foreign producers. Learning-by-exporting refers to the mechanism through which firms improve their productivity after entering export markets.<sup>26</sup> Through buyer-seller relationships, exporters learn from foreign customers and rivals about improving product quality, shipment size or specific investment requirements, hence fostering process and product innovations. Several empirical studies point to the occurrence of learning by exporting rather than just self-selection of better and more productive firms into export markets (Blalock & Gertler, 2004; Salomon and Shaver, 2005; de Loecker,

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<sup>19</sup> Factor accumulation refers to an increase in factors used to produce goods and services in an economy, including financial capital, human capital, land and assets amongst other factors

<sup>20</sup> Competitiveness is related to absolute advantage, where an economy is able to produce at a lower cost than its competitors.

<sup>21</sup> A global value chain is a sequential composite of the tasks necessary to produce a product, from conception to delivery to end consumers in international markets, a process including research and development, product design, parts and components manufacturing, assembly and distribution.

<sup>22</sup> Gereffi, G and Karina, F. (2011). *Global value chain analysis: a primer*. Center on Globalization, Governance and Competitiveness, Duke University. Available at:

[https://www.researchgate.net/publication/265892395\\_Global\\_Value\\_Chain\\_Analysis\\_A\\_Primer](https://www.researchgate.net/publication/265892395_Global_Value_Chain_Analysis_A_Primer)

<sup>23</sup> Where comparative advantage exists, this also improves the allocative efficiency of the economy in shifting its labour and capital inputs towards the production of goods and services that the economy has comparative advantage in.

<sup>24</sup> Foreign direct investment (FDI) flows also tends to be a major source of capital accumulation.

<sup>25</sup> Grossman and Helpman (1991), *Trade, knowledge spillovers, and growth*. Available at:

<https://www.sciencedirect.com/science/article/abs/pii/001429219190153A>

<sup>26</sup> This idea broadly draws from the characterisation of learning-by-doing (Arrow, 1962).

2013; Atkin et. Al, 2017).<sup>27</sup> Notably, many of these studies highlight the positive innovation effects and quality improvements as key drivers behind the observed productivity increases, demonstrating how knowledge and technology diffusion creates additional value-added in goods and services produced, or reductions in unit costs of production.

Imports give domestic firms access to foreign intermediate inputs and investment partners. Intermediate goods or imports could contain technologies unavailable to the recipient economy in the absence of international trade. As the domestic firms capitalise on these foreign inputs to innovate and produce greater value-added goods and services, it could drive productivity or increase the value-added of industries in the recipient economy to drive economic growth. The greater the quantity of such goods or services, the greater the potential for spillovers from trade to the broader economy. Diffusion of knowledge and technologies also take place through foreign direct investment (FDI) flows, which tend to be mutually reinforcing with trade as an accompanying flow.<sup>28</sup> For instance, multinational enterprises could establish operations through a subsidiary in a market where goods and services are cheaper to produce, setting up production facilities staffed by local workers and then sell those goods through free trade. The knowledge gained by these workers could spill to other firms in the host economy through labour turnover to increase the overall amount of knowledge in the economy (Aizenman and Sushko, 2011). In addition, business travel or cross-border exchange of ideas necessitated by cross-border trade could also promote knowledge spillovers by facilitating the diffusion of tacit knowledge (Oettl and Agrawal, 2008).<sup>29</sup>

Through these technology and knowledge spillovers, domestic firms tend to experience productivity increases at the firm level as they catch up or keep abreast of the international technology frontier, exhibiting either efficiency or technological progress (Kumbhakar and Lovell, 2000).<sup>30</sup> Emerging economies may also be able to engage in more knowledge- and technologically intensive parts of the global value chain which demonstrate higher productivity and larger impacts on economic growth<sup>31</sup>, if simultaneously facilitated by complementary investments in human capital.

- (iii) Openness to global competition leads to heightened competitive pressures and higher productivity of remaining firms

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<sup>27</sup> Sources include Blalock and Gertler (2004), *Learning from Exporting Revisited in a Less Developed Setting*. Journal of Development Economics. Available at: [https://d1wqtxts1xzle7.cloudfront.net/43999976/Learning\\_from\\_Exporting\\_Revisited\\_in\\_a20160322-30148-12ei9oq-with-cover-page-v2.pdf?Expires=1669188259&Signature=BHpwGp9iiVPkepoiWrHUk2EsN-RloFqun~KNaHRwERO54YewwLKVHJ5dTzOLQLY5omrRVpZ51jnGijNvTB9jk9fTP9MaiJ~aLUAS4bQpfFNC7wHODvY45aFkz3RMJppeKV4fZF-TzqcC3RYaWKH3bxamx1Ze4TqKGQqguZejb3R39KVEZ-BA22kW~6QKJqGW8FVSycM2VawU4sk7OFxbYxx7R1YyLBV08ZRQqlmw5MR4dnM3UwT-SSmApwRMOUN02AGkZd4rSa1bsbkhIqzk7rGaQ-VCTwHXMd0BNzADxL-hwqiktNUEDcddqERNWGMCHJHLP2V38rKpJofDmi6aw\\_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA](https://d1wqtxts1xzle7.cloudfront.net/43999976/Learning_from_Exporting_Revisited_in_a20160322-30148-12ei9oq-with-cover-page-v2.pdf?Expires=1669188259&Signature=BHpwGp9iiVPkepoiWrHUk2EsN-RloFqun~KNaHRwERO54YewwLKVHJ5dTzOLQLY5omrRVpZ51jnGijNvTB9jk9fTP9MaiJ~aLUAS4bQpfFNC7wHODvY45aFkz3RMJppeKV4fZF-TzqcC3RYaWKH3bxamx1Ze4TqKGQqguZejb3R39KVEZ-BA22kW~6QKJqGW8FVSycM2VawU4sk7OFxbYxx7R1YyLBV08ZRQqlmw5MR4dnM3UwT-SSmApwRMOUN02AGkZd4rSa1bsbkhIqzk7rGaQ-VCTwHXMd0BNzADxL-hwqiktNUEDcddqERNWGMCHJHLP2V38rKpJofDmi6aw_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA); Salomon and Shaver (2005), *Learning by Exporting: New Insights from Examining Firm Innovation*. Journal of Economics & Management Strategy, Volume 14, Issue 2, June 2005. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1530-9134.2005.00047.x>; de Loecker (2013), *Detecting Learning by Exporting*. American Economic Journal: Microeconomics, Vol. 5, No. 3 (August 2013). Available at: <https://www.jstor.org/stable/43189629>; and Atkin et. al (2017), *Exporting and Firm Performance: Evidence from a Randomized Experiment*. The Quarterly Journal of Economics, Volume 132, Issue 2, May 2017, Pages 551-615. Available at: <https://academic.oup.com/qje/article/132/2/551/3002609>

<sup>28</sup> Aizenman and Noy (2006). *FDI and trade—Two-way linkages?*. The quarterly review of economics and finance, 46(3), 317-337. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S1062976906000305>

<sup>29</sup> FDI presence may benefit domestic firms via channels like labor turnover, demonstration of new technology, competition effect, reverse engineering, and 'learning by watching' (MacDougall, G. D. A., 1960, Kokko, A., 1994, Blalock, G. and Gertler, P. J., 2008).

<sup>30</sup> Total factor productivity changes can be decomposed into technical change, scale changes, and efficiency changes. For brevity, we combine the latter two under improvements in efficiency. Kumbhakar and Lovell (2000), *Stochastic Frontier Analysis*. Cambridge University Press. Available at: <https://catdir.loc.gov/catdir/samples/cam032/99031297.pdf>

<sup>31</sup> Didier and Pinat (2013), *How does trade cause growth?* Available at: <https://www.gtap.agecon.purdue.edu/resources/download/6158.pdf>

There is a strong body of empirical evidence showing that increased competition can drive greater productivity. This occurs in three main ways<sup>32</sup>: (1) competition acts as a disciplining force within firms, pressuring managers to become more efficient ('within-firm' effect); (2) it ensures that less productive firms lose market share as they become less price-competitive and eventually exit the market due to economic losses, thus increasing the average productivity of the industry ('across-firm' or 'market-sorting' effect); (3) competition is a key motivator for innovation, coming up with new products and processes which can increase efficiency.

Conversely, a lack of openness to global competition can hurt economic growth in the long run. One way in which economies can reduce or avoid exposure to global competition is through import substitution measures, or actions taken to replace imports with domestic production. This entails the adoption of import tariffs or subsidies for domestic production to shield domestic producers from foreign competition. While such measures might promote immediate demand for domestically produced goods, the lack of competition could result in significant productivity decreases in domestic industries in the long-term.<sup>33</sup> The liberalisation of trade regimes is associated with the removal of such measures and greater exposure to global competition for domestic firms, so that increased competitive pressures can lead to domestic firms becoming more productive, contributing to economic growth and output.

### **1.2.3 Understanding how digital trade impact the channels through which participation in cross-border trade leads to economic growth**

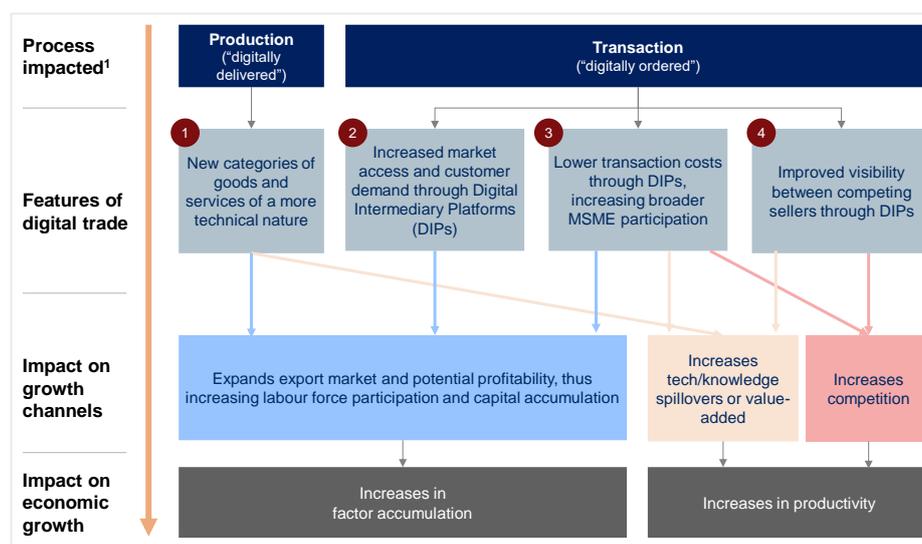
Trade requires the completion of two steps: (i) the production process of the good or service; and (ii) the transaction process which includes transfer of the good or service across borders. To understand how the channels through which conventional trade impacts on economic growth are impacted by digital trade, it is first necessary to understand how digital trade has changed these production and transaction steps, and then map out how these changes impact the various channels of effect through which participation in international trade impacts economic growth (Exhibit 5).

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<sup>32</sup> Competition and Markets Authority (2015), *Productivity and competition: a summary of evidence*. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/909846/Productivity\\_and\\_competition\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909846/Productivity_and_competition_report.pdf)

<sup>33</sup> Irwin (2020), "Import substitution is making an unwelcome comeback". Available at: <https://www.piie.com/blogs/trade-and-investment-policy-watch/import-substitution-making-unwelcome-comeback>

### Through changes in production and transaction processes, digital trade strengthens the trade channels which spur economic growth



#### Notes:

1. Despite this classification, some goods and services can be both digitally ordered and digitally delivered, e.g., music and streaming downloads

Source: Literature review and Access Partnership analysis

Four key differences between digital trade and conventional trade have been identified. These differences across the production and transaction processes strengthen the channels through which increased trade flows help spur economic growth. On the whole, digital trade encourages further factor accumulation as it creates new goods and services to be traded, further increases market access and lowers informational and cost barriers for both buyers and sellers to encourage greater participation in trade. Digital trade also increases productivity by helping to increase the value-added of goods and services produced in various industries through the use of technology, knowledge diffusion across digital trade participants, and promoting innovation and more efficient business practices through greater competitive pressures. The differences between conventional and digital trade are detailed as follows:

- (i) Participation in digital trade creates new categories of goods and services, thus expanding the export market to drive increased factor accumulation and increasing productivity

One important aspect of digital trade is the creation of new product categories, which serves to expand the export market. Digital content such as games, music, mobile apps are demonstrating strong growth for entertainment expenditure. For instance, global spending in mobile apps is expected to reach more than USD 230 billion by 2026, at a compound annual growth rate of 12%.<sup>34</sup> These new product varieties have significantly increased economic growth for economies. Content that had previously been in the form of physical goods has also increasingly been converted into digitally deliverable forms and traded digitally as part of new business models; these include films, books, music, as well as educational content. In 2021, streaming and digital downloads comprised almost 70% of total global recorded music revenues, compared to 19.2% for physical album sales from CDs and vinyl.<sup>35</sup> A digitally deliverable form of a product removes costs associated with physically delivering an item across borders. These

<sup>34</sup> Sensor Tower (2022). *2022 to 2026 Mobile Market Forecast*. <https://go.sensortower.com/rs/351-RWH-315/images/Sensor-Tower-2022-2026-Market-Forecast.pdf>

<sup>35</sup> IFPI (2022), *Global Music Report 2022: State of the Industry*. Available at: <https://www.ifpi.org/ifpi-global-music-report-global-recorded-music-revenues-grew-18-5-in-2021/>

cost savings can translate to economic growth, should they be retained as profits by producers, or passed on to consumers through lower prices that increase the quantity of exports demanded by foreign consumers.

Beyond expanding the export market, these new categories of goods and services tend to be of higher value-added<sup>36</sup> in and of itself, due to its technical nature and requirements for skilled labour.<sup>37</sup> Digitally delivered goods and services are also essential inputs for economies to engage in the production of higher domestic value-added goods and services.<sup>38</sup> As value-added per worker or unit of capital increases, this registers as an increase of labour or capital productivity and thus gross value-added (a measure of economic growth).

- (ii) Participation in digital trade increases market access and customer demand via digital intermediary platforms and increases factor accumulation through an expanded export market

Digital trade has transformed the ease with which customers can discover, evaluate, and act on cross-border purchases. Digital platforms, business websites, and online communication services (i.e., email or chat functions) reduce search costs and allow buyers to compare the offerings of suppliers easily and without incurring significant costs. Digital trade can reduce distance-related trade costs and shrink the distance between buyer and seller by almost a third.<sup>39</sup> Through digital platforms such as Booking.com or Expedia, travellers can book accommodation abroad with relatively low transaction costs while platforms such as Amazon allow buyers to access a large range of merchandise at relatively low cost (i.e., the cost of their internet services). As a result, digital trade sees strong participation from consumers, with close to 60% of e-commerce in some economies being dominated by business-to-consumer (B2C) transactions.<sup>40</sup> By reducing informational search costs and smoothing the digital ordering component of the customer journey, digital intermediary platforms play a key role in realising latent export demand.

- (iii) Digital trade lowers transaction costs through digital intermediary platforms and allows more MSMEs and people to participate in trade, that in turn drive productivity increases through increased competition as well as technology and knowledge spillovers

Compared to conventional trade, the lower costs associated with marketing and ordering products and services online means that digital trade sees a wider range of participants. From a procurement angle, business-to-business (B2B) platforms such as Shopify Plus as well as online trade fairs or business matching platforms help to reduce the costs of procuring raw materials, intermediate goods or finished products from different parts of the world and increase accessibility to suppliers in different markets. Digital technologies such as cloud-based computing enable financial and insurance services, media services and administrative services amongst other types of services to be delivered cross-border in an affordable and secure manner. This lowers the costs and risks of sourcing for such services from abroad and makes it attractive for firms, including small businesses, to outsource certain functions to vendors based outside their markets. In terms of selling, the rise of digital intermediary platforms has allowed more varied types of sellers, including smaller firms or individual proprietors, to participate in cross-

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<sup>36</sup> Through the efforts of employees and the application of capital, the firm “adds value” to its purchases of raw materials. At the firm level, value-added can be computed by subtracting the costs of purchased materials, services, and utilities from the firm’s total revenue. Equivalently, value-added can be calculated as the sum of all employee compensation, depreciation, operating income, and (non-income) taxes.

<sup>37</sup> Timmer et., al (2014), *Slicing Up Global Value Chains*. Journal of Economic Perspectives, 28 (2): 99-118. Available at: <https://www.aeaweb.org/articles?id=10.1257/jep.28.2.99>

<sup>38</sup> Ding, Zhang and Tang (2021), “How Does the Digital Economy Affect the Domestic Value-Added Rate of Chinese Exports”. Available at: <https://www.igi-global.com/gateway/article/full-text-html/279665&riu=true>

<sup>39</sup> Lendle, Andreas and Olarreaga, Marcelo and Schropp, Simon and Vezina, Pierre-Louis (2016). *There Goes Gravity: How Ebay Reduces Trade Costs*. <https://ssrn.com/abstract=2167187>

<sup>40</sup> UNCTAD (2018), *UNCTAD Estimates of Global e-Commerce 2018*. Available at: [https://unctad.org/system/files/official-document/tn\\_unctad\\_ict4d15\\_en.pdf](https://unctad.org/system/files/official-document/tn_unctad_ict4d15_en.pdf)

border trade. A review of existing data and case studies suggest that such digital tools could reduce export costs for the average MSME by as much as 82%.<sup>41</sup>

With lower costs, small businesses reaping limited economies of scale can be more profitable and become more viable in business operations through digital trade, boosting output. This would also increase labour force utilisation and participation, given that MSMEs in the APEC region account for two-thirds of employment and contributed over 60% to net employment growth in half of the APEC economies over the past 5-10 years, with several economies having shares above 90%.<sup>42</sup> These impacts can be strengthened if strong support is provided to MSMEs to participate actively in digital trade (see Box 1).

A wider range of firms participating in digital trade can also increase opportunities for innovation and amplify the spread of knowledge and technology diffusion. For instance, digital native businesses (DNBs) and start-ups can challenge existing modes of business by innovating on product variety and business models. In the long run, this will create competitive pressures on incumbent firms, increasing the development and diffusion of industry best practices through a process of imitation and iteration, enhancing firm-level and industry-level productivity by extension.

### **Box 1: Supporting MSMEs to harness the gains of digital trade**

By reducing trade costs including shipping costs and financial costs, digitalisation has made it easier for MSMEs to participate actively in global supply chains. For example, MSMEs are estimated to contribute 45% of Singapore's B2C value of e-commerce exports in 2021 while more than half of Australian businesses, including MSMEs, have placed orders via the internet.<sup>43</sup>

Despite the potential gains that digital trade could bring to MSMEs, MSMEs still face significant challenges in harnessing the gains of digital trade compared to larger companies. Past research conducted in ASEAN suggests that such challenges include limited knowledge of digital technologies and platforms, shortage of workers familiar with digital technologies, the absence of a safe digital environment (i.e., fraud, cybersecurity breaches) and challenges in adapting business processes to digital platforms amidst other challenges.<sup>44</sup>

To ensure that MSMEs can gain from digital trade, governments need to pursue targeted policies to address these challenges. One example is the South Australian government's "eCommerce Accelerator Program (eCAP)" that supports South Australian MSMEs interested in selling their goods or services digitally and globally.<sup>45</sup> eCap has three funding categories, from which sellers who are new to e-commerce will be able to access funds with no upfront investments required, while sellers with more advanced e-commerce capabilities will be provided one-to-one matched funding from the government. Grants of up to AUD 5,000 (USD 3,600) will be provided to new e-commerce sellers to enable them to build their e-commerce capabilities. These can be spent on professional training and advisory services or on the upfront costs required to develop their cross-border e-commerce strategy

<sup>41</sup> Asia Pacific MSME Trade Coalition (2018), *Micro-Revolution: The New Stakeholders of Trade in APAC*. Available at: <https://static1.squarespace.com/static/5393d501e4b0643446abd228/t/5a83876b71c10b85cc1bd35d/1518569362142/MSME+R+eport-APAC.PDF>

<sup>42</sup> APEC Policy Support Unit (2020), *Overview of the SME Sector in the APEC Region: Key Issues on Market Access and Internationalization*. Available at: <https://www.apec.org/Publications/2020/04/Overview-of-the-SME-Sector-in-the-APEC-Region>

<sup>43</sup> Sources include Digital News Asia (2021). "Amazon releases report on e-commerce export opportunities for Singapore MSMEs." <https://www.digitalnewsasia.com/business/amazon-releases-report-e-commerce-export-opportunities-singapore-msmes>; and ABS (2018). "Summary of IT Use and Innovation in Australian Business." <https://www.abs.gov.au/statistics/industry/technology-and-innovation/summary-it-use-and-innovation-australian-business/latest-release>

<sup>44</sup> ERIA (2019). *Study on MSMEs Participation in the Digital Economy in ASEAN*. <https://www.eria.org/uploads/media/Books/2019-October-ERIA-ASEAN-Study-On-MSMEs-Participation.pdf>

<sup>45</sup> ConnectPlus (n.d.), "eCAP guidelines". Available at: <https://connectplus.sa.gov.au/pages/ecap-guidelines>

to expand into their target markets. This reduces the cost barriers faced by new e-commerce sellers and provides them with an impetus to embark on their e-commerce export journey.

Support could also be provided for MSME workers to undergo digital skills training. In Singapore, various forms of support are provided to employers to train their workers. The Enhanced Training Support for SMEs program provides funding for up to 90% of course fees when SMEs send their employees to attend training courses.<sup>46</sup> To ensure that employers are not deterred by the loss of manpower when employees undergo training; the program also offers absentee payroll funding to cover part of the worker's salary during the training period. Eligible courses cover digital skills in areas such as e-commerce and use of digital wallets among a wide range of training areas.

- (iv) Participation in digital trade improves visibility between competing sellers, increasing productivity through technology and knowledge diffusion as well as competition

Firms operate at varying levels of efficiency across an economy, depending on their innovation level and cost structure, among other determinants of economic profitability. The lack of complete or perfect information constrains firms from reaching maximal efficiency. That is, they incur monetary and time costs to monitor how their product, production and selling processes compare to competitors, and even then, may not fully succeed in such attempts to capture best practices and attain the industry technology or production frontier.

Information access and knowledge diffusion increases through the aggregation of sellers on digital intermediary platforms, which increasingly mediate the process of digital ordering. Examples include large cross-border e-commerce marketplaces such as Amazon, eBay, and Mercado Libre. The aggregation of sellers into a single marketplace increases proximity effects, in the form of observation and perceived competition. For any given seller, differences in competitor pricing or sales volumes can serve as instantaneous read-throughs of evolving best practices, such as improvements in supplier sourcing, production processes, or sales strategies. These firms can then subsequently act on these signals, for example through innovation or imitation. In addition, digital intermediary platforms also support this process by offering additional services and support to sellers, especially in areas where expertise or scale tends to be critical, for instance logistics fulfilment. These channels of knowledge and technological diffusion help firms to become more productive in their processes.

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<sup>46</sup> SSG (n.d.), "Enhanced Training Support for SMEs". Available at: <https://www.ssg.gov.sg/programmes-and-initiatives/training/enhanced-training-support-for-smes.html>

## 2. *What is the impact of digital trade provisions on digital trade flows?*

Section 2 discusses how the adoption of modern digital trade provisions could support capturing the benefits of higher digital trade exports and the key insights are summarised as follows:

- **The prevalence of digital trade provisions between trade pairs in the APEC region increased significantly since 2000, but as of 2021 there was still scope to further increase coverage between APEC economies.** Based on the Digital Trade Openness Index (DTOI) that was created to approximate the coverage of digital trade provisions in APEC, coverage of key digital trade provisions between APEC economies has increased significantly over the past two decades. Despite this progress, 121 out of 210 trade pairs in APEC are still not covered by any of the 13 digital trade provisions in the DTOI in 2021, suggesting that more progress could be made to strengthen APEC's digital trade infrastructure.
- **Overall, the increased coverage of digital trade provisions in the APEC region had an observable effect of increasing digital trade flows.**<sup>47</sup> The analysis found that flows of digitally deliverable services increased by 2.3% for every additional digital trade provision that came into force between two trading partners on aggregate. This translates into digital trade provisions coming into force between 2000 and 2018 adding around USD 40.1 billion or 2.9% to digitally delivered trade flows in 2018. While the aggregate level analysis did not find a significant relationship between the coverage of digital trade provisions and the flow of digitally ordered trade, the provision-level analysis revealed an impact.
- **The adoption of specific digital trade provisions was found to increase the flows of digitally ordered and digitally deliverable trade by between 11% and 44% in successive years.** Individual provisions that demonstrated a positive significant impact on digital trade flows, either digitally ordered or digitally deliverable, could increase the flows of digital trade by between 11% and 44% in successive years after adoption. A provision coming into force could increase digital trade flows in the subsequent one to two years and, for digitally deliverable trade, up to three years. For instance, taking the digital trade value for digitally deliverable services between a hypothetical trade pair as USD 100 million in 2015, an e-invoicing provision that comes into force in 2015 could potentially create an additional USD 40 million in trade value between 2016 and 2018. In 2019, the direct impact of the provision will taper off, but future growth would ride on the higher trade flows created by the adoption of the provision.
- **Robust implementation of digital trade provisions backed by capacity building efforts is critical to achieving benefits of digital trade.** The analysis reinforces that beyond concluding digital trade provisions, it is also critical for economies to focus on creating capacity for the implementation of digital trade provisions. It finds that making a digital trade provision legally binding<sup>48</sup>—which generally signifies a stronger commitment towards implementation—presently does not have an observable effect on digital trade flows, suggesting that administrations may only be entering into legally binding provisions when already confident that they have the capacity

<sup>47</sup> The analysis excluded Papua New Guinea due as data was not available for both components used to estimate digital trade and included digital trade flows with India and the EU to reflect the full benefit that digital trade provisions could have on digital exports from the APEC region.

<sup>48</sup>The categorisation between binding and non-binding commitments follows the typology developed by Abbot and Snidal, where binding commitments (or hard law) refers to legally binding obligations that are precise, whereas non-binding commitments (or soft law) are legal arrangements that are 'weakened along one or more of the dimensions of obligation, precision, and delegation'.

to implement them. To this end, ensuring that authorities have the capacity to implement the provisions, as well as ensuring consumers and businesses can adapt, is critical to achieving the benefits of digital trade.

## *2.1 Recent developments on digital trade rules in APEC*

APEC economies have played an important role in the making of modern digital trade rules. Some of the most forward-looking trade agreements focused on growing the digital economy and facilitating digital trade growth were signed amongst APEC economies. These include the Digital Economy Partnership Agreement (DEPA) signed between Chile, New Zealand and Singapore in June 2020, the Digital Economy Agreement (DEA) signed between Australia and Singapore in August 2020, and the Korea-Singapore Digital Partnership Agreement (KSDPA) signed in November 2022. Regional comprehensive trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)<sup>49</sup> and Regional Comprehensive Economic Partnership (RCEP)<sup>50</sup> also included various provisions aimed at facilitating digital trade flows.

A review of past trade agreements signed between APEC economies suggest that while foundational policy issues for the digital economy such as cybersecurity and privacy protection are well-entrenched in earlier trade agreements (including agreements not exclusively focused on digital trade), provisions more specific to enabling digital trade are emerging in more recent agreements. For instance, the DEA signed between Australia and Singapore in 2020 called for Parties to collaborate on initiatives which promote, support, or facilitate the adoption of e-invoicing by enterprises, and share best practices on promoting the adoption of interoperable systems for e-invoicing.<sup>51</sup> These digital economy-focused agreements could play an important role in shaping the future of digital trade (see Box 2).

### **Box 2: Digital Economy Agreements (DEA) amongst APEC economies are at the forefront of digital trade rulemaking**

A Digital Economy Agreement (DEA) establishes digital trade rules and digital economy collaborations between two or more economies. Unlike trade agreements with clauses covering digital trade issues, the DEAs are centred around collaboration in digital economy and trade issues.

The Australia-Singapore Digital Economy Agreement (DEA) signed in August 2020 provides a range of new trade rules and comprehensive framework for bilateral cooperation to reduce digital trade barriers and enable business and consumers in both Australia and Singapore to capitalise on the digital economy.<sup>52</sup> Amongst other areas, the DEA delivers robust rules to ensure that businesses, including those in the financial sector, can transfer data across borders and will not be required to build or use data storage centres in either jurisdiction; establishes new commitments on compatible e-invoicing and e-payment frameworks; and sets the stage for Singapore and Australia to collaborate closely in supporting the harmonisation of key international standards to support digital trade.

The DEPA was signed between New Zealand, Chile, and Singapore in June 2020, with the intention of complementing WTO negotiations on e-commerce and building on work related to the digital

<sup>49</sup> CPTPP signatories include Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore and Viet Nam

<sup>50</sup> RCEP signatories include the Association of Southeast Asian Nations (ASEAN) - Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam - and Australia, China, Japan, New Zealand and the Republic of Korea which are also ASEAN's free trade agreement partners

<sup>51</sup> Australian Department of Foreign Affairs and Trade. Australia-Singapore Digital Economy Agreement. Available at: <https://www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement>

<sup>52</sup> Australian Department of Foreign Affairs and Trade (2020), "Australia-Singapore Digital Economy Agreement." Available at: <https://www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement>

economy underway in APEC as well as other international forums.<sup>53</sup> The DEPA is a living agreement and membership is open to WTO members able to meet its standards.<sup>54</sup> To-date, Canada, China and the Republic of Korea have expressed interest in joining the DEPA. Modules under the DEPA cover a range of digital economy issues, including the adoption and use of technology to facilitate trade (e.g., paperless trading, growth of e-payments, prohibition of customs duties on electronic transmission), SME cooperation, as well as data issues.<sup>55</sup>

## 2.2 Digital Trade Openness Index

### 2.2.1 The Digital Trade Openness Index

As part of this study, a Digital Trade Openness Index (DTOI) was constructed to capture the coverage of digital trade provisions at the bilateral level between the 21 APEC member economies. A higher DTOI score means that more provisions assessed to be important to facilitating digital trade are in place. The DTOI is collated on an annual basis and uses a binary scoring system. For each year, the provisions in-force between each trade pair are studied and scored, and an increase is observed from year to year as new agreements containing provisions are signed and come into force. As such, trade pairs with no agreements in place between them would start with a DTOI score of 0 and this score increases as more agreements containing digital trade provisions are signed, ratified and come into force, up to a maximum score of 13 once all included provisions have been “covered”. The Trade Agreements Provisions on Electronic-commerce and Data (TAPED) dataset collated by researchers at the University of Lucerne was used to determine the trade agreements in force and provisions covered under each agreement.<sup>56</sup>

Each of the 13 digital trade provisions in the DTOI is expected to affect digital trade flows through a particular mechanism of impact, either as a demand-side factor by influencing consumers’ and firms’ participation in digital trade as buyers, or as a supply-side factor by influencing businesses’<sup>57</sup> participation in digital trade as suppliers and sellers. The provisions can be grouped into five categories based on these effects (see Exhibit 6). More details on the provisions included in the DTOI and their coverage is in Appendix I.

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<sup>53</sup> New Zealand Ministry of Foreign Affairs and Trade. Digital Economy Partnership Agreement. Available at: <https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/digital-economy-partnership-agreement-depa/>

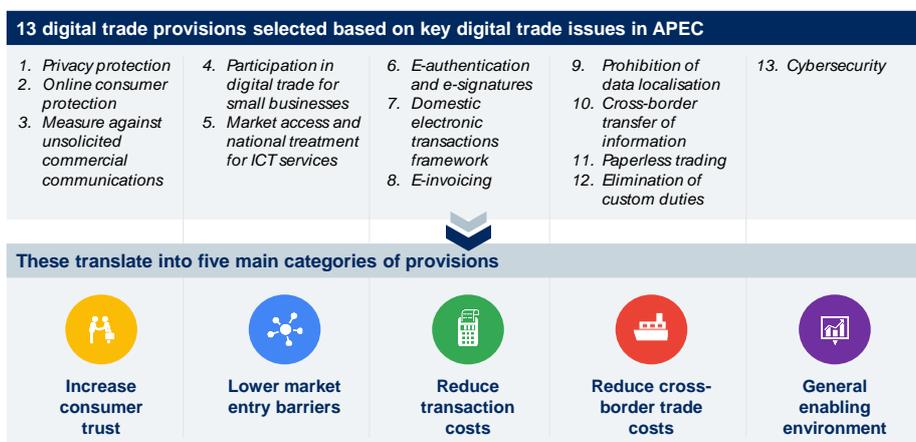
<sup>54</sup> New Zealand Ministry of Foreign Affairs and Trade. Digital Economy Partnership Agreement. Available at: <https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/digital-economy-partnership-agreement-depa/>

<sup>55</sup> New Zealand Ministry of Foreign Affairs and Trade. Digital Economy Partnership Agreement. Available at: <https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/digital-economy-partnership-agreement-depa/>

<sup>56</sup> The TAPED (Trade Agreements Provisions on Electronic-commerce and Data) dataset seeks to comprehensively trace developments in digital trade governance. The dataset includes a detailed mapping and coding of all preferential trade agreements that cover chapters, provisions, annexes, and side documents that directly or indirectly regulate digital trade. The June 2022 edition of the dataset was used. University of Lucerne. TAPED. Available at: <https://www.unilu.ch/en/faculties/faculty-of-law/professorships/burri-mira/research/taped/>

<sup>57</sup> Businesses tend to form the largest proportion of buyers (though individuals and government buyers also exist in cases of G2B, G2C, C2C and C2B trade), hence the mechanism of impact for sellers is viewed through the lens of businesses.

### Digital trade provisions selected for the Digital Trade Openness Index can be grouped into five categories by mechanism of impact



Source: Access Partnership analysis

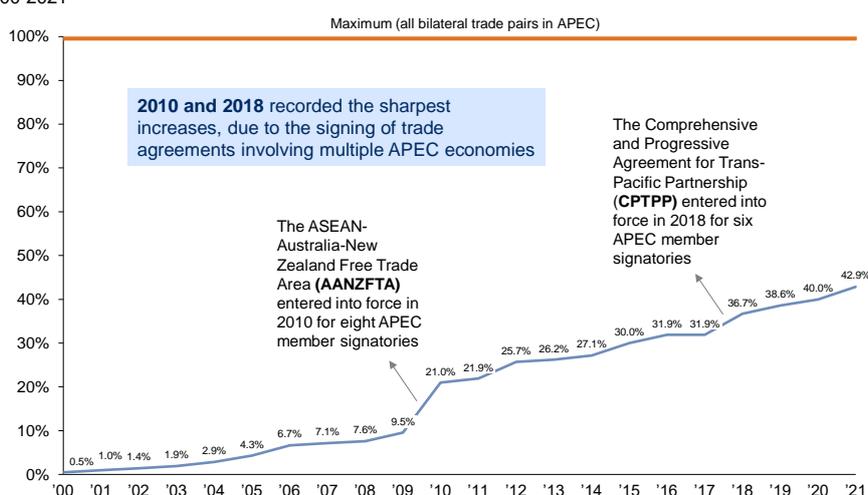
### 2.2.2 Trends in digital trade openness in APEC

Tracking the changes in the DTOI within the APEC region are useful to understand the development of digital trade liberalisation in APEC. While adoption of digital trade provisions was limited in 2000, 21% of trade pairs in APEC had adopted digital trade provisions as of 2010 (Exhibit 7). The coverage of digital trade provisions between APEC economies further increased over the following decade so that over 40% of trade pairs in APEC were covered by at least one digital trade provision in 2021.

### Digital trade provision coverage among APEC economies increased over the past two decades with sharp jumps in 2010 and 2018

**Progress in coverage in digital trade provisions among APEC economies**

Percentage of trade pairs within APEC which have provisions in force between them (non-zero DTOI), 2000-2021



Source: Access Partnership analysis, TAPED

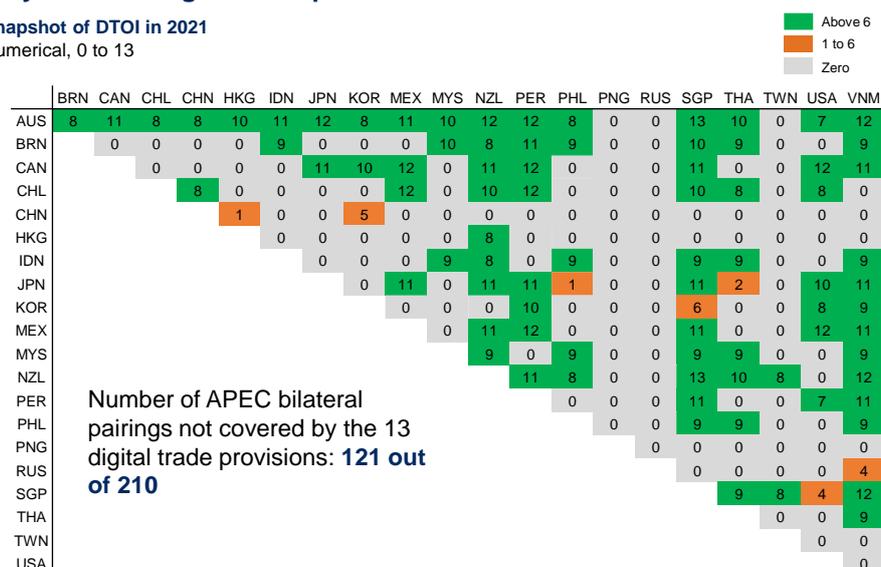
While the subsequent econometric analysis conducted to compare digital trade openness against digital trade flows spanned 2000 to 2018, the DTOI was compiled up to 2021 to provide a view of more recent developments in digital trade liberalisation. Compared to 2018, the DTOI in 2021 revealed that (i) an

additional 12 APEC bilateral trade relationships are covering some of the 13 digital trade provisions; and (ii) the coverage of digital trade provisions has increased for 32 trade pairs (Exhibit 8). This progress reflects recent trade agreements such as the RCEP and ASEAN Agreement on Electronic Commerce that came into force after 2018. Nevertheless, 121 out of 210 unique trade pairs in APEC remain not covered by any of the 13 digital trade provisions as of 2021, and there is scope to further improve APEC's digital trade infrastructure.

## EXHIBIT 8

### As of 2021, more than half of trade pairs in APEC are still not covered by any of the 13 digital trade provisions in the DTOI

Snapshot of DTOI in 2021  
Numerical, 0 to 13



Source: Access Partnership analysis, TAPED

### 2.3 Potential impact of digital trade rules on digital trade flows

Using the DTOI as an approximation for digital trade liberalisation, an analysis was conducted to understand the extent to which the adoption of digital trade provisions led to increased digital trade flows (approximated in Section 1). To recap, digital trade flows in this study are measured through two components; Component 1 measures the cross-border trade of digitally ordered goods and services, while Component 2 measures the cross-border trade of services expected to be digitally deliverable.<sup>58</sup> Papua New Guinea was not included in the econometric analysis as digital trade data for both Components were not available. In addition, digital trade with APEC's major trading partners, the EU and India, was included in the econometric analysis in order to capture a more comprehensive picture of the effect of digital trade liberalisation, which has an effect beyond intra-APEC digital trade flows.

An econometric model based on a structural gravity model, adapted from Anderson and van Wincoop (2003), is used in this study.<sup>59</sup> The structural gravity model is widely used to study and quantify the effects of various determinants of international trade and is seen as a critical tool for the analysis of trade policy. The specifications of the structural gravity model used can be found in Appendix I. The analysis seeks to answer the following questions:

<sup>58</sup> Goods and services that are both digitally ordered and digitally deliverable are accounted for in both Component 1 and 2, hence caution should be taken when thinking of calculating total digital trade, due to the potential overlap between Component 1 and Component 2. This overlap is not expected to be significant.

<sup>59</sup> Anderson & van Wincoop (2003), *Gravity with Gravitas: A Solution to the Border Puzzle*. Available at: [https://vi.unctad.org/tda/papers/Gravity%20Models\\_Roberta\\_Jean/Anderson\\_van%20Wincoop%20\(2003\)%20Gravity%20with%20gravitas%20-%20a%20solution%20to%20the%20border%20puzzle.pdf](https://vi.unctad.org/tda/papers/Gravity%20Models_Roberta_Jean/Anderson_van%20Wincoop%20(2003)%20Gravity%20with%20gravitas%20-%20a%20solution%20to%20the%20border%20puzzle.pdf)

1. Do digital trade provisions collectively affect digital trade flows, and how soon is this effect realised?
2. Which specific provisions or categories of provisions have observable effects on digital trade flows?
3. Do provisions that are not legally binding have a different magnitude of impact from those that are legally binding?

From the analysis, four key insights were observed:

- (i) **Adopting digital trade provisions increased the volume of digitally deliverable trade. Digital trade provisions that came into force between 2000 and 2018 are estimated to have added USD 40.1 billion or 2.9% to the overall value of digitally deliverable trade between APEC economies in 2018.**

An aggregate-level analysis found that, between 2000 and 2018, there was a significant positive relationship ( $p < .001$ ) between the extent of coverage of digital trade provisions and the flow of digitally deliverable services between trading partners (i.e., Component 2).<sup>60</sup> On average, exports of digitally deliverable services increased by 2.9% over and beyond business-as-usual (BAU) trade growth levels for every additional DTOI provision in force between two trading partners. Part of the impact can be attributed to the presence of an FTA between two economies, as FTAs provide an indication of strong bilateral trade ties, and encourage an overall stronger trade relationship, both digital and non-digital. However, even when controlling for the presence of FTAs, the positive relationship remained significant ( $p = .007$ ), exports of digitally deliverable services increased by 2.3% over and beyond BAU trade growth levels for every additional DTOI provision in force between two trading partners.<sup>61</sup>

By compounding the 2.3% increase in flows of digitally deliverable services above BAU levels at each given year across bilateral trade pairs to 2018, digital trade provisions that came into force between 2000 and 2018 are estimated to have added USD 40.1 billion or 2.9% to the value of trade in digitally deliverable services in 2018.<sup>62</sup> However, these gains are not distributed evenly across APEC economies as most APEC trade pairs continued not to be covered by any of the 13 digital trade provisions in 2018, suggesting that some APEC economies may not be harnessing the full benefits of digital trade.

The aggregate-level analysis did not find a significant relationship between the coverage of digital trade provisions and the flow of digitally ordered goods and services ( $p = .115$ ).<sup>63</sup> However, the provision-level analysis suggests that this is due to fewer digital trade provisions in the DTOI having a significant relationship with digitally ordered goods and services (Component 1) at the individual provision level.<sup>64</sup>

- (ii) **The impact of digital trade provisions on trade volumes for digitally deliverable services was strongest one year after provisions came into force.**

Even after digital trade provisions come into force, there could be a period of implementation or adjustment for governments, businesses, or consumers before an impact on trade flows can be observed. Specific to flows of digitally deliverable services, the analysis found that changes in the coverage of digital trade provisions had a significant positive relationship with digital trade flows at a lag of one year.<sup>65</sup> The one-year lag time is a relatively short one and could in part be attributed to the time difference between the signing of trade agreements and when they come into force. During this period,

<sup>60</sup> See Table D2 of Appendix I.

<sup>61</sup> See Table D2 of Appendix I.

<sup>62</sup> For instance, if the DTOI increased in 2009 between a bilateral trade pair, the modelled increase in digital trade flows which are over and beyond BAU growth levels would be based on the prior year (2008)'s digital trade exports, and further compounded by the 2009-2018 CAGR for digital trade flows to arrive at the overall contribution of digital trade provisions to digital trade flows in 2018, for that bilateral trade pair.

<sup>63</sup> See Table D1 of Appendix I

<sup>64</sup> See Tables D3.1 and D3.2 of Appendix I

<sup>65</sup> See Table D2 of Appendix I

participants may already be taking steps to fulfil their commitments under the trade agreements. For instance, economies could already be putting frameworks into place and preparing businesses for potential changes created by new commitments expected to come into force shortly.

### **Box 3: Testing for reverse causality**

Existing trade literature often highlights the risk of reverse causation or bi-directional causality in interpreting policy effects on trade.<sup>66</sup> Higher bilateral trade flows could create stronger incentives for economies to adopt digital trade provisions, potentially confounding the results by overestimating the impact of digital trade provisions on digital trade flows, when such impact is in fact due to higher trade flows in the first instance (i.e., a bi-directional causality). That is, finding evidence of reverse causality would undermine the interpretation that increased coverage of trade provisions leads to (or 'causes') increased digital trade flows. To test for this, a Granger causality test was conducted to detect the direction of causality between coverage of digital trade provisions at an aggregate level and the flow of digitally deliverable services.<sup>67</sup> The same analysis was not conducted for digitally ordered trade due to the lack of a significant relationship at the aggregate level.

This analysis did not find evidence of reverse causality. In other words, the volume of trade in digitally deliverable services in any given year does not influence the likelihood of a trade pair adopting digital trade provisions in the following years. As such, the relationship between the coverage of digital trade provisions and flows of digitally deliverable services is unidirectional and increased digital trade provision coverage likely leads to higher flows of digitally deliverable services.

- (iii) **The adoption of specific digital trade provisions could increase the flows of digitally ordered and digitally deliverable trade by between 11% and 44% in successive years. Provisions to increase consumer trust and lower market entry barriers for sellers had the clearest impact on digital trade.**

The study also sought to understand the potential impact of individual provisions on digital trade flows. For individual provisions that demonstrated a positive significant impact on digital trade flows, either digitally ordered (Component 1) or digitally deliverable (Component 2), Exhibit 9 lists the sum of the impact on digital trade flows over the next two years for digital ordered trade,<sup>68</sup> and three years for digitally deliverable trade. The two-year or three-year timeframes were selected to demonstrate the long-run impact of each provision. The impact of adopting a provision tapers off after three years, but it would continue to be reflected in the overall increase in digital trade for subsequent years even if trade grows at BAU levels (i.e., as the trade pair would now be at a higher base).

These results means that provision coming into force could increase digital trade flows in the subsequent one to two years and, for digitally deliverable trade, up to three years for digitally ordered trade. The total gain is estimated at between 11% to 44% against the volume of exports in Year T. For instance, taking the digital trade value for digitally deliverable services between a hypothetical trade pair as USD 100 million in 2015, an e-invoicing provision that comes into force in 2015 could potentially create an additional USD 40 million in trade value between 2016 and 2018. In 2019, the direct impact

<sup>66</sup> One example is the "natural trading partner" hypothesis (Lipsey, 1960; Summers, 1991, Wonnacott and Lutz, 1989, Krugman, 1991), where economies are more likely to form regional trade agreements (RTAs) with partners with which they already trade a lot, and these RTAs are more likely to benefit its members.

<sup>67</sup> A Granger causality test is a statistical hypothesis test for determining whether a time series variable is useful in forecasting another, otherwise known as Granger-causing another variable, and is a probabilistic account of causality. We measure the possibility of reverse causality by running a Granger causality test in the reverse direction between the DTOI and flows of digitally deliverable services. Higher flows of digitally deliverable services do not Granger-cause higher DTOI values ( $p = .1933$ ).

<sup>68</sup> Only up to two years of data is available for digitally ordered trade (2016 to 2018).

of the provision will taper off, but future growth would ride on the higher trade flows created by the adoption of the provision in earlier years. That said, this analysis does not consider the interaction between individual provisions. In other words, the total impact on digital trade flows is not the sum of the individual impact of these provisions.

Of the 13 provisions, provisions committing economies to not impose customs duties on digital products and/or electronic transmissions were found to have no significant impact on digital trade and were omitted from further analysis. This could be a result of the regular extension of a Moratorium on imposing customs duties on electronic transmissions by WTO members since 1998, thus demonstrating little information value and statistical significance on the impact of these provisions on digital trade, as they merely represent restatements of Parties' official policy positions.<sup>69</sup> The Moratorium has been extended until the 13<sup>th</sup> Ministerial Conference (MC13) of WTO due to take place by end-2023.<sup>70</sup>

EXHIBIT 9

## Impact of individual digital trade provisions on components of digital trade

### Impact of digital trade provisions on digital trade components in the long-run<sup>1</sup>

Provision	Digitally ordered	Digitally delivered	Provision	Digitally ordered	Digitally delivered
 Cybersecurity		25.0%	 E-authentication and e-signatures	18.8%	21.3%
 Privacy protection	11.2%		 Domestic electronic transactions framework		
 Online consumer protection	21.4%		 E-invoicing		44.0%
 Measures against unsolicited commercial communications	32.5%		 Prohibition of data localisation		
 Participation in digital trade for small businesses	24.6%		 Cross-border transfer of information		
 Market access and national treatment for ICT services	19.9%	29.1%	 Paperless trading		17.0%

**Impact<sup>2</sup>** | **A%** Strong statistical significance ( $p < .05$ )  Weak statistical significance ( $p < .1$ )  No statistical significance

**Mechanism of impact** |  General  Increase consumer trust  Lower market entry barriers  
 Reduce business transaction cost  Reduce business trade cost

Notes

1. The long-run impact is defined as the total impact of each trade provision on flows in each digital trade component in the next 2 years (for digitally ordered trade) or next 3 years (for digitally delivered trade) and is expressed as a percentage of digital trade flows in the year in which the provision comes into force.
2. Statistical significance quantifies how likely a relationship between two variables is likely to be attributed to a specific cause instead of pure chance. In the absence of "Strong statistical significance" or "Weak statistical significance", the provision does not have a statistically significant impact on digital trade flows (observed relationship is likely to be due to chance).

Source: Access Partnership analysis, Euromonitor, OECD TiVA, TAPED, UNCTAD

<sup>69</sup> WTO (2022), Work Programme on Electronic Commerce: Draft Ministerial Decision of 16 June 2022. Available at: <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:WT/MIN22/W23.pdf&Open=True>

<sup>70</sup> WTO (2022). MC12 "Geneva package" - in brief. Available at: [https://www.wto.org/english/thewto\\_e/minist\\_e/mc12\\_e/geneva\\_package\\_e.htm](https://www.wto.org/english/thewto_e/minist_e/mc12_e/geneva_package_e.htm)

To understand the results, it is important to examine the channels through which the specific trade provisions impacts digital trade flows. These are discussed in further detail as follows:

**A. The adoption of provisions aimed at strengthening the enabling environment for digital trade, such as cybersecurity provisions had a statistically significant and positive relationship with trade in digitally deliverable services.**

Cybersecurity provisions are usually formulated as cooperative activities such as building the capacity of entities responsible for computer security incident response and cooperating using existing collaboration mechanisms to identify and mitigate malicious intrusions or dissemination of malicious code that affect electronic networks.

Our analysis found a statistically significant and positive relationship between the adoption of cybersecurity provisions with flows of digitally deliverable services only ( $p = .042$ ). The adoption of cybersecurity provisions could increase digitally deliverable trade flows by 25% of digitally deliverable trade value in the year of adoption in the three years following adoption.<sup>71</sup> While a statistically significant relationship was not observed for digitally ordered trade, it is undoubted that cybersecurity is important to trade conducted via e-commerce platforms. The lack of an observable relationship could be due to the lack of direct interface between users of e-commerce platforms and cybersecurity frameworks, with users placing their trust in the quality of the security of e-commerce platforms rather than monitoring changes in cybersecurity regulations. Beyond increasing trust at the B2B level for firms to participate in digital trade, the cooperation element implied in these provisions helps to harmonise cybersecurity standards. This may support market access through an open Internet and reduce costs of Internet access and cross-border transactions, especially in emerging economies.<sup>72</sup> As such, this finding emphasises cybersecurity response, cooperation, and standard-setting as a foundational element for the digital trade agenda.

**B. The adoption of provisions aimed at increasing consumer trust had statistically significant and positive relationships with digital trade flows, although the effect was stronger for trade in digitally ordered goods and services.**

Provisions aimed at increasing consumer trust refer to those aimed at strengthening protection of privacy and personal data, online consumer protection and combating unsolicited commercial e-communications (spam). The adoption of such provisions was generally found to have a statistically significant and positive relationship with flows of digitally ordered goods and services. The relationship with digitally deliverable services was found to be either not statistically significant or to have positive, albeit weak, statistical significance, depending on the specific provision. The impact of specific provisions is discussed in Box 4.

**Box 4: Discussion on specific provisions related to increasing consumer trust**

**The adoption of privacy protection provisions revealed a statistically significant relationship with digitally ordered goods and services.** The analysis found a positive relationship between the adoption of provisions related to privacy protection with flows of digitally ordered goods and services ( $p = .032$ ).<sup>73</sup> The adoption of such provisions led to increases in digitally ordered trade values for the next two years that amount to 11.2% of digitally ordered trade value in the year of adoption. The relationship with digitally deliverable services was not statistically significant ( $p = .174$ ).<sup>74</sup>

<sup>71</sup> See Table D4.1 of Appendix I.

<sup>72</sup> Oddenino (2018), *Digital standardization, cybersecurity issues and international trade law*. Available at: [http://www.gil-gdi.org/wp-content/uploads/2018/08/03\\_Data-Protection\\_-ODDENINO\\_FIN.pdf](http://www.gil-gdi.org/wp-content/uploads/2018/08/03_Data-Protection_-ODDENINO_FIN.pdf)

<sup>73</sup> See Table D3.1 of Appendix I.

<sup>74</sup> See Table D4.1 of Appendix I.

Provisions relating to personal information protection and privacy are often cited as key enablers of the digital economy, to address risks and foster greater trust among participants of digital trade, particularly for buyers.<sup>75</sup> A study commissioned by security vendor Imperva on consumers in Singapore, Australia, the United States, and the United Kingdom revealed that consumers share more personal data today compared to two years ago but would stop using a service altogether if the provider suffered a security incident or data breach, underlining the importance of consumer trust in data security.<sup>76</sup>

Therefore, the result of the analysis likely reflects that trade in digitally ordered goods and services tend to be B2C relationships, with users who are concerned about personally identifiable data and payment details, while trade in digitally deliverable services tend to be B2B relationships, which would occur between entities that rely on commercial contracts to protect business data.

**The adoption of online consumer protection provisions had an overall positive effect on digital trade flows.** The analysis found that the adoption of online consumer protection provisions had a statistically significant and positive relationship with the flow of digitally ordered goods and services ( $p = .007$ )<sup>77</sup>, and a positive, albeit weak, statistically significant relationship with digitally deliverable services ( $p = .068$ ).<sup>78</sup> The adoption of such provisions leads to increases in digitally ordered trade values for the next two years that amount to 21.4% of digitally ordered trade value in the year of adoption.

The weaker relationship with digitally deliverable services may be because services such as financial services are more likely to be transacted with known sellers. This contrasts with trade in digitally ordered goods and services on e-commerce platforms that bring together smaller and less known sellers. Consumers making online purchases are often limited in their means to test the reliability of retailers and the quality of products and having online consumer protection mechanisms in place may be more important.<sup>79</sup> Online consumer protection provisions seek to reduce risk through addressing fraudulent practices and creating avenues for dispute resolution and redress through cooperation between consumer protection agencies.<sup>80</sup> Therefore, consumer protection provisions are more important in trades between two parties who are unfamiliar to each other.

**The adoption of provisions aimed at addressing unsolicited commercial electronic messages only revealed a statistically significant relationship with the flow of digitally ordered goods and services.** The analysis found that provisions targeted at reducing spam had a statistically significant and positive relationship with digitally ordered goods and services ( $p = .003$ ).<sup>81</sup> The relationship with digitally deliverable services was not statistically significant ( $p = .146$ ).<sup>82</sup> The adoption of such provisions led to increased trade in digitally ordered goods and services for the next two years that amount to 32.5% of digitally ordered trade value in the year of adoption.

For potential e-commerce users, perceived security is important. Spam messages are common avenues for cyber security attacks (including malware and phishing) and the volume of spam may

<sup>75</sup> For instance, Article 19.8.1 of the United States-Mexico-Canada Agreement (USMCA) states that “The Parties recognize the economic and social benefits of protecting the personal information of users of digital trade and the contribution that this makes to enhancing consumer confidence in digital trade.”

<sup>76</sup> Imperva (2022), “No Silver Linings: Your Dirty Little Secrets Aren’t Safe in the Cloud”. Available at: [https://www.imperva.com/resources/resource-library/reports/no-silver-linings-your-dirty-little-secrets-arent-safe-in-the-cloud/?utm\\_source=press-release&utm\\_medium=pr](https://www.imperva.com/resources/resource-library/reports/no-silver-linings-your-dirty-little-secrets-arent-safe-in-the-cloud/?utm_source=press-release&utm_medium=pr)

<sup>77</sup> See Table D3.1 of Appendix I.

<sup>78</sup> See Table D4.1 of Appendix I.

<sup>79</sup> Mavlanova et al (2012), *Signaling theory and information asymmetry in online commerce*. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0378720612000444>

<sup>80</sup> The United Nations Guidelines for Consumer Protection (UNGCP), last revised by the General Assembly in 2015, provides a set of principles for effective consumer protection legislation and promotion of cooperation among Member States.

<sup>81</sup> See Table D3.1 of Appendix I.

<sup>82</sup> See Table D4.1 of Appendix I.

influence perceptions on the safety of online transactions.<sup>83</sup> Furthermore, sending excessive personalised notifications constantly to an e-commerce customer would eventually be considered spam by the customer, eroding trust and reducing purchases. A study by Adobe on Asia Pacific consumers highlighted that digital experiences outranked in-person experiences for building consumer trust, and that poor personalisation, such as irrelevant ads and offers or ‘contact in a creepy way’, erodes trust for a significant proportion of e-commerce customers.<sup>84</sup>

### C. The adoption of provisions aimed at lowering market entry barriers for businesses had a statistically significant and positive relationship with overall digital trade flows.

Barriers for firms entering overseas markets can include information gaps on local regulations and industry dynamics, or regulatory preference for domestic producers of goods and services. To address these market entry issues, FTAs can include provisions for participation of small businesses in digital trade, as well as non-discrimination between domestic and foreign producers (market access and national treatment commitments). Lowering the barriers for small businesses to participate in cross-border digital trade and providing certainty to foreign entrants can encourage competition which may in turn increase productivity, lower prices for consumers and increase trade volumes. The impact of specific provisions is discussed in Box 5.

#### Box 5: Discussion on specific provisions related to lowering market entry barriers

**The adoption of provisions to facilitate small businesses’ participation in digital trade had a statistically significant and positive relationship with digital trade flows.** The analysis found that the adoption of provisions to support small businesses to engage in digital trade had a statistically significant and positive relationship with flows of digitally ordered goods and services ( $p = .006$ )<sup>85</sup>. The relationship with flows of digitally deliverable services was also positive and statistically significant, but to a weaker extent ( $p = .059$ ).<sup>86</sup> The adoption of such provisions led to increased trade in digitally ordered goods and services for the next two years that amount to 24.6% of digitally ordered trade value in the year of adoption.

MSMEs account for 98% of total business establishments in APEC, and around 35% of direct exports.<sup>87</sup> It is unsurprising that provisions encouraging MSME participation in digital trade have an impact on digital trade flows. The weaker relationship between these provisions and trade in digitally deliverable services could be potentially due to programs that drive MSME participation in digital trade being more focused on e-commerce – particularly as the participation of MSMEs in e-commerce and global value chains is seen by policymakers as an effective tool to support MSMEs growth.<sup>88</sup>

Provisions to reduce e-commerce barriers for MSMEs have been prevalent since the United States-Chile Free Trade Agreement,<sup>89</sup> with similar provisions included in recent agreements such as the Japan-Australia Economic Partnership Agreement (JAPEA) and the Australia-Singapore Digital

<sup>83</sup> Rao and Reiley (2012), *The Economics of Spam*. Journal of Economic Perspectives – Volume 26, Number 3. Available at: <https://pubs.aeaweb.org/doi/pdf/10.1257/jep.26.3.87#:~:text=This%20brings%20the%20total%20worldwide,nearly%20%2414%20billion%20per%20year.&text=If%20firms%20were%20not%20investing,loss%20at%20over%20%241%20trillion>.

<sup>84</sup> Adobe (2022), Adobe Trust Report 2022: APAC. Available at: <https://business.adobe.com/au/resources/trust-apac-report.html>

<sup>85</sup> See Table D3.2 of Appendix I.

<sup>86</sup> See Table D4.2 of Appendix I.

<sup>87</sup> APEC Secretariat (2021), “Small and Medium Enterprises”. Available at: <https://www.apec.org/groups/som-steering-committee-on-economic-and-technical-cooperation/working-groups/small-and-medium-enterprises#:~:text=They%20contribute%20significantly%20to%20economic,or%20less%20of%20direct%20exports>.

<sup>88</sup> World Bank Blogs (2022). Boosting small businesses through E-Commerce and integration into value chains. <https://blogs.worldbank.org/psd/boosting-small-businesses-through-e-commerce-and-integration-value-chains>

<sup>89</sup> Article 15.5: “Having in mind the global nature of electronic commerce, the Parties recognize the importance of: (a) working together to overcome obstacles encountered by small and medium enterprises in the use of electronic commerce”.

Economy Agreement, with a focus on commitments to increase cooperation, information sharing, and participation in platforms to assist small businesses with international trade.<sup>90</sup> Another initiative encouraging MSME participation in digital trade is the APEC MSME Marketplace, which provides training and education resources, and help with connecting to trade promotion agencies, suppliers, and financiers across the region.<sup>91</sup>

**The adoption of provisions regarding market access and national treatment of ICT services had a statistically significant and positive relationship with digital trade flows.** The analysis found that provisions requiring parties to provide treatment that is no less favourable to their trading partners than they accord to domestic suppliers in ICT services and not discriminate between domestic and foreign firms had a statistically significant and positive relationship with both digitally ordered goods and services ( $p = .007$ )<sup>92</sup>, and digitally deliverable services ( $p = .008$ ).<sup>93</sup> The adoption of such provisions led to increases in digitally ordered trade values for the next two years that amounts to 19.9% of digitally ordered trade value in the year of adoption and increases in digitally deliverable trade values for the next three years that amounts to 29.1% of digitally deliverable trade value in the year of adoption.

The results suggest that provisions that facilitate foreign firms or suppliers to compete on an even playing field in the ICT sector are critical in building confidence amongst foreign companies and increasing digital trade. Such provisions also serve to enhance the stability and predictability of the trade regime, offering assurance to suppliers of services that regulations in their export markets or investment destinations will not become more restrictive. The results are consistent with a 2018 OECD study on the positive impact of legally binding market access and national treatment commitments on services exports.<sup>94</sup>

**D. The adoption of provisions aimed at reducing transaction costs for businesses through facilitating electronic transactions has a statistically significant and positive relationship with digital trade flows, with a stronger effect for digitally deliverable services.**

These provisions include electronic authentication and electronic signatures, establishing a domestic electronic transactions framework, and electronic invoicing. Establishing functional equivalence and technological neutrality between electronic and paper methods of documentation, authentication, and signatures, facilitates electronic transactions. This reduces operating costs and shortens payment cycles, helping businesses meet working capital needs and increase activity in digital trade, particularly MSMEs that have less access to capital.<sup>95</sup> The impact of specific provisions is discussed in Box 6.

**Box 6: Discussion on specific provisions related to reducing transaction costs for businesses**

**The adoption of provisions related to electronic authentication and electronic signatures had a statistically significant and positive relationship with digital trade flows.** The analysis found a statistically significant and positive relationship between provisions related to electronic

<sup>90</sup> University of Lucerne (n.d.). "TAPED: A Dataset on Digital Trade Provisions". Available at:

<https://www.unilu.ch/en/faculties/faculty-of-law/professorships/burri-mira/research/taped/>

<sup>91</sup> APEC MSME Marketplace (n.d.). Available at: <https://apecmsmemarketplace.com/>

<sup>92</sup> See Table D3.2 of Appendix I.

<sup>93</sup> See Table D4.2 of Appendix I.

<sup>94</sup> Lamprecht and Miroudot (2018), *The value of market access and national treatment commitments in*

*services trade agreements*, OECD Trade Policy Papers, No. 213, OECD Publishing, Paris. Available at: <https://www.oecd-ilibrary.org/docserver/d8bfc8d8->

<en.pdf?expires=1666619139&id=id&accname=guest&checksum=0A688D43000AEB2882056FB7080C2C8C>

<sup>95</sup> APEC Policy Support Unit (2020), Supporting MSMEs' Digitalization Amid COVID-19. Available at:

[https://www.apec.org/docs/default-source/Publications/2020/7/Supporting-MSMEs-Digitalization-Amid-COVID-19/220\\_PSU\\_Supporting-MSMEs-Digitalization-Amid-COVID-19.pdf](https://www.apec.org/docs/default-source/Publications/2020/7/Supporting-MSMEs-Digitalization-Amid-COVID-19/220_PSU_Supporting-MSMEs-Digitalization-Amid-COVID-19.pdf)

authentication and electronic signatures with both digitally ordered goods and services ( $p = .010$ )<sup>96</sup>, and digitally deliverable services ( $p = .028$ ).<sup>97</sup> The adoption of such provisions led to increases in digitally ordered trade values for the next two years that amounts to 18.8% of digitally ordered trade value in the year of adoption and increases in digitally deliverable trade values for the next three years that amounts to 21.3% of digitally deliverable trade value in the year of adoption.

The result could be attributed to the overall impact of such provisions on reducing operational costs for firms by reducing the need for complex paperwork and time needed to process transactions. The use of e-signatures could also reduce the incidence of fraud and allow for easier storage of business documents. Existing research also suggests that e-authentication and e-signatures is particularly critical in supporting B2B transactions. B2C transactions can be completed without complex exchanges of documents if robust cross-border payment systems are in place, such as through digital intermediary platforms. However, business contracts that require longer periods of fulfilment and complex payment terms are more likely to rely on secure e-signatures to conclude deals remotely.<sup>98</sup>

**The adoption of domestic electronic transaction framework provisions revealed a positive, albeit weak, statistically significant relationship with flows of digitally deliverable services, and no statistically significant relationship with digitally ordered trade.** The analysis found that adopting provisions encouraging Parties to avoid unnecessary regulatory burden on electronic transactions to drive stronger participation in cross-border trade had a positive, albeit weak, statistically significant relationship with digitally deliverable services ( $p = .070$ ).<sup>99</sup> The relationship with digitally ordered goods and services was not statistically significant ( $p = .918$ ).<sup>100</sup>

That this provision was observed to have a statistically significant relationship with trade in digitally deliverable services but not digitally ordered goods and services may reflect that transactions of the latter largely occur on e-commerce platforms that are already operating via electronic transactions, and therefore these provisions do not change the status quo. On the other hand, the positive, albeit weak, statistically significant relationship with digitally deliverable services may reflect that some B2B transactions are already not subject to an electronic transaction framework.

**The adoption of provisions related to electronic invoicing had a statistically significant and positive relationship with flows of digitally deliverable services.** E-invoicing<sup>101</sup> plays an important role in improving the efficiency, accuracy, and reliability of electronic commerce transactions. These provisions encourage acceptance of electronically submitted invoices in the same manner as hard copies, and sharing of best practices on measures while aligning with international standards to ensure cross-border interoperability. The analysis found a statistically significant and positive relationship between e-invoicing provisions with flows of digitally deliverable services ( $p = .006$ ).<sup>102</sup> The relationship with digitally ordered goods and services was not statistically significant ( $p = .163$ ).<sup>103</sup> The adoption of such provisions led to increased trade in digitally deliverable services for the next three years that amount to 44% of digitally deliverable trade value in the year of adoption.

E-invoicing can increase the volume and velocity of digital trade by reducing the risk of human error, shortening processing cycles, and reducing transaction costs such as printing and storage of paper

<sup>96</sup> See Table D3.2 of Appendix I.

<sup>97</sup> See Table D4.2 of Appendix I.

<sup>98</sup> World Bank (2020), The Regulation of Digital Trade: Key policies and international trends. Available at: <https://openknowledge.worldbank.org/bitstream/handle/10986/33164/The-Regulation-of-Digital-Trade-Key-Policies-and-International-Trends.pdf?sequence=1>

<sup>99</sup> See Table D4.2 of Appendix I.

<sup>100</sup> See Table D3.2 of Appendix I.

<sup>101</sup> Electronic invoicing, or e-invoicing, is the automated creation, exchange, and processing of request for payments between suppliers and buyers using a structured digital format.

<sup>102</sup> See Table D4.2 of Appendix I.

<sup>103</sup> See Table D3.2 of Appendix I.

invoices.<sup>104</sup> E-invoicing also enables MSMEs with more limited access to capital to participate in digital trade, as they become better able to meet working capital needs by selling their accounts receivables to lenders for cash, as well as improving on-time payment.<sup>105</sup> The lack of impact of e-invoicing provisions on digital ordered goods and services may be attributed to most of such transactions already being processed through e-commerce platforms which are likely early adopters of e-invoicing with or without such provisions.

**E. The adoption of provisions aimed at reducing cross-border digital trade costs for businesses had a positive, albeit weak, statistically significant relationship with digitally deliverable services, and no statistically significant relationship with digitally ordered goods and services.**

These provisions include prohibition of data localisation, cross-border transfer of information, and paperless trading. The presence of a positive relationship with digitally deliverable services is expected as any limitations to data flows could severely restrict trade in digitally deliverable services directly<sup>106</sup>, while in the case of digitally ordered goods and services, these limitations would largely impact the digital platforms first, and not sellers and consumers directly. However, the weak relationship for digitally deliverable services suggests that current exemptions or carve-outs often included in trade agreements alongside such provisions could be weakening their impact in enabling digital trade. The impact of specific provisions is discussed in Box 7.

**Box 7: Discussion on specific provisions related to reducing cross-border digital trade costs for businesses**

**The adoption of provisions relating to prohibition of data localisation had a positive, albeit weak, statistically significant relationship with digitally deliverable services trade.** Data localisation laws have aimed to reduce cybercrimes, allay privacy concerns, and protect public interest by preventing foreign authorities from accessing confidential data. However, the analysis found a positive, albeit weak, statistically significant relationship between provisions related to the prohibition of data localisation with flows of digitally deliverable services ( $p = .064$ ).<sup>107</sup> The relationship with digitally ordered goods and services was not statistically significant ( $p = .105$ ).<sup>108</sup>

Provisions prohibiting data localisation are unlikely to impact transaction volumes on digital platforms (digitally ordered trade) unless the platforms pass on the cost of data localisation to their users. On the other hand, it can impact a firm's decision to outsource certain parts of its financial and business processes to foreign service providers if there are restrictions on where confidential data such as human resource or financial data should be processed and stored, resulting in a statistically significant impact on digitally deliverable services trade flows. The weak effect could be due to data localisation provisions being more likely to be in-force between economies where there is already a strong digital trade relationship and mutual trust in the data storage and protection processes. In

<sup>104</sup> APEC Policy Support Unit (2019), *Chapter 6: Electronic Invoicing and Digital Trade*. Available at: [https://www.apec.org/docs/default-source/publications/2019/7/fostering-an-enabling-policy-and-regulatory-environment-in-apec-for-data-utilizing-businesses/toc/chapter-6.pdf?sfvrsn=6d55b89\\_1](https://www.apec.org/docs/default-source/publications/2019/7/fostering-an-enabling-policy-and-regulatory-environment-in-apec-for-data-utilizing-businesses/toc/chapter-6.pdf?sfvrsn=6d55b89_1)

<sup>105</sup> APEC Policy Support Unit (2020), *Supporting MSMEs' Digitalization Amid COVID-19*. Available at: [https://www.apec.org/docs/default-source/Publications/2020/7/Supporting-MSMEs-Digitalization-Amid-COVID-19/220\\_PSU\\_Supporting-MSMEs-Digitalization-Amid-COVID-19.pdf](https://www.apec.org/docs/default-source/Publications/2020/7/Supporting-MSMEs-Digitalization-Amid-COVID-19/220_PSU_Supporting-MSMEs-Digitalization-Amid-COVID-19.pdf)

<sup>106</sup> A working paper by the U.S. International Trade Commission similarly finds that digital trade facilitation provisions in trade agreements, measured by the presence of free data flow provisions, have increased trade in services but not goods. This broadly corroborates with our findings that free data flow provisions (prohibition of data localisation, and cross-border transfer of information) have positive, albeit weak, statistically significant effects on digitally deliverable services, but no statistically significant effect on digitally ordered goods and services.

<sup>107</sup> See Table D4.1 of Appendix I.

<sup>108</sup> See Table D3.1 of Appendix I.

such situations, data flows are already being facilitated regardless of such provisions. In addition, provisions could be subject to specific sectoral carveouts or exclude certain types of information, thus weakening their impact. The weak effect of the provision does not detract from the reality that domestic data storage or processing requirements can create significant costs for companies when they switch from a foreign supplier to a domestic supplier to store and process data, reducing the provision and trade in cross-border data-related services. A Leviathan Security Group study in 2016 estimated that data localisation measures raise firms' cost of hosting data by 30-60%<sup>109</sup>.

**The adoption of provisions related to the cross-border transfer of information had a positive, albeit weak, statistically significant relationship with digitally deliverable services.** The analysis found a positive, albeit weak, relationship between provisions related to the cross-border transfer of information with flows of digitally deliverable services ( $p = .056$ ).<sup>110</sup> The relationship with digitally ordered goods and services was not statistically significant ( $p = .171$ ).<sup>111</sup>

Provisions related to cross-border data transfers commit parties to recognise that cross-border flows of information are an essential part of electronic commerce and trade and include commitments to refrain from imposing or maintaining unnecessary barriers to electronic flow of information across borders. Such provisions are unlikely to impact transaction volumes on digital platforms (digitally ordered goods and services) as it is less likely affect end users of such platforms. For digitally deliverable services, the statistically significant relationship is in line with existing studies showing that lifting data transfer restrictions could increase services imports by an average of 5% globally.<sup>112</sup> This is attributable to the benefits for local companies and consumers who can now access cheaper digital services from abroad. However, as with data localisation provisions, such commitments are likely to be made between economies that already have a strong level of mutual trust or similar levels of data protections and therefore strong levels of cross-border data flows. Similarly, such provisions are also subject to carveouts which could weaken their impact.

**The adoption of provisions encouraging paperless trading had a statistically significant and positive relationship with digitally deliverable services.** The analysis found a positive relationship between provisions related to paperless trading and flows of digitally deliverable services ( $p = .026$ ).<sup>113</sup> The relationship with digitally ordered goods and services was not statistically significant ( $p = .132$ )<sup>114</sup>. The adoption of such provisions led to increased trade in digitally deliverable goods and services for the next three years that amount to 17% of digitally deliverable trade value in the year of adoption.

Such provisions relate to the facilitation of electronic custom procedures to import and export goods and include commitments to provide for pre-arrival processing of trade documents electronically as well as make trade administration documents available in an electronic format. This could include the establishment of a "trade single window" to enable traders to submit documentation for import, export, or transit of goods to the custom authorities.<sup>115</sup> Such provisions are unlikely to impact transactions on e-commerce platforms, as the difference in border costs and lag times from the presence or absence of paperless trading systems are incurred by digital platforms and third-party logistics providers so costs might not be fully passed on to consumers. De minimis thresholds across APEC

<sup>109</sup> Leviathan Security Group (2016), *Quantifying the Cost of Forced Localization*. Available at: <https://static1.squarespace.com/static/556340e4b0869396f21099/t/559dad76e4b0899d97726a8b/1436396918881/Quantifying+the+Cost+of+Forced+Localization.pdf>

<sup>110</sup> See Table D4.1 of Appendix I.

<sup>111</sup> See Table D3.1 of Appendix I.

<sup>112</sup> Centre for Economic Policy Research (2018), "The cost of data protectionism". Available at: <https://cepr.org/voxeu/columns/cost-data-protectionism>

<sup>113</sup> See Table D4.2 of Appendix I.

<sup>114</sup> See Table D3.2 of Appendix I.

<sup>115</sup> See Article 7.1 (Pre-arrival processing), 10.2 (Acceptance of Copies), and 10.4 (Single Window) of the WTO Trade Facilitation Agreement. A Trade Single Window allows the trader or intermediary to submit all border data needed in a standardised format. This would mean submitting only once to border authorities through a single portal.

economies – allowing goods below a certain value to qualify for faster customs and border clearance and not pay import duties – may already have reduced associated trade costs for e-commerce sellers which deal in small value transactions to some extent so that paperless trade plays a smaller role in reducing trade costs further. For digitally deliverable trade, paperless trading provisions supports the digitalisation of information and could make it easier for businesses to engage foreign providers for administrative services if fewer paper documents are needed overall.

(iv) **Robust implementation backed by capacity building efforts is critical to achieve actual outcomes for digital trade provisions**

Trade agreements and provisions can be legally binding ('hard law') or non- legally binding ('soft law') commitments.<sup>116</sup> Analysis was undertaken to determine if a digital trade provision would have a more observable impact on digital trade flows if it were legally binding. Overall, making provisions legally binding did not create a more observable impact on digital trade flows. This could be as signatories generally prefer not to sign legally binding commitments until they are ready to implement the requirements. As such, it is critical to ensure that economies have the capacity to implement initiatives to support digital trade. Capacity building initiatives at the economy and regional levels will help ensure that the intent behind the digital trade provisions is borne out. In the case of paperless trading provisions, this could include building capacity through initiatives such as the ASEAN Single Window (ASW) and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific (CPTA). In this light, conclusion of more binding commitments can be viewed as a yardstick to identify and guide digital trade infrastructure and capacity building efforts in areas that require further progress.

An analysis of individual provisions found that among the provisions that had a significant positive relationship with digitally ordered goods and services, only **online consumer protection** provisions were significantly affected by its legally binding nature ( $p = .041$ )<sup>117</sup>. The analysis also found that among the provisions that had a significant positive relationship with digitally deliverable services, only **paperless trading** provisions were significantly affected by its legally binding nature ( $p = .030$ )<sup>118</sup>. This means that the significant positive relationships found between the other provisions and digital trade flows were unaffected by their legally binding nature.

To better understand these findings, the actual application of binding and non-binding commitments in the APEC region's context must be considered. Some provisions are almost always legally binding, such as provisions on market access and national treatment commitments for ICT services, as these obligations are identified by the General Agreement on Trade in Services (GATS) by the WTO, as well as provisions related to non-imposition of custom duties that APEC members (as WTO members) would need to abide by. In contrast, other provisions are rarely legally binding, particularly where they deal with more nascent initiatives, such as e-invoicing or broad issues such as facilitating MSME participation in digital trade and cybersecurity. These observations are reflected in the digital trade provisions in force among APEC economies and with key trading partners today. Exhibit 10 shows the prevalence of legally binding status for provisions amongst APEC trade pairs.

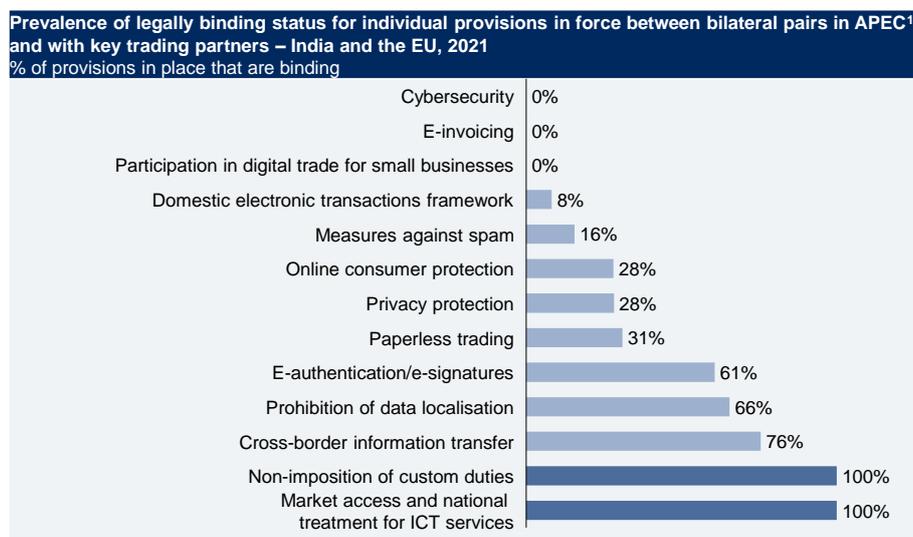
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<sup>116</sup> Example of binding commitments: 'shall', 'must', 'shall take appropriate measures'. The categorisation between binding and non-binding commitments follows the typology developed by Abbot and Snidal, where binding commitments (or hard law) refers to legally binding obligations that are precise, whereas non-binding commitments (or soft law) are legal arrangements that are 'weakened along one or more of the dimensions of obligation, precision, and delegation'. Binding commitments are those that are enforceable by another Party. These are commitments that oblige a Party to comply with a provision or a principle, and a claim for their non-compliance could eventually be brought under the dispute settlement mechanism of the agreement. See: Kenneth W Abbott and Duncan Snidal, 'Hard and Soft Law in International Governance' (2000) 54 International Organization 421, 421–422.

<sup>117</sup> See Table D5 of Appendix I.

<sup>118</sup> See Table D6 of Appendix I.

### Of the 13 provisions in the DTOI, two are always legally binding and three are always not legally binding



#### Notes

1. Economies included are APEC economies (ex. Papua New Guinea), as well as key trading partners India and the European Union. The bilateral relationship between India and European Union was not included. Papua New Guinea was excluded from the analysis as digital trade flow data for both components of digital trade was not available.

Source: Access Partnership analysis, TAPED

For the five provisions which are either always binding or non-binding across the trade agreements studied, the available data do not allow us to examine the difference in impact. Of the remaining eight, only provisions related to online consumer protection and paperless trading were found to have a larger impact on digital trade flows when legally binding. This impact could potentially be due to the importance of cross-border collaboration in addressing these areas. For online consumer protection and paperless trading, the establishment of frameworks and implementation protocols across borders is critical as it impacts both buyers and sellers across jurisdictions. For instance, cross-border paperless trade requires the set-up and operation of multiple measures in concert, such as IT border systems for EDI-based exchange, single windows, domestic rules on the legal validity of electronic documents and signatures, capacity building in internet access and digital skills to boost paperless trade use by MSMEs and e-traders.<sup>119</sup> The adoption of legally binding trade provisions can strengthen collaboration significantly in these areas to have strong impact on digital trade flows.

On the other hand, provisions for privacy protection, measures against spam, prohibition of data localisation, cross-border transfer of information, e-authentication, and the maintenance of a domestic electronic transaction framework are more reliant on domestic frameworks to implement even when cross-border collaboration is needed. For instance, e-authentication provisions call for the recognition of e-signatures in different jurisdictions, but before Parties can enter legally binding e-authentication provisions, they must first be confident of their ability to recognise and process e-signatures securely both domestically and internationally. As such, when a Party enters into an agreement, it would be likely that such infrastructure would already be in place and a further jump in digital trade flow is unlikely. Similarly, for measures related to privacy protection and data flows facilitation, Parties must be reasonably confident of their own ability and that of their partners to put such protections in place before putting in force such provisions. Again, this demonstrates that capacity building is critical to implementation and thus the impact of digital trade provisions on digital flows.

<sup>119</sup> The United Nations Centre for Trade Facilitation and Electronic Business (2017), *White Paper: Paperless Trade*. Available at: [https://unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePapers/WP-PaperlessTrade\\_Eng.pdf](https://unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePapers/WP-PaperlessTrade_Eng.pdf)

### *3. How APEC economies can capture the benefits of increased digital trade flows*

The first section of this report discussed how increasing digital trade flows could unlock economic growth. The second explored the impact of digital trade provisions on digital trade flows for APEC economies. Based on the research insights, existing policy developments and priorities in APEC, as well as global best practices, seven recommendations were identified under three policy pillars that can support policymakers to harness the benefits of digital trade:

Pillar 1: Support coverage and implementation of digital trade provisions

1. Increase coverage of digital trade provisions between APEC member economies.
2. Support implementation of provisions that encourage cross-border trade flows.
3. Promote interoperability as a core principle in the development of digital trade infrastructure.

Pillar 2: Support stakeholder confidence in digital trade environment

4. Focus on provisions to build consumer trust to improve participation of individual consumers and MSMEs in digital trade.
5. Focus on cybersecurity collaboration to strengthen digital trade infrastructure in APEC.

Pillar 3: Support digital trade participation through capacity building and monitoring

6. Pursue programs to help consumers, businesses, and policymakers to more actively participate in contributing to a vibrant digital trade environment.
7. Pursue initiatives to track the implementation of digital trade provisions to support the development of capacity building initiatives.

#### *3.1 Key takeaways for policymakers in APEC*

The adoption of modern digital trade rules through the conclusion of FTAs or digital economy agreements can contribute to an increase in digital trade flows. Overall, the adoption of specific digital trade provisions was found to increase the flows of digitally ordered and digitally deliverable trade by between 11% and 44% in successive years. The increased digital trade flows in turn allow economies to unlock the benefits of digital trade. These benefits are created through similar mechanisms as conventional cross-border trade but potentially with stronger effects. As such, it is imperative for policymakers in APEC to play a proactive role in driving the adoption of digital trade rules to harness the benefits of digital trade. The research also casts light on the specific impacts that different types of digital trade provisions could have on digital trade flows among APEC economies. Based on the insights from the research, three policy pillars have been identified to support different stakeholders involved in digital trade (Exhibit 11). Together, these three pillars aim to improve the coverage of digital trade provisions, to build the confidence and capacity of stakeholders in participating in digital trade, and enable APEC economies to strengthen the digital trade infrastructure in the APEC region.

### From the research, three policy pillars through which policymakers in APEC can harness the benefits of digital trade were identified

	Key findings from the research	 Support coverage and implementation of digital trade provisions	 Support stakeholder confidence in the digital trade environment	 Support digital trade participation through capacity building and monitoring
<b>What is digital trade and why is it important for APEC?</b>	<b>1</b> In 2018, APEC intra-regional digital trade contributed USD 2.1 trillion to APEC economies			✓
	<b>2</b> Robust implementation of provisions backed by capacity building efforts is critical to unlock digital trade benefits			✓
<b>How has adoption of digital trade rules changed in APEC?</b>	<b>3</b> Digital trade provision coverage in APEC increased significantly since 2000, with scope for further increase	✓		
	<b>4</b> Increased coverage of digital trade provisions had a positive impact on digital trade flows	✓		
<b>Do digital trade rules increase digital trade flows?</b>	<b>5</b> Provisions to reduce business transaction costs had a positive relationship with digital trade flows	✓		
	<b>6</b> Cybersecurity provisions had a positive relationship with digitally delivered trade flows		✓	
	<b>7</b> Consumer trust provisions had a positive relationship with digitally ordered trade flows		✓	
	<b>8</b> Absence of a significant relationship for cross-border data flow provisions demonstrates scope to improve implementation of provision	✓		

Source: Access Partnership analysis

Considering the insights of the research and ongoing policy developments in APEC, seven recommendations have been proposed to support policymakers in the APEC region harness the benefits of digital trade going forward under the three policy pillars (Exhibit 12).

### Seven recommendations under three policy pillars can support different groups of stakeholders involved in digital trade

	Recommendations
 <b>Support coverage and implementation of digital trade provisions</b>	<b>1</b> Increase coverage of digital trade provisions between APEC member economies
	<b>2</b> Support implementation of provisions that encourage cross-border trade flows
	<b>3</b> Promote interoperability as a core principle in the development of digital trade infrastructure
 <b>Support stakeholder confidence in the digital trade environment</b>	<b>4</b> Focus on provisions to build consumer trust to improve participation of individual consumers and MSMEs in digital trade
	<b>5</b> Focus on cybersecurity collaboration to strengthen digital trade infrastructure in APEC
 <b>Support digital trade participation through capacity building and monitoring</b>	<b>6</b> Pursue programs that support consumers, businesses and policymakers to more actively participate in contributing to a vibrant digital trade environment
	<b>7</b> Pursue initiatives to track the implementation of digital trade provisions to support development of targeted capacity building initiatives

Source: Access Partnership analysis

## Pillar 1: Support coverage and implementation of digital trade provisions

### **(i) Increase coverage of digital trade provisions between APEC member economies.**

Based on the DTOI, the coverage of key digital trade provisions between APEC economies has increased significantly from 2000 to 2021. Despite this progress, 121 out of 210 trade pairs in APEC are not covered by any of the 13 DOTI digital trade provisions 2021, indicating further need to strengthen APEC's digital trade infrastructure, as set out in key focus area 11 on "Facilitation of E-commerce and Advancing Cooperation on Digital Trade" under the APEC Internet and Digital Economy Roadmap (AIDER).

There is therefore scope for further action to strengthen the coverage of modern digital trade provisions between trade pairs in APEC. This could be done through the participation of more economies in digital economy agreements such as the DEA signed between Australia and Singapore or multilateral trade agreements such as the RCEP. The Australia-Singapore DEA provides a range of new trade rules and comprehensive framework for bilateral cooperation to reduce digital trade barriers and enable business and consumers in Australia and Singapore to capitalise on the digital economy.<sup>120</sup> Amongst other areas, it delivers robust rules to ensure that businesses can transfer data across borders and will not be required to build or use data storage centres in either jurisdiction; establishes new commitments on compatible e-invoicing and e-payment frameworks; and sets the stage for both parties to collaborate closely in supporting the harmonisation of key international standards to support digital trade.

Similarly, despite being a general trade agreement, the RCEP covers 12 of the 13 provisions under the DTOI although it does not include an e-invoicing provision. Trade pairs could also draw on APEC guidelines or frameworks setting out principles for key issues covered under the DTOI, such as the APEC Guidelines for Paperless Trade released by the APEC Sub-Committee on Customs Procedures in November 2021.<sup>121</sup> The Guidelines serve as a live document, which economies can consider when addressing paperless trade issues.

### **(ii) Support implementation of provisions that encourage cross-border data flows**

Past research has demonstrated the importance of strong data flows as an underlying enabler of digital trade. These studies suggest that lifting data transfer restrictions could increase services imports by an average of 5% globally. Against this background, the weak statistically significant relationship found in the analysis suggests that such provisions may not be achieving their full potential impact.<sup>122</sup>

Research has found that the macroeconomic costs of forced data localisation range between 0.7% and 1.7% of GDP, as it reduces trade, slows productivity, and increases prices for the affected industries.<sup>123</sup> In addition, data localisation has been associated with investment decreases of up to 4% as such restrictions reduce the attractiveness and competitiveness of an economy, suggesting that constraints on cross-border data flows not only affect the digital sector itself, but also the broader economy.<sup>124</sup> The weak statistically significant relationship between digital trade flows and provisions that facilitate cross-

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<sup>120</sup> Australian Department of Foreign Affairs and Trade (2020), "Australia-Singapore Digital Economy Agreement." Available at: <https://www.dfat.gov.au/trade/services-and-digital-trade/australia-and-singapore-digital-economy-agreement>

<sup>121</sup> APEC (2021). *Guidelines for Paperless Trade*. [https://www.apec.org/docs/default-source/publications/2021/11/guidelines-for-paperless-trade/221\\_sccp\\_guidelines-for-paperless-trade-doc.pdf?sfvrsn=fc955e27\\_2](https://www.apec.org/docs/default-source/publications/2021/11/guidelines-for-paperless-trade/221_sccp_guidelines-for-paperless-trade-doc.pdf?sfvrsn=fc955e27_2)

<sup>122</sup> Centre for Economic Policy Research (2018), "The cost of data protectionism". Available at: <https://cepr.org/voxeu/columns/cost-data-protectionism>

<sup>123</sup> Matthias Bauer et al. (2014), *The costs of data localization: Friendly fire on economic recovery*, European Centre for International Political Economy (ECIPE). Available at: [https://www.aicasia.org/wp-content/uploads/2017/06/OCC32014\\_1.pdf](https://www.aicasia.org/wp-content/uploads/2017/06/OCC32014_1.pdf)

<sup>124</sup> Matthias Bauer et al. (2014), *The costs of data localization: Friendly fire on economic recovery*, European Centre for International Political Economy (ECIPE). Available at: [https://www.aicasia.org/wp-content/uploads/2017/06/OCC32014\\_1.pdf](https://www.aicasia.org/wp-content/uploads/2017/06/OCC32014_1.pdf)

border data flows could be attributed to (i) trade pairs having such provisions in-force typically having a strong level of mutual trust in each other's data protection regimes that precede the conclusion of such provisions; and (ii) the presence of carve-outs in trade agreements specific to clauses governing data flows. As of 2021, considering all the trade pairs in APEC and with their largest trading partners, the EU and India, provisions to address data localisation are in-force between only 58 of these trade pairs. To encourage more trade pairs to work towards enabling data flows and improve the effectiveness of such provisions, policymakers could explore how to strengthen the language of such provisions alongside capacity building measures to ready more jurisdictions or economies to be well-placed to support data flows so as to encourage digital trade. For instance, capacity building programs could be undertaken to support more APEC economies to participate in the Global Cross-Border Privacy Rules (CBPR) Forum.<sup>125</sup> Economies with strong data protection regimes could potentially reap the benefits of cross-border data flows more easily. For instance, India announced in November 2022 that an upcoming Personal Data Protection Bill may allow the storage of personal data in selected geographies.<sup>126</sup>

To help make a case for implementation, policymakers could also consider conducting market research to better understand the impact of data localisation requirements or cross-border data flow restrictions on firms. This would align with the broader imperative under the AIDER, specifically key focus area 8 on "Facilitating the free flow of information and data for the development of the Internet and Digital Economy, while respecting applicable domestic laws and regulations".

### **(iii) Promote interoperability as a core principle in the development of digital trade infrastructure**

This research has found that provisions aimed at reducing the transaction costs for businesses at both the domestic and cross-border levels, such as provisions related to e-invoicing, domestic e-transactions frameworks, and e-authentication, largely have positive relationships with digital trade flows, although the extent varied between provisions. This suggests that the development of interoperable standards in the advancement of digital trade infrastructure would have a positive impact on digital trade flows and offers a lesson around the value of interoperability as a core principle for pursuing digital trade policy.

The contribution of e-authentication, e-invoicing and digital payments technologies to cross-border digital trade is strongly linked to the recognition of these technologies in different jurisdictions and the development of interoperability. Economies would also need to commit to avoid discrimination against specific technologies, networks, or systems to ensure that devices are able to communicate on a regular and stable basis. This principle of interoperability is core to the AIDER's key focus area 2 on "Promotion of Interoperability" which further points to interoperability being a key tenet not merely for digital trade but the overall development of the digital economy.<sup>127</sup>

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<sup>125</sup> The CBPR Forum is a voluntary certification scheme, originally developed in APEC. The Global CBPR Forum builds on the APEC CBPR formed in 2011 and is open to participation by non-APEC members. An economies must demonstrate that they can enforce compliance with the Privacy Framework requirements before joining. As of November 2022, participants include Australia, Chinese Taipei, Canada, Japan, the Republic of Korea, Mexico, Singapore, the United States of America, and the Philippines.

<sup>126</sup> MediaNama (2022). DPDP Bill, 2022: Transfers of Personal Data To Select Countries Will Be Allowed. Available at: <https://www.medianama.com/2022/11/223-dpdp-bill-2022-data-localisation-provisions-removed-data-transfer/>

<sup>127</sup> APEC (2017). *APEC Internet and Digital Economy Roadmap*. Available at: [http://mddb.apec.org/Documents/2017/SOM/CSOM/17\\_csom\\_006.pdf](http://mddb.apec.org/Documents/2017/SOM/CSOM/17_csom_006.pdf)

## Pillar 2: Support stakeholder confidence in digital trade environment

### **(iv) Focus on provisions to build consumer trust to improve participation of individual consumers and MSMEs in digital trade**

Provisions aimed at increasing consumer trust refer to those aimed at strengthening protection of privacy and personal data, online consumer protection and combating unsolicited commercial e-communications (spam). Such provisions were generally found to have a significant positive relationship with flows of digitally ordered goods and services, approximated based on transactions made on e-commerce platforms, and to a smaller degree, flows of digitally deliverable services, such as financial services and business services. The findings suggest that provisions perceived to strengthen consumer protection and privacy for individual users or MSMEs encourage the more active use of e-commerce platforms more actively to increase participation in digital trade flows. The finding suggests that as individual users or MSMEs engage buyers and sellers on e-commerce platforms for transactions, likely for the first time and without the protection of commercial contracts, the perceived safety of the platform becomes extremely important. Provisions that help to improve the safety of these platforms, whether actual or perceived, help to build consumer trust. Actual safety improvements are made when provisions lead to platforms operating across borders being mandated by personal data or consumer protection frameworks while perceived safety improvements are obtained when the volume of spam received by users is reduced.

Therefore, to strengthen confidence amongst users and increase participation in digital trade among individual consumers and MSMEs, policymakers should consider making consumer trust provisions an integral part of trade negotiations and explore broader initiatives to build frameworks or standards to strengthen consumer trust at the bilateral, regional, and multilateral level. This complements a broader imperative under the AIDER to enhance trust and security in the use of ICTs.<sup>128</sup> In APEC, ongoing discussions to develop a regional consumer protection framework could be deepened and accelerated in view of the study's findings (see Box 8). Insights and principles could be derived from policy debates taking place outside of the APEC region, such as the EU. For instance, past research in the EU suggests that consumer protection provisions or frameworks need to be complemented by cross-border enforcement systems and strong collaboration across enforcement agencies.<sup>129</sup>

#### **Box 8: APEC Regional Consumer Protection Framework**

APEC member economies have been discussing the importance of reviewing global trade rules to protect consumers engaging in digital trade and strengthening the implementation of such rules. Against this backdrop and rising participation in e-commerce due to the COVID-19 pandemic, the concept of an APEC-wide framework for consumer protection has been proposed by the Republic of Korea.<sup>130</sup>

The potential design of the framework was discussed at an APEC workshop held in August 2021, during which participants agreed that it was important to establish common principles for consumer protection within the APEC region and guidelines for firms and consumers to follow as domestic regulations were unable to adequately address the needs of cross-border transactions. If developed.

<sup>128</sup> APEC (2017). *APEC Internet and Digital Economy Roadmap*. Available at: [http://mddb.apec.org/Documents/2017/SOM/CSOM/17\\_csom\\_006.pdf](http://mddb.apec.org/Documents/2017/SOM/CSOM/17_csom_006.pdf)

<sup>129</sup> Hunter and Riefa (2017), *The challenge of protecting consumers in global online markets*. Commissioned by BEUC, Brussels. Available at: <https://www.beuc.eu/reports/challenge-protecting-eu-consumers-global-online-markets>

<sup>130</sup> APEC (2021). *APEC Regional Consumer Protection Framework Workshop*. Available at: [https://www.apec.org/docs/default-source/publications/2021/12/apec-regional-consumer-protection-framework-workshop/221\\_cti\\_apec-regional-consumer-protection-framework-workshop.pdf?sfvrsn=2495f71d\\_2](https://www.apec.org/docs/default-source/publications/2021/12/apec-regional-consumer-protection-framework-workshop/221_cti_apec-regional-consumer-protection-framework-workshop.pdf?sfvrsn=2495f71d_2)

such guidelines could be aligned with the UN Consumer Protection Guidelines. Participants also discussed the potential development of an APEC Online Dispute Resolution (ODR) platform to bring parties to a cross-border dispute together to resolve conflict in an affordable manner as well as the potential introduction of an APEC-wide trust mark that could provide information to consumers as well as foster opportunities for MSMEs in APEC's digital economy.

Given the importance of consumer protection efforts in strengthening consumer trust and therefore driving the participation of individuals and MSMEs in digital trade, APEC economies may wish to continue and accelerate these discussions and progress of the APEC Regional Consumer Protection Framework on the whole.

**(v) Focus on cybersecurity collaboration to strengthen digital trade infrastructure in APEC**

The analysis found a significant positive relationship between the adoption of cybersecurity provisions and flows of digitally deliverable services such as financial and business services. The adoption of cybersecurity-related provisions (including those that encourage the establishment of incidence response agencies and regional cooperation) had a positive impact on digital trade exports, illustrating its foundational role for the digital trade agenda. The finding is aligned with past research demonstrating that the risk of economic losses due to cyber incidents could be significant.<sup>131</sup> The estimated GDP loss due to cybercrimes can be up to 0.5% of GDP in high-income economies – the more likely targets of cybercrimes and the potential of cybercrimes could be a deterrence to digital trade participation.<sup>132</sup>

Given the cross-border nature of cyber threats and the role that collaboration in cybersecurity could play in driving increased confidence in digital trade and thus trade flows, it is critical for governments to work together to develop effective responses and protections. The APEC Framework for Securing the Digital Economy provides a set of non-binding principles and recommendations to inform member economies as they develop policy and regulatory frameworks to secure their digital economies. It encourages member economies to establish relationships to share experiences, best practices and collaborating to improve responses to domestic and cross-border threats, including through establishing Computer Security Incident Response Teams (CSIRT) points-of-contact. Within APEC, the ASEAN-Singapore Cybersecurity Centre of Excellence (ASCCE) provides a model for cybersecurity cooperation and the sharing of best practices (see Box 9).

Overall, as digital trade volumes increase alongside increased participation from a range of users, more users are at risk for being victims of cybercrimes. For instance, to achieve cost savings, MSMEs often outsource IT functions to local or remotely-managed service providers (MSPs), increasing their reliance on third parties. MSPs are not always adequately protected, opening the risks of malware infiltrating their customers' backend systems.<sup>133</sup> Past research estimates that breaching an MSP with 600 MSME customers could potentially lead to economic losses of about USD 80 billion, exceeding the impacts of natural disasters such as Hurricane Sandy (approximately USD 65 billion).<sup>134</sup> It is thus imperative for APEC economies to work together to address the risks of cybersecurity to ensure that the gains from digital trade are distributed to small businesses as well. This aligns with the AIDER's key focus area 7 on "Enhancing trust and security in the use of ICTs".

<sup>131</sup> FDD (2021), *The Economic Costs of Cyber Risk*. Available at: <https://www.fdd.org/analysis/2021/06/28/the-economic-costs-of-cyber-risk/>

<sup>132</sup> CSIS and McAfee (2018), *Economic Impact of Cybercrime – No Slowing Down*. Available at: <https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/economic-impact-cybercrime.pdf>

<sup>133</sup> Crowd Strike (2021), "How to Avoid Being Impacted by a Managed Service Provider (MSP) Breach". Available at: <https://www.crowdstrike.com/blog/how-to-avoid-being-a-victim-of-a-msp-breach/> and GovTech (2021), "Locking in COVID-19 digitalisation gains". Available at: <https://www.tech.gov.sg/media/technews/locking-in-covid19-digitalisation-gains>

<sup>134</sup> FDD (2021), *The Economic Costs of Cyber Risk*. Available at: <https://www.fdd.org/analysis/2021/06/28/the-economic-costs-of-cyber-risk/>

**Box 9: The ASEAN-Singapore Cybersecurity Centre of Excellence (ASCCE) provides a model for cybersecurity collaboration and sharing of best practices**

The ASEAN-Singapore Cybersecurity Centre of Excellence (ASCCE) collaborates with a range of international partners and experts to deliver cybersecurity training programmes to senior officials in ASEAN and beyond. The ASCCE was announced in 2018 and seeks to strengthen ASEAN's cybersecurity strategy development, legislation, and research capabilities.<sup>135</sup> Besides providing training, it also promotes the sharing of publicly accessible information on cyber threats and attacks, as well as best practices, and conducts research in areas such as international law, cyber strategy, legislation, cyber norms, and other cyber-security policy issues.<sup>136</sup>

Pillar 3: Support digital trade participation through capacity building and monitoring

**(vi) Pursue programs that support consumers, businesses and policymakers to more actively participate in contributing to a vibrant digital trade environment**

The analysis demonstrates that increased digital trade creates economic growth through the same mechanisms that conventional trade led to economic growth, but with stronger effects and on a broader basis. Technology and knowledge diffusion is a key channel for economies to benefit from the impact of increased digital trade flows and distribute the gains of digital trade more equally. Simultaneously, the goods and services involved in digital trade tend to be of higher value-added, representing a critical economic growth area. In addition, the analysis reinforces that beyond concluding digital trade provisions, it is also critical for economies to focus on creating capacity for the implementation of digital trade provisions. This is because the analysis suggests that legally binding provisions tend to be concluded only when administrations are confident of implementing them without creating significant challenges for consumers and businesses. As such, knowledge and digital skills gaps in the consumer population, businesses and public service must be addressed to harness the full benefits of digital trade.

APEC policymakers can consider various programs to build capacity for each of the following groups so that they can participate more actively in creating a vibrant digital trade environment:

- **Consumers.** Programs and policies to equip the general population with the adequate digital skills to access digital platforms and participate in digital trade confidently and safely could improve participation in digital trade and the digital economy. Such programs could be complemented by universal broadband access initiatives and other strategies to build inclusiveness and narrow potential digital divides.
- **Businesses and workers.** Programs to encourage the adoption of digital technologies and innovation amongst businesses, particularly MSMEs, and allow them to participate more actively in cross-border digital trade. Policies and programs should be devised to help firms leverage technologies to innovate in products, services, processes, and business models.
- **Government officials.** Programs to guide public officers in shaping a robust regulatory environment that will encourage digital trade participation and implement commitments under digital trade provisions effectively. It is particularly important for public agencies, including sectoral agencies, to be guided on crafting coherent regulatory approaches that provide clear direction for firms operating in different sectors, as outlined by the AIDER's key focus area 5

<sup>135</sup> Cybersecurity Agency of Singapore (2021), "ASEAN-Singapore Cybersecurity Centre of Excellence." Available at: <https://www.csa.gov.sg/News/Press-Releases/asean-singapore-cybersecurity-centre-of-excellence>

<sup>136</sup> The Straits Times (2021), "ASEAN-Singapore Centre for training National Cyber-Security Teams Opens New Campus." Available at: <https://www.straitstimes.com/tech/tech-news/asean-spore-centre-for-training-national-cyber-security-teams-opens-new-campus>

on “Promoting coherence and cooperation of regulatory approaches affecting the Internet and Digital Economy”.<sup>137</sup>

**(vii) Pursue initiatives to track the implementation progress of digital trade provisions to support development of targeted capacity building initiatives**

The findings of the study highlight the need for robust implementation of digital trade provisions to support digital trade flows, backed by regional capacity building efforts to ready economies for greater participation in the digital economy. To ensure that digital trade provisions in-force between APEC economies continue to be useful to enabling digital trade growth in the region, it is important for APEC economies to work together to gather and track the implementation of digital trade provisions. Importantly, insights from such data about implementation gaps would support the development of targeted capacity building initiatives in APEC, particularly for government officials. And aligns with the AIDER’s key focus area 9 on “Improvement of baseline Internet and Digital Economy measurements”.

The UN Global Survey on Digital and Sustainable Trade Facilitation is one example of a mechanism that monitors the progress made in trade facilitation globally based on the scope of the WTO Trade Facilitation Agreement (TFA) as well as emerging trade issues.<sup>138</sup> In APEC, similar initiatives could be considered to track the implementation of digital trade provisions as well as the implementation of broader relevant initiatives, to ensure that progress in strengthening digital trade infrastructure is regularly tracked. This could build on existing databases such as the OECD Digital Trade Inventory that collates existing rules, principles and standards that enable digital trade in jurisdictions across the world, including a number of APEC member economies.<sup>139</sup>

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<sup>137</sup> APEC (2017). *APEC Internet and Digital Economy Roadmap*. Available at:

[http://mddb.apec.org/Documents/2017/SOM/CSOM/17\\_csom\\_006.pdf](http://mddb.apec.org/Documents/2017/SOM/CSOM/17_csom_006.pdf)

<sup>138</sup> UN (2022). *Digital and Sustainable Trade Facilitation: Global Report 2021*. Available at: <https://www.untsurvey.org/report>

<sup>139</sup> OECD. *Digital Trade*. Available at: <https://www.oecd.org/trade/topics/digital-trade/>

# Appendix I: Methodology and detailed analysis

This section describes the detailed methodology and sources used for the research. There are three main parts in this section:

- (a) Methodology for estimating economic contribution in Section 1.2
- (b) Methodology and data sources to approximate digital trade in Section 2.1
- (c) Trade provisions included in the DTOI
- (d) Specifications of structural gravity model and detailed results of quantitative analysis in Section 2.3

## A. Methodology for estimating economic contribution

Economic contribution measures the value of production by a firm or industry. Value added is the most appropriate metric for economic contribution, as compared to other metrics such as total revenue or total export value, as these other methods risk double-counting and thus overstating economic contributions. For instance, these latter metrics would also include contributions by other industries supplying inputs as well as imported inputs, which are then reflected in the value of the final good or service which is sold. Instead, value added represents the unique contribution that each factor of production (e.g., labour and capital) creates for the value of the product in each intermediate step of production, and this can be measured by the incomes earned by those who own these factors of production. The sum of value added in production across all entities at the economy level, this is equivalent to the gross domestic product (GDP) of an economy.

Input-output (IO) tables provide a detailed dissection of intermediate transactions within sectors in an economy. The intra-industry production relationships described in IO tables are expressed as multipliers. Using these multipliers, it is possible to analyse the total impact on all industries in an economy where there is a change in the demand for the output of any one industry. The analysis considers three categories of impacts: direct effects, indirect effects, and consumption induced effects.

- **Direct effects:** Where there is an increase in final use for a particular industry output, there will be an equivalent increase in the output of that industry, as producers react to meet the increased demand. The direct multiplier is exactly equivalent to one.
- **Indirect effects:** As these producers in this industry increase their output, inputs from other industries may also be required, as well as other inputs from the same industry. The first round output from all industries will induce extra output from all industries, and in turn, these will induce extra output, and so on. The induced output is the industrial support output and is added to the first round output to give the indirect effect (otherwise known as production induced effects).
- **Consumption induced effects:** In the process of producing the initial and production induced output, wage and salary earners will earn additional income, which they will in turn spend on commodities produced by all industries in the economy. This spending will induce further production by all industries and is therefore described as “consumption-induced”.

Across these three categories, multipliers for value added and employment can be tabulated from the underlying gross output multipliers, using corresponding ratios specific to each industry in each economy.

The IO analysis in this study uses IO tables from the World Input-Output Database (WIOD) Project.<sup>140</sup> The IO tables and underlying data cover 43 economies and include a model for the rest of the world from 2000-2014. The IO tables provide data for 56 sectors in each economy. The IO analysis of gross output and value added impacts used economy-specific IO multipliers where data was available, and applied multipliers from the rest of the world model as a reasonable proxy where data was not available. For the IO analysis of employment impacts, economy-specific data was also used from ADB's Input-Output Tables for the Asia and the Pacific in instances where economy-specific data was not available from WIOD.<sup>141</sup>

While economic contribution studies through an IO approach are useful in characterising and quantifying the resultant impacts from initial changes in economic activities, there are some limitations. First, such studies do not account for displacement and opportunity cost; some factors of production which are consumed to meet the increased demand from the industry may have been spent on other economic activities. Second, the assumption of an unconstrained environment for economic activity neglects potential crowding out of economic activities when increase in economic activity in one area increases prices for another area, thus potentially overstating economic contribution. Thirdly, as a partial equilibrium model focusing on the demand side, the IO approach does not allow for price movements alongside quantity movements, as captured in a more dynamic model incorporating the supply side, such as a Computable General Equilibrium model.

### *B. Methodology and data sources to approximate digital trade*

As described in Section 2.1 of the report, two key components were identified to approximate digital trade. Table A1 shows the detailed methodology on how the two components were measured; the data sources used as well as the limitations of the methodology.

**Table B1: Methodology to approximate digital trade and limitations**

#	Component	Methodology and data sources	Limitations
1	Trade in digitally ordered goods and services (i.e., cross-border e-commerce)	<p>The OECD-WTO-IMF Handbook defines digitally ordered trade as “the international sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders”.</p> <p>Cross-border e-commerce statistics in economies are used to estimate trade in digitally ordered goods and services as well as trade in digital content. This component is only sized for 2016 to 2018 due to limitations in obtaining earlier data. A three-step process was used:</p> <ol style="list-style-type: none"> <li>1. Obtain estimates of cross-border business-to-consumer (B2C) e-commerce imports for each APEC</li> </ol>	<p>Different economies and sources record e-commerce values differently and this could lead to an underestimation in cases where e-commerce values are largely associated with trade in goods rather than trade in services. To address this, we will compare economy-level data with the values collected by UNCTAD which include both goods and services such as travel services.</p>

<sup>140</sup> Groningen Growth and Development Centre. World Input-Output Database. Available at:

<https://www.rug.nl/ggdc/valuechain/wiod/>

<sup>141</sup> Asian Development Bank. Input-Output Tables for Asia and the Pacific. Available at: <https://www.adb.org/what-we-do/data/regional-input-output-tables>

#	Component	Methodology and data sources	Limitations
		<p>economy and key trading partners.<sup>142</sup> This was checked against UNCTAD e-commerce estimates for major economies.<sup>143</sup></p> <ol style="list-style-type: none"> <li>Scale up the estimates from Step 1 to include cross-border business-to-business (B2B) e-commerce sales, using UNCTAD ratios of cross-border B2B:B2C sales.<sup>144</sup></li> <li>Break down cross-border e-commerce imports by source exporter at the bilateral level (i.e., between each APEC exporting/importing trade pair) using TiVA data on economy origin of gross imports for each APEC economy, excluding sectors in which e-commerce is less likely to be prevalent (i.e., agriculture, hunting, forestry and fishing; food products, beverages and tobacco; and mining and quarrying). For B2C e-commerce, the export composition was proxied based on the export composition of gross imports of final products, and for B2B e-commerce, the export composition was proxied by the export composition of gross imports of intermediate products, to reflect the differences between B2C and B2B e-commerce composition.</li> </ol>	
2	Trade in digitally deliverable services	The Handbook defines digitally delivered trade as “international transactions that are delivered remotely in an electronic format, using computer networks specifically designed for the purpose.” Aligned with this	Some categories used by other organisations were excluded from this research <sup>145</sup> : (a) Education services – Many APEC economies which rely

<sup>142</sup> This estimate was derived by taking the foreign share of B2C e-commerce goods sales (Euromonitor: Foreign E-Commerce (Goods) and E-commerce (Goods)), and then scaling up to include services (Euromonitor: Total E-Commerce (Goods and Services)). Data was purchased from Euromonitor, and available for the following economies: Australia; Canada; People’s Republic of China; Hong Kong, India; Indonesia; Japan; Republic of Korea; Mexico; The Philippines; The Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America. Data for the European Union (EU-28) was approximated by scaling up sales for United Kingdom, Germany, and France. <https://www.euromonitor.com/e-commerce-goods-and-services>.

<sup>143</sup> Sources include UNCTAD (2021), *Estimates of Global E-commerce 2019 and Preliminary Assessment of COVID-19 Impact on Online Retail 2020*. Available at: [https://unctad.org/system/files/official-document/tn\\_unctad\\_ict4d18\\_en.pdf](https://unctad.org/system/files/official-document/tn_unctad_ict4d18_en.pdf); UNCTAD (2020), *UNCTAD Estimates of Global E-commerce 2018*. Available at: [https://unctad.org/system/files/official-document/tn\\_unctad\\_ict4d15\\_en.pdf](https://unctad.org/system/files/official-document/tn_unctad_ict4d15_en.pdf); and UNCTAD (2019), “Global e-commerce sales surged to \$29 trillion”. Available at: <https://unctad.org/news/global-e-commerce-sales-surged-29-trillion#:~:text=Global%20e%2Dcommerce%20sales%20grew,quarter%20of%20the%20world's%20population>.

<sup>144</sup> The actual B2B:B2C ratios were used for each economy where available, otherwise the average for the top 10 exporters was used. Sources include UNCTAD (2020), *UNCTAD Estimates of Global E-commerce 2018*. Available at: [https://unctad.org/system/files/official-document/tn\\_unctad\\_ict4d15\\_en.pdf](https://unctad.org/system/files/official-document/tn_unctad_ict4d15_en.pdf); and UNCTAD (2019), “Global e-commerce sales surged to \$29 trillion”. Available at: <https://unctad.org/news/global-e-commerce-sales-surged-29-trillion#:~:text=Global%20e%2Dcommerce%20sales%20grew,quarter%20of%20the%20world's%20population>.

<sup>145</sup> Note: For other organisations’ definitions, other classifications were used in place of the ISIC codes. Sources include OECD, WTO, and IMF (2019). Available at: <https://www.oecd.org/sdd/its/Handbook-on-Measuring-Digital-Trade-Version-1.pdf>; UNCTAD (2021). Available at: [https://unstats.un.org/unsd/trade/events/2021/Beijing\\_workshop/presentations/5\\_3\\_UNCTAD%20Measuring%20e-commerce%20and%20the%20Digital%20Economy.pptx](https://unstats.un.org/unsd/trade/events/2021/Beijing_workshop/presentations/5_3_UNCTAD%20Measuring%20e-commerce%20and%20the%20Digital%20Economy.pptx); and ADB (2022). Available at: [https://aric.adb.org/pdf/aeir/AEIR2022\\_7\\_theme-chapter-advancing-digital-services-trade-in-asia-and-the-pacific.pdf](https://aric.adb.org/pdf/aeir/AEIR2022_7_theme-chapter-advancing-digital-services-trade-in-asia-and-the-pacific.pdf)

#	Component	Methodology and data sources	Limitations
		<p>definition, this study includes the following categories of services in sizing digitally deliverable services:</p> <ul style="list-style-type: none"> <li>• Publishing, audio-visual, and broadcasting activities (ISIC 58 to 60)</li> <li>• Telecommunications services (ISIC 61)</li> <li>• IT and other information services (ISIC 62, 63)</li> <li>• Financial and insurance activities (ISIC 64 to 66)</li> <li>• Professional, scientific, and technical activities (ISIC 69 to 75)</li> <li>• Administrative and support services (ISIC 77 to 82).</li> </ul> <p>Gross export values for digitally deliverable services at a bilateral level were obtained from the OECD-WTO Trade in Value-Added (TiVA) database (2021 revision). This was only sized between 2000 and 2018 due to limitations in obtaining more recent data.</p>	<p>less on education exports do not publish data on digital delivery of education exports, making it difficult to disaggregate the digital share of education exports;</p> <p>(b) Arts, entertainment, recreation, and other service activities – these are not digitally delivered to a material extent<sup>146</sup>; and</p> <p>(c) Travel services consumed abroad – these are likely to be partly accounted for by Component 1 (<i>trade in digitally ordered goods and services</i>), due to the increased presence and use of Digital Intermediary Platforms (e.g., Expedia, Agoda) in such use cases.</p> <p>In economies with a significant share of digitally delivered education exports (e.g., firms that deliver educational content online) or digitally delivered arts, entertainment, recreation services, this component could potentially be undersized. However, in absence of data, it would be more distortionary to include such services in the analysis.</p>

<sup>146</sup> The ADB remarked, “In other personal cultural and recreational services, other personal services (covering social services, membership dues of business associations, domestic services) are not generally considered to be yet digitally deliverable. In both cases, however, the traded values in those categories are negligible and therefore including them in the aggregate of digitally deliverable services will not affect the observed trends”. ADB (2022). Available at: [https://aric.adb.org/pdf/aeir/AEIR2022\\_7\\_theme-chapter-advancing-digital-services-trade-in-asia-and-the-pacific.pdf](https://aric.adb.org/pdf/aeir/AEIR2022_7_theme-chapter-advancing-digital-services-trade-in-asia-and-the-pacific.pdf)

### C. Trade provisions included in the DTOI and reasons for inclusion

The Digital Trade Openness Index is composed of 13 provisions that govern digital trade. The selection of the trade provisions to be included in the DTOI was based on two factors. First, the frequency of inclusion of the specific trade provision in trade agreements containing digital-related provisions signed between all economies, with particular focus on key recent trade agreements involving APEC economies such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Second, the inclusion of the provision in the key areas covered in the OECD Digital Trade Inventory, which provides a baseline for the analysis.<sup>147</sup>

**Table C1: Provisions included in the DTOI and reasons for inclusion**

#	Provision	Description	Reasons for inclusion
<b>General environment</b>			
1	Cybersecurity	Provisions related to cybersecurity. These could include cooperation activities such as building the capacity of entities responsible for cybersecurity incident response and/or collaborating to identify and mitigate malicious intrusions.	Strong cybersecurity frameworks and cross-border cybersecurity collaboration would create stronger reassurance for both firms and individual consumers in engaging in digital trade and encourage increased digital trade flows.
<b>Increasing consumer trust</b>			
2	Privacy protection	Provisions related to the protection of personal data and data privacy, including encouraging parties to proactively protect personal information by designing a legal privacy framework to prevent a misuse of individual information of consumers engaged in electronic commerce.	Strong data protection frameworks and collaboration can help foster consumer trust and increase use of digital tools, which in turn can incentivise participation in the digital economy and by extension, digital trade.
3	Online consumer protection	Provisions related to the protection of consumers engaged in e-commerce and/or the prevention of deceptive and fraudulent practices in e-commerce, including collaboration between consumer protection agencies.	Strong online consumer protection frameworks and collaboration could increase consumer confidence in online digital transactions and drive digital trade flows.

<sup>147</sup> The OECD Digital Trade Inventory aims to provide greater transparency and visibility for digital trade regulation across a range of fora, by providing an account of existing rules, principles and standards that are of importance for digital trade, in the context of issues that are being discussed for the Joint Statement Initiative (JSI) at the WTO. Nemoto and López-González (2021), "Digital trade inventory: Rules, standards and principles." *OECD Trade Policy Papers, Vol. N. 251*. Available at: <https://www.oecd-ilibrary.org/docserver/9a9821e0-en.pdf?expires=1663081641&id=id&accname=guest&checksum=201ED808802DCBEE54A54F4ACF55D150>

4	Measures against unsolicited commercial e-communications	Provisions calling for parties to take steps to regulate and/or reduce unsolicited commercial electronic communications (i.e., spam).	Unsolicited messages are a common avenue for cybersecurity attacks, including malware and phishing, and may be one of the most visible sign of security risks for consumers. Strong frameworks or collaboration to address this could contribute to stronger confidence amongst buyers or sellers about the security of digital trade transactions.
<b>Lowering market entry barriers</b>			
5	Participation in digital trade for small businesses	Provisions related to the facilitation of digital trade by micro, small and medium-sized enterprises (MSMEs). This could include cooperation on MSME -related issues such as knowledge building for MSMEs.	MSMEs face disproportionate challenges in participating in digital trade compared to large companies, but the participation of MSMEs in digital trade can help to ensure that benefits can reach a larger proportion of the workforce and population. Reducing the barriers to entry of new participants in digital trade can drive greater competition, delivering consumer benefits, and potentially increased digital trade flows.
6	Market access and national treatment for ICT services	Provisions related to market access and national treatment for the computer and related services and telecommunications services sectors.	Increased market access for ICT services to providers located cross-border could help to promote healthy competition and increase digital trade flows.
<b>Reducing transaction costs for businesses</b>			
7	Electronic authentication and electronic signatures	Provisions calling for parties not to prohibit electronic authentication methods or deny the legal validity of e-signatures and relating to mutual recognition of digital certificates and signatures.	E-signatures can reduce transaction costs associated with trade flows by reducing the amount of paperwork required, reducing the incidence of fraud, and allowing for easier storage of trade administration documents. Reduced transaction costs potentially facilitate increased digital trade flows.
8	Domestic electronic transactions framework	Provisions encouraging parties to avoid unnecessary regulatory burdens on electronic transactions and e-commerce.	Reducing the regulatory burden on electronic transactions and e-commerce could make it more affordable and attractive for users to engage in electronic transaction both domestically and across borders, driving digital trade flows.

9	Electronic invoicing	Provisions related to e-invoicing frameworks or collaboration. E-invoicing refers to the automated creation, exchange, and processing of requests for payments between suppliers and buyers using a structured digital format.	Encouraging or facilitating the adoption of e-invoicing frameworks and practices could reduce transaction costs for users and make transactions more secure, including for cross-border transactions. This could increase digital trade flows.
<b>Reducing cross-border trade costs for businesses</b>			
10	Prohibition of data localisation	Provisions aimed at limiting or prohibiting the use of data localisation requirements, including entities not being required to locate computing facilities, such as data storage facilities, in a particular jurisdiction as a condition for conducting business there.	Restricting the cross-border flow of data could impose additional economic costs on participants, as economies of scale and innovation processes are hampered. Removing these frictions potentially facilitates increased digital trade flows.
11	Cross-border transfer of information	Provisions related to enabling the free movement of data and cross-border transfer of information by electronic means.	
12	Paperless trading	Provisions related to facilitating the exchange of data relating to custom procedures, including paperless trade administration documents, pre-arrival processing of documents in electronic format, acceptance of electronic copies of required documents, including single windows for trade.	The adoption of paperless trading systems could reduce customs clearance time, including for small-value trade transactions, and the cost of cross-border trade, benefitting MSMEs especially. The reduced transaction costs could potentially facilitate increased digital trade flows.
13	Elimination of customs duties on digital products and/or electronic transmissions	Provisions related to elimination of customs duties, fees, or other charges on cross-border electronic transmission of digital products.	The imposition of custom duties on electronic transmissions could potentially discourage such transmissions and reduce digital trade flows.

#### D. Specifications of structural gravity model and detailed results of quantitative analysis

The foundational structural gravity equation for aggregate trade, adapted from the Anderson and Van Wincoop (2003) model, is specified as follows: <sup>148</sup>

$$\log X_{ij} = \log Y_i + \log Y_j + \log Y + (1 - \sigma)[\log \tau_{ij} - \log \Pi_i - \log P_j] \quad (1)$$

$$\log \tau_{ij} = b_1 \log distance_{ij} + b_2 contig_{ij} + b_3 comlang\_off_{ij} + b_4 col\_dep\_ever_{ij} + b_5 comcol_{ij} + b_6 FTA_{ij} \quad (2)$$

$$\Pi_i = \sum_{j=1}^C \left(\frac{\tau_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y} \quad (3)$$

$$P_j = \sum_{i=1}^C \left(\frac{\tau_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_j}{Y} \quad (4)$$

Where  $X_{ij}$  is digital trade exports of exporter economy  $i$  to importer economy  $j$ ,  $Y$  is world GDP,  $\sigma$  is the intra-sectoral elasticity of substitution,  $\tau_{ij}$  is trade costs,  $distance_{ij}$  is the geographical distance between economies  $i$  and  $j$ ,  $contig_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  share a common land border,  $comlang\_off_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  share a common official language,  $comcol_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  were colonised by the same power, and  $FTA_{ij}$  is a dummy variable equal to unity if there are any free trade agreements between economies  $i$  and  $j$ .  $\Pi_i$  represents outward multilateral resistance, which captures the fact that exports from economy  $i$  to economy  $j$  depend on trade costs across all possible export markets.  $P_j$  represents inward multilateral resistance, which captures the dependence of imports into economy  $i$  from economy  $j$  on trade costs across all possible suppliers. These multilateral resistance terms are unobservable, because they do not correspond to any price indices collected by government statistical agencies, and thus are to be indirectly removed through the exporter-time and importer-time fixed effects in the model specification when a time dimension is included.

In terms of the main model, this analysis will use a log-linear specification for an ordinary least squares (OLS) estimation, with exporter-time and importer-time fixed effects (Baier and Bergstrand, 2007). The OLS equation is laid out as follows:

$$\log X_{ijt} = b_0 + b_1 \log DTOI_{ijt} + b_2 F_{it} + b_3 F_{jt} + b_4 \log distance_{ij} + b_5 contig_{ij} + b_6 comlang\_off_{ij} + b_7 comcol_{ij} + b_8 FTA_{ijt} + U_{ijt}$$

Where  $X_{ijt}$  is the digital trade component in question from exporter economy  $i$  to importer economy  $j$  in year  $t$ ,  $DTOI_{ijt}$  is the Digital Trade Openness Index specific to the bilateral pair  $ij$  based on applicable treaties in year  $t$ ,  $F_{it}$  is the full set of exporter-time fixed effects (a dummy variable equal to unity for exporter economy  $i$  in year  $t$  and 0 otherwise),  $F_{jt}$  is the full set of importer-time fixed effects (a dummy variable equal to unity for importer economy  $j$  in year  $t$  and 0 otherwise),  $distance_{ij}$  is the geographical distance between economies  $i$  and  $j$  which reflects trade costs that are correlated to distance,  $contig_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  share a common land border,  $comlang\_off_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  share a common official language,  $comcol_{ij}$  is a dummy variable equal to unity if economies  $i$  and  $j$  were colonised by the same power,  $FTA_{ijt}$  is a

<sup>148</sup> Anderson & van Wincoop (2003), *Gravity with Gravitas: A Solution to the Border Puzzle*. Available at: [https://vi.unctad.org/tda/papers/Gravity%20Models\\_Roberta\\_Jean/Anderson\\_van%20Wincoop%20\(2003\)%20Gravity%20with%20gravitas%20-%20a%20solution%20to%20the%20border%20puzzle.pdf](https://vi.unctad.org/tda/papers/Gravity%20Models_Roberta_Jean/Anderson_van%20Wincoop%20(2003)%20Gravity%20with%20gravitas%20-%20a%20solution%20to%20the%20border%20puzzle.pdf)

dummy variable equal to unity if there are any free trade agreements (FTAs) between economies  $i$  and  $j$  in year  $t$ , and  $U_{ijt}$  is the error term.

In terms of the panel data literature, the exporter-time and importer-time fixed effects  $F_{it}$  and  $F_{jt}$  can be seen as accounting for all sources of unobserved heterogeneity that are constant for a given exporter across all importers and constant for a given importer across all exporters, such as economy GDP and the unobservable effects of inward multilateral resistance  $\Pi_i$  and outward multilateral resistance  $P_j$ . The  $FTA_{ijt}$  variable will serve to isolate the individual effects of the provisions from the impact of having FTAs on trade. Also, the above specification is consistent with the gravity model literature, through its inclusion of factors such as distance, common language and colonial ties, which have been found to be a significant determinant of bilateral trade as they contribute to trade costs (e.g., Baier and Bergstrand, 2007). As the DTOI is a variable that varies bilaterally and does not vary only in the same dimension as the importer-time and exporter-time fixed effects, our approach of fixed effects OLS estimation remains appropriate as there is no risk of perfect collinearity.

Table D1 presents the results from a series of estimations examining the relationship between the DTOI on the dependent variable, in this case digitally ordered trade (Component 1). Column (1) reflects a baseline model that includes the conventional gravity covariates. The magnitude and direction of these estimates are broadly consistent with prior estimates in the literature. Column (2) introduces the FTA measure, which is positive and significant. Column (3) finds positive and significant effects for the DTOI on digitally ordered trade, with the estimate suggesting that each one-point increase in the DTOI (in other words, every additional digital trade provision) increases digitally ordered trade by 3.7%. However, column (4) illustrates that this effect moderates to insignificance once the presence of FTAs is controlled for.

Table D1: Gravity model estimates of the effects of DTOI on digitally ordered trade (Component 1)

	(1)	(2)	(3)	(4)
Log(distance)	-0.685***	-0.648***	-0.631***	-0.631***
	(0.066)	(0.063)	(0.066)	(0.064)
Contiguous borders	0.265	0.253	0.295	0.272
	(0.214)	(0.210)	(0.213)	(0.210)
Common official language	0.265***	0.242**	0.273***	0.253***
	(0.095)	(0.096)	(0.094)	(0.096)
Common coloniser	0.384**	0.451**	0.421**	0.450***
	(0.183)	(0.175)	(0.177)	(0.174)
FTA		0.318***		0.221**
		(0.076)		(0.103)
DTOI			0.037***	0.020
			(0.009)	(0.012)

	(1)	(2)	(3)	(4)
Num.Obs.	1000	1000	1000	1000
AIC	13835.2	13791.2	13798.3	13786.2
BIC	13859.7	13820.6	13827.7	13820.6

Note: This table presents estimates derived from the gravity model of trade. Exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D2 examines the time lag for changes in coverage of digital trade provisions at the aggregate level to have a positive impact on digitally deliverable trade (Component 2). Column (1) uses the same baseline model as Table D1, but with digitally deliverable services (Component 2) as the dependent variable. The positive and significant coefficient for the DTOI suggests that for every additional digital trade provision (a one-point increase in the DTOI), digitally deliverable trade increases by 2.9% on average. Column (2) introduces the FTA measure, and the above effect moderates to 2.3%, but remains significant at the 1% level. Columns (3) through (7) runs increasing lags lengths of DTOI values. The clustering of the positive and significant effects for the lag length of 1 across the multiple estimations suggests that the increase in digitally deliverable trade is observed within one year of the provisions coming in force.

Table D2: Gravity model estimates of the effects of lagged DTOI on digitally deliverable trade (Component 2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(distance)	-0.669***	-0.664***	-0.663***	-0.662***	-0.659***	-0.656***	-0.652***
	(0.049)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Contiguous borders	0.018	0.013	0.008	0.002	-0.004	-0.010	-0.016
	(0.160)	(0.159)	(0.160)	(0.161)	(0.162)	(0.162)	(0.161)
Common official language	0.460***	0.458***	0.460***	0.465***	0.468***	0.473***	0.478***
	(0.077)	(0.077)	(0.078)	(0.078)	(0.079)	(0.079)	(0.079)
Common coloniser	0.105	0.115	0.121	0.126	0.127	0.127	0.126
	(0.151)	(0.150)	(0.151)	(0.152)	(0.153)	(0.153)	(0.154)
FTA		0.075	0.076	0.078	0.081	0.087	0.100
		(0.060)	(0.061)	(0.061)	(0.061)	(0.062)	(0.063)
DTOI	0.029***	0.023***	0.011	0.012	0.011	0.011	0.013*
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
DTOI 1 year before			0.014**	0.009*	0.009**	0.009*	0.006

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
DTOI 2 years before				0.007	0.003	0.004	0.004
				(0.005)	(0.003)	(0.003)	(0.003)
DTOI 3 years before					0.004	-0.003	-0.002
					(0.005)	(0.003)	(0.003)
DTOI 4 years before						0.008	0.000
						(0.005)	(0.004)
DTOI 5 years before							0.009*
							(0.005)
Num.Obs.	8625	8625	8167	7710	7254	6798	6343
AIC	97419.3	97410.5	96646.5	95905.3	95100.9	94307.8	93526.7
BIC	97461.7	97460.0	96702.6	95967.8	95169.8	94382.9	93607.8

Note: This table presents estimates derived from the gravity model of trade. Exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D3.1 and D3.2 presents the results from examining the effect of individual provisions, coded as binary variables, on digitally ordered trade. A lag length of 2 was included in each model specification, each containing a singular provision. The results across columns (1) through (13) suggest that provisions for privacy protection, online consumer protection, measures against unsolicited commercial communications (spam), e-authentication, participation in digital trade for small businesses, and market access and national treatment for ICT services increased digitally ordered trade between the APEC economies and its major trading partners, the EU and India. Long run effects of these provisions on digitally ordered trade are derived by summing the coefficients of the lagged explanatory variables, giving a range of 11.2%-32.5% for the provisions with positive and statistically significant effects.

**Table D3.1: Gravity model estimates of the effects of provisions 1-6 on digitally ordered trade (Component 1)**

	Privacy protection (1)	Online consumer protection (2)	Spam (3)	Cyber-security (4)	Prohibition of data localisation (5)	Cross-border transfer of information (6)
Provision	0.383**	0.480***	0.595***	0.353	-0.775	-0.414
	(0.178)	(0.176)	(0.197)	(0.216)	(0.477)	(0.370)
Provision 1 year before	-0.204	-0.158	-0.225		0.450	0.451

	Privacy protection (1)	Online consumer protection (2)	Spam (3)	Cyber-security (4)	Prohibition of data localisation (5)	Cross-border transfer of information (6)
	(0.235)	(0.237)	(0.226)		(0.328)	(0.328)
Provision 2 years before	-0.067	-0.108	-0.045	-0.092	-0.056	-0.047
	(0.193)	(0.190)	(0.180)	(0.191)	(0.179)	(0.179)
Num.Obs.	333	333	333	333	333	333
AIC	12809.5	12805.8	12802.1	12803.1	12809.3	12810.2
BIC	12843.7	12840.0	12836.4	12833.6	12843.6	12844.4

Note: This table presents estimates derived from the gravity model of trade. Standard gravity covariates (distance, contiguous borders, common official language, common colonisers, FTA), exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Missing coefficient values indicate presence of multicollinearity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D3.2: Gravity model estimates of the effects of provisions 7-13 on digitally ordered trade (Component 1)

	E-authentication (7)	Domestic electronic transaction framework (8)	E-invoicing (9)	Paperless Trading (10)	MSME (11)	No custom duties (12)	Market access and national treatment (13)
Provision	0.458***	-0.011		0.329	0.486***	0.261	0.483***
	(0.176)	(0.206)		(0.218)	(0.175)	(0.179)	(0.179)
Provision 1 year before	-0.156		0.421		-0.292	-0.252	-0.121
	(0.236)		(0.301)		(0.220)	(0.231)	(0.240)
Provision 2 years before	-0.114	0.019		-0.153	0.052	-0.026	-0.163
	(0.190)	(0.186)		(0.201)	(0.211)	(0.192)	(0.201)
Num.Obs.	333	333	333	333	333	333	333
AIC	12806.6	12809.5	12806.3	12805.0	12805.7	12811.0	12805.4
BIC	12840.9	12840.0	12832.9	12835.4	12840.0	12845.3	12839.7

Note: This table presents estimates derived from the gravity model of trade. Standard gravity covariates (distance, contiguous borders, common official language, common colonisers, FTA), exporter-year and importer-year fixed effects were included in all

E-authentication (7)	Domestic electronic transaction framework (8)	E- invoicing (9)	Paperless Trading (10)	MSME (11)	No custom duties (12)	Market access and national treatment (13)
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specifications but not reported for brevity. Missing coefficient values indicate presence of multicollinearity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D4.1 and D4.2 presents the results from examining the effect of individual provisions, coded as binary variables, on digitally deliverable trade. A lag length of 3 was included in each model specification, each containing a singular provision. The results across columns (1) through (13) suggest that provisions for cybersecurity, e-authentication, e-invoicing, and paperless trading, and market access and national treatment for ICT services increased digitally ordered trade. Long run effects of these provisions on digitally deliverable trade are derived by summing the coefficients of the lagged explanatory variables, giving a range of 17.0%-44.0% for the provisions with positive and statistically significant effects. The clustering of the positive and significant effects for the lag length of 1 across the multiple estimations suggests that the increase in digitally deliverable trade is largely observed within one year of the provisions coming in force.

**Table D4.1: Gravity model estimates of the effects of provisions 1-6 on digitally deliverable trade (Component 2)**

	Privacy protection (1)	Online consumer protection (2)	Spam (3)	Cyber- security (4)	Prohibition of data localisation (5)	Cross- border transfer of information (6)
Provision	0.039	0.046	0.080	0.124*	0.100	0.112
	(0.066)	(0.067)	(0.069)	(0.069)	(0.133)	(0.110)
Provision 1 year before	0.047	0.065*	0.076	0.104**	0.327*	0.187*
	(0.034)	(0.036)	(0.052)	(0.051)	(0.176)	(0.098)
Provision 2 years before	0.029	0.028	0.035	0.022	0.046	0.008
	(0.022)	(0.023)	(0.032)	(0.030)	(0.069)	(0.028)
Provision 3 years before	0.005	-0.008	0.058	-0.012		-0.065
	(0.044)	(0.044)	(0.047)	(0.041)		(0.115)
Num.Obs.	7254	7254	7254	7254	7254	7254
AIC	95133.4	95130.2	95109.1	95097.5	95139.2	95127.3
BIC	95202.2	95199.1	95178.0	95166.4	95201.2	95196.2

Note: This table presents estimates derived from the gravity model of trade. Standard gravity covariates (distance, contiguous borders, common official language, common colonisers, FTA), exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Missing coefficient values indicate presence of

Privacy protection (1)	Online consumer protection (2)	Spam (3)	Cyber-security (4)	Prohibition of data localisation (5)	Cross-border transfer of information (6)
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multicollinearity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table D4.2: Gravity model estimates of the effects of provisions 7-13 on digitally deliverable trade (Component 2)**

	E-authentication (7)	Domestic electronic transaction framework (8)	E-invoicing (9)	Paperless Trading (10)	MSME (11)	No custom duties (12)	Market access and national treatment (13)
Provision	0.095	0.015	0.428***	0.033	0.143*	0.025	0.100
	(0.067)	(0.083)	(0.156)	(0.064)	(0.075)	(0.079)	(0.066)
Provision 1 year before	0.078**	0.027	0.012	0.077**	0.035	0.029	0.085***
	(0.035)	(0.058)	(0.017)	(0.034)	(0.027)	(0.052)	(0.032)
Provision 2 years before	0.026	0.030*		0.018	0.028	0.036*	0.020
	(0.023)	(0.017)		(0.019)	(0.029)	(0.020)	(0.022)
Provision 3 years before	0.014	-0.011		0.042	0.013	-0.047	0.086*
	(0.046)	(0.060)		(0.051)	(0.041)	(0.064)	(0.044)
Num.Obs.	7254	7254	7254	7254	7254	7254	7254
AIC	95101.6	95146.0	95142.8	95118.1	95102.6	95146.7	95051.2
BIC	95170.5	95214.8	95197.9	95187.0	95171.5	95215.6	95120.1

Note: This table presents estimates derived from the gravity model of trade. Standard gravity covariates (distance, contiguous borders, common official language, common colonisers, FTA), exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Missing coefficient values indicate presence of multicollinearity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Given significant variance in terms of the prevalence of legally binding commitments across digital trade provisions in trade agreements, an important question is whether the impact of the provision, if positive and significant, comes from its legally binding force. Table D5 presents the results on this question for digitally ordered trade. We separate the effect of the individual provision into two measures by interacting the provision with its legally binding status. Among the provisions which had significant positive impacts on digitally ordered trade, only the legally binding status for the online consumer protection provision had a positive and significant effect.

Table D5: Gravity model estimates of the effects of legally binding status of provisions with significant and positive effects on digitally ordered trade (Component 1)

	Privacy protection (1)	Online consumer protection (2)	Spam (3)	E-authentication (7)	MSME (11)	Market access and national treatment (13)
Provision	0.097	0.157	0.222**	0.151	0.227**	0.168
	(0.108)	(0.107)	(0.108)	(0.112)	(0.105)	(0.112)
Provision x legally binding	-0.151	0.370**	0.012	-0.113	-0.297	
	(0.259)	(0.181)	(0.213)	(0.178)	(0.185)	
Num.Obs.	1000	1000	1000	1000	1000	1000
AIC	13791.7	13778.9	13783.1	13788.8	13781.1	13785.6
BIC	13831.0	13818.2	13822.3	13828.1	13820.4	13819.9

Note: This table presents estimates derived from the gravity model of trade. Standard gravity covariates (distance, contiguous borders, common official language, common colonisers, FTA), exporter-year and importer-year fixed effects were included in all specifications but not reported for brevity. Missing coefficient values indicate presence of multicollinearity. Standard errors were clustered at the exporter-importer pair level and are reported in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

Table D6 presents the results on the above question for digitally deliverable trade. We separate the effect of the individual provision into two measures by interacting the provision with its legally binding status. Among the provisions which had significant positive impacts on digitally ordered trade, only the legally binding status for the paperless trading provision had a positive and significant effect.

Table D6: Gravity model estimates of the effects of legally binding status of provisions with significant and positive effects on digitally deliverable trade (Component 2)

	Cyber-security (4)	E-authentication (7)	E-invoicing (9)	Paperless Trading (10)	Market access and national treatment (13)
Provision	0.218***	0.187**	0.435***	0.108	0.243***
	(0.079)	(0.077)	(0.157)	(0.082)	(0.077)
Provision x legally binding	-0.001	-0.015		0.299**	
	(0.168)	(0.159)		(0.138)	
Num.Obs.	8625	8625	8625	8625	8625
AIC	97408.3	97412.5	97452.1	97397.5	97369.6

	Cyber- security (4)	E- authenticati on (7)	E-invoicing (9)	Paperless Trading (10)	Market access and national treatment (13)
BIC	97464.8	97469.0	97501.5	97454.0	97419.1

## Appendix II: Key quantitative results

**APEC intra-regional digital trade in 2018 was around USD 1.68 trillion (Exhibit K1), approximately 20% of APEC intra-regional trade.** This is comprised of digitally ordered goods and services (e.g., cross-border e-commerce) and digitally deliverable services (e.g., financial and insurance services). Digital trade grew faster than conventional trade among APEC economies in the pre-pandemic period, with growth in digitally deliverable services trade (7.8% CAGR) outpacing trade in overall commercial services (6.3% CAGR) over the same period.

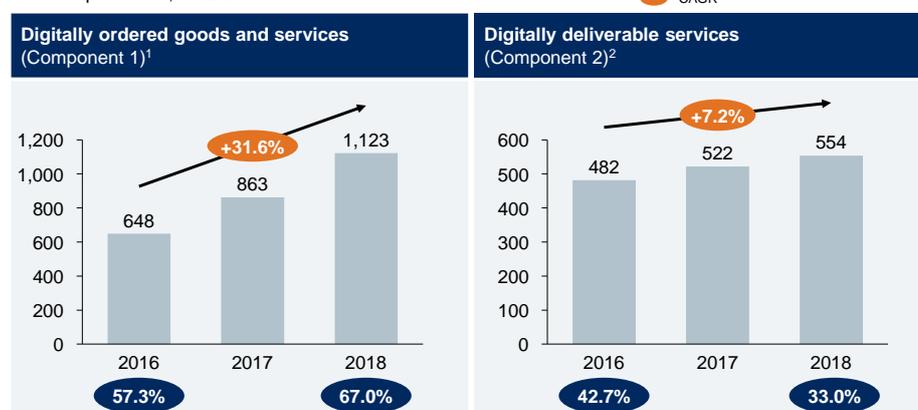
### EXHIBIT K1

#### APEC intra-regional digital trade in 2018 was around USD 1.68 trillion, with digitally ordered trade being the larger and faster growing component

**Digitally ordered trade (Component 1) and digitally deliverable services trade (Component 2) between APEC economies, 2016 to 2018**

Gross export value, USD billion

● Share of APEC intra-regional digital trade  
● CAGR



<sup>1</sup> Cross-border e-commerce statistics in economies are used to estimate trade in digitally ordered goods and services and digital content.

<sup>2</sup> Publishing, audio-visual, and broadcasting activities (ISIC 58 to 60); telecommunications services (ISIC 61); IT and other information services; (ISIC 62 to 63); financial and insurance activities (ISIC 64 to 66); professional, scientific, and technical activities (ISIC 69-75); and administrative and support services (ISIC 77 to 82).

SOURCE: Access Partnership analysis, Euromonitor, OECD-WTO Trade in Value-Added (TIVA) database (2021 revision), UNCTAD

**In 2018, APEC intra-regional digital trade was estimated to have contributed around USD 2.1 trillion (or 4.1%) of value added to regional GDP and supported more than 60 million jobs (Table K1).**

TABLE K1

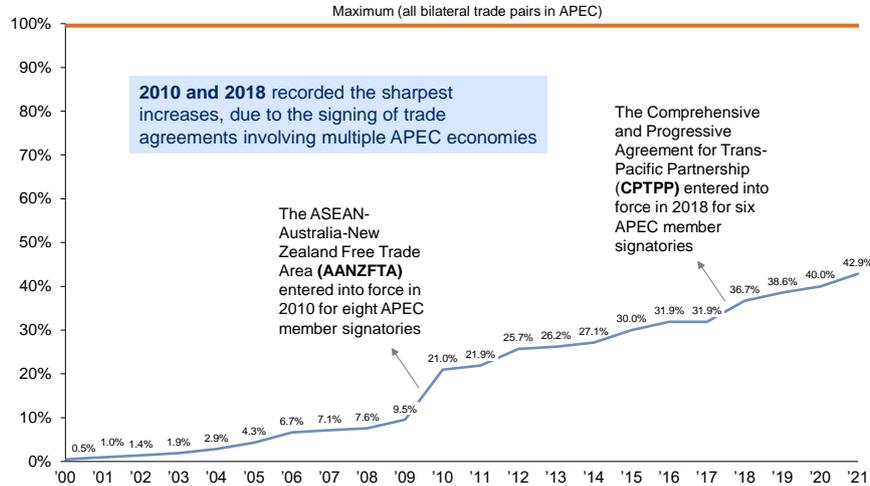
Breakdown of Economic Contribution	Gross Output (USD billions)	Value Added (USD billions)	Jobs Created (millions of Full-Time Equivalents)
Direct effects	1,680	690	21.0
Indirect effects	2,160	790	24.1
Consumption induced effects	1,400	650	15.6
<b>Total</b>	<b>5,240</b>	<b>2,130</b>	<b>60.7</b>

**Coverage of digital trade provisions between APEC economies has increased significantly over the past two decades, with over 40% of trade pairs covered by at least one digital trade provision in 2021 (Exhibit K2).** This is based on the Digital Trade Openness Index which captures coverage of 13 key digital trade provisions at the bilateral level between the 21 APEC member economies.

### Digital trade provision coverage among APEC economies increased over the past two decades with sharp jumps in 2010 and 2018

#### Progress in coverage in digital trade provisions among APEC economies

Percentage of trade pairs within APEC which have provisions in force between them (non-zero DTOI), 2000-2021



SOURCE: Access Partnership analysis, TAPED

Digital trade provisions that came into force between 2000 and 2018 are estimated to have added USD 40.1 billion or 2.9% to the overall value of digitally deliverable trade between APEC economies in 2018. Flows of digitally deliverable services increased by 2.3% for every additional digital trade provision that came into force between two trading partners on aggregate. Individual provisions that demonstrated a positive statistically significant impact, could increase the flows of digital trade by between 11% and 44% in successive years after their adoption (Exhibit K3).

EXHIBIT K3

### Impact of individual digital trade provisions on components of digital trade

#### Impact of digital trade provisions on digital trade components in the long-run<sup>1</sup>

Provision	Digitally ordered	Digitally delivered	Provision	Digitally ordered	Digitally delivered
Cybersecurity	X	25.0%	E-authentication and e-signatures	18.8%	21.3%
Privacy protection	11.2%	X	Domestic electronic transactions framework	X	✓
Online consumer protection	21.4%	✓	E-invoicing	X	44.0%
Measures against unsolicited commercial communications	32.5%	X	Prohibition of data localisation	X	✓
Participation in digital trade for small businesses	24.6%	✓	Cross-border transfer of information	X	✓
Market access and national treatment for ICT services	19.9%	29.1%	Paperless trading	X	17.0%

Impact<sup>2</sup> | A% Strong statistical significance (p < .05) | Weak statistical significance (p < .1) | X No statistical significance

Mechanism of impact | General | Increase consumer trust | Lower market entry barriers | Reduce business transaction cost | Reduce business trade cost

<sup>1</sup> The long-run impact is defined as the total impact of each trade provision on flows in each digital trade component in the next 2 years (for digitally ordered trade) or next 3 years (for digitally delivered trade) and is expressed as a percentage of digital trade flows in the year in which the provision comes into force.

<sup>2</sup> Statistical significance quantifies how likely a relationship between two variables is likely to be attributed to a specific cause instead of pure chance. In the absence of "Strong statistical significance" or "Weak statistical significance", the provision does not have a statistically significant impact on digital trade flows (observed relationship is likely to be due to chance).

SOURCE: Access Partnership analysis, Euromonitor, OECD TIVA, TAPED, UNCTAD